

## **FIRE STATION 27 GENERATOR REPLACEMENT**

Fire Station 27 Generator Replacement (the “**Contract**”) is entered between the Village of Buffalo Grove (hereinafter the “**Village**” or “**Owner**”), an Illinois home-rule unit of government, and Kellenberger Electric (hereinafter the “**Contractor**”) on this 15th day of April, 2024 (the “**Effective Date**”). The Village and the Contractor are hereinafter sometimes collectively referred to as the “**Parties**” and individually as a “**Party**”.

### **RECITALS**

**WHEREAS**, the Village has solicited bids for the Work (defined below), Contractor has submitted a bid for the Work and Village has selected Contractor for the Work based on their bid; and

**WHEREAS**, the Contractor wishes to enter into this Contract with the Village and the Village wishes to enter into this Contract with the Contractor for the Work;

**NOW THEREFORE**, for and in consideration of the mutual covenants and promises herein contained, the adequacy and sufficiency of which are hereby acknowledged by the Parties, it is agreed as follows:

### **ARTICLE I - WORK TO BE DONE BY THE CONTRACTOR**

The Village does hereby hire and contract with the Contractor to provide all the labor, equipment, materials and/or services described more thoroughly on Contract **Exhibit A** (the “**Work**”) which is incorporated into the Contract by this reference.

### **ARTICLE II - CONTRACT DOCUMENTS**

The following exhibits are attached hereto and incorporated herein by this reference:

- Contract Exhibit A – Description of the Work**
- Contract Exhibit B – Schedule of Prices**
- Contract Exhibit C – Performance and Payment Bond**
- Contract Exhibit D – Partial Lien Waiver**
- Contract Exhibit E – Final Lien Waiver**

If any term or provision of this Contract shall conflict with any term or provision of the exhibits referenced above, the terms and provisions of the exhibit shall control.

### **ARTICLE III - CONTRACT AMOUNT**

The Village agrees to pay the Contractor for the proper and timely performance of the Work in strict accordance with this Contract as detailed in **Contract Exhibit B** (the “**Schedule of Prices**”) Unless explicitly provided otherwise in this Contract, the detailed sums shall be the full and exclusive compensation owed to the Contractor for the Work; and Contractor may not seek additional payments from the Village.

The Village of Buffalo Grove reserves the right to reject a proposed price increase and terminate the Contract.

### **ARTICLE IV – APPLICATION FOR PAYMENT**

The Contractor shall be paid at most once a month and only after providing the Village the following:

1. An executed and notarized Contractor’s Sworn Statement in a form similar to AIA G702 or AIA G703;
2. Either a partial or final lien waiver from every subcontractor, sub-subcontractor, or materialman in substantially the same form as attached here as **Contract Exhibit D** and **Contract Exhibit E**;
3. Certified payroll necessary for the Prevailing Wage Act; and

All payments under this Contract must be approved by the Village’s Board at regularly scheduled meetings. The Village reserves the right to request any receipts, invoices, proof of payments as the Village, in its sole discretion, may deem necessary to justify the payment requested *prior* to paying the requested payment. The Contractor shall furnish with his final application for payment a Final Lien Waiver from itself and, if not already provided, from every subcontractor and materialman of the Work.

The Contractor acknowledges that the Village is a unit of local government and that all payments under the Contract are subject to the Local Government Prompt Payment Act, 50 ILCS 505 et seq. To that extent, the Village shall have forty-five calendar (45) days from receipt of a bill or invoice to pay the same before it is considered late under the Contract. Interest, if any, charged for any late payments will be subject to the interest rate caps specified in the Prompt Payment Act.

### **ARTICLE V – CONTRACT TIME**

**Term.** The Contractor shall fully, and not substantially, complete all the Work and the Work shall be accepted by the Director of Public Works, provided that acceptance by the Director of Public Works shall not be unreasonably delayed, on or before Friday, June 28, 2024.

If the Contractor shall fail to complete the work within the Contract Time which shall include any proper extension granted by the Village, the Contractor shall pay to the Village an amount equal to Five Hundred dollars (\$500) per calendar day for each day past the Contract Time until final acceptance by the Village, as liquidated damages and not as a penalty.

**Termination of Contract.** The Contract may be terminated, in whole or in part, by either party if the other party substantially fails to fulfill its obligations under the Contract through no fault of the terminating party; or the Village may terminate the Contract, in whole or in part, for its convenience. However, no such termination may be effected unless the terminating party gives the other party: (1) not less than thirty (30) calendar days written notice by certified mail of intent to terminate, and (2) an opportunity for a meeting with the terminating party before termination.

## **ARTICLE VI – PERFORMANCE and PAYMENT BOND**

The Contractor shall provide the Village with a performance and payment bond in substantially the same form as on **Contract Exhibit C** (the “**Performance and Payment Bond**”) prior to Contractor beginning any Work and within 10 calendar days of the Notice of Award sent to the Contractor.

## **ARTICLE VII – ACCIDENT PREVENTION**

The Contractor shall exercise every precaution at all times to protect itself, the property of the Village and the property of others. The safety provision of all applicable laws and ordinances shall be strictly observed by the Contractor at all times. Any practice deemed hazardous or dangerous by the Director of Public Works or his authorized representatives shall be immediately discontinued by the Contractor upon receipt of instructions from the Director of Public Works or his authorized representatives. To the fullest extent permitted by law, the Contractor shall be solely responsible for all safety-related matters.

## **ARTICLE VIII – INDEMNIFICATION**

To the fullest extent permitted by law, the Contractor agrees to defend, pay on behalf of, indemnify, and hold harmless the Village, its elected and appointed officials, agents, employees and volunteers and others working on behalf of the Village against any and all claims, demands, suits or loss, including all costs connected therewith, and for any damages which may be asserted, claimed or recovered against or from the Village, its elected and appointed officials, agents, employees and volunteers and others working on behalf of the Village, by reason of personal injury, including bodily injury and death, and/or property damage, whether damage to property of the Village or of a third party, including loss of use thereof, which arises out of or is in any way connected or associated with the Contract and the Work.

## **ARTICLE IX – CONTRACTORS INSURANCE**

Contractor shall procure and maintain, for the duration of the Contract and any maintenance period, insurance against claims for injuries to persons or damages to property, which may arise from or in connection with the performance of the work hereunder by the Contractor, his agents, representatives, employees or subcontractors.

A. Minimum Scope of Insurance: Coverage shall be at least as broad as:

Insurance Services Office Commercial General Liability occurrence form CG 0001 with the Village of Buffalo Grove named as additional insured on a primary and non-contributory basis. This primary, non-contributory additional insured coverage shall be confirmed through the following required policy endorsements: ISO Additional Insured Endorsement CG 20 10 or CG 20 26 and CG 20 01 04 13

1. Insurance Services Office Commercial General Liability occurrence form CG 0001 with the Village named as additional insured, on a form at least as broad as the ISO Additional Insured Endorsement CG 2010 and CG 2026
2. Insurance Service Office Business Auto Liability coverage form number CA 0001, Symbol 01 "Any Auto."
3. Workers' Compensation as required by the Labor Code of the State of Illinois and Employers' Liability insurance.
4. Owners and Contractors Protective Liability (OCP) policy with the Village of Buffalo Grove as insured.

B. Minimum Limits of Insurance: Contractor shall maintain limits no less than:

1. Commercial General Liability: \$1,000,000 combined single limit per occurrence for bodily injury, personal injury and property damage. The general aggregate shall be twice the required occurrence limit. Minimum General Aggregate shall be no less than \$2,000,000 or a project/contract specific aggregate of \$1,000,000.
2. Business Automobile Liability: \$1,000,000 combined single limit per accident for bodily injury and property damage.
3. Workers' Compensation and Employers' Liability: Workers' Compensation coverage with statutory limits and Employers' Liability limits of \$500,000 per accident.
4. Owners and Contractors Protective Liability (OCP): \$1,000,000 combined single limit per occurrence for bodily injury and property damage.

C. Deductibles and Self-Insured Retentions

Any deductibles or self-insured retentions must be declared to and approved by the Village. At the option of the Village, either: the insurer shall reduce or eliminate such deductibles or self-insured retentions as it respects the Village, its officials, agents, employees and volunteers; or the Contractor shall procure a bond guaranteeing payment of losses and related investigation, claim administration and defense expenses.

D. Other Insurance Provisions

The policies are to contain, or be endorsed to contain, the following provisions:

1. General Liability and Automobile Liability Coverages:
  - a. The Village, its officials, agents, employees and volunteers are to be covered as insureds as respects: liability arising out of activities performed by or on behalf of the Contractor; products and completed operations of the Contractor; premises owned, leased or used by the Contractor; or automobiles owned, leased, hired or borrowed by the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to the Village, its officials, agents, employees and volunteers.
2. The Contractor's insurance coverage shall be primary and non-contributory as respects the Village, its officials, agents, employees and volunteers. Any insurance or self-insurance maintained by the Village, its officials, agents, employees and volunteers shall be excess of Contractor's insurance and shall not contribute with it.
3. Any failure to comply with reporting provisions of the policies shall not affect coverage provided to the Village, its officials, agents, employees and volunteers.
4. The Contractor's insurance shall contain a Severability of Interests/Cross Liability clause or language stating that Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.
5. If any commercial general liability insurance is being provided under an excess or umbrella liability policy that does not "follow form," then the Contractor shall be required to name the Village, its officials, employees, agents and volunteers as additional insureds
6. All general liability coverages shall be provided on an occurrence policy form. Claims-made general liability policies will not be accepted.
7. The contractor and all subcontractors hereby agree to waive any limitation as to the amount of contribution recoverable against them by the Village. This specifically includes any limitation imposed by any state statute, regulation, or case law including any Workers' Compensation Act provision that applies a limitation to the amount recoverable in contribution such as Kotecki v. Cyclops Welding

E. All Coverages:

1. No Waiver. Under no circumstances shall the Village be deemed to have waived any of the insurance requirements of this Contract by any act or omission, including, but not limited to:
  - a. Allowing work by Contractor or any subcontractor to start before receipt of Certificates of Insurance and Additional Insured Endorsements.
  - b. Failure to examine, or to demand correction of any deficiency, of any Certificate of Insurance and Additional Insured Endorsement received.
2. Each insurance policy required shall have the Village expressly endorsed onto the policy as a Cancellation Notice Recipient. Should any of the policies be cancelled before the expiration date thereof, notice will be delivered in accordance with the policy provisions.

F. Acceptability of Insurers

Insurance is to be placed with insurers with a Best's rating of no less than A-, VII and licensed to do business in the State of Illinois.

G. Verification of Coverage

**Contractor shall furnish the Village with certificates of insurance naming the Village, its officials, agents, employees, and volunteers as additional insured's and with original endorsements, affecting coverage required herein.** The certificates and endorsements for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. The certificates and endorsements are to be received and approved by the Village before any work commences. The Village reserves the right to request full certified copies of the insurance policies and endorsements.

The Certificate of Insurance shall state the Village of Buffalo Grove has been endorsed as an "additional insured" by the Vendor's insurance carrier. Specifically, this Certificate must include the following language: **"The Village of Buffalo Grove, and its respective elected and appointed officials, employees, agents, consultants, attorneys and representatives, are, and have been endorsed, as an additional insured under the above reference policy number \_\_\_\_\_ on a primary and non-contributory basis for general liability and automobile liability coverage for the duration of the agreement term."**

H. Subcontractors

Contractor shall include all subcontractors as insured's under its policies or shall furnish separate certificates and endorsements for each subcontractor. All coverage's for subcontractors shall be subject to all of the requirements stated herein.

I. Assumption of Liability

The contractor assumes liability for all injury to or death of any person or persons including employees of the contractor, any subcontractor, any supplier or any other person and assumes liability for all damage to property sustained by any person or persons occasioned by or in any way arising out of any work performed pursuant to the Contract.

J. Workers' Compensation and Employers' Liability Coverage

The insurer shall agree to waive all rights of subrogation against the Village of Buffalo Grove, its officials, employees, agents and volunteers for losses arising from work performed by Contractor for the municipality.

K. Failure to Comply

In the event the Contractor fails to obtain or maintain any insurance coverage's required under this contract, The Village may purchase such insurance coverage's and charge the expense thereof to the Contractor.

**ARTICLE X – CERTIFICATE OF AUTHORITY AND SURETY CERTIFICATE**

The Contractor shall furnish the Village with a current Certificate of Authority or Surety Certificate issued by the Illinois Department of Insurance for the bonding company and insurance company they are using. In lieu of a Certificate of Authority of Surety Certificate, the Contractor may provide certificate of good standing from the Illinois Department of Insurance’s website.

**ARTICLE XI – COPYRIGHTS AND LICENSES**

The Contractor agrees that all documents of any kind whatsoever, and in whatever medium expressed, prepared by the Contractor and the Contractor’s consultants in connection with the Work (collectively, the “**Documents**”) or otherwise pursuant to this Contract and all rights therein (including trademarks, trade names, rights or use, copyrights and/or other proprietary rights) shall be and remain the sole property of the Village (regardless of whether the Village or the Contractor terminates this Contract for any reason whatsoever). The Contractor hereby agrees that the Documents are or shall be deemed to be “Works for Hire” within the meaning of Section 101 of the Copyright Act, and the Contractor hereby assigns to the Village all right, title and interest therein. Notwithstanding, the Contractor shall indemnify and hold harmless the Village, its appointed and elected officials, employees, agents and volunteers from and against all claims, damages, losses, and expenses (including attorneys’ fees and court and arbitration costs) arising out of any infringement of patent rights or copyrights incident to the Documents and the Work.

**ARTICLE XII – NOTICE**

All notices, demands, requests, consents, approvals and other communications required or permitted to be given hereunder (a “**Notice**”) shall be in writing and shall be deemed effective three (3) business days after mailing if mailed by certified mail with return receipt requested and immediately if served personally, and shall be addressed to the following:

IF TO THE VILLAGE: Village of Buffalo Grove  
50 Raupp Blvd  
Buffalo Grove, IL 60089  
Tcwisniewski@vbg.org  
ATTN: Purchasing Manager

WITH COPIES TO: Cc: pbrankin@schainbanks.com  
Cc:brobinson@vbg.org

IF TO THE CONTRACTOR: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
ATTN: \_\_\_\_\_

### **ARTICLE XIII – CHANGE ORDERS**

If the Village requests any change to the Work the Village shall do so by delivering Notice of the same to the Contractor and the change requested by the Village shall be effective upon receipt of the Notice by the Contractor. The Contractor may propose a change to the Work by delivering Notice of the proposed change along with a description of the changes full effect on the Work to the Village; provided, such requested change shall not be deemed accepted until the Village has delivered to the Contractor Notice of the same. Prior to approving a proposed change to the Work by the Contractor, the Village may request such additional documentation as it deems necessary to investigate the proposed change. The Contractor shall be responsible for informing all its employees and subcontractors of any changes to the Work, whether such change is requested by the Contractor or the Village.

### **ARTICLE XIV – NOTICE OF STARTING WORK**

The Contractor shall provide Notice to the Village prior to the Contractor, or its employees or subcontractors, starting the Work or any phase of the Work.

### **ARTICLE XV – SEQUENCE OF THE WORK**

The Director of Public Works shall have the power to direct the order and sequence of the Work. On any major portion of the Work, all accessories shall be set coincident with the main construction. Payment for major portions of the Work may be withheld until proper completion of accessories.

### **ARTICLE XVI – SUPERVISION**

The Director of Public Works shall have override power to superintend and direct the Work, and the Contractor shall perform all of the Work herein specified to the satisfaction, approval and acceptance of the Director of Public Works. The Contractor shall have at all times a competent foreman or superintendent at the Work's site, who shall have full authority to act for the Contractor and to receive and execute orders from the Director of Public Works, and any instructions given to such superintendent or person, executing work for the Contractor, shall be binding on the Contractor as though it was personally given to the Contractor.

### **ARTICLE XVII – STANDARD OF WORK AND WORKERS**

The Contractor shall employ competent staff and shall discharge, at the request of the Director of Public Works, any incompetent, unfaithful, abusive or disorderly workers in its employ. Where experts or skilled workers must be employed, only expert or skilled workers shall be employed.



**ARTICLE XVIII – CONDITIONS OF THE WORK SITE**

The Contractor shall provide and maintain such sanitary accommodations for the use of its employees as may be necessary to comply with the State and local Board of Health requirements. Public nuisances will not be permitted. The Contractor shall leave said Work's site(s) in the best possible condition to the complete satisfaction of the Director of Public Works. No vehicles of any kind shall be placed, parked, or operated upon any grass areas at any time except as authorized by the Director of Public Works or his authorized representative. Further, the Contractor shall exercise every precaution for the protection of all persons and all property. The safety provisions of all-applicable laws and ordinances shall be strictly observed. Any practice hazardous in the opinion of the Director of Public Works or his authorized representatives shall be immediately discontinued by the Contractor upon his receipt of instructions from the Director of Public Works or his authorized representative. To the maximum extent permitted by law, the Contractor shall be responsible for all safety-related matters.

**ARTICLE XIX – WARRANTY PERIOD**

All material and workmanship shall be warranted and guaranteed according to manufacturer's recommendation after inspection and approval by the Director of Public Works or his designated representative. All work performed by the Contractor shall be warranted by the Contractor following completion and final acceptance of the Work for a period of twelve (12) months from the date of final, and not substantial, completion.

**ARTICLE XX – ACCIDENTS**

In the event of any accident of any kind that involves the general public or property of the Village or a third party, the Contractor shall immediately notify the Director of Public Works by phone as well as provide Notice of the same. The Notice shall include a full accounting of all details of the accident. The Contractor shall furnish the Village with copies of all reports of such accidents at the same time that the reports are forwarded to any other interested parties.

**ARTICLE XXI – NO ASSIGNMENT**

If the Contractor sublets or assigns any part of the Work then the Contractor shall not under any circumstances be relieved of its liabilities hereunder. All transactions of the Village shall be with the Contractor. Subcontractors shall be recognized only in the capacity of employees or workmen and shall be subject to the same requirements as to character and competence. The Contractor shall not assign, transfer, convey, sell or otherwise dispose of the whole or any part of this Contract to any person, firm or corporation without written consent of the Director of Public Works or his authorized representative.

## **ARTICLE XXII – DEFAULT**

The following shall constitute a default an “**Event of Default**” by the Contractor under this Contract:

- A. If the Contractor shall fail to strictly observe or perform one or more of the terms, conditions, covenants and agreements of this Contract;
- B. If there shall be placed on any property owned by the Village any mechanics’, materialmens’ or suppliers’ lien;
- C. If there shall be instituted any proceeding against the Contractor seeking liquidation, dissolution or similar relief and the same shall not be dismissed within forty-five (45) calendar days;
- D. If there shall be appointed any trustee, receiver or liquidator of the Contractor and such appointment shall not have been vacated within forty-five (45) calendar days; and
- E. If the Contractor fails to maintain or obtain any and all permits, licenses and the like, if any, required by the Village, State or Federal governments for the Work.

Upon any Event of Default the Village shall have the option of (i) terminating the Contract; (ii) pursuing any remedy available to it at law or in equity; or (iii) pursuing both simultaneously. In addition, upon an Event of Default, the Village may withhold payments due to the Contractor until it has hired a replacement of the Contractor and deducted all costs of hiring a replacement.

## **ARTICLE XXIII – DELAYS**

The Contractor shall not be liable in damages for delays in performance when such delay is the result of fire, flood, strike, acts of God, or by any other circumstances which are beyond the control of the Contractor; provided, however, under such circumstances the Village may, at its option, cancel the Contract.

## **ARTICLE XXIV – COMPLIANCE WITH LAWS**

The Contractor shall comply with all applicable laws, regulations and rules promulgated by any federal, state, local, or other governmental authority or regulatory body pertaining to all aspects of the Work, now in effect, or which may become in effect during the performance of the Work. The scope of the laws, regulations, and rules referred to in this paragraph includes, but is in no way limited to, the Illinois Human Rights Act, Illinois Equal Pay Act of 2003, Occupational Safety & Health Act along with the standards and regulations promulgated pursuant thereto (including but not limited to those safety requirements involving work on elevated platforms), all forms of traffic regulations, public utility, Interstate and Intrastate Commerce Commission regulations, Workers’ Compensation Laws, Public Construction Bond Act, Public Works Preference Act, Employment of Illinois Workers on Public Works Act, USA Security Act, federal Social Security Act (and any of its titles), and any other law, rule or regulation of the Illinois Department of Labor, Department of Transportation, Illinois Environmental Protection Act, Illinois Department of Natural Resources, Illinois Department of Human Rights, Human Rights Commission, EEOC, and the Village of Buffalo Grove. Notwithstanding the following, the Contractor shall particularly note that:

**A. NO DISCRIMINATION** – The Contractor shall comply with the provisions of the Illinois Public Works Employment Discrimination Act and the Illinois Human Rights Act/Equal Opportunity Clause which, pursuant to Illinois law, are deemed to be part of this Contract.

**B. FREEDOM OF INFORMATION** - The Contractor agrees to furnish all documentation related to the Contract, the Work and any documentation related to the Village required under an Illinois Freedom of Information Act (ILCS 140/1 et. seq.) (“**FOIA**”) request within five (5) calendar days after the Village issues Notice of such request to the Contractor. The Contractor agrees to defend, indemnify and hold harmless the Village, and agrees to pay all reasonable costs connected therewith (including, but not limited to attorney’s and witness fees, filing fees and any other expenses) for the Village to defend any and all causes, actions, causes of action, disputes, prosecutions, or conflicts arising from Contractor’s actual or alleged violation of FOIA or the Contractor’s failure to furnish all documentation related to a FOIA request within five (5) calendar days after Notice from the Village for the same. Furthermore, should the Contractor request that the Village utilize a lawful exemption under FOIA in relation to any FOIA request thereby denying that request, Contractor agrees to pay all costs connected therewith (such as attorneys' and witness fees, filing fees and any other expenses) to defend the denial of the request. This defense shall include, but not be limited to, any challenged or appealed denials of FOIA requests to either the Illinois Attorney General or a court of competent jurisdiction.

**C. ILLINOIS WORKERS ON PUBLIC WORKS ACT** - To the extent applicable, the Contractor shall comply with the Illinois Workers on Public Works Act, 30 ILCS 570/1 et seq., and shall provide to the Village any supporting documentation necessary to show such compliance.

**D. NOT A BLOCKED PERSON** - The Contractor affirms and covenants that neither the Contractor nor any individual employed by the Contractor for this Work or under this Contract is a person forbidden from doing business with a unit of local government under Executive Order No. 13224 (Sept 23, 2001), 66 Fed.Reg. 49,079 (Sept 23, 2001) or is a person registered on the Specially Designated Nationals and Blocked Persons List. The Contractor shall indemnify the Village from all costs associated with failure to comply with this paragraph.

**E. SUBSTANCE ABUSE PREVENTION ON PUBLIC WORKS ACT** - The Contractor knows, understands and acknowledges its obligations under the Substance Abuse Prevention on Public Works Act (820 ILCS 265/1 et seq.), and shall comply and require all subcontractors and lower tiered contractors to comply with the requirements and provisions thereof.

**F. PREVAILING WAGE ACT** - The Village is an Illinois unit of local government and the Work hereunder is subject to the Illinois Prevailing Wage Act, 820 ILCS 130/0.01, et seq.

Pursuant to PA 100-1177 the Illinois Department of Labor (IDOL) has activated an electronic database (Payroll Portal) capable of accepting and retaining certified payrolls submitted under the State of Illinois Prevailing Wage Act (820 ILCS/130/1). All contractors and subcontractors completing work for the Village of Buffalo Grove pursuant to the Act must submit all certified payroll through the IDOL Payroll Portal.

Consequently, the Contractor and each subcontractor shall submit with their application for payment(s) the email certification received from their IDOL Payroll Portal submittal with each of their pay requests. Any delay in processing the payments due to a lack of aforementioned email certification shall not be an event of default by the Village and shall not excuse any delay by the Contractor who shall proceed with the Work as if no delay in payment has occurred. The Contractor and Village shall agree to take any further steps not outlined above to ensure compliance with the Prevailing Wage Act. Upon two business days’ Notice, the Contractor and each subcontractor shall make available to the Village their records to confirm compliance with the Prevailing Wage Act. Finally, to ensure compliance with Prevailing Wage Act, the Contractor and each subcontractor shall keep for a period of not less than 5 years after the Work has been completed records of all laborers, mechanics, and other workers employed by them for the Work; the records shall include each worker’s name, address, telephone number, classification or classifications, the hourly wages paid in each period, the number of hours worked each day, the starting and ending times of work each day and, when available, last four digits of the social security number

Current rates can be located on the Illinois Department of Labor website.  
<https://www2.illinois.gov/idol/Laws-Rules/CONMED/Pages/Rates.aspx>

## **ARTICLE XXV – NO WAIVER OF RIGHTS**

A waiver by the Village of any Event of Default or any term of provision of this Contract shall not be a waiver of the same Event of Default, another Event of Default or any other term or provision of this Contract.

## **ARTICLE XXVI – CONTROLLING LAW AND VENUE**

This Contract is entered into in the State of Illinois, for work to be performed in the State of Illinois and shall be governed by and construed in accordance with the laws of the State of Illinois. Any legal matters or dispute shall be resolved in the Circuit Court of Cook County and the Parties hereby submit to the jurisdiction of such Circuit Court. This Contract shall be construed without regard to any presumption or other rule requiring construction against the Party causing the Contract to be drafted.

## **ARTICLE XXVII – MISCELLANEOUS**

- A. AMENDMENT** – This Contract may be amended only in writing executed by both Parties.
- B. NO RECORDING** – This Contract, or a memorandum thereof, may not be recorded in any form by either Party. If either Party records this Contract, or a memorandum thereof, they shall immediately file a release of the same.
- C. SECTION HEADINGS** – The headings in the Contract are intended for convenience only and shall not be taken into consideration in any construction or interpretation of the Contract.
- D. NO THIRD-PARTY BENEFICIARIES** – This Contract does not confer any rights or benefits on any third party.
- E. BINDING EFFECT** – This Contract shall be binding and inure to the benefit of the Parties hereto, their respective legal representatives, heirs and successors-in-interest.
- F. ENTIRE AGREEMENT** – This Contract supersedes all prior agreements and understandings and constitutes the entire understanding between the Parties relating to the subject matter hereof.
- G. SEVERABILITY** - If any term, condition or provision of the Contract is adjudicated invalid or unenforceable, the remainder of the Contract shall not be affected and shall remain in full force and effect, to the fullest extent permitted by law.
- H. TORT IMMUNITY DEFENSES** - Nothing contained in this Contract is intended to constitute nor shall constitute a waiver of the rights, defenses, and immunities provided or available to the Village under the Local Governmental and Governmental Employees Tort Immunity Act, 745 ILCS 10 *et seq.*
- I. CALENDAR DAYS AND TIME.** Unless otherwise provided in this Contract, any reference in this Contract to “day” or “days” shall mean calendar days and not business days. If the date for giving of any notice required to be given, or the performance of any obligation, under this Contract falls on a Saturday, Sunday or federal holiday, then the notice or obligation may be given or performed on the next business day after that Saturday, Sunday or federal holiday.


**J. COUNTERPARTS** – This Contract may be executed by the Parties in any number of counterparts, each of which shall be deemed an original, but all of which together shall constitute an original instrument.

**IN WITNESS WHEREOF**, the Parties hereto have caused the Contract to be executed as of the Effective Date.

**Village of Buffalo Grove,**  
an Illinois home-rule unit of government

**Company**  
**Kellenberger Electric**

By:   
Name: Dane Bragg  
Title: Village Manager

By:   
Name: Brienne Martin  
Title: President

CONTRACT EXHIBIT C- FORM OF PERFORMANCE AND PAYMENT BOND

Bond Number: \_\_\_\_\_

KNOW ALL MEN BY THESE PRESENTS, That \_\_\_\_\_ (the "Principal") and \_\_\_\_\_ (the "Surety"), are held and firmly bound unto the Village of Buffalo Grove, an Illinois home-rule unit of government (the "Village"), the full and just sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_) in lawful money of the UNITED STATES OF AMERICA as herein provided.

THE CONDITION OF THIS OBLIGATION is such that the Principal and Surety agree to bind themselves, their successors, assigns, executors, heirs and administrators, jointly and severally, for the full and faithful performance of the Work as defined in that particular Fire Station 27 Generator Replacement between Principal and the Village dated \_\_ day of \_\_\_\_\_, 20\_\_, (hereinafter referred to as the "Contract"), a copy of which is attached and incorporated by reference as though fully set forth herein.

NOW THE CONDITIONS OF THIS OBLIGATION ARE SUCH that if the said Principal (i) shall in all respects keep and perform all the undertakings, covenants, terms, conditions and agreements of the Contract; (ii) shall pay all sums of money due or to become due, for any labor, materials, apparatus, fixtures or equipment furnished for the Work provided in said Contract; and (iii) shall remove and replace any defects in workmanship or materials which may be apparent or may develop within the ARTICLE XIX – WARRANTY PERIOD of the Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

And the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or the Work thereunder shall in any way affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the Work.

IN WITNESS WHEREOF, we have hereunto set our hands and sea \_\_ day of \_\_\_\_\_, 20\_\_.

SURETY

PRINCIPAL

By: \_\_\_\_\_  
Name: \_\_\_\_\_  
Title: \_\_\_\_\_

By: \_\_\_\_\_  
Name: \_\_\_\_\_  
Title: \_\_\_\_\_

ATTEST

ATTEST

By: \_\_\_\_\_

By: \_\_\_\_\_

NOTE: Date of Bond must not be prior to date of Contract.  
If Contractor is Partnership, all partners should execute Bond.  
IMPORTANT: Surety companies executing Bonds must appear on the Treasury Departments most current list (Circular 570 as amended) and be authorized to transact business in the state where the Work is located.

CONTRACT EXHIBIT D- PARTIAL WAIVER

PARTIAL LIEN WAIVER

STATE OF ILLINOIS

COUNTY OF \_\_\_\_\_

TO WHOM IT MAY CONCERN:

WHEREAS the undersigned has been employed by \_\_\_\_\_ to furnish \_\_\_\_\_ for the premises known as \_\_\_\_\_ of which \_\_\_\_\_ is the owner. THE undersigned, for and in consideration of \$ \_\_\_\_\_

) Dollars, and other good and valuable considerations, the receipt whereof is hereby acknowledged, do(es) hereby waive and release any and all lien or claim of, or right to, lien, under the statutes of the State of Illinois, relating to mechanics' liens, with respect to and on said above-described premises, and the improvements thereon, and on the material, fixtures, apparatus or machinery furnished, and on the moneys, funds or other considerations due or to become due from the owner, on account of all labor, services, material, fixtures, apparatus or machinery, furnished to this date by the undersigned for the above-described premises, INCLUDING EXTRAS.\*

DATE \_\_\_\_\_ COMPANY NAME \_\_\_\_\_ ADDRESS \_\_\_\_\_ SIGNATURE AND TITLE \_\_\_\_\_

\*EXTRAS INCLUDE BUT ARE NOT LIMITED TO CHANGE ORDERS, BOTH ORAL AND WRITTEN, TO THE CONTRACT

CONTRACTOR'S AFFIDAVIT

STATE OF ILLINOIS

COUNTY OF \_\_\_\_\_

TO WHOM IT MAY CONCERN:

THE UNDERSIGNED, (NAME) \_\_\_\_\_ BEING DULY SWORN, DEPOSES AND SAYS THAT HE OR SHE IS (POSITION) \_\_\_\_\_ OF (COMPANY NAME) \_\_\_\_\_ WHO IS THE CONTRACTOR FURNISHING \_\_\_\_\_ WORK ON THE BUILDING LOCATED AT \_\_\_\_\_ OWNED BY \_\_\_\_\_

That the total amount of the contract including extras\* is \$ \_\_\_\_\_ on which he or she has received payment of \$ \_\_\_\_\_ prior to this payment. That all waivers are true, correct and genuine and delivered unconditionally and that there is no claim either legal or equitable to defeat the validity of said waivers. That the following are the names and addresses of all parties who have furnished or delivered material or labor, or both, for said work and all parties having contracts or sub contracts for specific portions of said work or for material entering into the construction thereof and the amount due or to become due to each, and that the items mentioned include all labor and material required to complete said work according to plans and specifications:

Table with 6 columns: NAMES AND ADDRESSES, WHAT FOR, CONTRACT PRICE (INCLUDE EXTRAS)\*, AMOUNT PAID, THIS PAYMENT, BALANCE DUE. Includes a row for TOTAL LABOR AND MATERIAL INCLUDING EXTRAS\* TO COMPLETE.

That there are no other contracts for said work outstanding, and that there is nothing due or to become due to any person for material, labor or other work of any kind done or to be done upon or in connection with said work other than above stated.

DATE \_\_\_\_\_ SIGNATURE: \_\_\_\_\_ SUBSCRIBED AND SWORN TO BEFORE ME THIS \_\_\_\_\_ DAY OF \_\_\_\_\_

\*EXTRAS INCLUDE BUT ARE NOT LIMITED TO CHANGE ORDERS, BOTH ORAL AND WRITTEN, TO THE CONTRACT. \_\_\_\_\_ NOTARY PUBLIC

CONTRACT EXHIBIT E- FINAL WAIVER

FINAL WAIVER OF LIEN

STATE OF ILLINOIS
COUNTY OF \_\_\_\_\_

TO WHOM IT MAY CONCERN:
WHEREAS the undersigned has been employed by \_\_\_\_\_
to furnish \_\_\_\_\_
for the premises known as \_\_\_\_\_
of which \_\_\_\_\_ is the owner.

THE undersigned, for and in consideration of \_\_\_\_\_
(\$ \_\_\_\_\_) Dollars, and other good and valuable considerations, the receipt whereof is hereby acknowledged,
do(es) hereby waive and release any and all lien or claim of, or right to, lien, under the statutes of the State of Illinois, relating
to mechanics' liens, with respect to and on said above-described premises, and the improvements thereon, and on the material,
fixtures, apparatus or machinery furnished, and on the moneys, funds or other considerations due or to become due from the
owner, on account of all labor, services, material, fixtures, apparatus or machinery, heretofore furnished, or which may be
furnished at any time hereafter, by the undersigned for the above-described premises, INCLUDING EXTRAS.\*

DATE \_\_\_\_\_ COMPANY NAME \_\_\_\_\_
ADDRESS \_\_\_\_\_
SIGNATURE AND TITLE \_\_\_\_\_

\*EXTRAS INCLUDE BUT ARE NOT LIMITED TO CHANGE ORDERS, BOTH ORAL AND WRITTEN, TO THE CONTRACT

CONTRACTOR'S AFFIDAVIT

STATE OF ILLINOIS
COUNTY OF \_\_\_\_\_

TO WHOM IT MAY CONCERN:
THE UNDERSIGNED, (NAME) \_\_\_\_\_ BEING DULY SWORN, DEPOSES
AND SAYS THAT HE OR SHE IS (POSITION) \_\_\_\_\_ OF
(COMPANY NAME) \_\_\_\_\_ WHO IS THE
CONTRACTOR FURNISHING \_\_\_\_\_ WORK ON THE BUILDING
LOCATED AT \_\_\_\_\_
OWNED BY \_\_\_\_\_

That the total amount of the contract including extras\* is \$ \_\_\_\_\_ on which he or she has received payment of
\$ \_\_\_\_\_ prior to this payment. That all waivers are true, correct and genuine and delivered unconditionally and that
there is no claim either legal or equitable to defeat the validity of said waivers. That the following are the names and addresses
of all parties who have furnished or delivered material or labor, or both, for said work and all parties having contracts or sub
contracts for specific portions of said work or for material entering into the construction thereof and the amount due or to
become due to each, and that the items mentioned include all labor and material required to complete said work according to
plans and specifications:

Table with 6 columns: NAMES AND ADDRESSES, WHAT FOR, CONTRACT PRICE INCLDNG, AMOUNT PAID, THIS PAYMENT, BALANCE DUE. Includes a total row for LABOR AND MATERIAL INCLUDING EXTRAS\*.

That there are no other contracts for said work outstanding, and that there is nothing due or to become due to any person for
material, labor or other work of any kind done or to be done upon or in connection with said work other than above stated.

DATE \_\_\_\_\_ SIGNATURE: \_\_\_\_\_

SUBSCRIBED AND SWORN TO BEFORE ME THIS \_\_\_\_\_ DAY OF \_\_\_\_\_

\*EXTRAS INCLUDE BUT ARE NOT LIMITED TO CHANGE
ORDERS, BOTH ORAL AND WRITTEN, TO THE CONTRACT.

NOTARY PUBLIC



CONTRACT EXHIBIT A- DESCRIPTION OF THE WORK

**[Insert Description of the Work]**



**Wold Architects and Engineers**  
110 North Brockway Street, Suite 220  
Palatine, IL 60067  
woldae.com | 847 241 6100

# **Project Manual**

**Divisions 00 - 26**

**Fire Station #27 Generator  
Replacement**

**Village of Buffalo Grove**

Buffalo Grove, Illinois

**SECTION 00 01 01  
PROJECT TITLE PAGE**

**PROJECT MANUAL**

**PROJECT IDENTIFICATION**

**BIDDING REQUIREMENTS**

**CONDITIONS OF THE CONTRACT**

**GENERAL REQUIREMENTS**

**AND SPECIFICATIONS**

**FOR**

Fire Station 27 Generator Replacement  
100 West Half Day Road  
Buffalo Grove, Illinois 60089

Village of Buffalo Grove  
50 Raupp Boulevard  
Buffalo Grove, Illinois 60089

**BID TIME:** 9:00 a.m.

**BID DATE:** April 4, 2024

**BID TO:**

Buffalo Grove Village Hall  
50 Raupp Boulevard  
Buffalo Grove, Illinois 60089

**ISSUE DATE:** March 19, 2024

**END OF SECTION 00 01 01**

**SECTION 00 01 03**  
**PROJECT DIRECTORY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Identification of project team members and their contact information.

**1.02 OWNER:**

- A. Name: Village of Buffalo Grove
  - 1. Address: 50 Raupp Boulevard, Buffalo Grove, Illinois 60089

**1.03 CONSULTANTS:**

- A. Architect:
  - 1. Company Name: Wold Architects and Engineers
    - a. Address: 220 North Smith Street, Suite 310, Palatine, Illinois 60067
    - b. Telephone: (847) 241-6100
- B. Electrical Engineering Consultant:
  - 1. Company Name: Wold Architects and Engineers
    - a. Address: 220 North Smith Street, Suite 310, Palatine, Illinois 60067
    - b. Telephone: (847) 241-6100

**PART 2 PRODUCTS - NOT USED**

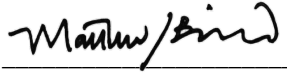
**PART 3 EXECUTION - NOT USED**

**END OF SECTION 00 01 03**

**SECTION 00 01 05**  
**CERTIFICATIONS PAGE**  
**Fire Station 27 Generator Replacement**  
**Village of Buffalo Grove**

Architect: Wold Architects and Engineers

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision, and that I am a duly Licensed Architect under the laws of the State of Illinois.

Signature: 

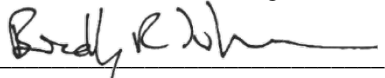
Typed Name: Matt Bickel

Registration: 001.020883

Date Signed: January 4, 2024

Electrical Engineer: Wold Architects and Engineers

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Illinois.

Signature: 

Typed Name: Bradley Johannsen

Registration: 062.060077

Date Signed: January 4, 2024

**END OF SECTION 00 01 05**



**SECTION 00 01 10**  
**TABLE OF CONTENTS**

**PROCUREMENT AND CONTRACTING REQUIREMENTS**

**DIVISION 00 -- PROCUREMENT AND CONTRACTING REQUIREMENTS**

- 00 01 01 - Project Title Page
- 00 01 03 - Project Directory
- 00 01 05 - Certifications Page
- 00 01 10 - Table of Contents

**SPECIFICATIONS**

**DIVISION 01 -- GENERAL REQUIREMENTS**

- 01 10 00 - Summary of the Work
- 01 25 00 - Substitution Procedures
- 01 25 01 - Pre-Bid Substitution Request Form
- 01 26 63 - Change Orders
- 01 30 00 - Administrative Requirements
- 01 50 00 - Temporary Facilities and Controls
- 01 70 00 - Execution and Closeout Requirements
- 01 78 00 - Closeout Submittals
- 01 79 00 - Demonstration and Training

**DIVISION 02 -- 25 (NOT USED)**

**DIVISION 26 -- ELECTRICAL**

- 26 05 00 - Common Work Results for Electrical
- 26 05 03 - Electrical Demolition
- 26 05 19 - Electrical Power Conductors
- 26 05 26 - Grounding and Bonding for Electrical Systems
- 26 05 29 - Hangers and Supports for Electrical Systems
- 26 05 33 - Raceway and Boxes for Electrical Systems
- 26 24 16 - Panelboards
- 26 28 13 - Engine Generators
- 26 36 00 - Transfer Switches
- 26 36 50 - Portable Generator Docking Stations

**DIVISION 27 -- 49 (NOT USED)**

**END OF SECTION 00 01 10**

**SECTION 01 10 00**  
**SUMMARY OF THE WORK**

**PART 1 GENERAL**

**1.01 PROJECT**

- A. Project Name: Fire Station 27 Generator Replacement
- B. Owner's Name: Village of Buffalo Grove
- C. Architect's Name: Wold Architects and Engineers.
- D. Additional Project contact information is specified in Section 00 01 03 - Project Directory.
- E. The Project consists of the construction of removal and replacement of a building generator and subsequent electrical work..
  - 1. Briefly and without force and effect upon the Contract Documents, the Work of this single prime Contract can be summarized as follows:
  - 2. Work under this Contract includes:
    - a. Generator Replacement:
      - 1) Work associated with removal of interior natural gas generator.
      - 2) Work associated with installation of interior natural gas generator.
- F. Keep Architect fully informed about progress of the work, performance of the work and potential problems.

**1.02 WORK BY OWNER THROUGH OTHER CONTRACTS**

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of this Contract with work performed under separate contracts.

**1.03 OWNER OCCUPANCY**

- A. Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.
- B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- C. Schedule the Work to accommodate Owner occupancy.

**1.04 CONTRACTOR USE OF SITE AND PREMISES**

- A. Construction Operations: Limited to areas noted on Drawings.
  - 1. Locate and conduct construction activities in ways that will limit disturbance to site.
  - 2. Contractor is to visit site and be familiar with existing conditions. Contractor will be required to accept existing conditions on site prior to mobilizing.
  - 3. Conform to City's noise control regulations, including limited hours of construction operations.
  - 4. Do not allow construction waste and debris to accumulate on site; remove debris as it accumulates and, unless specified otherwise, dispose of legally off-site.
  - 5. Use of Existing Building: Maintain existing building in a weathertight condition throughout construction period. Repair damage caused by construction operations. Protect building and its occupants during construction period.
- B. Arrange use of site and premises to allow:
  - 1. Owner occupancy.
  - 2. Work by Others.
  - 3. Work by Owner.
  - 4. Use of site and premises by the public.
- C. Provide access to and from site as required by law and by Owner:
  - 1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
  - 2. Do not obstruct roadways, sidewalks, or other public ways without permit.
- D. Time Restrictions:
  - 1. The Owner's normal business hours are: 7:00 am to 3:30 pm.

2. Should the Contractor begin work within the existing building prior to the scheduled start date, continuous use of facilities is required by the Owner.
    - a. Work in those areas shall occur during evenings and weekends and shall be cleaned and available for use the following business day.
  3. Should the Contractor choose to perform work after normal business hours when the building is occupied, the Contractor shall:
    - a. Maintain access, building utilities, and services to allow full and free use of the facility during this time. All temporary conditions, re-routing of services, utilities and/or power are the Contractor's responsibility.
    - b. Coordinate access and storage of materials and equipment with the Owner's designated building representative. To the fullest extent possible provide for normal building operation, and the safety of the building's occupants. Work in areas that occur during evenings and weekends shall be cleaned and available for use the following business day.
    - c. Coordinate schedule with the Owner's designated building representative.
  4. Should the Contractor have additional work to complete after the substantial completion date including punchlist work within the existing or newly completed building, continuous use of facilities is required by the Owner.
- E. Utility Outages and Shutdown:
1. Provide the Owner with at least 7 days notice of Outages and Shutdowns.
  2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
  3. Prevent accidental disruption of utility services to other facilities.

#### **1.05 WORK SEQUENCE**

- A. Start work immediately upon contract award by the Owner.

#### **1.06 SPECIFICATION SECTIONS APPLICABLE TO EVERY CONTRACT**

- A. Sections in Division 1 govern the execution of the Work of all items in the Technical Specification Sections.

#### **PART 2 PRODUCTS - NOT USED**

#### **PART 3 EXECUTION - NOT USED**

**END OF SECTION 01 10 00**

**SECTION 01 25 00  
SUBSTITUTION PROCEDURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Procedural requirements for proposed substitutions.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 GENERAL REQUIREMENTS**

**A. PRODUCT OPTIONS NOT REQUIRING PRE-BID SUBMITTAL**

1. Where a single manufacturer is specified and acceptable manufacturer are also listed, acceptable manufacturers must provide an identical product or accept responsibility for all design implications when providing a product other than the specified product.
2. Where products are specified by reference standards, any product established by a material testing agency to meet these standards is acceptable.
3. Where multiple manufacturers and associated models are specified, select any one named.
4. Where manufacturer(s) alone are specified, select any manufacturer and the product recommended in writing by the manufacturer as most suited to the application shown on the Drawings and Specifications.
5. Where the phrase "or equal" or "equivalent" follows the name of a manufacturer, any product which meets the performance and appearance standards established by the specified manufacturer may be selected, subject to the Architect's acceptance.
6. Where a manufacturer is listed in both a technical specification section and the Interior Material Finish/Color Schedule, on the Drawings and a color is provided.

**B. PRODUCT SUBSTITUTIONS REQUIRING PRE-BID SUBMITTALS**

1. Step One - Manufacturers Substitution Request
  - a. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
    - 1) Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
    - 2) Agrees to provide the same warranty for the substitution as for the specified product.
    - 3) Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
    - 4) Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
    - 5) Waives claims for additional costs or time extension that may subsequently become apparent.
  - b. Attached Substitution Request Form is submitted ten (10) calendar days prior to the bid date with the following information:
    - 1) Specified manufacturer's model numbers and proposed manufacturer's product literature, noting product numbers for proposed substitutions, and where appropriate, samples and data relating to construction details.
      - (a) Clearly indicate on the literature what product is being submitted for substitution.
      - (b) If submitted literature does not match the requirements of the specified product, submit a letter stating proposed manufacturer will custom make products to meet specified product.
2. Step Two - Manufacturers Acceptance
  - a. Individual specification sections may be amended by the Architect during the bid period to include additional names of manufacturers determined to be capable of providing acceptable materials.

- b. The Interior Material Finish/Color Schedule, on the Drawings or Specifications may be amended by the Architect during the bid period to include colors by manufacturers listed in technical sections, but not noted on the Interior Material Finish/Color Schedule, on the Drawings or in the Specifications.
  - c. Architect's acceptance is based upon his determination that a manufacturer is capable of supplying acceptable materials. Approval is not assured or implied for a specific material, item of equipment, color or finish.
  - d. Official notification will be by addendum to the Contract Documents.
    - 1) If the proposed equivalent product requires products of other specification sections to be revised to comply with an alternative NFPA 285 Wall Assembly, the substitute manufacturer will pay all associated costs based on changes to products in other specification sections, as well as reimbursement of architectural and engineering services to document those changes, if any, required to incorporate substitution products in the Work.
3. Step Three - Product Acceptance
- a. Upon award of a construction contract, accepted manufacturers may submit for review to the Architect through the General Contractor or Construction Manager, specific products, materials or equipment items as substitutes for those specified.
    - 1) Contractor to provide letter stating they will reimburse Architect to review substitutions.
  - b. Architect will review substitute products for performance, appearance, color, finish, size and suitability for inclusion in the work. If a substitute product is not accepted, submit another product by the same or other accepted manufacturer or provide the specified product.
  - c. Match specified colors and dimensions exactly, whether or not they are standard with the substitute product, unless a minor variation is accepted by the Architect.
  - d. If a substitute product is accepted, coordinate any necessary changes in other related work and pay for these changes.
    - 1) Pay cost of architectural or engineering services, if any, required to incorporate substitute products in the Work.

**C. SUBSTITUTIONS BY CHANGE ORDER AFTER CONTRACT AWARD**

- 1. A substitution for a specified product may be permitted by a no cost or deduct change order to the Owner if product proposed is determined to be equivalent in performance and suitability, and if at least one of the following conditions apply:
  - a. Owner is given a credit for the work.
  - b. Product is of superior quality than product specified.
  - c. Product color or finish selection is preferable.
  - d. Products specified and upon which building is designed have been discontinued by manufacturer.
- 2. Provide Architect, through Owner, reasonable compensation for product evaluation.

**3.02 ATTACHMENTS**

- A. A Substitution Request Form required to be used on the Project is included after this section.

**END OF SECTION 01 25 00**



**END OF SECTION 01 25 01**



**SECTION 01 26 63  
CHANGE ORDERS**

**PART 1: GENERAL**

**1.01 CHANGE ORDER PROCEDURES**

- A. Changes in the Project scope of work affecting the project cost can be made only through AIA Document G701 - Change Order.
  - 1. The procedures for processing changes in the scope of Work are listed as follows:
  - 2. The Architect prepares one of the following documents to modify the scope of work. Documents and attachments revising the drawings and specifications will be distributed electronically and the Contractor will be responsible for printing.
    - a. Supplemental Instructions (SI) which are used for no cost changes.
    - b. Proposal Request (PR) to be used for proposed changes that need written approval on cost prior to proceeding.
    - c. Construction Change Directive AIA Document G714 (CCD) which is used when the work must proceed immediately and time and material cost submitted as soon as possible for review by the Architect.
  - 3. The Contractor reviews and responds as follows:
    - a. Supplemental Instructions (SI): This no cost change is to be carried out in accordance with the following modifications to the contract documents described herein. If this change effects cost, do not proceed with this change. Notify the Architect in writing within 10 days of receipt that an itemized (labor and material) quotation will be submitted within 21 days of initial receipt of this Supplemental Instruction. If a cost is not submitted within 21 days, this Supplemental Instruction will be accepted at no additional cost.
    - b. Proposal Request (PR): Submit an itemized (labor and material) quotation for the proposed modifications to the contract documents as described herein within 21 days of receipt. If a cost is not submitted within 21 days, this Proposal Request can be accepted at no additional cost. Written approval is required prior to proceeding with this change.
    - c. Construction Change Directive AIA Document G714 (CCD): Proceed immediately to carry out this change in the contract documents as described herein. If this revision effects cost, submit an itemized (labor and material) quotation within 21 days of receipt. If a cost is not submitted within 21 days this Change Directive will be accepted at no additional cost.
  - 4. The Architect will review the Contractor's labor and material itemized quotation and respond in writing whether it is acceptable or needs revision. When all pricing is accepted by the Architect and Owner, a Change Order will be processed. Change Orders will be processed at increments determined by the Architect throughout the construction schedule.
- B. See the General Conditions of the Contract for Construction for methods of determining cost or credit, mark-up and schedule on submitting claims.

**END OF SECTION 01 26 63**

**SECTION 01 30 00**  
**ADMINISTRATIVE REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. General administrative requirements.
- B. Electronic document submittals.
- C. Preconstruction meeting.
- D. Progress meetings.
- E. Schedule of Values.
- F. Submittals for review, information, and project closeout.
- G. Requests for Information (RFI) procedures.
- H. Submittal procedures.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 ELECTRONIC DOCUMENT SUBMITTAL**

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF) format, as appropriate to the document, and transmitted via email the architect's staff assigned to the project.
  - 1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Information (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
  - 2. It is Contractor's responsibility to submit documents in allowable format.
  - 3. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

**3.02 LIST OF MATERIALS**

- A. Within 7 days after the award of the Contract (notice to proceed or letter of intent), submit a complete list electronically of all material, products, and equipment proposed to be used in construction to the Architect for acceptance.
  - 1. Do not order materials until the proposed listed materials, products and equipment to be used in construction are accepted by the Architect.
- B. Where two or more makes or kinds of items are named in the specifications (or additional names are called for in addenda), the Contractor shall state which particular make or kind of each item they proposes to provide. If the Contractor fails to state a preference, the Owner shall have the right to select any of the makes or kinds named without change in price.
- C. This list shall be arranged generally in order of specification sections. The items listed shall fully conform to project requirements and specifications. All materials are subject to the Architect's acceptance.
  - 1. After acceptance, changes or substitutions will not be permitted.
- D. Clearly identify or list the material, product or equipment by manufacturer and brand by listing the names for all items, including those where only one material or product is specified. Each and every material, product and equipment shall be specifically named, not listed "as specified".

**3.03 LIST OF SUBCONTRACTORS**

- A. Immediately after Contract award submit a subcontractor and supplier list.
  - 1. Propose use of subcontractors or sub-subcontractors who are established, reputable firms of recognized standing with a record of successful and satisfactory past performance. Include the following information: specification section, item of work, subcontractor or supplier, material/manufacturer (as specified will not be allowed), project manager, phone and email. List major sub-subcontractors for mechanical and electrical work. Use only those subcontractors (and sub-subcontractors, when appropriate) who are acceptable to the Architect and Owner on the Work.

### **3.04 SCHEDULE OF VALUES**

#### **A. Requirements**

1. Submit Schedule of Values to Architect ten (10) days prior to first Application For Payment (AIA Form G702, G702a).
  - a. Break down labor and material separately.
  - b. Round off amounts to nearest ten dollars.
  - c. Provide separate line items for each of the following items:
    - 1) Operations and Maintenance Manuals, equaling of 0.125% of Contract value.
    - 2) As-Built Drawings, equaling of 0.0625% of Contract value.
    - 3) Training, equaling of 0.125% of Contract value.
2. Use Schedule of Values only as basis for Contractor's Application For Payment.

#### **B. Form of Submittal**

1. Base format on Sections listed in Section 00 01 10 - Table of Contents, as well as, the Mechanical Electrical, Communications and Security Table of Contents. Break down labor and material separately.

### **3.05 CONSTRUCTION SCHEDULES**

- #### **A. Refer to Section 01 32 16 - Construction Progress Schedule.**

### **3.06 PRECONSTRUCTION MEETING**

- #### **A. Schedule meeting within 15 days after Notice to Proceed.**

#### **B. Attendance Required:**

1. Owner's representative.
2. Architect and their consultants.
3. Contractor's Project Manager and Site Superintendent.
4. Major Subcontractors.
5. Major Suppliers.
6. Others as appropriate.

#### **C. Agenda:**

1. Distribution and discussion of:
  - a. List of subcontractors.
  - b. List of major suppliers.
  - c. Projected construction schedules.
  - d. Submittal schedule.
  - e. Scheduling of pre-installation conferences.
2. Project coordination and scheduling:
  - a. Designation of responsible personnel representing the Owner, Contractor, Architect and Architect's Consultants.
  - b. Major equipment deliveries and priorities, including expected submittals for such.
  - c. Critical work sequencing.
  - d. Mock-up Panels.
  - e. Temporary utilities.
  - f. Use of onsite utilities.
3. Procedures and processing of: field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
  - a. Status of Building Permit and:
    - 1) Steel Fabricator Certification.
    - 2) Special Inspection Form.
  - b. Field decisions.
  - c. Submittals.
  - d. Product substitutions.
  - e. Applications for payments.
  - f. Time limit on claims of 21 days.
  - g. Proposal Requests and Supplemental Instructions.

- h. Change Orders.
- i. Scheduling activities of a Geotechnical Engineer.
- 4. Procedures for maintaining Record Documents.
- 5. Use of Premises:
  - a. Office, work and storage areas.
  - b. Owner's requirements.
- 6. Construction facilities, controls and construction aids.
  - a. Construction Dust Control and Periodic Cleaning:
    - 1) Submittal of work area and procedures schedule.
    - 2) Dust proof enclosures.
    - 3) HEPA filters on vacuums.
    - 4) Maintaining negative air flow.
    - 5) Dust control by watermist of surfaces.
    - 6) Debris removal weekly.
    - 7) Daily cleaning requirements.
  - b. Failure to Comply.
    - 1) A written warning will be issued for correction.
      - (a) If correction notice is not complied within 8 hours, Owner may stop work or take over cleaning.
      - (b) Cost will be borne by Contractor.
  - c. Final Cleaning:
    - 1) Schedule in time for Owner to complete furniture installation, and cleaning/waxing of floors.
    - 2) Any cleaning done by the Owner due to unacceptable cleaning by the Contractor, or not proceeding in a timely fashion will be back charged to Contractor.
- 7. Contractor to record minutes and distribute copies within two days after meeting to participants, with electronic copies to Architect, Owner, participants, and those affected by decisions made.

### **3.07 PROGRESS MEETINGS**

- A. Schedule and administer meetings throughout progress of the work at regular intervals and as required due to the progress of the work.
- B. Hold called meetings at the Contractor's project field office.
- C. Attendance Required:
  - 1. Contractor.
  - 2. Owner.
  - 3. Architect may attend as needed.
  - 4. Architect' consultants may attend as needed.
  - 5. Contractor's superintendent.
  - 6. Subcontractors appropriate to the progress of the work.
  - 7. Suppliers and manufacturer's representatives as appropriate to the agenda.
- D. Agenda:
  - 1. Review and approval of minutes from previous meetings.
  - 2. Review of work progress since previous meeting.
  - 3. Field observations, problems, and decisions.
  - 4. Identification of problems that impede, or will impede, planned progress.
  - 5. Review of submittals schedule and status of submittals.
  - 6. Review of off-site fabrication and delivery schedules.
  - 7. Maintenance of progress schedule.
  - 8. Corrective measures to regain projected schedules.
  - 9. Planned progress during succeeding work period before the next meeting.
  - 10. Maintenance of quality and work standards.

11. Effect of proposed changes on progress schedule and coordination.
  12. Other business relating to work.
- E. Contractor to record minutes and distribute copies within two days after meeting to participants, with electronic copies to Architect, Owner, participants, and those affected by decisions made.

### **3.08 REQUESTS FOR INFORMATION (RFI)**

- A. Definition: A request seeking one of the following:
1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
  2. A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.
- C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
1. Prepare a separate RFI for each specific item.
    - a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
    - b. Do Not forward requests which solely require internal coordination between subcontractors.
- D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
  2. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
    - a. Approval of substitutions.
    - b. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
    - c. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
  3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
  4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question.
    - a. They will be rejected.
    - b. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.
- E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
1. Official Project name and number, and any additional required identifiers established in Contract Documents.
  2. Discrete and consecutive RFI number, and descriptive subject/title.
  3. Issue date and requested reply date no sooner than 7 working days.
  4. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
  5. Annotations: Field dimensions and/or description of conditions which have engendered the request.
  6. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.

- F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- G. Review Time: Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
  - 1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

### **3.09 SUBMITTAL SCHEDULE**

- A. Submit to Architect for review a schedule for submittals in tabular format.
  - 1. Submit at the same time as the preliminary schedule specified in Section - 01 32 16 - Construction Progress Schedule.
  - 2. Coordinate with Contractor's construction schedule and schedule of values.
  - 3. Format schedule to allow tracking of status of submittals throughout duration of construction.
  - 4. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
  - 5. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
    - a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

### **3.10 SUBMITTALS FOR REVIEW**

- A. When the following are specified in individual sections, submit them for review:
  - 1. Product data.
  - 2. Shop drawings.
  - 3. Samples for selection.
  - 4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
  - 1. Prepare clearly identified shop drawings or schedules to this specific project, containing only data applicable. Include with the shop drawings or schedules a letter of transmittal listing and dating the submitted drawings in sets.
  - 2. Contractor to review all submittals prior to submittal to Architect, and indicate such review with a stamp and signature. Review submittals for conformance to Drawings, Specifications, coordination with other trades and adjacent construction and verification of field dimensions. Failure of Contractor to adequately review submittals shall be cause for rejection.
  - 3. Prepare and submit electronically (with exception for color charts and samples) to Architect for review, all shop drawings and manufacturers catalog sheets showing illustrated cuts of items to be furnished, scale details, sizes, dimensions, performance characteristics, capacities, wiring diagrams, weights and arrangements. Each submittal to include a transmittal on contractor letterhead. Submittal to be in the form of one combined PDF, labeled with project name, professionally assembled so all documents are facing the same way.
- C. If equipment other than that used in the design of this project is proposed to be used, the Contractor and/or supplier shall verify electrical differences, dimension variations and weight increases. The Contractor shall be responsible for any extra costs incurred as a result of equipment substitutions.
- D. Samples will be reviewed for aesthetic, color, or finish selection.
  - 1. Unless otherwise specified, submit samples of size, and nature representing typical qualities. Where required, submit a sufficient number of samples to demonstrate the complete range of variations of the material or quality. Written acceptance of the Architect is required prior to ordering any item for which samples are required.

- E. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.

### **3.11 SUBMITTALS FOR INFORMATION**

- A. When the following are specified in individual sections, submit them for information:
  - 1. Design data.
  - 2. Certificates.
  - 3. Test reports.
  - 4. Inspection reports.
  - 5. Manufacturer's instructions.
  - 6. Manufacturer's field reports.
  - 7. Other types indicated.
- B. Submit for Architect's knowledge as contract administrator or for Owner.

### **3.12 SUBMITTALS FOR PROJECT CLOSEOUT**

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:
  - 1. Project record documents.
  - 2. Operation and maintenance data.
  - 3. Warranties.
  - 4. Bonds.
  - 5. Other types as indicated.
- D. Submit Demonstration and Training recorded training modules.
- E. Submit for Owner's benefit during and after project completion.

### **3.13 NUMBER OF COPIES OF SUBMITTALS**

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
  - 1. After review, produce duplicates.
  - 2. Retained samples will not be returned to Contractor unless specifically so stated.

### **3.14 SUBMITTAL PROCEDURES**

- A. General Requirements:
  - 1. Use a separate transmittal for each item.
  - 2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
  - 3. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
    - a. When labeling shop drawings or product data, include the Specification Section number of where the product is specified for a submittal . For example, for cavity wall insulation Section 07 21 00 - Insulation does not require an insulation submittal, but Section 04 20 00 - Non-Bearing Unit Masonry does require that submittal.
  - 4. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
    - a. Submittals from sources other than the Contractor, or without Contractor's stamp will be rejected.
  - 5. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
    - a. Deliver submittals to Architect via email.



- b. Submit samples to Architect's office, securely packaged, with the name of the Owner and Project clearly indicated on the package exterior. Each physical sample shall have a label or tag, firmly attached to the sample, bearing the following information: (a) Name of Owner and Project, (b) Name of Supplier, (c) Name of Contractor, and (d) Product information such as manufacturer's designation, finish, type, class, grade, etc. as is appropriate. The Architect will retain one copy of each sample.
  - 6. Schedule submittals to expedite the Project, and coordinate submission of related items.
    - a. When submitting multiple submittals at the same time, provide the Architect with a priority list for review.
    - b. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
    - c. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 days.
    - d. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Architect's approval, allow an additional 30 days.
  - 7. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
  - 8. When revised for resubmission, identify all changes made since previous submission.
  - 9. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
  - 10. Submittals not requested will not be recognized or processed.
- B. Product Data Procedures:
- 1. Submit only information required by individual specification sections.
  - 2. Collect required information into a single submittal.
  - 3. Submit concurrently with related shop drawing submittal.
  - 4. Do not submit (Material) Safety Data Sheets for materials or products.
- C. Shop Drawing Procedures:
- 1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
  - 2. Do not reproduce Contract Documents to create shop drawings.
    - a. Contractor is to generate shop drawings based on the information identified in the contract documents and notify the architect of discrepancies in the documents.
  - 3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.
- D. Samples Procedures:
- 1. Transmit related items together as single package.
  - 2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.

### **3.15 SUBMITTAL REVIEW**

- A. The Architect will take one of the following actions on submittals:
  - 1. "Reviewed": Contractor shall proceed with ordering and/or fabrication.
  - 2. "Review Comments": Contractor shall proceed with ordering and/or fabrication after taking into account noted comments.
  - 3. "Rejected": Contractor shall provide a submittal that meets the intent of the specifications.
  - 4. "Revise and Resubmit": Contractor shall modify submittal to address comments and resubmit.
- B. Submittals for Information: Architect will not acknowledge receipt, and take no other action.

**END OF SECTION 01 30 00**

**SECTION 01 50 00**  
**TEMPORARY FACILITIES AND CONTROLS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Temporary utilities.
- B. Temporary Controls: Barriers, enclosures, fencing, and construction dust control.
- C. Security requirements.
- D. Vehicular access and parking.
- E. Waste removal facilities and services.

**1.02 TEMPORARY UTILITIES**

- A. Owner will provide the following:
  - 1. Electrical power, consisting of paying for utility charges on existing services.
    - a. Temporary power and lighting, refer to Div. 26.
  - 2. Water supply, consisting of paying for utility charges on existing services.
- B. Contractor will:
  - 1. Engage appropriate local utility company to install temporary service or connection to existing service. Where the utility company provides only part of the service, provide the remainder of the service with matching, compatible materials and equipment, comply with utility company requirements.
    - a. Arrange with the Utility Company, Owner and existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.
    - b. Provide adequate capacity at each stage of construction. Provide mobile power as needed before temporary power is connected.
    - c. If required, obtain easements to bring temporary utilities to the project site, where Owner's easements cannot be used for that purpose.
- C. Existing toilet facilities may not be used.
  - 1. Provide and maintain required sanitary facilities and enclosures. Provide at time of project mobilization.
  - 2. Maintain daily in clean and sanitary condition.
- D. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses as required by the local Fire Marshal or Building Official.
  - 1. If directed by the Building Official or Fire Marshal, provide fire watch with personnel acceptable to authorities until permanent fire-protection is activated.
  - 2. Provide temporary fire extinguishers, type and quantity as designated by local authorities.

**1.03 BARRIERS**

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way, exiting through the construction site and for public access to existing building.
  - 1. Review exiting that will be blocked with the local Fire Marshal and gain approval for exiting of those areas prior to blocking the exits.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

**1.04 EXTERIOR ENCLOSURES**

- A. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

### **1.05 INTERIOR PROTECTION**

- A. Provide temporary sound insulated partitions as indicated to separate work areas from the Owner's occupied areas, to prevent penetration of dust and moisture into the Owner's-occupied areas, and to prevent damage to existing materials and equipment.
- B. Construction: Framing, fiberglass insulation and gypsum board over plywood sheet materials with closed joints and sealed edges at intersections with existing surfaces.
  - 1. Maximum flame spread rating of 75 in accordance with ASTM E84.
- C. Limit food and soft drink consumption to within the Contractor's trailer or out of the building.

### **1.06 SECURITY**

- A. Provide security and facilities to protect Work, existing facilities, and the Owner's operations from unauthorized entry, vandalism, or theft.

### **1.07 VEHICULAR ACCESS AND PARKING**

- A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
- B. Coordinate access and haul routes with governing authorities and the Owner.
- C. Provide and maintain access to fire hydrants, free of obstructions.
- D. Provide means of removing mud from vehicle wheels before entering streets.
- E. Designated existing on-site roads may be used for construction traffic.
- F. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.
- G. Do not allow vehicle parking on existing pavement.

### **1.08 WASTE REMOVAL**

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- B. Provide containers with lids.
  - 1. Debris shall be removed from the construction site and police exterior project site area on a weekly basis at a minimum to clean-up any wind-blown or excess construction materials or debris and dispose of in construction dumpsters to maintain a clean project site.
- C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

### **1.09 CONSTRUCTION DUST CONTROL**

- A. Provide Construction Dust Control on projects with areas occupied during construction, including dust producing construction during punchlist correction.
- B. Air Quality Contaminant Control:
  - 1. Ventilate barricaded construction areas by use of fans to the outside of building.
  - 2. Maintain a minimum negative pressure of -0.01 inch (-0.254 mm) WC with door closed at barricade entrance openings by use of fans vented to outside of building.
    - a. Rebalance air handling equipment to maintain correct airflow to occupied areas as required.
  - 3. Secure operable exterior windows and interior doors/windows not required for construction access as required to maintain negative pressure.
  - 4. Provide additional local exhaust during welding.
- C. Dustproof enclosures:
  - 1. Install dustproof enclosures for work when required to protect areas occupied by the Owner from dust, debris and damage.
    - a. Enclosures must be tight to cut off any flow of dust particles into occupied areas by sealing openings with tape or other impenetrable sealant to seal barrier wall seams, cracks around window and door frames, exhaust system ductwork, pipes, floor penetrations, joints and ducts.
  - 2. Block supply and return ventilation as to not recirculate air from construction area to air handlers supplying occupied areas or to prevent contamination of existing ductwork to remain.
  - 3. Install filters on exterior air handling equipment intakes adjacent to exhaust fans.

4. For work creating dust outside of dustproof enclosures, provide temporary sealed enclosures around the work area.

D. Procedures:

1. Contractor shall maintain all construction dust control devices throughout the construction period.
  - a. Traffic between barricaded areas and open areas shall be kept to a minimum.
    - 1) Instruct workers to refrain from tracking dust into adjacent occupied areas or opening windows or doors allowing construction dust/airborne contaminants into adjacent occupied areas.
  - b. Whenever possible, transport materials and refuse into an area from an external site without violating occupied areas.
  - c. Execute work by methods to minimize raising dust from construction operations.
    - 1) Spray surfaces with water mist during dust-producing interior demolition activities.

**1.10 OPERATION, REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS**

- A. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
  1. Protect water piping from damage caused by freezing temperatures and similar elements.
  2. Maintain markers and protect underground utilities from damage during excavation operations.
- B. Temporary Facility Changeover: Except for using permanent fire protection as soon as available, do not change over from using temporary security and protection facilities to permanent facilities until Date of Substantial Completion.
- C. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
- D. Remove underground installations to a minimum depth of 2 feet (600 mm). Grade site as indicated.
- E. Clean and repair damage caused by installation or use of temporary work.
- F. Restore existing facilities and exterior landscaping used during construction to original condition.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION 01 50 00**

**SECTION 01 70 00**  
**EXECUTION AND CLOSEOUT REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Cleaning and protection.
- F. Starting of systems and equipment.
- G. Substantial Completion and Final Completion procedures, including Contractor's Correction Punch List, except payment procedures.

**1.02 COORDINATION**

- A. See Section 01 10 00 for occupancy-related requirements.
- B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- C. Notify affected utility companies and comply with their requirements.
- D. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- E. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- G. Coordinate completion and clean-up of work of separate sections.
- H. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

**PART 2 PRODUCTS**

**2.01 PATCHING MATERIALS**

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

**2.02 CLEANING MATERIALS**

- A. Cleaning materials as recommended by manufacturer of surface to be cleaned, as well as recommended by the cleaning material manufacturer for those materials being cleaned.
- B. Vacuums that are HEPA rated.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

### **3.02 PREPARATION**

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

### **3.03 PREINSTALLATION MEETINGS**

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect thirty days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
  - 1. Review conditions of examination, preparation and installation procedures.
  - 2. Review coordination with related work.
- E. Contractor to record minutes and distribute copies within two days after meeting to participants, with electronic copies to Architect, Owner, participants, and those affected by decisions made.

### **3.04 FINAL CLEANING COORDINATION MEETING**

- A. When requested by the Owner, the Construction Manager or General Contractor shall coordinate a final cleaning coordination meeting 30 days prior to the start of cleaning to establish the phasing of the areas to be final cleaned by the Cleaning Contractor and for reviewing the requirements of the final cleaning as required for Owner move-in.
- B. Attendants:
  - 1. Owner.
  - 2. Architect.
  - 3. Construction Manager or General Contractor.
  - 4. Cleaning Contractor.
- C. Cleaning Contractor in conjunction with the Construction Manager or General Contractor shall provide a detailed schedule, including a work plan, respective dates for each area and tasks for the work and quantity of personnel.

### **3.05 GENERAL INSTALLATION REQUIREMENTS**

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

### **3.06 ALTERATIONS**

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
  - 1. Verify that construction and utility arrangements are as indicated.
  - 2. Report discrepancies to Architect before disturbing existing installation.
  - 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
  - 1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 50 00 .



- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
  - 1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
  - 2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.
- D. Remove existing work as indicated and as required to accomplish new work.
  - 1. Remove items indicated on drawings.
  - 2. Relocate items indicated on drawings.
  - 3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
  - 4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- E. Services (Including but not limited to HVAC and Electrical): Remove, relocate, and extend existing systems to accommodate new construction.
  - 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
  - 2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
  - 3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
    - a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
    - b. Provide temporary connections as required to maintain existing systems in service.
  - 4. Verify that abandoned services serve only abandoned facilities.
  - 5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- F. Protect existing work to remain.
  - 1. Prevent movement of structure; provide shoring and bracing if necessary.
  - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
  - 3. Repair adjacent construction and finishes damaged during removal work.
- G. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
  - 1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
  - 2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
  - 3. Where a change of plane of 1/4 inch (6 mm) or more occurs in existing work, submit recommendation for providing a smooth transition for Architect review and request instructions.
- H. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- I. Refinish existing surfaces as indicated:
  - 1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
  - 2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
- J. Clean existing systems and equipment.

- K. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- L. Do not begin new construction in alterations areas before demolition is complete.
- M. Comply with all other applicable requirements of this section.

### **3.07 CUTTING AND PATCHING**

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
  - 1. Complete the work.
  - 2. Fit products together to integrate with other work.
  - 3. Provide openings for penetration of mechanical, electrical, and other services.
  - 4. Match work that has been cut to adjacent work.
  - 5. Repair areas adjacent to cuts to required condition.
  - 6. Repair new work damaged by subsequent work.
  - 7. Remove samples of installed work for testing when requested.
  - 8. Remove and replace defective and non-complying work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing.
  - 1. In existing work, minimize damage and restore to original or specified condition.
- E. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- G. Restore work with new products in accordance with requirements of Contract Documents.
- H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 84 00, to full thickness of the penetrated element.
- J. Patching:
  - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
  - 2. Match color, texture, and appearance.
  - 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

### **3.08 PROTECTION OF INSTALLED WORK**

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Protect work from spilled liquids. If work is exposed to spilled liquids, immediately remove protective coverings, dry out work, and replace moisture soaked materials.
- G. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- H. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

### **3.09 SYSTEM STARTUP**

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Coordinate start-up schedule with Architect and Owner prior to start-up of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

### **3.10 DEMONSTRATION AND INSTRUCTION**

- A. See Section 01 79 00 - Demonstration and Training.

### **3.11 ADJUSTING**

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

### **3.12 FINAL CLEANING**

- A. Execute final cleaning prior to Substantial Completion.
- B. Use cleaning materials that are nonhazardous.
- C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, grease, dust, fingerprints polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- F. Replace filters of operating equipment as specified in Division 23 specifications
- G. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
- H. Clean site; sweep paved areas, rake clean landscaped surfaces.
- I. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.
- J. Coordinate with the Construction Manager or General Contractor to have marred surfaces repaired, patched or touched-up to match adjacent surfaces.
- K. Maintain cleaning until the building or portion thereof, is occupied by the Owner.

### **3.13 SUBSTANTIAL AND FINAL COMPLETION PROCEDURES**

- A. Make submittals that are required by governing or other authorities.
  - 1. Provide copies to Architect and Owner.
- B. Obtain and submit to the Architect a Certificate of Occupancy from AHJ.
- C. Provide preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.
- D. Notify Architect in writing when work is considered ready for Architect's Substantial Completion inspection.
- E. Architect will visit the project to evaluate the request for issuance of a Certificate of Substantial Completion.
  - 1. If the Architect concurs that the Project is substantially complete, the Architect will deliver a Certificate of Substantial Completion and a list of work items necessary for completion or correction prior to request for inspection for final completion.
  - 2. If the Architect determines that the work is not substantially complete, the Architect will deliver to the Contractor a written statement including reasons.
- F. Complete work on the items required by the Architect for achieving substantial completion and make additional written requests for issuance of a Certificate of Substantial Completion until the Architect determines that sufficient Work has been performed.
- G. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.

- H. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.
- I. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- J. When the punchlist work is considered complete, submit written certification that:
  - 1. When work is considered finally complete and ready for Architect's Final Completion inspection.
  - 2. The Building Permit has been finalized by the AHJ and submit a copy for the Architects and Owners record.
- K. Architect will make an inspection to verify the status of completion with reasonable promptness after receipt of such certification.
  - 1. Should Architect consider that the Work is incomplete or defective:
    - a. Architect will notify the Contractor in writing, listing the incomplete or defective work.
      - 1) Take immediate steps to remedy the stated deficiencies and send a second written certification to Architect that the Work is complete.
      - 2) Architect will reinspect the Work.
  - 2. Should Architect perform reinspection's due to failure of the Work to comply with the claims of status of completion made by the Contractor:
  - 3. Owner will compensate Architect for such additional services.
    - a. Owner will deduct the amount of such compensation from the final payment.

**END OF SECTION 01 70 00**

**SECTION 01 78 00  
CLOSEOUT SUBMITTALS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Project record documents.
- B. Operation and maintenance data.
- C. Warranties and bonds.

**1.02 SUBMITTALS**

- A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
- B. Operation and Maintenance Data:
  - 1. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
  - 2. Submit one copy of completed documents 15 days after Substantial Completion. This copy will be reviewed and returned, with Architect comments. Revise content of all document sets as required prior to final submission.
  - 3. Submit two sets of revised final documents in final form and one digital copy 60 days before final inspection.
- C. Warranties, Bonds and other required forms:
  - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
  - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
  - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.
- D. Final Adjustment of Accounts.
  - 1. Make submittals within 30 days prior to final Application for Payment.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 PROJECT RECORD DOCUMENTS**

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
  - 1. Drawings.
  - 2. Specifications.
  - 3. Change Orders and other modifications (accepted PR's, SI's and CCD's) to the Contract.
  - 4. Reviewed shop drawings, product data, and samples.
  - 5. Field test reports.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction in a location protected from the weather.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
  - 1. Manufacturer's name and product model and number.
  - 2. Product substitutions accepted during construction.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
  - 1. Label each set of Drawings "RECORD DOCUMENTS".
  - 2. Measured depths of foundations in relation to finish first floor datum.
  - 3. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - 4. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
  - 5. Field changes of dimension and detail.

6. Details not on original Contract drawings.
- G. Shop Drawings – Label each set by corresponding specification section. At the completion of the project, provide the Owner with one complete set, reviewed and stamped by architect, organized by specification section in the following formats:
  1. Paper (various sizes) folded to 8 1/2” x 11” and boxed with project name and completion date clearly labeled on exterior.
  2. Scanned PDF copy on a flash drive, ordered by specification section.

### **3.02 OPERATION AND MAINTENANCE DATA**

#### **A. Physical Format for Binders:**

1. Commercial quality three-ring binders with durable , cleanable plastic cover in 8-1/2 x 11 inch (215.9 x 279.4 mm) size and maximum thickness of 2 inches (50.8 mm).
  - a. When multiple binders are used, correlate the data into related consistent groupings.
2. Manufacturer's printed data or typed pages on 20 pound (9.072 kg) weight white paper.
3. Provide fly-leaf for each separate product, or each piece of operating equipment.
  - a. Provide typed description of product, and major component parts of equipment.
  - b. Provide indexed tabs.
4. Identify each volume with typed or printed title "OPERATING, MAINTENANCE AND WARRANTY INSTRUCTIONS". Listing:
  - a. Title of Project
  - b. Identity of separate structure as applicable.
  - c. Identity of general subject matter covered in the manual.
5. Drawings:
  - a. Provide reinforced punched binder tab, bind in with text.
  - b. Fold larger drawings to the size of the text pages.

#### **B. Digital Format:**

1. Submit one PDF copy on a flash drive.

#### **C. Content:**

1. Arrange neatly typewritten table of contents for each volume, in the following systematic order.
  - a. Contractor, name of responsible principal, address and telephone number.
  - b. A list of each product required to be included, indexed to the content of volume.
  - c. List, with each product, the name, address and telephone number of:
    - 1) Contractor or installer.
    - 2) Maintenance contractor, as appropriate.
    - 3) Identify the area of responsibility of each.
    - 4) Local source of supply for parts and replacement.
    - 5) Include warranty information as specified.
  - d. Identify each product by product name and other identifying symbols such as set in Contract Documents.
2. Product Data
  - a. Include only those sheets which are pertinent to the specific product.
  - b. Annotate each sheet to clearly identify the specific product or part installed.
3. Content, for moisture-protection and weather-exposed products:
  - a. Manufacturer's data, giving full information on products.
    - 1) Applicable standards
    - 2) Chemical composition
    - 3) Details of installation
    - 4) Instructions for inspection, maintenance and repair.
4. Additional requirements for maintenance data: The respective technical sections of the Project Manual.

### **3.03 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS**

- A. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

### **3.04 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS**

- A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- C. Binders: Commercial quality, 8-1/2 by 11 inch (216 by 280 mm) three D side ring binders with durable plastic covers; 2 inch (50 mm) maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
- F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
- G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
- H. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.
- I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

### **3.05 WARRANTIES AND BONDS**

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after Substantial Completion. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized including:
  - 1. Contractor's Affidavit of Payment of Debts and Claims, AIA Document G706, with exceptions itemized by subcontractor and amounts owed each.
  - 2. Contractors Affidavit of Release of Liens, AIA Document G706A.
  - 3. Consent of Surety to Final Payment on Consent of Surety Company to Final Payment, AIA Document G707.
  - 4. Warranties and Bonds.

### **3.06 FINAL ADJUSTMENT OF ACCOUNTS TO FINAL PAYMENT**

- A. Submit a final statement of accounting to the Architect.
- B. Statement shall reflect all adjustments to the Contract Sum:
  - 1. The original Contract Sum.
  - 2. Additions and deductions resulting from:
    - a. Previous Change Orders.
    - b. Allowances.

**END OF SECTION 01 78 00**



**SECTION 01 79 00**  
**DEMONSTRATION AND TRAINING**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Demonstration of products and systems where indicated in specific specification sections.
- B. Training of Owner personnel in operation and maintenance is required for:
  - 1. All software-operated systems.
  - 2. Electrical systems and equipment.
  - 3. Items specified in individual product Sections.
- C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
  - 1. Items specified in individual product Sections.

**1.02 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Training Plan: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
  - 1. Submit to Architect for transmittal to Owner.
  - 2. Submit not less than four weeks prior to start of training.
  - 3. Revise and resubmit until acceptable.
  - 4. Provide an overall schedule showing all training sessions.
  - 5. Include at least the following for each training session:
    - a. Identification, date, time, and duration.
    - b. Description of products and/or systems to be covered.
    - c. Name of firm and person conducting training; include qualifications.
    - d. Intended audience, such as job description.
    - e. Objectives of training and suggested methods of ensuring adequate training.
    - f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
    - g. Media to be used, such as slides, hand-outs, etc.
    - h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.
- C. Training Manuals: Provide training manual for each attendee as designated by the Owner:
  - 1. Include applicable portion of O&M manuals.
  - 2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
  - 3. Provide one extra copy of each training manual to be included with operation and maintenance data.
- D. Video Recordings: Submit digital video recording of each demonstration and training session for Owner's subsequent use.
  - 1. Format: DVD Disc.
  - 2. Label each disc and container with session identification and date.

**1.03 QUALITY ASSURANCE**

- A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
  - 1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
  - 2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 DEMONSTRATION - GENERAL**

- A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.
- B. Demonstration may be combined with Owner personnel training if applicable.

- C. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
  - 1. Perform demonstrations with-in one month after Substantial Completion, unless directed differently by the Owner.
  - 2. For equipment or systems requiring seasonal operation, perform demonstration for other season within eight months.
- D. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
  - 1. Perform demonstrations with-in one month of Substantial Completion, unless directed differently by the Owner.
- E. Demonstration and Training Recording: Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
  - 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
  - 2. Submit media to Owner with-in two weeks of date the Demonstration and Training occurred.

### **3.02 TRAINING - GENERAL**

- A. Conduct training on-site unless otherwise indicated.
- B. Owner will provide classroom and seating at no cost to Contractor.
- C. Provide training in minimum two hour segments.
- D. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.
- E. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
  - 1. The location of the O&M manuals and procedures for use and preservation; backup copies.
  - 2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
  - 3. Typical uses of the O&M manuals.
- F. Product- and System-Specific Training:
  - 1. Review the applicable O&M manuals.
  - 2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
  - 3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
  - 4. Provide hands-on training on all operational modes possible and preventive maintenance.
  - 5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
  - 6. Discuss common troubleshooting problems and solutions.
  - 7. Discuss any peculiarities of equipment installation or operation.
  - 8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
  - 9. Review recommended tools and spare parts inventory suggestions of manufacturers.
  - 10. Review spare parts and tools required to be furnished by Contractor.
  - 11. Review spare parts suppliers and sources and procurement procedures.
- G. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

### **3.03 DEMONSTRATION**

- A. Manufacturer's onsite field technician shall demonstrate the operation of items specified in the specific Technical Sections to the Owner.
  - 1. A video outlining the operation of the item or system, scheduled maintenance, basic troubleshooting and care of the item or system shall be provided to the Owner by the manufacturer.

**END OF SECTION 01 79 00**

## SECTION 26 05 00

### COMMON WORK RESULTS FOR ELECTRICAL

#### PART 1: GENERAL

##### 1.1 SCOPE

- A. This section includes:
  - 1. Electrical equipment coordination and installation.
  - 2. Sleeves for raceways and cables.
  - 3. Sleeve seals.
  - 4. Grout.
  - 5. Common electrical installation requirements.
  - 6. Sleeves and seals for raceways.
  - 7. Fire-stopping.
- B. This Section covers basic electrical requirements for providing labor, materials, equipment, and services necessary for the proper completion of all electrical work as shown on the drawings and specified herein. In general, this consists of wiring for light and power, installation of electrical systems, installation of lighting fixtures and any other equipment as hereinafter specified or required. Electrical work shall be complete with all documentation, wiring, conduit, fittings, equipment, and connections as specified or required. The omission of express reference to any items or work necessary for, or reasonably incidental to, a complete installation shall not be construed as releasing the Contractor from providing such items or work.
- C. Conditions of the Contract (General and Supplementary Conditions) and Division 1, General Requirements, govern the Work of Divisions 26, 27 and 28 specification sections.
- D. This section applies to all work in Divisions 26, 27 and 28 specification sections.

##### 1.2 DEFINITIONS

- A. The terms listed below are defined as follows only when used in Division 26, 27 and 28.
  - 1. Work: Labor and materials of the Contractor and/or Sub-contractor.
  - 2. Furnish: Obtain, coordinate, submit the necessary drawings, deliver to the job site in new condition and guarantee.
  - 3. Install: Receive at the job site, unload, store, set in place, connect, place in operation and guarantee.
  - 4. Provide: Furnish and install.
  - 5. Connect: Bring service to the equipment and make final attachment including necessary switches, outlets, connections, etc.
  - 6. Conduit: Includes, in addition to conduit, all fittings, pull boxes, hangers, and other supports and accessories related to such conduit.
  - 7. Concealed: Hidden from sight in chases, furred spaces, shafts, hung ceilings, embedded in construction, in crawl spaces or buried.
  - 8. Exposed: Not installed underground nor concealed as defined above.
  - 9. The building structure or building structural members consist of steel columns, steel beams, steel joists (top chord and at panel points), concrete walls and concrete block walls. Metal decking, joist bridging and bottom chords of bar joists shall not be construed as building structure or as a building structural member for the purpose of support.
- B. Provide Electrical work which is finished work, tested and ready for operation.
  - 1. Apparatus, appliances, material or work not indicated or any incidental accessories necessary to make the work complete and ready for operation, even though not specified nor shown on the drawings, are to be provided.
  - 2. Should there be any discrepancies or a question of intent, refer the matter to the Architect/Engineer for decision before ordering equipment or materials and before starting any related work.
  - 3. Where work connects to that of another trade, or to wiring or equipment in place, take measurements in the field to make connecting work come true and line up with the item being connected.

### **1.3 CONTRACTOR**

- A. The Contractor shall not employ a proposed project manager to whom the Owner or Engineer has made reasonable and timely objection. The Contractor shall not change the project manager without the Owner's consent, which shall not unreasonably be withheld or delayed.

### **1.4 INSPECTION OF SITE BEFORE CONSTRUCTION**

- A. Before submitting a proposal on the work contemplated, bidder shall examine the site of the proposed work and thoroughly familiarize himself/herself with existing conditions and limitations affecting the performance of his work. No extra compensation will be allowed because of misunderstanding as to the amount of work involved or the bidder's failure to verify existing conditions which he could have discovered or reasonably anticipated prior to bidding. Contractor shall be responsible for any additional cutting, patching, mounting or installation modifications, etc., not called out on the drawings but required for the successful completion of the job.
- B. This includes any additional work required due to any existing jobsite condition (i.e., the construction of walls, ceiling spaces, clearances, available voltages, mounting requirements, existing equipment coordination, hazardous materials, etc) that the contractor had an opportunity to determine in the pre-bid walk-through and could have reasonably determined before the bid by visual inspection or by asking the Engineer or Owner. No additional money shall be awarded for additional work incurred caused by existing jobsite conditions which could have been verified by the contractor prior to bid. In addition, no additional money shall be awarded for failure to properly coordinate with other trades.

### **1.5 PLAN INTERPRETATION**

- A. The plans are diagrammatic and indicate the arrangement of systems and equipment unless indicated otherwise by dimensions or detail plans of 1/4" = 1'-0" scale or larger. Refer to dimensioned plans for exact locations of building elements. However, field measurements take precedence over dimensioned plans. Report any differences discovered between electrical plans and the plans for other divisions. The installation of all systems and equipment is subject to clarification as indicated in reviewed shop drawings.
- B. Equipment outlines shown on detailed plans of 1/4" = 1'-0" scale or larger and/or dimensions indicated on the plans are limiting dimensions. Do not install any equipment that exceeds the equipment outlines shown or reduces indicated clearances.

### **1.6 SUBMITTALS**

- A. Provide the following submittals.
  - 1. Shop Drawings shall be submitted for approval for equipment listed in the following Division 26, 27 and 28 sections.
  - 2. Samples of equipment or system components shall be submitted for examination/approval as requested.
  - 3. Instructions and Manuals. Provide on-site training and copies of instruction manuals to Owner designated personnel for operation, maintenance and warranty of electrical systems.
  - 4. Test Reports. Reports shall be submitted outlining the results of testing performed for the installed equipment as described herein.
  - 5. As-Built / Record Drawings. Keep layout plans for each system on the job site, marking changes made during installation. At completion of the project, this set of Record drawings shall be submitted as described herein.
  - 6. Warranty. Warranty information shall be submitted upon project completion.
  - 7. Rebates. Contractor shall provide all receipts as necessary for utility rebates and forward to Engineer / Owner. Contractor shall assist rebate application process by providing site data; including existing and proposed device / fixture counts and power usage.

### **1.7 PERMITS, LICENSES AND FEES**

- A. The Contractor shall secure all permits and licenses, both temporary and permanent required for his work. The Contractor shall pay all fees and expenses required for the permits and licenses.
  - 1. The Contractor shall request inspections as required by regulating agencies and/or regulations. The Contractor shall pay all charges for inspections.

2. Contractor shall furnish the Owner with a certificate of final inspection and approval by enforcement authorities. Include a copy of all permits pulled, signed for completion, in closeout documents.
3. Comply with requirements of Division 00.
4. Refer to 26 27 01 Electrical Utility Coordination for requirements pertaining to Utility fees.

## **1.8 QUALITY ASSURANCE**

- A. Workmanship - All Work on each system complying with these Specifications shall be carried out and/or managed by a competent firm. The respective contractor(s) shall be regularly engaged in the installation and testing of the system that is their responsibility. If requested, the Contractor shall furnish evidence of its qualifications to perform the Work specified. Evidence may be a listing of major lines of equipment for which the Contractor is a dealer. This evidence may also include a list of projects of similar scope and size that the Contractor has performed, including names of contacts and phone numbers for each project.
- B. Codes - Materials and workmanship shall comply with the most recently adopted applicable codes. As a minimum, codes include: All State and Federal laws, local ordinances, utility company regulations and requirements and recommendations of the following:
  1. State and Local Building codes
  2. Life Safety Code
  3. International Building Code
  4. State Industrial Commission Regulations
  5. State and Local Fire Codes and Regulations
  6. International Fire Code
  7. National Electric Code
  8. State and Local Electrical Codes
  9. Occupational Safety and Health Administration Regulations
  10. Environmental Protection Agency
  11. If these specifications with accompanying drawings are in any way at variance with these codes, the above cited codes shall govern and the Contractor shall make this installation accordingly, except where the drawings or specifications call for a higher quality of work than required by the Code.
- C. Standards - These shall be used where referenced by the following abbreviations:
  1. ADA: American Disabilities Act
  2. AIA: American Insurance Association
  3. AIA: American Institute of Architects
  4. ANSI: American National Standards Institute
  5. ASTM: American Society of Testing and Materials
  6. EPA: Environmental Protection Agency
  7. FM: Factory Mutual Insurance Association
  8. IEEE: Institute of Electrical and Electronic Engineers
  9. IES: Illuminating Engineering Society of North America
  10. NBS: National Bureau of Standards
  11. NECA: National Electrical Contractors Association
  12. NEMA: National Electrical Manufacturers Association
  13. NFPA: National Fire Protection Association
  14. NEIS: National Electrical Information Standards
  15. NSC: National Safety Council
  16. OSHA: Occupational Safety and Health Act
  17. TIA/EIA: Telecommunication Electronic Industry/Electronic Industry Association
  18. UL: Underwriter's Laboratories

## **1.9 CORRELATION / COORDINATION OF WORK**

- A. Consult the drawings and specifications of Mechanical and other trades for correlating information and lay-out work so that it will coordinate with other trades. Verify dimensions and conditions (i.e. finished ceiling heights, footing and foundation elevations, beam depths, etc.) with the Architectural and Structural drawings. If conflicts occur such that resolution is not possible by the affected trades on the job, the Architect/Engineer shall be notified so that the proper changes can be made to avoid extra cost to the Owner.

- B. Where work must be replaced due to the failure of the Contractor to verify the conditions existing on the job, such replacement must be accomplished at no cost to the Owner. This shall apply to shop fabricated work as well as to work fabricated in place.
- C. Throughout the course of the work, minor changes and adjustments to the installation may be requested by the Engineer. The Contractor shall make adjustments without additional cost to the Owner, where such adjustments are necessary, to the proper installation and operation within the intent of the Contract Documents. This does not include work already completed.
- D. Coordinate arrangement, mounting, and support of electrical equipment, so that connecting raceways, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- E. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- F. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Panels" and "Steel Doors and Frames."
- G. Coordinate electrical service connections to components furnished by utility companies. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for electric-metering components. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services.
- H. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface. Where acoustical ceilings and similar finishes will conceal electrical identification markings and devices, coordinate installation of these items before ceiling installation.
- I. Coordinate selection and application of firestopping specified in Division 07 Section "Firestopping".

#### **1.10 CORRECTIVE PERIOD / GUARANTEE**

- A. The Contractor shall guarantee and maintain the stability of work and materials and keep same in perfect repair and condition for the period of one (1) year after the Date of Substantial Completion of the Project.
- B. Defects of any kind due to faulty work or materials appearing during the above mentioned period must be immediately made good by the Contractor at his own expense to the entire satisfaction of the Owner and Architect and Engineer. Such reconstruction and repairs shall include damage to the finish or the building resulting from the original defect or repairs thereto.
- C. This guarantee shall not apply to injuries occurring after final acceptance and due to wind, fire, violence, abuse or carelessness or other Contractors or their employees or the agents of the Owner.
- D. This guarantee shall not apply where other guarantees for different lengths of time are specifically called for.

### **PART 2: PRODUCTS**

#### **2.1 ACCEPTABLE MANUFACTURERS.**

- A. Duly authorized distributors shall represent equipment and systems to be used on this project with service departments regularly engaged in the maintenance and installation of these systems and equipment. Such service departments shall regularly stock standard replacement parts and equipment and shall be located within a reasonable distance from the installation site.

## **2.2 MATERIALS**

- A. Materials and equipment shall be listed, labeled, or certified by a nationally recognized testing laboratory, such as Underwriters Laboratories (UL). Materials and equipment shall be of current production by a manufacturer regularly engaged in the manufacture of such items from which replacement parts shall be available. When items are specified by manufacturer's name or catalog designation, it shall be understood that this is to establish the class, features, quality rating, duty and, in the case of visible building elements such as lighting fixtures, service fittings, control panels, and the like, appearance. Materials shall be consistent (identical manufacturer and model, unless otherwise noted) throughout all phases of the project.

## **2.3 APPROVAL / SUBSTITUTION OF MATERIALS**

- A. Refer to General conditions and Division 01 for approval requirements.
- B. Refer to General conditions and Division 01 for substitution requirements.
  - 1. Where approved substitutes are used, the Contractor assumes responsibility for physical dimensions and other resulting changes. This responsibility extends to include extra work required by other trades as result of the substitution. Substituted equipment which requires additional costs by other trades in its application shall have such costs borne by the contractor furnishing the equipment.
  - 2. The Contractor shall assume any costs associated with the replacement of a non-specified product, unapproved by the Engineer, with an as-specified product.

## **2.4 MATERIAL PROTECTION**

- A. Material and equipment shall be protected during shipment and storage against physical damage, dirt, moisture, cold, and rain. During installation, enclosures, equipment, controls, controllers, circuit protective devices, and other like items shall be protected against entry of foreign matter and be vacuum cleaned both inside and outside before testing and operating and repainting if required. Damaged equipment shall be, as determined by the Engineer, placed in first class operating condition or be returned to the source of supply for repair or replacement. Damaged paint on equipment and materials shall be refinished to the satisfaction of the Engineer.

## **2.5 OWNER'S RIGHT OF RETENTION**

- A. Firmware, hardware, and software which is necessary to run the Project systems and/or equipment provided hereunder, shall become the property of the Owner. Such firmware, hardware, and software shall be upgradable and/or editable by the Owner to facilitate future functional changes and/or additions or deletions without cost or the need for second party software.

## **2.6 SLEEVES FOR RACEWAYS AND CABLES**

- A. Provide sleeves for all cables passing through walls and floors. Provide sleeves for conduits passing through floors, footings, and/or exterior walls. Provide sleeves for conduits 1-1/4" and larger passing through walls.
- B. Provide sealing material at pipe sleeves that must be sealed against hydrostatic pressure, i.e. footing penetrations. Sleeve seals are usually furnished with EPDM sealing elements, plastic pressure plates, and carbon-steel bolts. NBR and silicone sealing elements, carbon- and stainless-steel pressure plates, and stainless-steel bolts are available for special applications.
- C. Sleeves for penetrations through rated walls and floors shall conform to the requirements of Specification 07 84 00 "Firestopping".

## **2.7 FIRESTOPPING AND SEALS**

- A. Seal all openings around conduit or other electrical work penetrating fire and smoke rated partitions, floors, and ceilings. Firestop material shall comply with UL 1479, NEC 300-21, and NEC 800-3(c), and conform to the requirements of Specification 07 84 00 "Firestopping".
- B. All sleeves and conduits penetrating walls built to deck require sealant. Refer to Division 07 Section "Sealants and Caulking" for materials and installation. Refer to Architectural Details for more information.

## **2.8 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION**

- A. Material, equipment, or systems as shown and/or specified shall be new and installed in accordance with manufacturer's recommendations and industry standards as applicable. Electrical Work shall be installed in a professional, neat, workmanlike manner, as per NECA / NEIS. Electrical equipment shall be adequately and securely mounted and supported.
1. Outdoor/Underground/Wet. All electrical Work installed where subject to the elements and/or water, wash down areas, shall be rated for such areas.
  2. Hazardous Locations. All electrical Work installed in classified hazardous areas, i.e. paint storage, shall be rated for such areas.
  3. Penetrations. Locate holes in advance where they are proposed in the structural sections such as ribs or beams. Obtain the approval of the Resident Engineer prior to drilling through structural sections. Electrical Work installed between different environments shall be sealed to prevent moisture or contaminants from traveling from one area to another.
  4. Grounding / Bonding. Electrical equipment and materials shall be grounded and bonded in accordance with NEC Article 250 and as specified herein or on the drawings.
  5. Fireproofing. Electrical materials and equipment shall be installed so as to prohibit the spread of fire. Fire-stop wall, floor, and ceiling penetrations to the same fire-rating as the penetrated wall, floor, or ceiling.
  6. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
  7. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
  8. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
  9. Right of Way: Give to piping systems installed at a required slope.
  10. All labeling, identification or programming related to room numbering shall follow the Owner's final room numbering scheme. Obtain documentation of Owner's final room numbering prior to final labeling and/or programming. Identification of all systems shall utilize Owner's final room numbers.

## **2.9 PENETRATIONS**

- A. Penetrations - Where raceways pass through fire partitions, fire walls, or smoke partitions, then provide firestopping seals as specified in Division 07 Section "Penetration Firestopping".
- B. Where multiple low-voltage conduits penetrate a full-height-to-structure partition (sound wall), and the area of such conduits is equivalent to or greater than (1) 4" conduit, then provide firestopping seals as specified in Division 07 Section "Penetration Firestopping".

## **2.10 FIRESTOPPING**

- A. Apply firestopping material to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

## **2.11 INSTALLATION OF SLEEVES**

- A. Coordinate sleeve locations.
1. Where raceways pass through floors, floors shall be core drilled and appropriately sized sleeves shall be installed. Sleeves shall terminate not less than 3 inches above floor slabs and not less than 3 inches below the ceiling of the floor below. Completely seal clearances between the raceway and sleeve, and make watertight. Low-voltage sleeves shall be bushed.
  2. Schedule 40 pipe sleeves shall have at least three (3) concrete anchors.
  3. Set all sleeves true to line, grade and position and plumb or level after concrete is poured. Correct any deviation from proper position.
  4. Provide galvanized steel tube sleeve 1 1/2" larger than O.D. of conduit. Sleeve shall have wall thickness of 0.061 inches.



5. Where conduits pass through exterior concrete walls below grade, caulk both sides with oakum and lead wool or otherwise adequately waterproof the openings around the conduit.
6. Caulk spaces between pipe and floor sleeves inside the building with a waterproof caulking material. Spaces between pipe and exterior partition sleeves shall be caulked with fiber glass insulation.
7. Seal space outside of sleeves with grout for penetrations of concrete and masonry
8. Aboveground, Exterior-Wall Penetrations: Seal penetrations using pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
9. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway and sleeve for installing mechanical sleeve seals.

## **2.12 DELIVERY, STORAGE, AND HANDLING**

- A. Store and protect products to be installed or turned over to Owner.
- B. Store material and products in a clean and dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect products from dirt, water, construction debris, and traffic. Material and equipment shall be protected during shipment and storage against physical damage, dirt, moisture, cold, and rain. During installation, enclosures, equipment, controls, controllers, circuit protective devices, and other like items shall be protected against entry of foreign matter and be vacuum cleaned both inside and outside before testing and operating and repainting if required. Damaged equipment shall be, as determined by the Engineer, placed in first class operating condition or be returned to the source of supply for repair or replacement. Damaged paint on equipment and materials shall be refinished to the satisfaction of the Architect/Engineer.

## **2.13 CLEAN UP**

- A. Contractor shall at all times keep the premises free from accumulation of waste material or rubbish caused by his employees or work. Upon completion of the work he shall remove his rubbish, tools, scaffolding, and surplus materials from and about the building, and shall leave his work areas "broom clean" or its equivalent. Electrical equipment shall be cleaned with temporary identification removed. In case of dispute the Owner will remove the rubbish and charge the cost to the Contractor.
- B. After tests have been made and accepted, the Electrical Contractor shall go over the whole job and clean light fixtures, panels and other equipment installed by him/her, leaving the entire plant in a clean and complete working order.

## **2.14 PAINTING**

- A. Refinish all electrical equipment damaged during shipping and/or installation to its original condition. Remove all rust; prime, and paint per manufacturer's recommendations for finish equal to original.

## **2.15 FIELD TESTS AND ADJUSTMENTS**

- A. Work shall, upon completion, be subjected to such tests as are required under industry standards and/or specified herein. Acceptance of the Work by the Engineer shall be contingent upon satisfactory completion of these tests. Actual tests required shall be specified under their respective sections.
- B. Prior to completion, the Work shall be subjected to a careful and thorough visual inspection to detect erroneous or loose connections, presence of foreign objects or materials, poor workmanship, incorrect ratings of overcurrent protective devices or equipment, compliance with drawings, or other abnormal conditions.
- C. Tests shall be scheduled in advance so that a representative of the Engineer may be present. Test Reports shall be tabulated by the Contractor including the pertinent readings or observations, as well as a statement of the method and specific equipment employed, and shall be filed with the Engineer as part of the permanent Project record. In cases of test failure, it shall be agreed that the corrective measures proposed are adequate before making repairs. A second test shall be conducted upon completion of repairs, adjustments, or replacements.
- D. The Contractor shall provide calibrated test equipment and temporary energy sources as required for tests.

## 2.16 SUBMITTALS

- A. The Contractor shall submit the following information to the Engineer:
1. Shop Drawings shall be first checked by the Electrical Contractor for space/dimensional considerations, performance characteristics, and general conformance to these plans and/or specifications, and shall be so stamped.
    - a. Shop drawings not stamped as specified will be returned to the Contractor without action. Contractor's stamp shall include his corporate name and address, the name of the checker, and the date. They shall then be sent to the General Contractor (as applicable) who will stamp them and forward to the Engineer.
    - b. One copy of the shop drawings for any item shall be submitted to the Engineer for approval. Drawing size shall be no larger than 11" x 17".
    - c. Submittals shall be grouped according to specification Section or categories and shall be labeled with the proper name of the project and specification Section. Partial submittals of a group or category will not be reviewed (e.g., submit all panels, all lighting fixtures, etc.).
  2. Test Report. Copy of test report, as detailed above, shall be submitted.
  3. As-Built / Record Documents. A set of construction documents shall be continuously marked during progress of construction to show actual circuit routing and makeup, equipment location changes, and variations between the project work, record-drawings, and the Contract documents. Such markings shall be made neatly and legibly with red felt-tipped pen. Submit with operation, maintenance and warranty data manuals.
  4. Installation and Maintenance Manuals. Copies of Installation Instructions and Operation, Maintenance and Warranty Data Instruction Manuals shall be furnished for electrical equipment furnished. These Manuals shall include parts lists, troubleshooting methods, lubrication recommendations, and calibration instructions. Manuals shall be made up with hard cover post type binders such as Federal 'Super-Lok.' Large sheets shall be neatly folded and installed with posthole reinforcements such that the sheets will unfold without need to open binder posts. Manuals shall include index, section tabs, approved shop drawings, installation, operation, maintenance and warranty data instructions packed with equipment, parts lists, and any other data as necessary and/or appropriate for the user to have.
  5. Software. Prior to project completion, and before final payment is made, the Contractor shall provide the Owner a hard copy printout of any PLC code and electronic media copies of PLC code and SCADA software, etc.

## 2.17 COMPLETION OF INSTALLATION

- A. System Acceptance. System optimization shall be performed to make sure that each electrical system is properly installed and that all components are working properly. This shall include, but not be limited to:
1. Equipment is functioning properly.
  2. Equipment is mounted in the correct location.
  3. Equipment is rigidly and securely mounted.
  4. Equipment is installed in a neat and visually professional manner.
  5. Equipment is clean.
  6. The training of operations personnel is complete.
  7. Final Inspection. Upon completion of the work, notify the Engineer that the Project is complete and ready for inspection. The Engineer will schedule an inspection and generate a list of items to be corrected or completed before contract closeout. If the Engineer is requested to make a final inspection by the Contractor, and the Engineer finds work is not complete enough to perform that inspection, the Contractor will compensate the Engineer for their time. The Contractor will then perform the necessary work to complete the project and again request a Final Inspection.
- B. Training. The Contractor shall furnish training for the operating and maintenance personnel of the Owner of the recommended and proper operation and maintenance of electrical systems. Training shall be both of the classroom type and the hands-on type, and shall cover all areas of maintenance and operation. Training shall be coordinated with the Engineer and Owner to allow videotaping, if requested by Owner.
1. The training period may be either concurrent with the system start-up or follow the start-up period at the Contractor's option; however, if it is given concurrent to the start-up, then the instructing personnel shall be furnished in addition to the start-up personnel and one shall not interfere with the other.
  2. Actual training periods and their scopes shall be specified under their respective Section. Scheduling of the Owner's personnel shall be mutually agreed upon between the Contractor and the Project Engineer.

- C. Cleanup. Keep the premises free from accumulation of waste material and rubbish. Remove debris from the job site and leave work areas broom clean upon completion of the work.
- D. Spare Parts. Spare parts shall be turned over to the Owner at the completion of the Project. The spare parts shall not be used during start-up or warranty. Package spare parts for protection against dirt and moisture.

**2.18 GUARANTEE (WARRANTY).**

- A. Unless specified in another Section, the warranty shall be described herein. The Contractor shall guarantee the equipment and systems to be free of defects in design, equipment, and workmanship for a period of one year from the date of acceptance as issued by the Architect's certificate of completion. The Contractor shall replace, redesign, and correct any equipment that fails within the one-year period.

**END OF SECTION 26 05 00**

## SECTION 26 05 03

### ELECTRICAL DEMOLITION

#### PART 1: GENERAL

##### 1.1 SCOPE

- A. This Section includes all labor, material, equipment, and services necessary and incidental to complete all the demolition and removal of all electrical systems as noted on the Drawings.

##### 1.2 EXAMINATION

- A. Examine the building to determine actual conditions and report any significant discrepancies with the Architect/Engineer for clarification. These examinations should include verifying field measurements, circuiting arrangements, and wiring that will be abandoned and that serves only abandoned equipment. Where new additions or penthouses are being constructed by this project that create openings in ceilings areas or roof, field visit the site to determine extent of conduit/wire relocation work and include in Bid.
- B. Contractor shall assume in his bid that existing equipment and fixtures to be reused are in good working condition and can be installed without any repairs. If certain items are found to be in need of repair or in unusable condition, Contractor shall notify the Engineer for decision. However, Contractor shall be responsible for any damage caused by him to equipment in removal or handling.
- C. The Electrical Contractor shall review the electrical equipment in and around the areas in which demolition work is to be performed. The Electrical Contractor shall submit a written list of items not working or broken to the Architect/Engineer. Upon completion of work, any electrical items not working or broken shall be the Electrical Contractor's responsibility to repair, unless noted on a list submitted prior to the start of demolition. If no such list is submitted to the Architect/Engineer prior to the start of demolition, the Electrical Contractor shall be made responsible to provide all equipment in working order at the end of the remodeling.
- D. Contractor shall be responsible for any additional demolition not called out on the drawings but which is required for the successful completion of the job. This is work required due to an existing jobsite condition (i.e., the construction of walls, ceiling spaces, hazardous materials, etc) that the contractor had an opportunity to determine in the pre-bid walk-through and could have reasonably determined before the bid by visual inspection or by asking the Architect, Engineer, or Owner. No additional money shall be awarded for work caused by existing conditions which could have been verified prior to bid.

##### 1.3 SUBMITTALS

- A. Provide documentation of hazardous waste being turned over to a certified hazardous waste disposal company.
- B. Provide written report of all findings where inspection is specified of existing equipment to be reused.

#### PART 2: PRODUCTS

##### 2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified in individual Sections.

## **PART 3: EXECUTION**

### **3.1 GENERAL INFORMATION**

- A. Provide demolition of all existing electrical facilities as shown on the drawings, or required. This includes, but is not limited to, lighting, power, and signal equipment. Existing electrical equipment to be reused is noted on the drawings.
- B. Equipment, panelboards, and connections that are not intended to be demolished shall be maintained. Feeders and connections shall be protected and remain in use throughout the construction process.

### **3.2 CONTINUITY OF SERVICES**

- A. If the Owner will be occupying the existing building during construction, provide any temporary connections necessary to maintain services to the existing systems. Provide advance notice of a minimum of four weeks to the Owner of any temporary service outages. Advance notice shall be in writing with copies to the Engineer or Architect/Construction Manager.
- B. Coordinate utility service outages with Power Utility Company.
- C. Phase all demolition activities to coordinate with the general construction and other trades' schedules to minimize disruption to other trades and downtime to Owner.
- D. Provide temporary wiring and connections to maintain continuity to existing systems in service during construction. Work must not be performed on energized equipment or circuits.
- E. Refer to other specification sections for continuity of services and systems during construction.
- F. Electrical circuit continuity shall be maintained where a device is removed from the circuit. Retrofit the circuit with conductors and raceways as required maintaining the connection to all devices that remain.
- G. Where a wall is demolished and devices are shown on the demolition plans as being demolished, it shall be the responsibility of the contractor to relocate circuitry as needed to maintain connectivity to devices upstream and downstream.
  - 1. The Contractor shall bear costs associated with this work, including core drilling of floor, assuming the following conditions:
    - a. The re-routing path is less than 40' (combined horizontally and vertically).
    - b. No cutting and patching of floor is required.
    - c. The ceiling below is accessible.
    - d. The conduit consists of 3/4" conduit or less containing branch circuitry with line voltage wiring, or low voltage wiring that can be spliced.
    - e. The amount of rerouting required is not disproportional to the scope of the project.
  - 2. The Contractor may submit a claim for additional costs where conditions deviate from the above, such as longer route, cutting and patching is required, home runs or larger conduits are uncovered, etc.

### **3.3 DEMOLITION AND REMODEL WORK**

- A. Demolish and extend existing electrical work under Provisions of Section 02 41 19, "Selective Demolition" and this section, and as indicated on the Drawings. The Owner shall be offered materials and equipment slated for demolition. Legally dispose of all demolition material and equipment that the Owner has been offered but has not accepted.
- B. Coordinate the demolition and/or installation of items by other trades to minimize the effect on existing electrical items to remain. E.C. shall relocate, reroute and/or replace materials needed to maintain existing electrical continuity and/or to maintain accessibility to j-boxes and other access points required by Code. Where modifications require new access panels, the E.C. shall provide them and coordinate size and location with other trades.

- C. When connections to existing outlets (light fixtures, switches, receptacles, motors, other devices, etc) are removed, remove all unused wire and raceway, where accessible, back to last active outlet or source. Extend existing circuiting, if required, to continue circuiting to other areas.
  - 1. Devices. Remove all devices in areas that will be remodeled as shown on the drawings. Replace all devices and cover plates in outlets that shall remain. When outlets in walls, ceilings, or floors are being removed that are essential for the operation of other remaining outlets, provide new wiring devices in relocated outlets. Disconnect abandoned flush outlets and remove devices. Provide blank covers for all abandoned boxes and openings.
  - 2. Lighting.
    - a. Remove all abandoned lighting fixtures in areas that are to be remodeled as shown on the drawings.
    - b. Temporarily remove fixtures that are to be reconnected as shown on the drawings. These fixtures shall be cleaned and reinstalled with new ballasts and lamps. If conduit and wiring serving these fixtures must be removed to permit demolition work, provide new conduit and wire to obtain the same circuiting arrangement as originally existed.
    - c. Wiring. Remove all wire wherever existing circuits are abandoned or modified. Install new conductors for all altered or remodeled circuits.
  - 3. Raceways. Remove abandoned raceways and boxes when exposed or when they interfere with new work of any trades, unless indicated or approved otherwise. When electrical materials are removed, patch and finish building surfaces to match existing finishes. If ceilings are exposed at any time during construction then abandoned raceways must be removed.
  - 4. The Electrical Contractor shall remove / protect existing low-voltage cables in areas affected by the demolition. When remodeling is complete, the Electrical Contractor shall reinstall / remove protection of low-voltage cables and confirm all electrical devices and cables are restored to their original working conditions.
  - 5. Permission. Obtain permission in writing from the Owner before interrupting services, branch circuits, communications, or other systems.
- D. No portion of the electrical or communication systems may be abandoned in place. Remove all electrical material to a previous point of usage.
- E. The existing distribution system shall be modified as indicated on the plans and specified herein. The revised system shall be complete and continuous with all superfluous equipment and connections which are not maintained to be removed.
- F. Existing circuits to be extended beyond the existing wall, ceiling, or floor to be removed shall be replaced with new conduits and conductors as required. Reroute the existing circuit, or serve the remaining devices from another electrical source to maintain the circuit and device functionality.

### **3.4 DISPOSITION OF EXISTING MATERIAL AND EQUIPMENT**

- A. All material and equipment, which is noted, specified, or required by the Owner to be salvaged, and is not scheduled to be reused or relocated, shall be carefully removed, delivered to the Owner, and stored where directed on site.
  - 1. Carefully remove and store on site all material and equipment noted or specified to be reused or relocated. Thoroughly clean this equipment prior to installation.
  - 2. Remove and properly dispose of all other materials or debris resulting from demolition operations from the site.

### **3.5 SALVAGED MATERIALS**

- A. All existing materials and equipment noted, specified, or required to be salvaged and which are not scheduled to be reused, shall be carefully removed and handled to minimize damage. The contractor shall be moved or delivered where directed by the owner.
- B. All existing material to be reused shall be carefully removed and stored in a dry location to minimize damage.

### **3.6 CLEANING AND REPAIR**

- A. All patching of or repair of damage to work in place shall be done in a neat and workmanlike manner with the approval of the Engineer/Architect. The Contractor whose operations require cutting of work in place, or who cause damage which entails repairs of such work, including wall/paint finish, shall employ mechanics of the particular trade whose work must be cut or which is damaged, and shall pay all costs of such patching or repair.
- B. Switchboards and Panelboards: For switchboards, panelboards, and other existing equipment that is modified within the project scope, de-energize and clean upon completion of project. Clean exposed surfaces and check tightness of electrical connections. Replace any damaged circuit breakers and provide closure plates for any vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

**END OF SECTION 26 05 03**



## SECTION 26 05 19

### ELECTRICAL POWER CONDUCTORS

#### PART 1: GENERAL

##### 1.1 SCOPE

- A. This Section includes:
  - 1. Building wires and cables rated 600 V and less.
  - 2. Connectors, splices, and terminations rated 600 V and less.

##### 1.2 SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples of any or all proposed equipment or system components shall be submitted for examination/approval as requested.

##### 1.3 REFERENCES

- A. The products provided by this section shall comply with the following applicable references (latest edition):
  - 1. ANSI / ASTM B3 – Annealed Bare Copper Conductor
  - 2. ICEA – Insulated Cable Engineer's Association
  - 3. NEMA WC 5 – Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
  - 4. NEMA WC 70 – Nonshielded Power Cables Rated 2000 Volts or Less
  - 5. UL 44 – Standard for Rubber-Insulated Wires and Cables (includes XHHW)
  - 6. UL 83 – Standard for Thermoplastic-Insulated Wires and Cables

##### 1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

#### PART 2: PRODUCTS

##### 2.1 GENERAL INFORMATION.

- A. All electrical equipment and material shall be new and bear a recognized testing laboratory's label, where applicable. The type of equipment and/or material shall be designated by the location where it will be installed and so defined by NEMA / NFPA 70 standards. General Indoor Purpose = THHN/THWN; Outdoor in conduit = XHHW; Outdoor exposed = Sunlight resistant; Plenum rated; etc.

##### 2.2 CONDUCTORS

- A. Copper conductors only.
- B. Conductors shall be UL listed.
- C. The conductors shall be annealed (soft) copper having a conductivity of 98% pure copper, 600 volt minimum rating and meet or exceed all applicable ASTM, NEMA, UL, ICEA specifications.

##### 2.3 SPLICES, TAPS, AND TERMINATIONS

- A. Splices, taps and terminations shall be in accordance with UL and NEC.
  - 1. For conductors 8 AWG and smaller, provide "crimp-on" or "wire-nut" self-insulating connectors, 600V, 105-degrees C. Integral insulator shall completely cover exposed conductors.

2. For copper conductors 6 AWG and larger, provide pressure or compression type connectors (indent, hex screw, or bolt clamp-type) with snap-on insulating covers.
3. Reusable lever-operated push-wire connectors are allowed for listed applications. Non-lever push-wire connectors are prohibited.

## **2.4 METAL CLAD CABLE**

- A. Metal clad (MC) cable SHALL NOT be used on this project except for lighting whips (MC or MC-LED), unless specifically noted otherwise.

## **PART 3: EXECUTION**

### **3.1 GENERAL INFORMATION.**

- A. Conductors and cables shall be installed in a neat and workmanlike manner. The NEIS Standard Practices for Good Workmanship in Electrical Contracting NECA 1 is hereby adopted to define such workmanship and the installation of conductors and cables.
- B. Conductors 8 AWG and larger shall be stranded per N.E.C. No conductor smaller than 12 AWG shall be used unless specifically noted.
  1. 600V Feeder Conductors - Type THHN/THWN in conduit.
  2. Branch Circuit and Control Conductors - Type THHN/THWN in conduit.
  3. 600V Feeder, Branch Circuit and Control Conductors Installed Underground or Outdoors in Conduit - Type XHHW.
  4. Control Cable (Low-Voltage) – 600V, 16-gauge, plenum rated heavy-duty multi-conductor type, with PVC/nylon insulation over each conductor, color coded, and PVC overall jacket.
- C. Cord Drops and Portable Appliance Connections – Type SO, hard service cord with stainless-steel, wire-mesh, strain-relief device at terminations to suit application.
- D. All home runs and feeders shall be in conduit.

### **3.2 INSTALLATION OF CONDUCTORS**

- A. General:
  1. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
  2. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- B. Installation of 600V Conductors (>100V)
  1. Install conductors in accordance with the NEC and as specified. Install all wiring in raceway systems unless specified otherwise.
  2. 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.
  3. Conductors shall not be pulled in by any manner likely to injure the insulation. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
  4. Swab underground raceways, 1-1/4" and larger, with sponge and drawstring before conductor installation.
  5. Splice conductors only in outlet boxes, junction boxes, pull boxes, manholes, or handholes.
  6. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
  7. For panelboards, cabinets, wireways, switches, and equipment assemblies, neatly form and train the conductors.
  8. Seal conductors with a non-hardening approved compound at transitions between two different temperature locations. I.E. Entering a building from underground.
  9. All conductors are 12 AWG copper unless indicated or specified otherwise. All conductor sizes indicated on the drawings are based on copper conductors. Do not substitute smaller conductors with higher temperature rated insulation. Verify conductors are sized per 3% energy code voltage-drop requirements.

10. Maximum number of conductors in raceways and boxes shall conform to the latest edition of the National Electrical Code with the following exception: Do not fill 1/2" conduit to more than 25% fill.
11. All line to neutral loads shall have dedicated neutrals, separate neutrals for each phase conductor.
12. 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 and UL 486B.
13. Wiring at Outlets: Install conductor at each outlet, with at least 8 inches of slack.
14. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."
15. Multiwire branch circuits are prohibited.
16. Secondary service, feeder, and branch circuit conductors shall be color coded as follows:

208/120 Volt		Phase	480/277 Volt	
Ungrounded	Neutral		Ungrounded	Neutral
Black	White / Blk tracer	A	Brown	Gray / Brown tracer
Red	White / Red tracer	B	Orange	Gray / Orange tracer
Blue	White / Blue tracer	C	Yellow	Gray / Yellow tracer

- C. Installation of Control Voltage Conductors (<100v).
1. Install conductors in accordance with the NEC, and as specified. Wiring splices shall be avoided and, if necessary, must be installed only in junction boxes. (Instrumentation and shielded control cables shall be run continuous from origin to termination.) All system junction boxes and any spliced cable must be labeled. Neatly form and train the conductors inside control panels.
  2. Cables shall be installed in conduit in the following locations:
    - a. Where required by a system specification or plan note.
    - b. Where cables are subject to physical damage or in corrosive atmospheres.
    - c. Where cables are concealed within inaccessible walls or ceilings.
    - d. In mechanical spaces and exposed storage areas.
    - e. On existing unfinished walls below structural ceiling.
  3. Where systems are allowed to be free-air, plenum rated cabling may be installed without a raceway as follows:
    - a. Align and run cables parallel or perpendicular to the building lines. Cable shall be supported at least every 5 feet. Whenever possible, cables shall be grouped together. Install horizontal runs close to the ceiling, beams, or structure and secure with appropriate supports. Cable shall be independently supported by cable tray, dedicated j-hooks, or equivalent (tie-wraps are not equivalent). Cable shall not tie off to other conduits or devices.
    - b. In a False Ceiling Environment, cable supports shall be mounted a minimum of 3" above the ceiling grid supporting the false ceiling. Cables routed in a suspended ceiling shall not be draped across the ceiling. Cable supports shall be provided by means that are structurally independent of the suspended ceiling, its framework, or supports.
    - c. Cabling, which runs parallel with electric power or lighting, conduits/conductors and is less than or equal to 480V, shall be installed with a minimum clearance of 2".
    - d. Cabling shall maintain a minimum clearance of 10' from power cables in excess of 480V.
    - e. Cabling must not be supported by ductwork or piping.
    - f. Cabling must be installed to allow for seasonal building expansion and contraction.
    - g. The Contractor shall observe the manufacturer's bending radius and pulling strength requirements of the cable during handling and installation.
    - h. The Number of Horizontal Cables placed in a cable support or pathway shall be limited to the number of cables that might cause a deformation of the standard geometric shape of the cables.
    - i. Cable Penetrations through partitions or walls shall be provided with a sleeve and appropriate sealants where required.

### **3.3 INSTALLATION OF MC CABLE**

- A. For Luminaires: MC and MC-LED cables are allowed as branch-circuit wiring from junction boxes to luminaires. Daisy chaining of luminaires with cable is prohibited. There shall be a maximum of four MC terminations per junction box.

### **3.4 SPLICES, TAPS, AND TERMINATIONS**

- A. Install electrical connectors and terminals according to manufacturer's published instructions.
  1. Splice / terminal connections shall be mechanically and electrically secure.
  2. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
  3. Installation of compression connectors shall be with manufacturer recommended tools. The crimper shall be mated to the crimp.
  4. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.
  5. 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 and UL 486B.
  6. Terminate spare conductors with wire nuts and electrical tape.

### **3.5 SLEEVE-SEAL INSTALLATION**

- A. Install to seal underground exterior-wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for cable material and size. Position cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- C. Coordinate selection and application of sleeve seals as specified in Division 07 Section "Firestopping".

### **3.6 FIRESTOPPING**

- A. Coordinate selection and application of firestopping specified in Division 07 Section "Firestopping".

### **3.7 FIELD QUALITY CONTROL**

- A. Contractor shall field inspect and test conductor installation as follows.
  1. Inspect wire, cable, and/or cord for physical damage and proper connection / termination.
  2. Subsequent to wire and cable hook-ups, energize circuits and demonstrate proper functioning. Correct malfunctioning conductors and cables at project site, where possible, and re-test to demonstrate compliance; otherwise, remove and replace with new units and retest.

**END OF SECTION 26 05 19**

## SECTION 26 05 26

### GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

#### PART 1: GENERAL

##### 1.1 SCOPE

- A. This Section covers basic electrical requirements for providing labor, materials, equipment, and services necessary for the proper grounding and bonding of electrical work as shown on the drawings and specified herein.
  - 1. Grounding conductors and connectors.
  - 2. Grounding electrodes.

##### 1.2 REFERENCES

- A. The products provided by this section shall comply with the following applicable references (latest edition):
  - 1. ANSI / ASTM B3 & B8 – Annealed Bare Copper Conductor
  - 2. ANSI/TIA-607-C: Generic Bonding and Grounding (Earthing) for Customer Premises
  - 3. BICSI TDMM 13th Edition Chapter 8 – Bonding and Grounding (Earthing)

##### 1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

#### PART 2: PRODUCTS

##### 2.1 GENERAL INFORMATION.

- A. All electrical equipment and material shall be new and bear a recognized testing laboratory's label, where applicable. The type of equipment and/or material shall be designated by the location where it will be installed and so defined by NEMA / NFPA 70 standards.

##### 2.2 GROUNDING CONDUCTORS AND CONNECTORS

- A. Conductors:
  - 1. Insulated Conductors: Copper wire insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
  - 2. Bare Copper Conductors: ASTM / UL.
- B. Connectors:
  - 1. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.

#### PART 3: EXECUTION

##### 3.1 GENERAL INFORMATION

- A. Grounding shall be in accordance with NEC Article 250.

- B. Grounding and bonding shall be installed in a neat and workmanlike manner. The NEIS Standard Practices for Good Workmanship in Electrical Contracting NECA 1-2006 is hereby adopted to define such workmanship and the installation of conductors and cables.
- C. Equipment grounding conductors shall be installed in all conduits.

### **3.2 APPLICATIONS**

- A. Equipment Grounding Conductor Application: Comply with NEC Article 250 for types, sizes, and quantities of equipment grounding conductors, except where specific types, larger sizes, or more conductors than required by NEC are indicated.
  - 1. Provide ground wire in all raceways as the equipment ground conductor.
  - 2. Conductors: Install solid conductor for No. 14 AWG and smaller, and stranded conductors for No. 12 AWG and larger, unless otherwise indicated.
- B. Conductor Terminations and Connections:
  - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
  - 2. Connections to Structural Steel: Welded connectors.
- C. Grounding at the Service: 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.
- D. Separately Derived Systems:
  - 1. Generators Connected with 4-Pole Transfer Switch: Install grounding electrode in the form of ground rod at the generator location to establish separately derived ground at generator. The electrode shall be connected to the equipment grounding conductor and to the frame of the generator.

### **3.3 INSTALLATION**

- A. General: Ground electrical systems and equipment in accordance with NEC requirements, except where the Drawings or Specifications exceed NEC requirements.

### **3.4 EQUIPMENT GROUNDING**

- A. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
  - 1. Feeders and branch circuits.
  - 2. Flexible raceway runs.
  - 3. Armored and metal-clad cable runs (where cables are allowed by Section 260519 Low-Voltage Electrical Power Conductors and Cables).

### **3.5 CONNECTIONS**

- A. General: Make connections in such a manner as to minimize possibility of galvanic action or electrolysis. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
  - 1. Provide electroplated or hot-tin-coated materials to assure high conductivity.
  - 2. Make connections with clean bare metal at points of contact.
  - 3. Make copper to steel connections with stainless steel separators and mechanical clamps.
  - 4. Coat and seal connections involving dissimilar metals with inert material such as red lead paint to prevent future penetration of moisture to contact surfaces.
- B. Exothermic Welded Connections: Use for connections to structural steel and for underground connections except those at test wells. Provide at connections to ground rods and plate electrodes. Comply with manufacturer's written recommendations and instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

- C. Terminate insulated equipment grounding conductors for feeders and branch circuits with pressure-type grounding lugs. Where metallic raceways terminate at metallic housings without mechanical and electrical connection to the housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to the ground bus in the housing. Bond electrically noncontinuous conduits at both entrances and exits with grounding bushings and bare grounding conductors.
- D. Tighten screws and bolts for grounding and bonding connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values for connectors and bolts. Where manufacturer's torque requirements are not indicated, tighten connections to comply with torque tightening values specified in UL 486A and UL 486B.
- E. Compression-Type Connections: Use hydraulic compression tools to provide the correct circumferential pressure for compression connectors. Use tools and dies recommended by the manufacturer of the connectors. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on the ground conductor.
- F. Moisture Protection: Where insulated ground conductors are connected to ground rods or ground buses, insulate the entire area of the connection and seal against moisture penetration of the insulation and cable.
- G. Equipment Grounding - Wire Terminations: For No. 12 AWG and larger, use pressure-type grounding lugs; for No. 14 AWG and smaller grounding conductors, terminate with winged pressure-type connectors.

**END OF SECTION 26 05 26**



## SECTION 26 05 29

### HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

#### PART 1: GENERAL

##### 1.1 SCOPE

- A. This Section includes the following:
  - 1. Hangers and supports for electrical equipment and systems.
- B. Summary: This Section includes the furnishing and installation of hangars and supports for electrical equipment and systems. The contractor shall design and provide supports for single and multiple raceway installations. The contractor shall also design and provide supports capable of supporting combined operating weight of supported equipment and connected systems and components.

##### 1.2 REFERENCES

- A. UL, Building Materials Directory.
- B. Welding-Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- C. MFMA – 4 Metal Framing Manufacturer's Association.
- D. MSS SP-58 - Manufacturers Standardization Society of the Valve and Fittings Industry.
- E. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel.

##### 1.3 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified together with concrete Specifications.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Section 077200 "Roof Accessories."

#### PART 2: PRODUCTS

##### 2.1 GENERAL INFORMATION

- A. All hangers and supports for electrical equipment and material shall be new and bear a recognized testing laboratory's label, where applicable. The type of equipment and/or material shall be designated by the location where it will be installed and so defined by NEMA / NFPA 70 standards.

##### 2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems, MFMA-4, with manufacturer recognized fittings and accessories. 12 gauge "U" section, 1-1/2" square nominal.
- B. Threaded rod: Zinc plated steel, 3/8" diameter minimum sized to support load with safety factor of 2.
- C. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- D. Conduit Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway to be supported.

- E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for electrical conductors in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors supported. Body shall be malleable iron.
- F. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
  - Mechanical-Expansion Anchors: Insert-wedge-type, steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
  - 2. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
  - 3. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
  - 4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
  - 5. Toggle Bolts: All-steel springhead type.
  - 6. Hanger Rods: Threaded steel.
- H. Structural Support Systems in Corrosive Atmospheres (including but not limited to pools, pool mechanical rooms, saunas, etc): Provide corrosion proof equipment (including anchoring equipment, hardware, fittings, coverplates, etc.) for all electrical equipment located within rooms. Provide non-ferrous stainless steel 304 grade or better or aluminum equipment. Ferrous metal equipment is not allowed.

### **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 Division 05 Section "Metal Fabrications" for steel shapes and plates.

### **2.4 PIPE/CONDUIT SUPPORTS**

- A. Pipe/Conduit Stands, General: fabricated assemblies made of corrosion-resistant components to support roof-mounted conduit and wiring. Wood supports shall not be allowed.
- B. Curb-Mounting-Type Pipe/Conduit Stands: Shop- or field-fabricated support made from structural-steel shape, continuous-thread rods, and rollers for mounting on permanent stationary roof curb. All supports components installed outside shall be corrosion resistant. Steel components shall be stainless steel or hot dipped galvanized.
- C. Adjustable Pre-manufactured Roof Pipe Support: Provide adjustable strut-based support stands with heavy-duty strut clamps for single or multiple conduits supports as required.
  - 1. Supports and accessories shall be manufactured by one of the following:
    - a. OMG
    - b. Miro Industries
    - c. ERICO
    - d. PHP Systems compressive strength.
    - e. Dura-Block

## **PART 3: EXECUTION**

### **3.1 GENERAL INFORMATION.**

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

### **3.2 METHODS AND LOCATIONS OF HANGERS AND SUPPORTS**

- A. Ceiling support wires shall not be utilized to support power, signaling or communications raceways or cables. Independent support wires used for support can be attached to a nonfire-rated assembly. These support wires shall be distinguishable by color, tagging or similar method.
- B. 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.
- C. 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. Drill holes for anchors in concrete at locations and to depths that avoid reinforcing bars.
  - 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. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.
    - a. 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 (100 mm) thick or greater.
    - b. Verify with Owner the use of powder-actuated anchors.
  - 5. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts or Beam clamps complying with MSS SP-69 or spring-tension clamps (for up to 1-1/2").
  - 6. To Light Steel: Sheet metal screws.
  - 7. 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.
- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

### **3.3 INSTALLATION OF HANGERS AND SUPPORTS**

- A. Surface mounted cabinets and panelboards: Provide a minimum of four anchors. Provide steel channel supports to stand cabinet one inch off of wall, or on 3/4" painted (all sides) plywood backboard.
- B. Flush mounted cabinets and panelboards: Provide bridging, top and bottom, between studs in wall.
- C. Miscellaneous Equipment: Do not fasten hangars or supports to piping, ductwork, mechanical equipment, or other electrical conduit.

- D. Roof:
  - 1. Support equipment and luminaires from the top chord of bar joists. Connect at bar joist top chord panel point, junction of vertical or angular member to top chord.
  - 2. Unless otherwise noted on the plans / drawings, do not support equipment from roof deck.
  - 3. Raceway and junction box installation installed under roof decking shall be supported so that nearest outside surface of the raceway is not less than 1-1/2" from the nearest surface of the roof decking.
- E. Concrete Housekeeping Pads: Install free-standing electrical equipment on 4" pad that overlaps equipment footprint by 2" on all sides.

### **3.4 INSTALLATION OF FABRICATED METAL SUPPORTS**

- A. Comply with installation requirements in Section 055000 "Metal Fabrications" for site-fabricated metal supports.
- 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.

### **3.5 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.
- B. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- C. Touchup: Comply with requirements in Division 09 for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- D. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

**END OF SECTION 26 05 29**

## SECTION 26 05 33

### RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

#### PART 1: GENERAL

##### 1.1 SCOPE

- A. This Section includes the furnishing, installation, and connection of conduit, fittings, and boxes for a complete grounded raceway system.
  - 1. Conduits, tubing, and fittings.
  - 2. Metal wireways and auxiliary gutters.
  - 3. Interior outlets and junction boxes.
  - 4. Boxes, enclosures, and cabinets.
- B. Related Sections:
  - 1. 26 27 26 "Wiring Devices" for floor boxes, poke-throughs and multi-outlet assemblies.

##### 1.2 REFERENCES

- A. The products provided by this section shall comply with the following applicable references (latest edition):
  - 1. ANSI C80.1 – Rigid Steel Conduit, Zinc Coated
  - 2. ANSI C80.3 – Electrical Metallic Tubing, Zinc Coated
  - 3. ANSI C80.5 – Aluminum Rigid Conduit
  - 4. ANSI C80.6 – Intermediate Metallic Conduit
  - 5. ANSI/NEMA FB-1 – Fittings and Supports for Conduit and Cable Assemblies
  - 6. NEMA 250 Enclosures for Electrical Equipment (1000V Maximum)
  - 7. NEMA OS 1 – Sheet Steel Outlet Boxes, Device Boxes, Covers and Box Supports
  - 8. NEMA RN-1 – PVC Externally-Coated Galvanized Rigid Steel Conduit
  - 9. NEMA TC2 – Electrical Plastic Tubing and Conduit
  - 10. NEMA TC3 – PVC Fittings for Use with Rigid PVC Conduit and Tubing
  - 11. UL, Building Materials Directory
  - 12. UL 5 – Surface Metal Raceways and Fittings

#### PART 2: PRODUCTS

##### 2.1 GENERAL INFORMATION.

- A. All electrical equipment and material shall be new and bear a recognized testing laboratory's label, where applicable. The type of equipment and/or material shall be designated by the location where it will be installed and so defined by NEMA / NFPA 70 standards. General Indoor Purpose = NEMA1, Outdoor = NEMA 3R, etc.

##### 2.2 CONDUIT AND FITTINGS

- A. Rigid non-metallic conduit (U.L. Standard UL-651, A.N.S.I. Standard F512, NEMA Standard TC-2, Federal Specifications GSA-FSS and W-C-1094-A):
  - 1. Provide schedule 40 PVC Conduit installed in accordance with NEC Article 352 for underground and exposed use and shall be used underground in or beneath slabs on grade, in crawl spaces and tunnels, and in exterior exposed locations unless noted otherwise. Schedule 80 shall be used in bored and under roadway/parking locations or as specified herein or on the drawings. Raceway supports shall be PVC or PVC-coated.
- B. Rigid PVC coated rigid steel conduit:
  - 1. Conduit, 40mil PVC coated, shall be used for transition from underground or underfloor to exposed locations. The transition shall be made underground or underfloor to 24" AFG or AFF.
  - 2. Provide threaded type fittings, couplings, and bushings for rigid PVC coated steel conduit with the same coating as the conduit. Provide brush-on PVC touch-up compound.

- C. Flexible metallic conduit (U.L. Standard UL-1):
  1. Provide flexible conduit, installed in accordance with NEC Article 348, for connections to motors, transformers, other rotating or vibrating equipment, and recessed lighting fixtures, but not over 6'-0" in length unless noted otherwise.
  2. Provide Type U.A., hot-dip galvanized, flexible steel conduit tubing. Provide steel or malleable iron type fittings, couplings, and bushings for flexible metallic conduit. Cast type devices are not acceptable.
- D. Liquid-tight flexible metal conduit (U.L. Standard UL-360):
  1. Provide liquid-tight flexible conduit, installed in accordance with NEC Article 350, for connections to rotating or vibrating equipment outdoors in wet or damp locations, or in corrosive atmospheres, but not over 6'-0" in length unless noted otherwise.
  2. Provide Type U.A. flexible conduit covered with an extruded, polyvinyl chloride sheath. Provide steel or malleable iron, water-tight type fittings, couplings, and bushings approved for use with liquid-tight flexible metal conduit.
- E. Rigid steel conduit (U.L. Standard UL-6, A.N.S.I. C80-1, Federal Specification WW-C-581E):
  1. Provide rigid steel conduit as required for applications not covered above and in accordance with NEC Article 344.
  2. Provide hot-dip galvanized or electro-galvanized, inside and outside, rigid steel conduit having a bichromate finish. Threads shall be zinc coated. Provide threaded type fittings, couplings, and bushings for rigid steel conduit.
- F. Rigid aluminum conduit (A.N.S.I. C80.5):
  1. Provide rigid aluminum conduit as required for applications not covered above (A-E) and in accordance with NEC Article 344.
  2. Provide rigid aluminum conduit conforming to U.L. and ANSI standards. The inside shall have a wax or similar coating to facilitate pulling. Provide threaded type fittings, couplings, and bushings for rigid aluminum conduit.
- G. Intermediate metal conduit (IMC) (U.L. Standard UL-1242, Federal Specification WW-C-581E):
  1. Provide intermediate metal conduit as required for applications not covered above (A-E) and in accordance with NEC Article 342.
  2. Provide hot-dip galvanized, intermediate metal conduit. Provide threaded type, concrete-tight split couplings, concrete-tight steel compression type, or concrete-tight steel set-screw type fittings, couplings, and bushings for intermediate metal conduit. Cast type devices are not acceptable.
- H. Electrical metallic tubing (EMT) (U.L. Standard UL-797, A.N.S.I. C80-3, Federal Specification WW-C-563):
  1. Provide electrical metallic tubing as required for applications not covered above (A-E) and in accordance with NEC Article 358.
  2. Provide electro-galvanized, electrical metallic tubing. The interior shall have a smooth coating of aluminum lacquer or enamel. Tubing shall not be threaded. Provide concrete-tight steel compression or set-screw type fittings, couplings, and bushings for electrical metallic tubing. Cast or indenter type devices are not acceptable.

### **2.3 METAL WIREWAYS AND AUXILIARY GUTTERS**

- A. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 (Type 3R for damp or wet locations) 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.
- B. 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.
- C. Wireways shall be provided without knockouts and shall have hinged type covers.
- D. Finish: Manufacturer's standard enamel finish.
- E. Provide "lay-in" type wireway with lengths and connectors hinged to provide unobstructed lay-in of conductors. All fittings must be so constructed to continue the "lay-in" feature through the entire installation.

- F. All sheet metal parts shall be provided with a rust-inhibiting phosphatizing coating and finished in baked enamel. All hardware shall be plated to prevent corrosion.
- G. All lengths, connectors and fittings shall be U.L. labeled and installed in accordance with NEC Article 366, and 376 (Auxiliary Gutters and Metallic Wireway) respectively. U.L. listing of lengths without listing connectors or fittings is not acceptable. Square D "Square-Duct", or approved equal.

## **2.4 INTERIOR OUTLET AND JUNCTION BOXES**

- A. Outlet and junction boxes in dry interior locations shall be as follows:
  - 1. For devices recessed within a vapor barrier wall (i.e. typical exterior wall) provide vapor barrier boxes, with gasketing as required to maintain the continuous vapor barrier. Exterior surfaces of boxes shall be sealed. Secure vapor retarder to box and provide flat blocking if required. Raceways entering/leaving boxes shall be sealed.
  - 2. For other interior locations provide minimum 4" square galvanized steel box.
- B. General requirements:
  - 1. For flush installations provide appropriate tile or plaster covers.
  - 2. Boxes in walls and ceiling tiles shall be securely fastened in such a manner as not to rely on cover trim plate for support.
  - 3. Where surface mounted outside or in wet locations, boxes shall be iron alloy type, FS or FD with threaded hubs.

## **2.5 CABINETS**

- A. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
- B. Hinged door in front cover with flush latch and concealed hinge.
- C. Key latch to match panelboards.
- D. Metal barriers to separate wiring of different systems and voltage.
- E. Accessory feet where required for freestanding equipment.

## **PART 3: EXECUTION**

### **3.1 GENERAL INFORMATION.**

- A. Raceways and boxes shall be installed in a neat and workmanlike manner. The NEIS Standard Practices for Good Workmanship in Electrical Contracting NECA 1-2006 is hereby adopted to define such workmanship and the installation of conductors and cables.

### **3.2 RACEWAY APPLICATION**

- A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
  - 1. Exposed Conduit: Rigid steel conduit.
  - 2. Concealed Conduit, Aboveground: Rigid steel conduit; IMC; EMT; RNC, Type EPC-40-PVC.
  - 3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
  - 4. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
  - 5. Underground Conduit:
    - a. Under driveways, roadways, parking lots, etc: RNC, Type EPC- 80-PVC, direct buried.
    - b. All other underground applications: RNC, Type EPC- 40-PVC, direct buried.
- B. Comply with the following indoor applications, unless otherwise indicated:
  - 1. Concealed in Ceilings and Interior Walls and Partitions: EMT.
  - 2. Exposed, Not Subject to Physical Damage: EMT.
  - 3. Exposed, Not Subject to Severe Physical Damage: EMT.

4. Exposed and Subject to Severe Physical Damage: Rigid steel conduit or IMC. Includes raceways in the following locations:
  - a. Loading dock.
  - b. Areas used for traffic of mechanized carts, forklifts, and pallet-handling units.
  - c. In parking garages or other vehicular areas below 7'-0".
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. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment):
  - a. LFMC in damp or wet locations.
  - b. FMC in other areas.
7. Damp or Wet Locations: Rigid steel conduit or IMC in other areas.
8. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel in damp or wet locations.

### **3.3 INSTALLATION OF CONDUIT**

- A. Installation shall be in accordance with the NEC and as shown on the drawings. Flattened, dented, deformed, or opened conduit is not permitted. If damaged during installation, damaged conduit shall be replaced with new undamaged material. Prevent foreign matter from entering raceways by using temporary closure protection. Test conduits with ball mandrel. Clear any conduit which rejects the ball and mandrel.
- B. Minimum size homerun to panels and cabinets is 3/4 inch. From all flush panelboards, terminal cabinets, and control panels, stub three empty 3/4" conduits up and down into the suspended ceiling spaces. In areas without ceilings, stub out near the underside of adjacent floor slabs.
- C. Minimum size conduit for mechanical equipment and architectural motors is 3/4" unless specifically noted otherwise on plans or schedules.
- D. Maintain separate raceway for 480/277V and 208/120V cabling.
- E. General Installation:
  1. Conceal raceways within finished walls, ceilings, and floors, unless otherwise noted.
  2. Assure that conduit installation does not encroach into the ceiling height headroom, walkways, or doorways. Align and run conduit parallel or perpendicular to the building lines and or adjacent piping. Install horizontal runs close to the ceiling or beams, and secure with conduit straps. Independently support all conduits. Do not use other supports i.e., (suspended ceilings, suspended ceiling supporting members, lighting fixtures, mechanical piping, or mechanical ducts).
  3. Complete raceways installation before starting conductor installation.
  4. Support all trapezes and all above ground feeder conduits from the building structure. Parallel runs of six (6) or more conduits shall be supported from the building structure. Do not support conduit with wire, nylon ties, nor perforated pipe straps. Remove wire used for temporary supports. Do not attach conduit to ceiling support wires. Do not support raceways from mechanical ductwork or equipment, except where required to connect to the equipment.
  5. Run all conduit in areas with unfinished ceilings above bottom chord of joists.
  6. Do not run conduits in columns except to feed column mounted devices.
  7. Place conduits at least 12" away from all hot piping and surfaces including domestic hot water lines. Do not mount conduit on mechanical equipment except where necessary to connect electrical devices mounted on the equipment. Provide 18" of flexible conduit in all runs "bridging" vibration mountings.
  8. Do not run conduit on or directly in front of access doors, removable panels, equipment removal spaces, control devices or other spaces necessary for normal maintenance and repair of the equipment.
  9. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system. Cap or plug conduit ends during construction. Cap or plug ends of conduits that are to remain empty and make watertight. Clean and swab conduits prior to pulling in conductors.
  10. Uncoated metal conduits installed underground shall be protected by two coats of bituminous paint (Koppers Bitumastic #50 or equal) or by vinyl tape (3M Scotchrap #43 or equal).



11. Seal all conduits penetrations of smoke or fire rated walls or floors with intumescent type fire barriers, 3M or equal. Seal all conduits where they pass through exterior walls and where they enter exterior fixtures. Seal all conduits where temperature differential between adjacent spaces is greater than 30 degrees Fahrenheit. Seal all conduits penetrating walls built to deck.
  12. Conduits shall be provided with expansion or expansion/deflection fittings where traversing building or structure joints. Additionally, straight exposed conduit runs in or on buildings or structures shall be provided with expansion fittings at 100' intervals. When in concrete slab on grade, provide expansion fittings at slab expansion joints.
  13. Provide a dedicated conduit and feeder conductors for each motor unit on the load side of each VFD feeding the motor.
  14. Raceways embedded in slabs: Install in middle third of the slab thickness where practical and leave at least 1 inch (25 mm) concrete cover. Tie raceways to reinforcing rods or otherwise secure them to prevent sagging or shifting during concrete placement. Space raceways laterally to prevent voids in the concrete. Run conduit larger than 1-inch (25 mm) trade size, parallel with or at right angles to the main reinforcement; where at right angles to the reinforcement, the conduit shall be close to one of the supports of the slab. Where nonmetallic conduit is used, raceways must be converted to rigid steel conduit or IMC before rising above floor.
- F. Flexible Conduit Connections: Use maximum of 72 inches (1830 mm) of flexible conduit for recessed and semi-recessed lighting fixtures, (between junction box at ceiling and each light fixtures, daisy-chaining fixtures is not accepted) equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
1. Use LFMC in damp or wet locations, even if not subject to severe physical damage.

### **3.4 PENETRATIONS**

- A. Refer to specification 26 05 00 "Common Work Results for Electrical" for requirements related to penetrations, sleeves, sleeve seals and firestopping.
- B. Roof Penetrations: Conduit penetrations directly through roof membrane are prohibited. Route conduits through equipment curb or provide roof penetration assembly per architectural details.
- C. Where raceways penetrate building envelopes: Flex shall not be used to penetrate vapor retarder. Seal joints (connectors and couplings) of raceway with vapor retarding tape, paint-on sealer, putty pads or other approved means. Provide solid blocking installed flat at all vapor retarder penetrations. Secure vapor retarder to blocking.

### **3.5 WIREWAY**

- A. Installation shall be in accordance with the NEC Article 376, 378, and 366, respectively, and as shown on the drawings. Manufacturer's suggested insulating bushings and inserts at connections to outlets and corner fittings shall be used, as required.

### **3.6 INSTALLATION OF OUTLET BOXES**

- A. Installation shall be in accordance with the NEC Article 314 and as shown on schedules on the drawings.
  1. Interior outlet junction boxes in the same wall mounted back-to-back are prohibited. Junction boxes shall be securely mounted and arranged so that the boxes are square with the building surfaces.
  2. Wall outlet boxes shall be plumb and accurately aligned in rows. Mount ceiling boxes symmetrical with walls, beams and/or tiles.
  3. Mount outlet boxes in exposed masonry walls with the top or bottom of the box aligned with mortar joints, but not less than 15" A.F.F.
  4. Provide center mounted fixture studs in boxes for direct fixture mounting. Provide special fixture hangers and/or auxiliary supports where the weight of the fixture requires more support than the fixture stud.
  5. Where the weight of the devices and/or use of the finished outlet assembly requires additional support in ceiling tile installations, provide special hangers and/or auxiliary supports.
  6. Thru-wall boxes shall not be used unless specifically noted.
  7. Close openings in all outlet boxes during plaster and concrete work with plain paper or slip on plastic or metal plates. Do not use newspaper.

8. Provide pull boxes fabricated of code gauge, galvanized sheet steel with screw covers held in place by corrosion resistant screws, and located to be accessible when the building is finished. Do not locate pull boxes in finished spaces without the specific approval of the Engineer/Architect. Equip boxes requiring 4 1/2" square or smaller covers with blank covers to match switch plates. Paint 5" square or larger steel pull box covers to match electrical panel fronts.
9. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.
10. Set metal floor boxes level and flush with finished floor surface.
11. Recess all device boxes in finished floors, ceilings, and walls unless otherwise indicated.

### **3.7 PROTECTION / CLEANING**

- A. Upon completion of installation of raceways, inspect interiors of raceways; clear all blockages and remove burrs, dirt, and construction debris.
- B. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion. Remove all construction debris.
  1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

**END OF SECTION 26 05 33**

## SECTION 26 05 53

### IDENTIFICATION FOR ELECTRICAL SYSTEMS

#### PART 1: GENERAL

##### 1.1 SCOPE

- A. This Section includes the furnishing and installation of identification of electrical equipment as specified and indicated on the drawings.

##### 1.2 SUBMITTALS

- A. Samples of each type of proposed label and/or signs shall be submitted for examination/approval as requested.
- B. Record Drawings. The Contractor shall keep layout plans on the job site, marking all changes made during installation. A set of As-Built / Record drawings shall be submitted.

##### 1.3 REFERENCES

- A. The products provided by this section shall comply with the following applicable references (latest edition):
  1. ANSI A13.1 – Pipe Identification Standard.
  2. 29 CFR 1910.145 – Accident Prevention Tags.

#### PART 2: PRODUCTS

##### 2.1 GENERAL INFORMATION.

- A. All electrical equipment and material shall be new and bear a recognized testing laboratory's label, where applicable. The type of equipment and/or material shall be designated by the location where it will be installed and so defined by NEMA / NFPA 70 standards.

##### 2.2 IDENTIFICATION LABELS / NAMEPLATES

- A. Provide equipment identification labels per labels identified on drawings. Nameplates: Engraved three-layer laminated plastic with white melamine core and black melamine surface:
  1. Engrave characters with a minimum height of 1/4".
  2. Punched or drilled for screw mounting.
  3. Provide white letters on a black background for equipment on normal utility power system.
  4. Provide white letters on a red background for equipment on emergency or standby power system.
- B. Concealed Indelible ink ('Sharpie') / Adhesive Marking Labels for Raceways and Cable: Pre-printed, flexible, self-adhesive labels with legend indicating voltage and service (Emergency, Lighting, Power, Communications, Control, Fire Alarm). Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
  1. Label Size:
    - a. Raceways 1-Inch and Smaller: 1-1/8 inches high by 4 inches long.
    - b. Raceways Larger than 1-Inch: 1-1/8 inches high by 8 inches long.
  2. Color: Black legend on orange background.

3. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape not less than 3 mils thick by 1 inch to 2 inches in width.
- C. Pre-tensioned Flexible Wraparound Colored Plastic Sleeves for Raceway and Cable Identification: Flexible acrylic bands sized to suit the raceway diameter and arranged to stay in place by pre-tensioned gripping action when coiled around the raceway or cable.

### **2.3 CONDUCTOR AND COMMUNICATION- AND CONTROL-CABLE IDENTIFICATION MATERIALS**

- A. Provide communication and control-cable identification with one of the following methods:
1. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.
  2. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
  3. Aluminum Wraparound Marker Labels: Cut from 0.014-inch- (0.35-mm-) thick aluminum sheet, with stamped, embossed, or scribed legend, and fitted with tabs and matching slots for permanently securing around wire or cable jacket or around groups of conductors.
  4. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), 19 gauge, with stamped legend, punched for use with self-locking nylon tie fastener.
  5. Where exposed to damage or rough service provide one of the following two methods.
    - a. Write-On Tags: Polyester tag, .015" thick, with corrosion-resistant grommet and polyester or nylon tie for attachment to conductor or cable.
    - b. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

### **2.4 WARNING LABELS AND SIGNS**

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Engraved, Plastic-Laminated Labels, Signs, and Instruction Plates: Engraving stock melamine plastic laminate, 1/8-inch minimum thick. Engraved legend in white letters on black face and punched for mechanical fasteners.
- C. Baked-Enamel Warning and Caution Signs for Interior Use: Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application. 1/4-inch (6.4-mm) grommets in corners for mounting. Nominal size, 7 by 10 inches (180 by 250 mm).
- D. Exterior Metal-Backed Butyrate Warning and Caution Signs: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm) galvanized-steel backing; and with colors, legend, and size required for application. 1/4-inch (6.4-mm) grommets in corners for mounting. Nominal size, 10 by 14 inches (250 by 360 mm).
- E. Fasteners for Plastic-Laminated and Metal Signs: Self-tapping stainless steel screws or number 10/32 stainless steel machine screws with nuts and flat and lock washers.

### **2.5 INSTRUCTION SIGNS**

- A. Provide instructions signs as indicated on drawings:
1. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. in. (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.
  2. Engraved legend with black letters on white face.

3. Punched or drilled for mechanical fasteners.
4. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

## **2.6 MISCELLANEOUS IDENTIFICATION PRODUCTS**

- A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.
1. Minimum Width: 3/16 inch (5 mm).
  2. Tensile Strength: 50 lb (22.6 kg), minimum.
  3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
  4. Color: Black, except where used for color-coding.
- B. Panelboard and relay schedules shall be typed and dated on card stock.

## **PART 3: EXECUTION**

### **3.1 GENERAL INFORMATION.**

- A. Identification means shall be installed in a neat and workmanlike manner. The NEIS Standard Practices for Good Workmanship in Electrical Contracting NECA 1-2006 is hereby adopted to define such workmanship and the installation of conductors and cables.

### **3.2 COORDINATION.**

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

### **3.3 INSTALLATION OF IDENTIFICATION / LABEL NAMEPLATES**

- A. Degrease and clean surfaces to receive nameplates. Install nameplates parallel to equipment lines. Secure nameplates to equipment fronts using screws, rivets, or adhesive. Secure nameplate to dead-front barrier recessed panelboards in finished locations. Embossed tape will not be permitted for any application.
- B. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and Operation, Maintenance and Warranty Data Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
1. Labeling Instructions:
    - a. Indoor Equipment: Self-adhesive, engraved, melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where 2 lines of text are required, use labels 2 inches (50 mm) high.
    - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
    - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.

2. Nameplate Engraving
  - a. Provide nameplates to identify all electrical distribution and control equipment, and loads served.
  - b. Letter Height: 1/8 inch for individual switches and loads served, 1/4 inch for distribution and control equipment identification.
  - c. Switchboards, panelboards, nameplates shall include: equipment name, the equipment name where the source originates, and equipment voltage.
3. Box Identification:
  - a. Label box cover with the panelboard(s) name and circuit numbers contained within. Use marking pen to label all feeder junction and pull boxes; communications systems junction and pull boxes; all junction boxes, pull boxes, and raceways installed for future use.
  - b. Paint covers of systems' junction boxes with assigned paint color and label with marking pen.
4. Equipment Identification:
  - a. Provide plastic laminated "NAME PLATES" as indicated or required in individual specification sections.
  - b. Install name plates inside covers in finished areas using approved contact cement.
  - c. Install name plates outside covers in unfinished areas using approved contact cement, self-tapping screws, or rivets.
  - d. Provide engraved cover plates where indicated on the Drawings.
5. 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.
6. Device Labeling:
  - a. Identify panelboard and circuit number from which served. Use permanent ink marker to label inside of box, and provide permanent adhesive labels (clear tape with black lettering) on front of coverplate. Install label on interior of device coverplate for weatherproof locations.
7. related to room numbering shall follow the Owner's final room numbering scheme. Obtain documentation of Owner's final room numbering prior to final labeling and/or programming. Identification of all systems shall utilize Owner's final room numbers.

### **3.4 INSTALLATION OF CABLE OR CONDUCTOR IDENTIFICATION / LABEL**

- A. Wire Identification:
  1. Provide wire markers on each conductor in panelboard gutters, pull boxes, outlet and junction boxes, and at load connection. Identify with branch circuit or feeder number for power and lighting circuits, and with control wire number as indicated on schematic and interconnection diagrams or equipment manufacturer's shop drawings for control wiring.
  2. Power-Circuit Feeder Conductor Identification: Identify source and circuit number of each set of conductors. For single conductor cables, identify phase in addition to the above.
  3. Branch-Circuit Conductor Identification: Where there are conductors for more than three branch circuits in same junction or pull box, Identify each ungrounded conductor according to source and circuit number.
  4. Conductors to Be Extended in the Future: Attach label to conductors and list source and circuit number.

5. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, signal, sound, intercommunications, voice, and data connections with source and circuit/zone number.
6. Match identification markings with designations used in panelboard / control panel shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installations.

### **3.5 INSTALLATION OF WARNING LABELS AND SIGNS AND INSTRUCTIONS**

- A. Provide warning, caution, or instruction label and signs and /or stencils as follows:
1. Install warning, caution, or instructions signs where required by NEC, where indicated, or where reasonably required to assure safe operation and maintenance of electrical systems and of the items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions or explanations are needed for system or equipment operation. Install butyrate signs with metal backing for outdoor items.
  2. Emergency Operating Signs: Install engraved laminate signs with white legend on red background with minimum 3/8-inch high lettering for emergency instructions on power transfer, load shedding, or other emergency operations.

### **3.6 IDENTIFICATION SCHEME**

- A. Verify system identification scheme / color coding with owner. If identification scheme is not defined the following color code shall be used:
1. Fire Alarm System: Red.
  2. Fire-Suppression Supervisory and Control System: Red and yellow.
  3. Combined Fire Alarm and Security System: Red and blue.
  4. Security System: Blue and yellow.
  5. Mechanical and Electrical Supervisory System: Green and blue.
  6. Telecommunication System: Green and yellow.
  7. Control Wiring: Green and red.

### **3.7 EQUIPMENT LABELS:**

- A. Equipment to Be Labeled:
1. Panelboards, relay panels, electrical cabinets, and enclosures.
  2. Electrical switchgear and switchboards.
  3. Emergency system boxes and enclosures.
  4. Disconnect switches.
  5. Enclosed circuit breakers.
  6. Push-button stations / HVAC equipment control stations.
  7. Power transfer equipment.
  8. Contactors.
  9. Remote-controlled switches, dimmer modules, and control devices.
  10. Power-generating units.
  11. Monitoring and control equipment.

**END OF SECTION 26 05 53**



## SECTION 26 24 16

### PANELBOARDS

#### PART 1: GENERAL

##### 1.1 SCOPE

- A. Section Includes:
  - 1. Lighting and appliance branch-circuit panelboards.
- B. This Section includes the furnishing and installation of all labor, materials, tools, appliances, hardware, junction boxes, and ancillary equipment for and incidental to the delivery, installation, and furnishing of completely operational panelboards as shown, required, and specified herein.

##### 1.2 SUBMITTALS

- A. Provide product data for each type of panelboard, switching and overcurrent protective device, accessory, and component indicated.
- B. Shop Drawings shall be submitted for each panelboard; including:
  - 1. Include dimensioned plans, elevations, and details, including required wiring space / gutter clearances.
  - 2. Provide current and voltage ratings.
  - 3. Provide short-circuit current rating of overcurrent protective devices.
  - 4. Provide panelboard ancillary equipment options, including hinged trim, feed thru lugs, shunt-trip breakers, GFCI, etc. See schedules for specific requirements.
  - 5. Panelboard schedules.
- C. Selective Coordination Study: Provide preliminary selective coordination study with shop submittal, indicating circuit breakers coordinate with critical and life safety distribution systems. Identify potential conflicts and provide suggested solutions.
- D. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, maintenance and warranty data manuals. In addition to items specified in Division 01 Section "Operation, Maintenance and Warranty Data," include the following:
  - 1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

##### 1.3 QUALITY ASSURANCE

- A. Manufacturer of panelboards shall be specialized in the manufacture and assembly of such equipment for a minimum of 25 years.
- B. Equipment shall be listed and/or classified by Underwriters Laboratories and in accordance with standards listed in this Specification.
- C. Installer Qualifications: An employer of workers qualified as defined in NEMA PB 1.1 and trained in electrical safety as required by NFPA 70E.
- D. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

##### 1.4 DELIVERY, STORAGE AND HANDLING

- A. Remove loose packing and flammable materials from inside panelboards; if storage conditions require it install temporary electric heating (250 W per panelboard) to prevent condensation.
- B. Handle and prepare panelboards for installation according to NECA 407.

## **1.5 PROJECT CONDITIONS**

- A. Environmental Limitations:
  - 1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
  - 2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
    - a. Ambient Temperature:
      - 1) For panels with fused switches: Not exceeding minus 22 deg F to plus 104 deg F.
      - 2) For panels with circuit breakers: Not exceeding 23 deg F to plus 104 deg F.
    - b. Altitude: Not exceeding 6600 feet.
- B. Service Conditions: NEMA PB 1, usual service conditions, as follows:
  - 1. Ambient temperatures within limits specified.
  - 2. Altitude not exceeding 6600 feet.
- C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
  - 1. Notify General Contractor/Construction Manager no fewer than ten working days in advance of proposed interruption of electric service.
  - 2. Do not proceed with interruption of electric service without Owner's written permission.
  - 3. Comply with NFPA 70E.

## **1.6 REFERENCES**

- A. The products provided by this section shall comply with the following applicable references (latest edition):
  - 1. NEMA AB 1 – Molded Case Circuit Breakers.
  - 2. NEMA KS 1 – Enclosed Switches.
  - 3. NEMA PB 1 – Panelboards.
  - 4. NEMA PB 1.1 – Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600V or Less.
  - 5. UL 489 – Molded Case Circuit Breakers.

## **1.7 MAINTENANCE**

- A. Panelboard manufacturer / vendor shall:
  - 1. Make ordering of new equipment for expansions, replacements, and spare parts available to end user.
  - 2. Make new replacement parts available for minimum of ten years from date of manufacture.
  - 3. Provide factory direct technical support hotline 24 hours per day, 7 days per week.
  - 4. Provide on-site service support within 24 hours anywhere in continental United States.
  - 5. Offer renewable service contract on yearly basis, to include parts, factory labor, and annual training visits. Make service contracts available up to ten years after date of system commissioning.

## **1.8 COORDINATION**

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

## **PART 2: PRODUCTS**

### **2.1 GENERAL INFORMATION.**

- A. All electrical equipment and material shall be new and bear a recognized testing laboratory's label, where applicable. The type of equipment and/or material shall be designated by the location where it will be installed and so defined by NEMA / NFPA 70 standards.

### **2.2 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide panelboards by one of the following:
  1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
  2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
  3. Siemens Energy & Automation, Inc.
  4. Square D; a brand of Schneider Electric.

### **2.3 GENERAL REQUIREMENTS FOR PANELBOARDS**

- A. Enclosures: Flush- and surface-mounted 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. Kitchen/Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
    - d. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
    - e. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 5.
  2. Finishes:
    - a. Panels and Trim: Steel or galvanized steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
    - b. Back Boxes: Same finish as panels and trim.
  3. Panelboard Cover: Entire front trim hinged to box with piano style hinges, and with standard door within hinged trim cover.
  4. Directory Card: Inside panelboard door, mounted in metal frame with transparent protective cover.
- B. Incoming Mains Location: Top or bottom (contractor's discretion).
- C. Phase, Neutral, and Ground Buses:
  1. Material: Hard-drawn copper, 98 percent conductivity.
  2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
  3. Neutral Bus:
    - a. Normally rated 100 percent of phase bus unless otherwise indicated.
    - b. Extra-Capacity Neutral Bus (for electronic grade panelboards and where otherwise indicated): Neutral bus rated 200 percent of phase bus and UL listed as suitable for nonlinear loads.
- D. 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.
  3. Ground Lugs and Bus-Configured Terminators: Mechanical type.
  4. Feed-Through Lugs (where indicated): Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
  5. Subfeed (Double) Lugs (where indicated): Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
  6. Extra-Capacity Neutral Lugs (for electronic grade panelboards and where otherwise indicated): Rated 200 percent of phase lugs mounted on extra-capacity neutral bus.
- E. Provisions for Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

- F. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Provide 65kAIC unless noted otherwise.
- G. See drawings for voltage, current, AIC ratings, flush or surface mounting, schedules, nameplates, environmental conditions, MLO, feed-thru lugs, future space / spare / overcurrent devices, etc.

## **2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS**

- A. The following general requirements apply to all lighting and appliance branch-circuit panelboards:
  - 1. Factory assembled and dead front safety type.
  - 2. Bolt-on breakers unless otherwise noted.
  - 3. With adequate wire bending space based on maximum overcurrent device capable of being installed.
  - 4. Pre-knocked out panelboard tops or bottoms shall not be permitted.
  - 5. Hinged trim (door-in-door) type unless otherwise noted.
  - 6. Trims:
    - a. Flush trims: concealed clamp and hinges, flush lock, and primer finish.
    - b. Surface: factory painted in manufacturer's standard color.
  - 7. If containing breakers that serve as sole disconnecting means, provide permanent means to lock breakers open.
  - 8. Field verify incoming feeder location for each panelboard.
  - 9. Provide typed directory card inside panelboard door, mounted in metal frame with transparent protective cover.
  - 10. If doors more than 48" high, have vault-type latch. Otherwise, have flush latch. Latches shall be keyed alike.

## **2.5 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES**

- A. See drawings for voltage, current, AIC ratings, GFCI, GFPE, Shunt-Trip, Handle Ties, Lock-On/Offs, switch rated, etc.
- B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents:
  - 1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
  - 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
  - 3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:
    - a. Instantaneous trip.
    - b. Long- and short-time pickup levels.
    - c. Long- and short-time time adjustments.
    - d. Ground-fault pickup level, time delay, and  $I^2t$  response.
  - 4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
  - 5. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
  - 6. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
  - 7. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
    - a. Standard frame sizes, trip ratings, and number of poles.
    - b. Lugs: Suitable for number, size, trip ratings, and conductor materials.
    - c. Ground-Fault Protection: Integrally mounted relay and trip-unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
    - d. Arc reduction maintenance switch function to meet NEC 240.87 for breaker frame sizes 1200 A and larger.

## **PART 3: EXECUTION**

### **3.1 GENERAL INSTALLATION**

- A. Panelboards shall be installed in a neat and workmanlike manner. The NEIS Standard Practices for Good Workmanship in Electrical Contracting NECA 1-2006 is hereby adopted to define such workmanship and the installation of conductors and cables.

- B. Provide all equipment, wiring, conduit, and junction boxes required for the installation of a complete and operating system in accordance with applicable local, state, and national codes, the manufacturers' recommendations, these plans and specifications.
- C. Panels shall be used for the voltage of which they are designed. The use of 480/277V panels on lesser voltages is not allowed.

### **3.2 PROJECT CONDITIONS**

- A. Environmental Limitations:
  - 1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
  - 2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
    - a. Ambient Temperature: Not exceeding 23 deg F to plus 104 deg F.

### **3.3 COORDINATION**

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

### **3.4 INSTALLATION OF PANELBOARDS**

- A. Mount panelboards and cabinets to building structure or interior wall construction. Mount independent of conduit and raceways entering boxes. Where indicated, provide free standing Plywood/Unistrut backboards (painted with fire retardant grey) rigidly mounted to the floor and/or ceiling for panelboard support means.
- B. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- C. Mount panelboards with cabinet top at 78" above finished floor.
- D. Provide 1" spare empty conduits from each flush mounted panelboard. When the floor is on grade, provide three (3) conduits into the ceiling cavity above. When the floor has accessible space below, provide two (2) conduits into the ceiling cavity above and two (2) conduits into the accessible space below the floor. Ends shall be capped and shall be tagged at both ends with permanent tags.
- E. Provide three spare empty 1" conduits from surface mounted panelboard into accessible ceiling space or space designated to be ceiling space.
- F. Provide each circuit in the panel(s) with a circuit number securely fastened to the breaker for identification purposes.
- G. Provide a circuit directory dated and completely typed on the interior of each panel door.
- H. Verify with owner critical circuits, for application of "lock-ons". (Telecommunication circuits, Fire Alarm, Security, HVAC, etc.)
- I. Install filler plates in unused spaces.
- J. Comply with NECA 1.

### **3.5 IDENTIFICATION**

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Division 26 Section "Identification for Electrical Systems."

- B. Create a directory to indicate installed circuit loads. Use template indicated at the end of this specification section.
  - 1. Incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
  - 2. Provide 8x11 panel directory in 8x11 plastic sleeve. Secure sleeve to inside cover of panelboard with appropriate materials.
  - 3. Free template (Excel format) is available upon request from engineer for contractor's use.
  - 4. Coordinate with engineer for fault current and date of study.
  - 5. Document accurate feeder lengths (within 10') as best possible.
  - 6. For existing panels requiring addition of more than five circuits field verify all information as reasonably possible.
  - 7. Submit final copy of each directory as part of O&M Manual.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
- D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

### **3.6 ADJUSTING AND CLEANING**

- A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.
- B. Adjust Circuit Breaker trip and time-delay settings to values as instructed by the Architect/Engineer.
- C. Upon completion of installation of panelboard, de-energize equipment and inspect interiors of panelboard; clear all blockages and remove burrs, paint splatters and other spots, dirt, and construction debris. Touch up scratches and mars of finish to match original finish.

### **3.7 DEMONSTRATION**

- A. Train Owner's maintenance personnel to adjust, operate, and maintain panelboards, overcurrent protective devices, and accessories. Include a 4 hour session.

### **3.8 WARRANTY**

- A. The Contractor shall provide a one-year warranty of the installed system against defects in material and workmanship. All labor and materials shall be provided at no expense to the Owner. Warranty period shall begin on the date of acceptance as issued by the Architect's certificate of completion.

### **3.9 EXTRA MATERIALS**

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Keys: Two spares for each type of panelboard cabinet lock.
  - 2. Spare Circuit Breakers shall be as shown on Drawings.

**END OF SECTION 26 24 16**

## SECTION 26 28 13

### FUSES

#### PART 1: GENERAL

##### 1.01 SUMMARY

A. Section Includes:

1. Cartridge fuses rated 600-V ac and less for use in control circuits, enclosed switches, panelboards, switchboards, enclosed controllers and motor-control centers.

##### 1.02 QUALITY ASSURANCE

- A. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.
- 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 FU 1 for cartridge fuses.
- D. Comply with NFPA 70.
- E. Comply with UL 248-11 for plug fuses.

##### 1.03 PROJECT CONDITIONS

- A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F or more than 100 deg F, apply manufacturer's ambient temperature adjustment factors to fuse ratings.

##### 1.04 COORDINATION

- A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

#### PART 2: PRODUCTS

##### 2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Cooper Bussmann, Inc.
  2. Edison Fuse, Inc.
  3. Littelfuse, Inc.
  4. Mersen, Inc.

##### 2.02 CARTRIDGE FUSES

- A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

## **PART 3: EXECUTION**

### **3.01 EXAMINATION**

- A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.
- B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.
- C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.
- D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 FUSE APPLICATIONS**

- A. Cartridge Fuses:
  - 1. Service Entrance: Class L, time delay.
  - 2. Feeders: Class RK1, time delay.
  - 3. Motor Branch Circuits:
    - a. Motors with Variable Frequency Drives: Type JJC, Class T.
    - b. All other Motors: Class RK5, time delay.
  - 4. Other Branch Circuits: Class RK5, time delay.
  - 5. Control Circuits: Class CC, time delay.

### **3.03 INSTALLATION**

- A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

### **3.04 IDENTIFICATION**

- A. Install labels complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block, socket, and holder.

**END OF SECTION 26 28 13**



## SECTION 26 32 13

### ENGINE GENERATORS

#### PART 1: GENERAL

##### 1.1 SCOPE

- A. This Section includes the installation of a Kohler 80REOZJF 83kW 208V 3P diesel electric generating set (supplied by the Village), completely installed, tested, and operative. All necessary equipment, labor, and materials shall be included; the coordination of all required equipment and material shall be the responsibility of one manufacturer, who has had an approved experience record in furnishing similar equipment. Capacity and voltage characteristics shall be as shown on the drawings. Contractor shall provide the required permits, generator modeling, and associated costs to install the new generator.
- B. This Section includes a packaged engine-generator set (supplied by Village, installed by contractor) for a Level 2 emergency power supply system with the following features:
  - 1. Diesel engines.
  - 2. Unit-mounted cooling system.
  - 3. Unit-mounted control and monitoring panel.
  - 4. Base mounted fuel oil tank.
  - 5. Outdoor enclosure.
- C. Concrete Bases: by Village.

##### 1.2 QUALITY ASSURANCE

- A. Installer Qualifications:
  - 1. An employer of workers qualified as defined in NEMA PB 1.1 and trained in electrical safety as required by NFPA 70E.
  - 2. Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
  - 3. Maintenance Proximity: Not more than four hours' normal travel time from Installer's place of business to Project site.
  - 4. Engineering Responsibility: Preparation of data for vibration isolators and seismic restraints of engine skid mounts, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

##### 1.3 PROJECT CONDITIONS

- A. Environmental Conditions: Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
  - 1. Ambient Temperature: -20F to 100F.
  - 2. Altitude: Sea level to 1000 feet (300 m).
  - 3. Do not deliver or install interior engine-generator sets until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above engine-generators is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
  - 1. Notify Architect, Construction Manager, and Owner no fewer than two weeks in advance of proposed interruption of service.
  - 2. Indicate method of providing temporary electric service.

3. Do not proceed with interruption of electric service without written permission from Architect, Construction Manager and Owner.
4. Comply with NFPA 70E.

#### **1.4 REFERENCES**

- A. The products provided by this section shall comply with the following applicable references (latest edition):
1. ASME B15.1 – Safety Standard for Mechanical Power Transmission.
  2. NFPA 37 – Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines.
  3. NFPA 110 – Standard for Emergency and Standby Power Systems.
  4. UL 2200 – Stationary Engine Generator Assemblies

#### **1.5 MAINTENANCE**

- A. Engine generator manufacturer / vendor shall:
1. Make ordering of new equipment for expansions, replacements, and spare parts available to end user.
  2. Make new replacement parts available for minimum of ten years from date of manufacture.
  3. Provide factory direct technical support hotline 24 hours per day, 7 days per week.
  4. Provide on-site service support within 24 hours anywhere in continental United States.
  5. Offer renewable service contract on yearly basis, to include parts, factory labor, and annual training visits. Make service contracts available up to ten years after date of system commissioning.
  6. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include quarterly exercising to check for proper starting, load transfer, and running under load. Include routine preventive maintenance as recommended by manufacturer and adjusting as required for proper operation. Provide parts and supplies same as those used in the manufacture and installation of original equipment.

#### **1.6 COORDINATION**

- A. Coordinate size and location of concrete bases for package engine generators. Provide base thickness and size as recommended by generator supplier as a minimum or as indicated. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03. Coordinate layout and installation of generator with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

### **PART 2: PRODUCTS**

#### **2.1 GENERAL INFORMATION.**

- A. All electrical equipment and material shall be new and bear a recognized testing laboratory's label, where applicable. The type of equipment and/or material shall be designated by the location where it will be installed and so defined by NEMA / NFPA 70 standards.

#### **2.2 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide complete generator set by one of the following:
1. Kohler Co.; Generator Division. 80REOZJF 83kW 208V 3P diesel.

### **PART 3: EXECUTION**

#### **3.1 GENERAL INSTALLATION**

- A. Engine generators shall be installed in a neat and workmanlike manner. The NEIS Standard Practices for Good Workmanship in Electrical Contracting NECA 1-2006 is hereby adopted to define such workmanship and the installation of conductors and cables.

- B. Provide all equipment, wiring, conduit, and junction boxes required for the installation of a complete and operating system in accordance with applicable local, state, and national codes, the manufacturers' recommendations, these plans and specifications.

### **3.2 EXAMINATION**

- A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine-generator performance.
- B. Examine roughing-in of piping systems and electrical connections. Verify actual locations of connections before packaged engine-generator installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.3 INSTALLATION**

- A. Comply with packaged engine-generator manufacturers' written installation and alignment instructions and with NFPA 110.
- B. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.
- C. Install packaged engine generator with elastomeric isolator pads having a minimum deflection of 1 inch on 4-inch- (100-mm-) high concrete base. Secure sets to anchor bolts installed in concrete bases. Verify and provide structural support bars, and thickness and size of concrete base required by manufacturer of genset.
- D. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted. Provide all interconnection and control wiring in conduit between genset and all automatic transfer switches and remote alarm, control and/or monitoring and annunciator panels. Verify wire quantities and types with manufacturer(s) of alarm or monitoring panels.
- E. Connect generator dampers, fuel pump motors and associated electrically operated items on emergency power circuits where required for generator operation.
- F. Provide full tank of fuel after testing is complete.

### **3.4 CONNECTIONS**

- A. Connect fuel, cooling-system, and exhaust-system piping adjacent to packaged engine generator to allow service and maintenance.
- B. Connect engine exhaust pipe to engine with flexible connector.
- C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

### **3.5 IDENTIFICATION**

- A. Identify system components according to Division 26 Section "Identification for Electrical Systems."

### **3.6 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.
- B. Perform tests and inspections and prepare test reports.
  - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

- C. Tests and Inspections:
1. Perform tests recommended by manufacturer and each electrical test and visual and mechanical inspection for "AC Generators and for Emergency Systems" specified in NETA Acceptance Testing Specification. Certify compliance with test parameters.
  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.
    - a. Testing shall include demonstration of all operational requirements, including open and closed transition switching as applicable at light (quarter-load), medium (half-load) and full load. Testing shall also include four consecutive hours of operation at full load.
  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. Verify acceptance of charge for each element of the battery after discharge.
    - c. 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. Harmonic-Content Tests: Measure harmonic content of output voltage under 25 percent and at 100 percent of rated linear load. Verify that harmonic content is within specified limits.
- D. Coordinate tests with tests for transfer switches and run them concurrently.
- E. Test instruments shall have been calibrated within the last 12 months, traceable to standards of NIST, and adequate for making positive observation of test results. Make calibration records available for examination on request.
- F. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
- G. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
- H. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- I. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.
- J. 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.
- K. Include all testing reports in Operation, Maintenance, and Warranty Data Manual(s).

### **3.7 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators. Provide video taping of this session. Refer to Division 01 Section "Demonstration and Training." Provide an 8 hour training session for Owner personnel.

**END OF SECTION 26 32 13**

## SECTION 26 36 00

### TRANSFER SWITCHES

#### PART 1: GENERAL

##### 1.1 SCOPE

- A. This Section includes the installation of a Kohler ModelK1 KSS-DFVC-0260S 260A 208V 4 pole automatic transfer switch (supplied by Village) of the type and operating characteristics described hereinafter, completely installed, tested, and operative. All necessary equipment, labor, and materials shall be included; the coordination of all required equipment and material shall be the responsibility of one manufacturer, who has had an approved experience record in furnishing similar equipment.
- B. All system equipment, materials, and components shall be of current production models and types, produced and marketed by manufacturers having an established reputation for satisfactory product performance and reliability.

##### 1.2 QUALITY ASSURANCE

- A. Installer Qualifications:
  - 1. An employer of workers qualified as defined in NEMA PB 1.1 and trained in electrical safety as required by NFPA 70E.
  - 2. Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
  - 3. Maintenance Proximity: Not more than four hours' normal travel time from Installer's place of business to Project site.

##### 1.3 REFERENCES

- A. The products provided by this section shall comply with the following applicable references (latest edition):
  - 1. NEMA ICS1 – Industrial Control and Systems.
  - 2. NEMA ICB-10-1993.
  - 3. NFPA 110 – Standard for Emergency and Standby Power Systems.
  - 4. UL 1008 – Transfer Switch Equipment.
  - 5. IEC 947-6-1.
  - 6. IEEE Standard 446.

##### 1.4 MAINTENANCE

- A. Transfer switch manufacturer / vendor shall:
  - 1. Make ordering of new equipment for expansions, replacements, and spare parts available to end user.
  - 2. Make new replacement parts available for minimum of ten years from date of manufacture.
  - 3. Provide factory direct technical support hotline 24 hours per day, 7 days per week.
  - 4. Provide on-site service support within 24 hours anywhere in continental United States.
  - 5. Offer renewable service contract on yearly basis, to include parts, factory labor, and annual training visits. Make service contracts available up to ten years after date of system commissioning.
  - 6. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include quarterly exercising to check for proper starting, load transfer, and running under load. Include routine preventive maintenance as recommended by manufacturer and adjusting as required for proper operation. Provide parts and supplies same as those used in the manufacture and installation of original equipment.

##### 1.5 COORDINATION

- A. Coordinate size and location of transfer switches. Coordinate layout and installation of transfer switch with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

- B. Mount on concrete pads where indicated. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

## **1.6 WARRANTY**

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of transfer switch(es) 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 GENERAL INFORMATION.**

- A. All electrical equipment and material shall be new and bear a recognized testing laboratory's label, where applicable. The type of equipment and/or material shall be designated by the location where it will be installed and so defined by NEMA / NFPA 70 standards.

### **2.2 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide Automatic Transfer Switches by one of the following:
  - 1. Kohler Power Systems; Generator Division. Model K1 KSS-DFVC-0260S.

## **PART 3: EXECUTION**

### **3.1 GENERAL INSTALLATION**

- A. Transfer switches shall be installed in a neat and workmanlike manner. The NEIS Standard Practices for Good Workmanship in Electrical Contracting NECA 1-2006 is hereby adopted to define such workmanship and the installation of conductors and cables.
- B. Provide all equipment, wiring, conduit, and junction boxes required for the installation of a complete and operating system in accordance with applicable local, state, and national codes, the manufacturers' recommendations, these plans and specifications.
- C. Mount on 4" concrete bases where floor mounting is indicated.

### **3.2 EXAMINATION**

- A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting transfer switch performance.
- B. Examine roughing-in of piping systems and electrical connections. Verify actual locations of connections before transfer switch installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.3 INSTALLATION**

- A. Comply with transfer switch manufacturers' written installation and alignment instructions and with NFPA 110. Verify / coordinate generator manufacturers' written installation and alignment instructions.
- B. Identify components according to Division 26 Section "Identification for Electrical Systems."
- C. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

### **3.4 CONNECTIONS**

- A. Wiring to Remote Components: Match type and number of cables and conductors to 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. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- C. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- D. Provide connection to remote 24V source in exterior generator.

### **3.5 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections per requirements below. Report results in writing.
- B. Perform tests and inspections and prepare test reports.
  - 1. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.
  - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
  - 3. 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.
  - 4. After energizing circuits, 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 of 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. 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.
- 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. Remove and replace malfunctioning units and retest as specified above.
- F. Include all test results in Owner's Operation, Maintenance, and Warranty Data manuals.

### **3.6 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment as specified below. Refer to Division 01 Section "Demonstration and Training." Include up to 4 hours training.
- B. Coordinate this training with that for generator equipment.

**END OF SECTION 26 36 00**



## SECTION 26 36 50

### PORTABLE GENERATOR DOCKING STATIONS

#### PART 1: GENERAL

##### 1.1 SCOPE

- A. This Section includes the furnishing of a portable generator docking station as described herein. The amperage, voltage, withstand, and close-on ratings shall be as shown on the plans.
- B. All system equipment, materials, and components shall be of current production models and types, produced and marketed by manufacturers having an established reputation for satisfactory product performance and reliability.

##### 1.2 SUBMITTALS

- A. Shop Drawings shall be submitted for each docking station. Include rated capacities, operating characteristics, interconnection diagrams, and furnished specialties and accessories. In addition, include the following:
  - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 2. Single-Line Diagram: Show connections between generator and transfer switches; and show interlocking provisions.
- B. Qualification Data: For manufacturer.
- C. Field quality-control test reports.
- D. Operation, Maintenance, and Warranty Data: For each type of product to include in emergency, operation, maintenance and warranty data manuals. In addition to items specified in Division 01 Section "Operation, Maintenance, and Warranty Data," include the following:
  - 1. Features and operating sequences, both automatic and manual.
  - 2. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

##### 1.3 QUALITY ASSURANCE

- A. Manufacturer of docking stations shall be specialized in the manufacture and assembly of such equipment for a minimum of 10 years.
- B. Equipment shall be listed and/or classified by Underwriters Laboratories and in accordance with standards listed in this Specification.
- C. Installer Qualifications:
  - 1. An employer of workers qualified as defined in NEMA PB 1.1 and trained in electrical safety as required by NFPA 70E.
  - 2. Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
  - 3. Maintenance Proximity: Not more than four hours' normal travel time from Installer's place of business to Project site.
- D. Manufacturer Qualifications: Maintain a service center capable of providing training, parts, and emergency maintenance repairs within a response period of less than eight hours from time of notification for 365 days per year..
- E. Source Limitations: Obtain docking stations through one source from a single manufacturer.
- F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

- G. Comply with NFPA 70, 99, and 110.
- H. Comply with UL 1008 unless requirements of these Specifications are stricter.

#### **1.4 PROJECT CONDITIONS**

- A. Environmental Conditions: Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
  - 1. Ambient Temperature: -20F to 100F.
  - 2. Altitude: Sea level to 1000 feet.
  - 3. Do not deliver or install interior engine-generator sets until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above engine-generators is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Installation Pathway: Remove and replace access fencing, doors, lift-out panels, and structures to provide pathway for moving equipment into place.
- C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
  - 1. Notify Architect, Construction Manager, and Owner no fewer than two weeks in advance of proposed interruption of service.
  - 2. Indicate method of providing temporary electric service.
  - 3. Do not proceed with interruption of electric service without written permission from Architect, Construction Manager and Owner.

#### **1.5 REFERENCES**

- A. The products provided by this section shall comply with the following applicable references (latest edition):
  - 1. NEMA ICS1 – Industrial Control and Systems.
  - 2. NEMA ICB-10-1993.
  - 3. NFPA 110 – Standard for Emergency and Standby Power Systems.
  - 4. UL 1008 – Transfer Switch Equipment.
  - 5. IEC 947-6-1.
  - 6. IEEE Standard 446.

#### **1.6 MAINTENANCE**

- A. Docking station manufacturer / vendor shall:
  - 1. Make ordering of new equipment for expansions, replacements, and spare parts available to end user.
  - 2. Make new replacement parts available for minimum of ten years from date of manufacture.
  - 3. Provide on-site service support within 24 hours anywhere in continental United States.

#### **1.7 COORDINATION**

- A. Coordinate size and location of docking stations. Coordinate layout and installation of docking stations with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Mount on concrete pads where indicated. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

## **PART 2: PRODUCTS**

### **2.1 GENERAL INFORMATION.**

- A. All electrical equipment and material shall be new and bear a recognized testing laboratory's label, where applicable. The type of equipment and/or material shall be designated by the location where it will be installed and so defined by NEMA / NFPA 70 standards.

### **2.2 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide docking station by one of the following:
  1. American Midwest Power
  2. States Manufacturing
  3. EMI
  4. Trystar
  5. Approved Equal.

### **2.3 GENERAL DOCKING STATION REQUIREMENTS**

- A. Generator docking stations shall be UL listed and shall consist of cam-style male connectors and grounding terminals, all housed within a pad lockable enclosure.
  1. Enclosure shall be NEMA 3R, constructed of 12 ga galvanealed steel. Enclosure shall be powder coated after fabrication; color shall be ANSI 61 gray.
  2. Phase and neutral bussing: Ampacity as indicated on plan, silver plated copper.
  3. Voltage to match generator output.
  4. Withstand rating: 65kA.
  5. Provide LSI electronic trip breakers:
    - a. For temp generator/load bank: Ampacity as indicated on plan.
  6. Concrete pad mounted or wall mounted as required.
  7. Main access shall be through hinged door which extends the full height of the enclosure. Access for portable generator cables with female cam-style plugs shall be via hinged lower door. All doors to have 3-point pad-lockable handles.
  8. Cam-style male connectors shall be UL listed. Connectors shall be color coded to match facility voltage colors. Connectors shall be provided for each phase, ground, and neutral. Provide size and quantities of mechanical lug connections required for specified amperage. Not be less than (2) 500 MCM per phase.
  9. The ground connectors shall be bonded to the enclosure, and a ground lug shall be provided for connection of the facility ground conductor. None of the cam-style male connectors shall be accessible unless the main access door is open.
  10. Phase rotation monitor.
    - a. L1-L2-L3 indicator lights. Solid green light indicates correct phase rotation. Flashing red light indicates incorrect phase rotation. Solid red indicates phase loss.
    - b. 1A time delay fusing for each light.
  11. Generator signal terminal wiring block and contacts.
  12. Selector switch.
    - a. Interlocked with permanent generator output breaker. When selector switch is turned to temp generator, the output breaker of permanent generator is to open.
  13. Kirk key interlock.

### **2.4 SOURCE QUALITY CONTROL**

- A. Factory test and inspect components, assembled switches, and associated equipment. Ensure proper operation.

### **2.5 CONCRETE BASES**

- A. Equipment Mounting (where floor-mounting is required): Install on concrete base, 4-inch nominal thickness. Comply with requirements for concrete base specified in Division 03 Section.
  1. Coordinate size of equipment bases with actual unit sizes provided. Fabricate base 4 inches larger in both directions than the overall dimensions of the supported unit. Chamfer top edge and corners of pad.

2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
3. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to transfer switch.

### **PART 3: EXECUTION**

#### **3.1 GENERAL INSTALLATION**

- A. Docking stations shall be installed in a neat and workmanlike manner. The NEIS Standard Practices for Good Workmanship in Electrical Contracting NECA 1-2006 is hereby adopted to define such workmanship and the installation of conductors and cables.
- B. Provide all equipment, wiring, conduit, and junction boxes required for the installation of a complete and operating system in accordance with applicable local, state, and national codes, the manufacturers' recommendations, these plans and specifications.
- C. Mount on 4" concrete bases where floor mounting is indicated.

#### **3.2 EXAMINATION**

- A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting transfer switch performance.
- B. Examine roughing-in of piping systems and electrical connections. Verify actual locations of connections before transfer switch installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.3 INSTALLATION**

- A. Comply with manufacturers' written installation and alignment instructions and with NFPA 110. Verify / coordinate generator and transfer switch manufacturers' written installation and alignment instructions.
- B. Identify components according to Division 26 Section "Identification for Electrical Systems."

#### **3.4 CONNECTIONS**

- A. Wiring to Remote Components: Match type and number of cables and conductors to control and communication requirements of generator and transfer switches as recommended by manufacturer. Increase raceway sizes as required to accommodate required wiring.
- B. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- C. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

#### **3.5 FIELD QUALITY CONTROL**

- A. Furnish temporary portable generator and provide tests and inspections and prepare test reports.
  1. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.
  2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
  3. After energizing circuits, demonstrate interlocking sequence and operational function of circuit breakers.
- B. Coordinate tests with tests of generator and transfer switch equipment and run them concurrently.

- C. 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.
- D. Remove and replace malfunctioning units and retest as specified above.
- E. Include all test results in Owner's Operation, Maintenance, and Warranty Data manuals.

### **3.6 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment as specified below. Refer to Division 01 Section "Demonstration and Training." Include up to 4 hours training.
- B. Coordinate this training with that for generator and transfer switch equipment.

**END OF SECTION 26 36 00**

ELECTRICAL SYMBOL SCHEDULE

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	MOUNTING HEIGHT	SYMBOL	DESCRIPTION	MOUNTING HEIGHT	SYMBOL	DESCRIPTION	MOUNTING HEIGHT	SYMBOL	DESCRIPTION	MOUNTING HEIGHT											
<b>GENERAL ELECTRICAL SYMBOLS</b>					<b>COMMUNICATION DEVICES</b>					<b>POWER AND MOTOR DEVICES</b>														
<p>A. DEVICES SHALL BE MOUNTED AT THE HEIGHT INDICATED, UNLESS NOTED OTHERWISE. HEIGHTS ARE MEASURED TO FROM DEVICE CENTER TO FINISHED FLOOR. DEVICES MOUNTED IN BLOCKBRICK WALLS SHALL CORRESPOND WITH BLOCKBRICK COURSEING. SEE MASONRY BACKBOX MOUNTING HEIGHT DETAIL.</p> <p>B. ALL MOUNTING HEIGHTS INDICATED ARE FROM THE FINISH FLOOR TO THE CENTER OF THE BOX.</p> <p>C. ON DEMOLITION DRAWINGS, DASHED ELECTRICAL ITEMS DENOTES EXISTING ITEMS TO BE REMOVED. SOLID SCREENED ELECTRICAL ITEMS DENOTES EXISTING ITEMS TO REMAIN, UNLESS NOTED OTHERWISE.</p> <p>D. ON NEW WORK LIGHTING, POWER AND SYSTEMS DRAWINGS, SCREENED ELECTRICAL ITEMS DENOTES EXISTING ITEMS TO REMAIN. SOLID ELECTRICAL ITEMS DENOTES NEW ITEMS, UNLESS NOTED OTHERWISE.</p>					<p><b>LIGHTING</b></p> <p>RECESSED LUMINAIRE (TYPE DENOTED)</p> <p>SURFACE MOUNTED LUMINAIRE (TYPE DENOTED)</p> <p>LUMINAIRE ON EMERGENCY CIRCUIT, SWITCHED</p> <p>LUMINAIRE ON EMERGENCY CIRCUIT, UNSWITCHED</p> <p>STRIP LIGHT LUMINAIRE, FOR SUSPENDED MOUNTING HEIGHTS, SEE DRAWINGS</p> <p>WALL MOUNTED LUMINAIRE, SEE REFLECTED CEILING PLAN FOR MOUNTING HEIGHT</p> <p>LINEAR PENDANT LUMINAIRE, FOR SUSPENDED MOUNTING HEIGHTS, SEE DRAWINGS</p> <p>CIRCULAR PENDANT LUMINAIRE, FOR SUSPENDED MOUNTING HEIGHTS, SEE DRAWINGS</p> <p>TRACK LIGHT LUMINAIRE (WITH HEADS OR PENDANTS); LENGTH AND MOUNTING AS NOTED ON DRAWINGS</p> <p>EXIT LIGHT-FACE SHOWN SHADED; PLAN INDICATES CEILING OR WALL MOUNTING AND DIRECTIONAL ARROWS</p> <p>EMERGENCY LIGHTING UNIT - TWO HEAD MOUNTING AS INDICATED ON DRAWINGS</p> <p>POLE MOUNTED SITE LUMINAIRE - SINGLE SQUARE HEAD, NUMBER OF HEADS AS SHOWN</p> <p>POLE MOUNTED SITE LUMINAIRE - PEDESTRIAN OR BOLLARD STYLE</p>					<p>PAGING/INTERCOM SPEAKER HORN ASSEMBLY - P.A. OR AS INDICATED</p> <p>xx INDICATES THE FOLLOWING: WG = WIREGUARD, PA = P.A. SYSTEM (34°C BUSHED EMT TO ACCESSIBLE CEILING)</p> <p>LOUVER SPEAKER HORN ASSEMBLY - VERIFY MOUNTING HEIGHT</p> <p>xx INDICATES THE FOLLOWING: WG = WIREGUARD, PA = P.A. SYSTEM (34°C BUSHED EMT TO ACCESSIBLE CEILING)</p> <p>SPEAKER WITH BACKBOX (WALL OR CEILING) xx INDICATES THE FOLLOWING: PA = P.A. SYSTEM V = WITH INTEGRAL VOLUME CONTROL, Z# = ZONE NUMBER, AV = REFER TO AV SYMBOLS (34°C BUSHED EMT TO ACCESSIBLE CEILING), MOUNT 12" BELOW CEILING OR AS INDICATED ON PLANS</p> <p>INTERCOM: x INDICATES THE FOLLOWING: M = MASTER STATION, IC = REFER TO AV SYMBOLS, HS = REFER TO AV SYMBOLS (12°C BUSHED EMT TO ACCESSIBLE CEILING)</p> <p>VOLUME CONTROL (12°C BUSHED EMT TO ACCESSIBLE CEILING)</p> <p>CALL BACK SWITCH (12°C BUSHED EMT TO ACCESSIBLE CEILING)</p> <p>CLOCK OUTLET (34°C BUSHED EMT TO ACCESSIBLE CEILING FOR WIRED CLOCKS ONLY), D = DOUBLE FACED</p> <p>BELL/AUDIBLE DEVICE (34°C BUSHED EMT TO ACCESSIBLE CEILING)</p> <p>WALL DATA AND COMMUNICATIONS OUTLET (BUSHED EMT TO ACCESSIBLE CEILING SPACE OR AS INDICATED), DR INDICATES TYPE OF OUTLET. SEE DETAIL SHEETS</p> <p>CEILING DATA OUTLET AND WIRELESS ACCESS POINT (BUSHED EMT TO ACCESSIBLE CEILING SPACE OR AS INDICATED), DR INDICATES TYPE OF OUTLET. SEE DETAIL SHEETS</p> <p>WALL MOUNT DATA OUTLET FOR ROOM SCHEDULING EQUIPMENT. REFER TO DETAILS</p> <p>WALL PHONE COMMUNICATIONS OUTLET (1" BUSHED EMT TO ACCESSIBLE CEILING SPACE), SEE DETAIL SHEETS</p> <p>DISTRIBUTED ANTENNA SYSTEM (DAS) ANTENNA</p>					<p>RECEPTACLE ABOVE NOTATION THE FOLLOWING:</p> <p>AB ABOVE COUNTER, BOTTOM OF BOX 2" ABOVE BACKSPLASH</p> <p>G ISOLATED GROUND</p> <p>GFI INTEGRAL GROUND FAULT CIRCUIT INTERRUPTER</p> <p>GFI CB GROUND FAULT CIRCUIT INTERRUPTER IN CIRCUIT BREAKER TR TAMPER RESISTANT</p> <p>USB (2) USB PORTS INTEGRAL WITH RECEPTACLE WP WEATHERPROOF</p> <p>SURFACE MOUNTED DUPLEX / QUAD RECEPTACLES AND DATA OUTLETS</p> <p>RECEPTACLES WITH GROUND FAULT CIRCUIT INTERRUPTER</p> <p>DUPLEX RECEPTACLE ON NORMAL CIRCUIT</p> <p>DUPLEX RECEPTACLE ON EMERGENCY CIRCUIT</p> <p>RECEPTACLE (SINGLE)</p> <p>DOUBLE DUPLEX RECEPTACLE (QUAD) ON NORMAL CIRCUIT</p> <p>DOUBLE DUPLEX RECEPTACLE (QUAD) ON EMERGENCY CIRCUIT</p> <p>SPECIAL PURPOSE OUTLET; RECESSED, MOUNT PER DWGS.</p> <p>RECESSED CEILING MOUNTED SINGLE OR DUPLEX RECEPTACLE W/ ADDITIONAL 10' FLEX MC/AC SLAC (COLE); FOR FUTURE DEVICE RELOCATION</p> <p>USB ONLY DEVICE, (4) USB CHARGING PORTS</p> <p>CEILING OR WALL MOUNTED JUNCTION BOX WITH REQUIRED COVERPLATE - PLAN INDICATES FUNCTION</p> <p>MOTOR RATED SWITCH AND PILOT</p> <p>MOTOR RATED SWITCH</p> <p>MOTOR STARTER SWITCH WITH MOTOR RUNNING PROTECTION (ADD RELAY IF CONTROL CONTACTS ARE REQUIRED)</p> <p>DISCONNECT SWITCH - NON FUSED</p> <p>DISCONNECT SWITCH - FUSED</p> <p>MOTOR STARTER</p> <p>COMBINATION STARTER/DISCONNECT SWITCH</p> <p>PUSHBUTTON - WALL MOUNTED</p> <p>PUSHBUTTON - WALL MOUNTED</p> <p>POWER POLE (DEVICES AS INDICATED)</p> <p>MOTOR, SEE MOTOR AND EQUIPMENT SCHEDULE</p> <p>POLE THROUGH (PT) OR FLOOR BOX (FB), FULLY RECESSED IN FLOOR REFER TO POLE-THROUGH AND FLOOR BOX SCHEDULE</p> <p>WALL MOUNTED FURNITURE FEED</p> <p>CORD REEL / CORD AND PLUG SET - CEILING MOUNTED. SEE PLANS FOR MORE INFORMATION</p>					<p><b>AUDIO / VIDEO DEVICES</b></p> <p>MICROPHONE OUTLET (WALL, CEILING, OR HANGING); HA = HANGING, 1 GANG J-BOX AT CEILING DECK OR AS NOTED (12°C BUSHED EMT TO ACCESSIBLE CEILING)</p> <p>AUXILIARY INPUT CONNECTOR (12°C BUSHED EMT TO ACCESSIBLE CEILING)</p> <p>COMMUNICATIONS OUTLET FOR TV (WALL OR CEILING), (BUSHED EMT TO ACCESSIBLE CEILING SPACE OR AS INDICATED), # = SEE DETAIL SHEETS</p> <p>TV/VIDEO CAMERA, CLOSED CIRCUIT (WALL OR CEILING MOUNTED), (12°C BUSHED EMT TO ACCESSIBLE CEILING), MOUNT PER DRAWINGS, CAMERA BY OTHERS</p> <p>AV WALL OR DESK MOUNTED EQUIPMENT RACK OR CABINET. REFER TO AV DETAILS. AVR # DENOTES RACK NUMBER</p> <p>AV FLOOR MOUNTED EQUIPMENT CABINET. REFER TO AV DETAILS. AVR # DENOTES RACK NUMBER</p> <p>CEILING OR WALL MOUNTED AV JUNCTION BOX. REFER TO KEYNOTE FOR DIMENSIONS AND ADDITIONAL INFORMATION</p> <p>AV CONTROL PANEL (TOUCHSCREEN OR BUTTON PANEL), WALL MOUNTED. REFER TO KEYNOTE</p> <p>AV WALL INPUT WALLPLATE/TRANSMITTER. REFER TO AV DETAILS</p> <p>AV INPUT IN FURNITURE. REFER TO AV DETAILS</p> <p>AV TECH IO PANEL (NUMBER), REFER TO AV PANEL DETAILS FOR DIMENSIONS AND ADDITIONAL INFORMATION</p> <p>ANTENNA J-BOX/WALLPLATE, 1-GANG, FOR WIRELESS MICS OR A.S. REFER TO AV WALLPLATE DETAILS</p> <p>PRODUCTION PT/Z CAMERA AND J-BOX/WALLPLATE. REFER TO AV WALLPLATE DETAILS</p> <p>PRODUCTION INTERCOM HEADSET STATION</p> <p>PRODUCTION INTERCOM OUTLET WALLPLATE. REFER TO AV WALLPLATE DETAILS</p> <p>CEILING OR WALL MOUNTED PROJECTOR. REFER TO AV DETAILS</p> <p>PROJECTION SCREEN - LOW VOLTAGE CONNECTION</p> <p>CEILING OR WALL MOUNT AV SPEAKER, FLUSH MOUNT, 2 ZONE #</p> <p>AVIP # 2, 4 CEILING MOUNTED AV SPEAKER, PENDANT MOUNT, 2 ZONE #</p> <p>SUSPENDED SPEAKER ENCLOSURE OR ARRAY, AND RIGGING. REFER TO AV DETAILS</p> <p>RECESSED CABLE ENCLOSURE IN FURNITURE</p>				
<b>POWER DISTRIBUTION AND EQUIPMENT</b>					<b>LIGHTING CONTROL</b>					<b>FIRE ALARM DEVICES</b>														
<p>SWITCHBOARD WITH CONCRETE PAD, FLOOR MOUNTED</p> <p>RELAY/CONNECTION CABINET, WALL MOUNTED, WITH TOP AT 72" AFF</p> <p>PANELBOARD, WALL MOUNTED WITH TOP AT 78" AFF</p> <p>AUTOMATIC TRANSFER SWITCH, SCHEDULE OR FLOOR PLANS, VERIFY</p> <p>TRANSFORMER, WITH SIZE AS NOTED, SEE RISER DIAGRAM, SCHEDULE OR FLOOR PLANS, VERIFY</p> <p>PULLBOX</p> <p>HANDHOLE</p> <p>MOTOR CONTROL CENTER (W/CONCRETE PAD), FLOOR MOUNTED</p> <p>PLUG-IN BUS DUCT SWITCH, SIZE AS INDICATED AND SPECIFIED, VERIFY MOUNTING HEIGHT</p> <p>METERSOCKET ASSEMBLY, MOUNT TOP AT 72" AFF</p>					<p>SWITCHING NOTATION: # INDICATES THE FOLLOWING:</p> <p>3 THREE-WAY</p> <p>4 FOUR-WAY</p> <p>D DIMMER</p> <p>K KEYPAD</p> <p>LV LOW VOLTAGE</p> <p>MC MOMENTARY CONTACT</p> <p>PL PILOT LIGHT TO TIME DELAY</p> <p>EACH SYMBOL DENOTES A SINGLE POLE LIGHT SWITCH WHEN MULTIPLE SWITCHES ARE SHOWN, LOCATE ALL UNDER SINGLE MULTI-SWITCH COVERPLATE</p> <p>PHOTOCELL - WALL, CEILING, OR ROOF MOUNTED; SEE DRAWINGS</p> <p>OCCUPANCY SENSOR - WALL OR CEILING CEILING MOUNT. REFER TO LIGHTING CONTROL SCHEDULE FOR OPERATION INFORMATION</p> <p>EMERGENCY LIGHTING RELAY (UL 924) - SEE WIRING SCHEMATIC ON DETAIL SHEETS</p>					<p>FIRE ALARM ANNUNCIATOR PANEL</p> <p>FIRE ALARM CONTROL PANEL (MASTER)</p> <p>FIRE ALARM NOTIFICATION APPLIANCE CIRCUIT PANEL, MOUNT TOP 62" AFF PLUS OR MINUS 2"</p> <p>FIRE ALARM MANUAL PULL STATION</p> <p>FIRE ALARM HORN (AUDIBLE), WALL MOUNTED</p> <p>FIRE ALARM CHIME (WP FOR EXTERIOR MOUNTING), B = BELL</p> <p>FIRE ALARM STROBE (VISUAL) DEVICE (WALL OR CEILING MOUNTED) xx INDICATES THE FOLLOWING: WG= WIRE GUARD, WP= WEATHER PROOF</p> <p>FIRE ALARM HORN/STROBE (COMBINATION) (WALL OR CEILING MOUNTED) xx INDICATES THE FOLLOWING: WG= WIRE GUARD, WP= WEATHER PROOF</p> <p>FIRE ALARM SPEAKER/STROBE (COMBINATION) (WALL OR CEILING MOUNTED) xx INDICATES THE FOLLOWING: WG= WIRE GUARD, WP= WEATHER PROOF</p> <p>FIRE ALARM SPEAKER (WALL OR CEILING MOUNTED) xx INDICATES THE FOLLOWING: WG= WIRE GUARD, WP= WEATHER PROOF</p> <p>FIREMAN PHONE; JACK, MOUNT TOP 54" AFF PLUS OR MINUS 2"</p> <p>MAGNETIC DOOR HOLD-OPEN (WALL MOUNTED); MOUNT PER DWGS.</p> <p>SPRINKLER FLOW-SWITCH; MOUNT PER DWGS.</p> <p>SPRINKLER TAMPER-SWITCH; MOUNT PER DWGS.</p> <p>SMOKE DETECTOR-CEILING MOUNTED</p> <p>S-CO COMBINATION SMOKE AND CARBON MONOXIDE DETECTOR</p> <p>S-H COMBINATION SMOKE AND HEAT DETECTOR</p> <p>HEAT DETECTOR (RATE-OF-RISE) # = FIXED TEMPERATURE - CEILING MOUNTED</p> <p>DUCT SMOKE DETECTOR; MOUNT PER DWGS.</p> <p>FIRE ALARM INDIVIDUAL ADDRESSABLE MODULE; MOUNT PER DWGS.</p> <p>FIRE ALARM CONTROL MODULE; MOUNT PER DWGS.</p> <p>FIRE/SMOKE DAMPER; MOUNT PER DWGS.</p>					<p>DOME LIGHT, CEILING MOUNTED</p> <p>WANDERING PATIENT DEVICE; MOUNT PER DWGS. xxx INDICATES THE FOLLOWING: KP = KEYPAD, RX = RECEIVER</p> <p>WANDER ALERT SENSOR; MOUNT ABOVE CEILING, xx INDICATES THE FOLLOWING: ML=MAG LOCK, DC= DOOR CONTACT</p>									
<b>BRANCH CIRCUIT, FEEDER, AND RACEWAY</b>					<b>SECURITY DEVICES</b>					<b>NURSE CALL DEVICES</b>														
<p>INDICATES CONDUIT ROUTED BELOW, IN FLOOR STRUCTURE, BELOW GRADE, OR AS NOTED</p> <p>INDICATES CONDUIT IS SURFACE MOUNTED</p> <p>INDICATES CONDUIT ROUTED CONCEALED ABOVE FLOOR OR GRADE (IN CEILING OR WALL)</p> <p>INDICATES CONDUIT UP</p> <p>INDICATES CONDUIT DOWN</p> <p>CONDUIT STUB - TERMINATION INDICATED BY NOTE</p> <p>CONDUIT CONTINUATION</p> <p>CONDUIT SLEEVE WITH BUSHINGS ON BOTH ENDS, SEE SCHEDULE FOR QUANTITIES AND SIZES OF SLEEVES</p> <p>CABLE TRAY (WITH X DEPTH)</p> <p>INDICATES 1" CONDUIT, (3) NO. 4 AWG CONDUCTORS AND (1) NO. 3 GROUND WIRE</p> <p>SURFACE RACEWAY ASSEMBLY, PROVIDE AS SPECIFIED, UNLESS NOTED OTHERWISE</p>					<p>SECURITY DEVICE: xx INDICATES THE FOLLOWING:</p> <p>CM CONTROL MODULE</p> <p>DC DOOR CONTACTS (MONITORING)</p> <p>EL ELECTRIC LOCK/LATCH</p> <p>ES ELECTRIC STRIKE</p> <p>GB GLASS BREAK DETECTOR</p> <p>IR INFRARED DETECTOR</p> <p>ML MAGNETIC LOCK</p> <p>REQ REQUEST TO EXIT</p> <p>XP EXIT PUSHBUTTON, MOUNT AT ADA HT</p> <p>OR = CARD READER ROUGH-IN AT ADA HEIGHT</p> <p>CRK = CARD READER WITH INTEGRATED KEY PAD REFER TO DETAILS</p> <p>DOOR RELEASE; MOUNT PER DWGS.</p> <p>VIDEO INTERCOM WITH INTEGRATED DOOR RELEASE, MOUNT WITH ACTIVATION BUTTON AT MAXIMUM 48" BUTTON LOCATION VARIES BY DEVICE MANUFACTURER, WALL MOUNT, 1" CONDUIT TO ACCESSIBLE CEILING, REFER TO DETAIL</p> <p>I = INTERCOM; VI = VIDEO INTERCOM</p> <p>KEYPAD; VERIFY MOUNTING HEIGHT WITH DWGS.</p> <p>DURESS BUTTON</p> <p>MASTER CONTROL STATION</p> <p>MOTION DETECTOR; ARROW INDICATES DIRECTION (WALL OR CEILING MOUNTED)</p> <p>CONTROL SWITCH - INTERVIEW ROOM ACTIVITY. REFER TO DETAIL</p> <p>INDICATOR LIGHT - INTERVIEW ROOM ACTIVITY. REFER TO DETAIL</p> <p>SURVEILLANCE CAMERA (WALL OR CEILING MOUNTED, 1" BUSHED EMT TO ACCESSIBLE CEILING)</p> <p>MULTI-LENS SURVEILLANCE CAMERA (WALL OR CEILING MOUNTED, 1" BUSHED EMT TO ACCESSIBLE CEILING)</p>					<p>NURSE CALL SYSTEM DEVICE, 4" SQUARE BOX WITH 3/4" BUSHED EMT TO ACCESSIBLE CEILING, UNO</p> <p>x INDICATES THE FOLLOWING:</p> <p>A = STAFF ASSIST REQUEST</p> <p>B = COX/BLE</p> <p>D = DUTY STATION, 3-GANG BOX</p> <p>E = EMERGENCY (PUSHBUTTON)</p> <p>E1 = EMERGENCY (PUSHBUTTON)</p> <p>L = DOME LIGHT, ABOVE DOOR HEADER</p> <p>M = MASTER STATION, 1-GANG BELOW COUNTER TOP</p> <p>M1 = MASTER STATION WALL MOUNTED, 3-GANG BOX</p> <p>P = PATIENT, 3-GANG BOX</p> <p>P1 = PATIENT W/ EXTRA JACK FOR PULLOW SPEAKER, 3-GANG BOX</p> <p>S = STAFF RESPONDER, 3-GANG BOX</p> <p>T = TV, MOUNT SAME HEIGHT AS ADJACENT RECEPTACLE</p>														

GENERAL ELECTRICAL NOTES

- INSTALL CONCEALED CONDUIT WITH FLUSH J.B.'S IN WALLS AND CEILINGS UNLESS NOTED OTHERWISE. IN FINISHED AREAS WITH INACCESSIBLE WALLS OR CEILINGS, PROVIDE SURFACE (WIREMOLD) RACEWAY; PAINT TO MATCH COLOR OF ADJACENT WALL OR CEILING.
- RACEWAYS SHALL CONTAIN A GROUNDING CONDUCTOR.
- CIRCUITS SUPPLYING LINE TO NEUTRAL LOADS SHALL HAVE DEDICATED NEUTRALS, I.E. ONE NEUTRAL PER PHASE. NEUTRAL CONDUCTORS SHALL HAVE TRACER STRIPE ALONG ENTIRE LENGTH INDICATING ASSOCIATED PHASE.
- UNDERSIDE CONDUCTORS SHALL BE THW/THHN. CONDUCTORS IN UNDERGROUND CONDUIT OUTSIDE OF BUILDINGS SHALL BE XHHW.
- NUMBERS AT RECEPTACLES AND LIGHT FIXTURES CORRESPOND DIRECTLY WITH PANELBOARD CIRCUIT NUMBERS AS SCHEDULED. BRANCH CIRCUIT WIRING AND HOMERUNS ARE NOT SHOWN FOR CLARITY. ACCURATE RECORD DRAWING INFORMATION IS TO BE PROVIDED AT THE PROJECT COMPLETION. TYPICAL THROUGHOUT. REFER TO SPECIFICATIONS FOR MATERIALS AND INSTALLATION REQUIREMENTS.
- REFER TO CONTRACT DOCUMENTS FOR SEQUENCE OF CONSTRUCTION AND PHASING OF THE CONTRACT.
- SWITCHES SHALL BE MOUNTED PER ADA REQUIREMENTS, 46" AFF, UNLESS OTHERWISE NOTED. RECEPTACLES AND TELECOMMUNICATION OUTLETS IN FINISHED AREAS SHALL BE MOUNTED 18" AFF. RECEPTACLES IN UNFINISHED SPACES SHALL BE MOUNTED AT 46" OR 4" ABOVE WORK SURFACE. COORDINATE RECEPTACLE MOUNTING HEIGHTS WITH MILLWORK LOCATIONS, ARCHITECTURAL ELEVATIONS, AND MASONRY COURSING.
- CRITICAL DEVICES / EQUIPMENT, INCLUDING TELEPHONE, COMPUTER, SECURITY, AND FIRE ALARM, AFFECT ASSOCIATED SYSTEMS BUILDING-WIDE. THESE SYSTEMS MUST REMAIN OPERATIONAL DURING THE CONSTRUCTION. INDIVIDUAL DEVICES MAY BE DISCONNECTED AND/OR RECONNECTED DURING CONSTRUCTION. COORDINATE POWER OUTGAGES WITH OWNER. PROVIDE TEMPORARY PANEL(S) AND/OR CIRCUIT(S) AS/IF NECESSARY TO MAINTAIN CONTINUITY. PROTECT FROM PHYSICAL AND DUST DAMAGE.
- THE BUILDING SHALL MAINTAIN POWER THROUGHOUT THE CONSTRUCTION PROCESS. COORDINATE ENERGIZATION OF NEW EQUIPMENT AND THE CORRESPONDING RECONNECTION OF EXISTING AFFECTED ELECTRICAL DISTRIBUTION EQUIPMENT.
- SEE RELATED PLUMBING AND HVAC DRAWINGS FOR LOCATION OF EQUIPMENT REQUIRING ELECTRICAL CONNECTIONS. COORDINATE INTERCONNECTION REQUIREMENTS WITH EQUIPMENT SHOP DRAWINGS.
- WIRING FOR MISCELLANEOUS HVAC DEVICES AND CONTROLLERS SUCH AS DAMPER MOTORS, THERMOSTATS, DUCT SMOKE DETECTORS, FREEZESTATS, DIFFERENTIAL PRESSURE SWITCHES, OCCUPIED AND UNOCCUPIED SELECTOR SWITCHES, ALARM LIGHTS, ETC., NOT SHOWN ON ELECTRICAL DRAWINGS IS DIVISION 23 WORK.
- FIELD VERIFY EXISTING CONDITIONS. DISCREPANCIES BETWEEN THE DRAWING AND ACTUAL FIELD CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO BIDS.
- MAINTAIN EXISTING CIRCUIT CONTINUITY ON ALL SYSTEMS ON THE SITE THAT ARE EXISTING TO REMAIN.
- PROVIDE ALL CONDUIT HOMERUNS AS 3/4" MIN.
- COORDINATE ALL WORK WITH OTHER CONTRACTORS AND OWNER.
- ALL CUTTING AND PATCHING FOR DIV. 28 WORK SHALL BE UNDER SUPERVISION AND APPROVAL OF ARCHITECT.
- REMOVE AND/OR REINSTALL ELECTRICAL DEVICES IN ALL AREAS OF WORK AS REQUIRED AND REPLACE ANY ELECTRICAL DEVICES DAMAGED BY WORK. NOT ALL DEVICES MAY BE SHOWN ON DRAWINGS.
- PROVIDE ALL BOXES, FITTINGS, CONDUIT, WIRING, TERMINATIONS, EQUIPMENT, ETC. FOR A COMPLETE INSTALLATION.
- BRING 20A CIRCUIT CONDUCTORS SHOULD BE SIZED AS FOLLOWS:

120V CCT LENGTH	277V CCT LENGTH	AWG
< 75'	< 130'	12
75' - 120'	130' - 215'	10
120' - 200'	215' - 330'	8

ELECTRICAL ABBREVIATIONS LIST

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
<	ANGLE	C	CONDUIT	J-BOX	JUNCTION BOX	N.C.	NORMALLY CLOSED	QUAN	QUANTITY
AB	ABOVE	CAV	CABLE TELEVISION	KV	KILOVOLT	NEC	NATIONAL ELECTRICAL CODE	UE	UNDERGROUND ELECTRICAL
AF	ABOVE FINISHED FLOOR	CB	CIRCUIT BREAKER	KVA	KILOVOLT-AMPERE	NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION	UH	UNIT HEATER
#	NUMBER	CCTV	CLOSED CIRCUIT TELEVISION	KVAR	KILOVOLT-AMPERE REACTIVE	NFS	NON-FUSED SAFETY SWITCH	UNO	UNLESS NOTED OTHERWISE
IP	1 POLE (OR 3P, 4P, ETC.)	CKT	CIRCUIT	KWH	KILOWATT HOUR	NOT IN CONTRACT	NOT IN CONTRACT	UT	UNDERGROUND TELEPHONE
A	AMPERE	CMR	COMPRESSOR	LOC	LOCATE OR LOCATION	NL	NEW LOCATION	UV	UNIT VENTILATOR OR ULTRAVIOLET
AC	AIR CONDITIONER	CONN	CONNECTION	LOC	LOCATE OR LOCATION	N.O.	NORMALLY OPEN	VA	VOLT-AMPERES
ACLG	ABOVE CEILING	CONT	CONTINUATION OR CONTINUOUS	LT	LIGHT	NTS	NOT TO SCALE	VERT	VERTICAL
ADA	AUTOMATIC DOOR ACTUATOR	CONV	CONVECTOR	LNG	LIGHTING	OFE	OWNER FURNISHED EQUIPMENT	VFD	VARIABLE FREQUENCY DRIVE
AF	ABOVE FINISHED FLOOR	CP	CIRCULATING PUMP	LV	LOW VOLTAGE	OH	OVERHEAD	VOL	VOLUME
AFG	ABOVE FINISHED GRADE	CT	CURRENT TRANSFORMER	MAG.S	MAGNETIC STARTER	OL	OVERLOADS	W	WATT
AFI	ARC-FAULT CIRCUIT INTERRUPTER	CU	COPPER	MC	MOMENTARY CONTACT	PA	PUBLIC ADDRESS	W/	WITH
ANU	AIR HANDLING UNIT	DCP	DOMESTIC WATER CIRCULATING PUMP	MCB	MAIN CIRCUIT BREAKER	PB	PULL BOX	WG	WIRE GUARD
AL	ALUMINUM	CONT	CONTINUATION OR CONTINUOUS	MCC	MOTOR CONTROL CENTER	PE	PEDESTAL	WH	WATER HEATER
ALT	ALTERNATE	CONTR	CONTRACTOR	MCD	MAIN DISTRIBUTION CENTER	NF	NOT IN CONTRACT	W/O	WITHOUT
AMP	AMPLIFIER	CONV	CONVECTOR	MDF	MAN DISTRIBUION PANEL	PH	PHASE	WP	WEATHERPROOF
ANNUN	ANNUNCIATOR	CP	CIRCULATING PUMP	MFR	MANUFACTURER	PI	PISTON	XFM	TRANSFORMER
AD-STAT	ADJUSTABLE	FS	FIBER OPTIC LINE	MFS	MAIN FUSED DISCONNECT SWITCH	PNL	PANEL	XFR	TRANSFER
ATS	AUTOMATIC TRANSFER SWITCH	GL	GLASS	MLO	MAIN LUGS ONLY	PP	POWER POLE		
AV	AUDIO VISUAL	HTR	HEATER	MMS	MANUAL MOTOR STARTER	PR	PRIMARY		
AWG	AMERICAN WIRE GAUGE	HVP	HIGH VOLTAGE	MOA	MULTI-OUTLET ASSEMBLY	PRJ	PROJECTION		
BATT	BATTERY	HW	HYDROVIC WATER PUMP	MOP	MOTOR STARTER PANELBOARD	PRV	POWER ROOF VENTILATOR		
BD	BOARD	MSBD	MAIN SWITCHBOARD	MTR	MOTOR, MOTORIZED	PT	POTENTIAL TRANSFORMER		
BLDG	BUILDING	IC	INTERLUPTING CAPACITY			PTC	POTENTIAL THERMOSTAT		
BAS	BUILDING AUTOMATION SYSTEM	IG	ISOLATED GROUND			TR	TAMPER RESISTANT		
		IMC	INTERMEDIATE METAL CONDUIT			T-ST	THERMOSTAT		
		INCAND	INCANDESCENT			TTC	TELEPHONE TERMINAL CABINET		
		IR	INFRARED			TYP	TYPICAL		
		INW	INTERLOCK WITH						

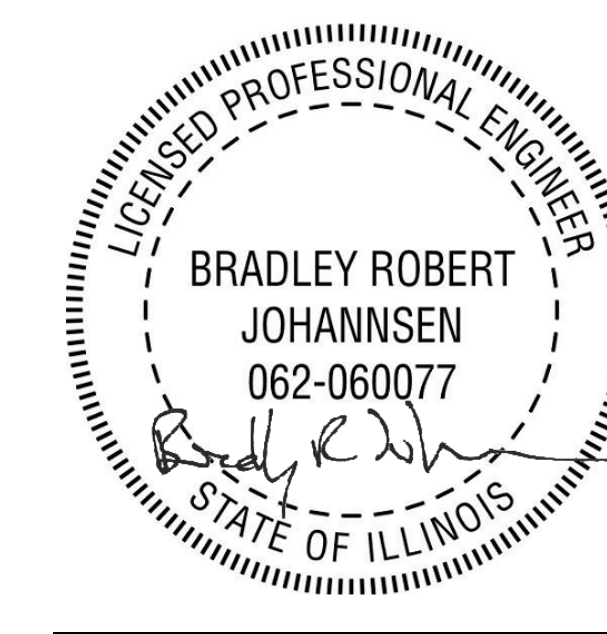
FIRE STATION #27 GENERATOR REPLACEMENT

100 W. Half Day Road, Buffalo Grove, IL 60089

VILLAGE OF BUFFALO GROVE 50 RAUPP BLVD, BUFFALO GROVE, IL 60089



WOLD ARCHITECTS AND ENGINEERS  
220 North Smith Street, Suite 310  
Palatine, Illinois 60067  
woldac.com | 847 241 6100



I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed PROFESSIONAL ENGINEER under the laws of the State of ILLINOIS

BRADLEY R. JOHANNSEN  
43936 Date: 12/16/2023

Description	Revisions	
	Date	Num

Comm: 231151  
Date: 12/15/2023  
Drawn: D.SALAZAR  
Check: B.JOHANNSEN

ELECTRICAL SYMBOLS AND ABBREVIATIONS

E0.00

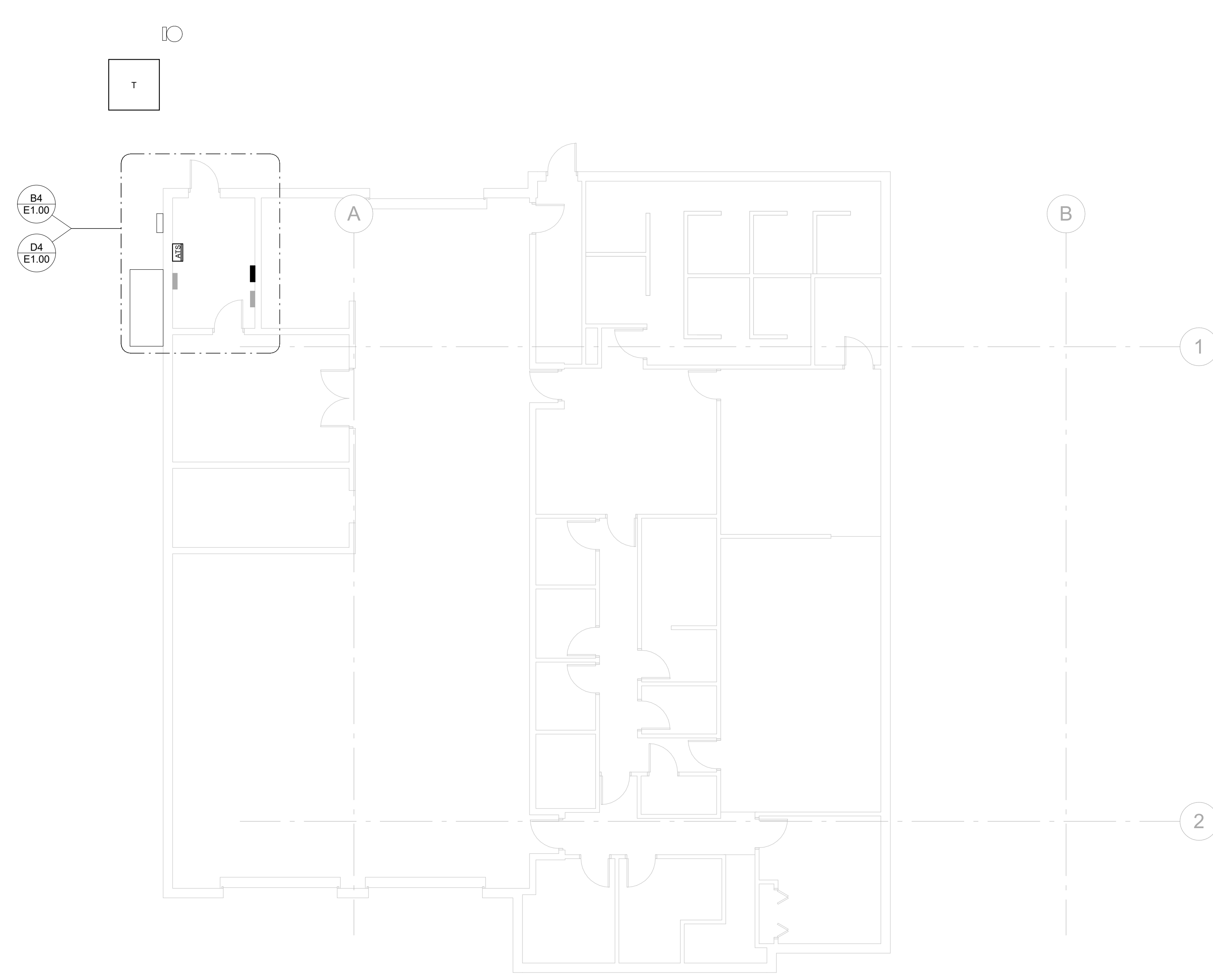
**FIRE STATION #27  
GENERATOR  
REPLACEMENT**

100 W. Half Day Road, Buffalo  
Grove, IL 60089

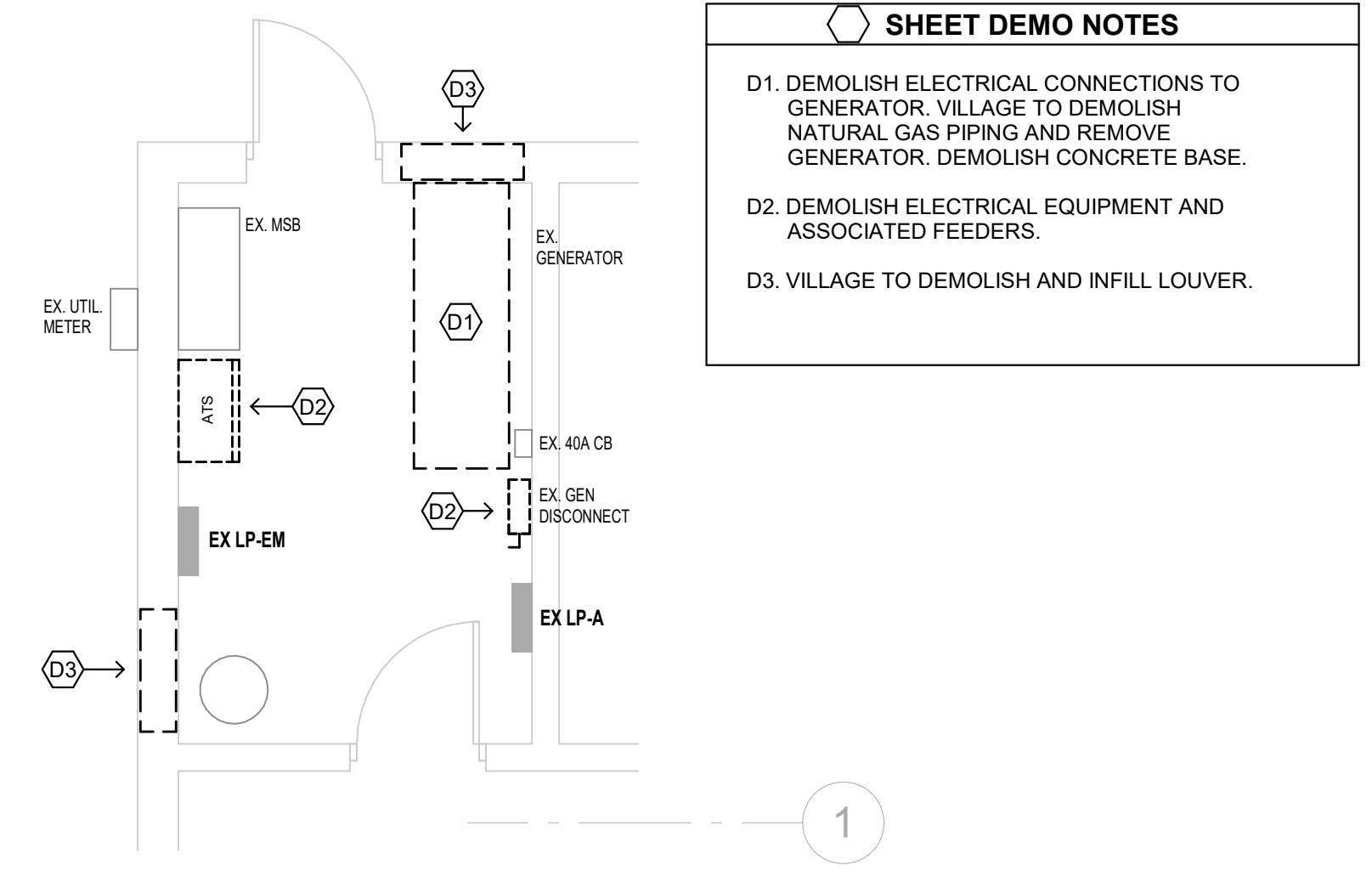
**VILLAGE OF BUFFALO  
GROVE**  
50 RAUPP BLVD, BUFFALO  
GROVE, IL 60089



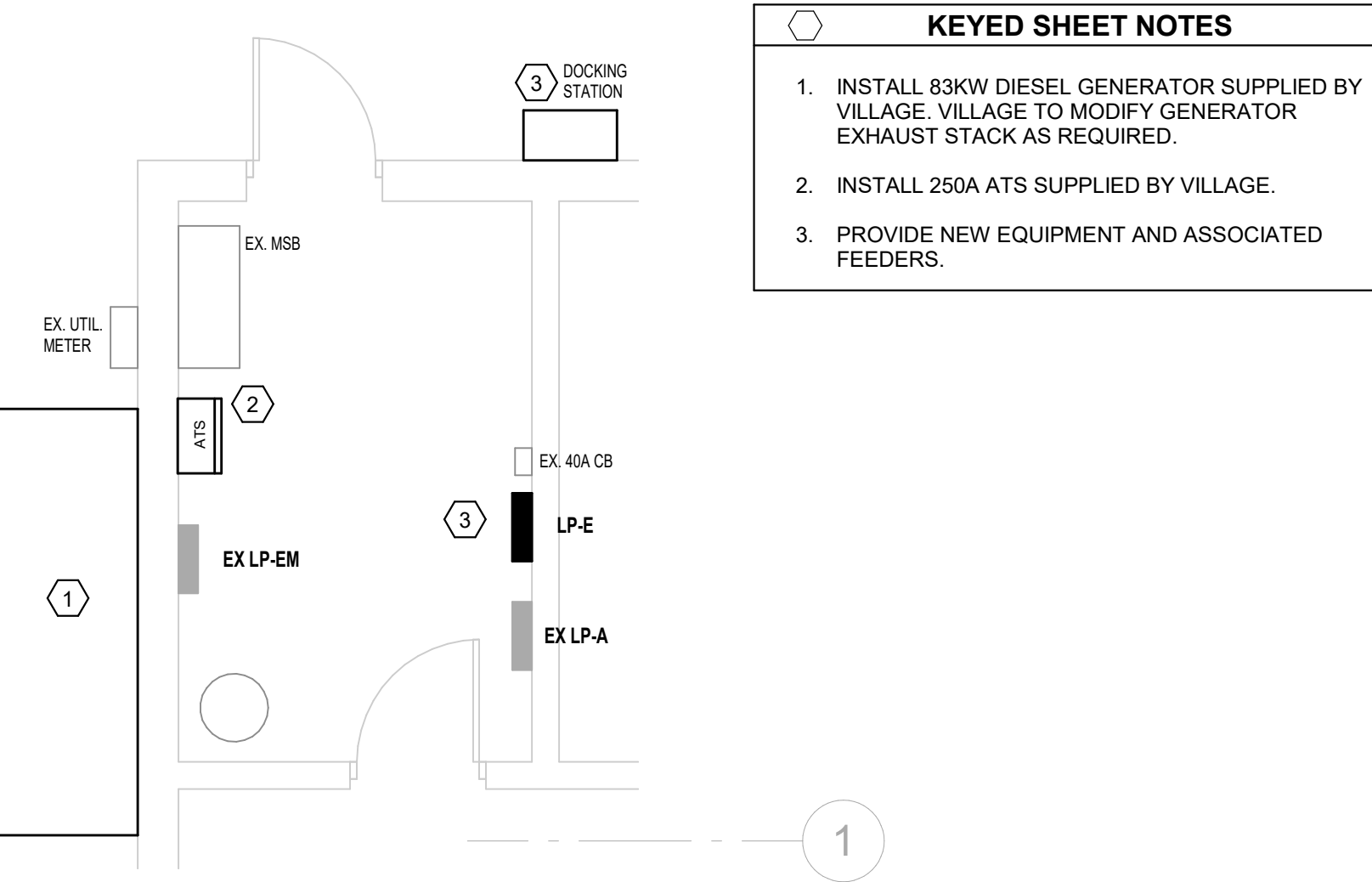
**WOLD ARCHITECTS  
AND ENGINEERS**  
220 North Smith Street, Suite 310  
Palatine, Illinois 60067  
woldac.com | 847.241.6100



**D1 OVERALL ELECTRICAL PLAN**  
1/8" = 1'-0"



**B4 ENLARGED ELECTRICAL DEMOLITION PLAN**  
1/4" = 1'-0"



**D4 ENLARGED ELECTRICAL PLAN**  
1/4" = 1'-0"

**SHEET DEMO NOTES**

D1. DEMOLISH ELECTRICAL CONNECTIONS TO GENERATOR. VILLAGE TO DEMOLISH NATURAL GAS PIPING AND REMOVE GENERATOR. DEMOLISH CONCRETE BASE.

D2. DEMOLISH ELECTRICAL EQUIPMENT AND ASSOCIATED FEEDERS.

D3. VILLAGE TO DEMOLISH AND INFILL LOUVER.

**KEYED SHEET NOTES**

1. INSTALL 83KW DIESEL GENERATOR SUPPLIED BY VILLAGE. VILLAGE TO MODIFY GENERATOR EXHAUST STACK AS REQUIRED.

2. INSTALL 250A ATS SUPPLIED BY VILLAGE.

3. PROVIDE NEW EQUIPMENT AND ASSOCIATED FEEDERS.

**PANELBOARD: LP-E**

LOCATION: SURFACED VOLTAGE: 208Y/120 V. 3 ø 4 W.  
MOUNTING: SURFACED A.F.C...  
MAINS TYPE: MLO SPECIAL: 22 KAIC  
MAINS AMPS: 100A  
BUS AMPS: 100A  
FED FROM: MSB

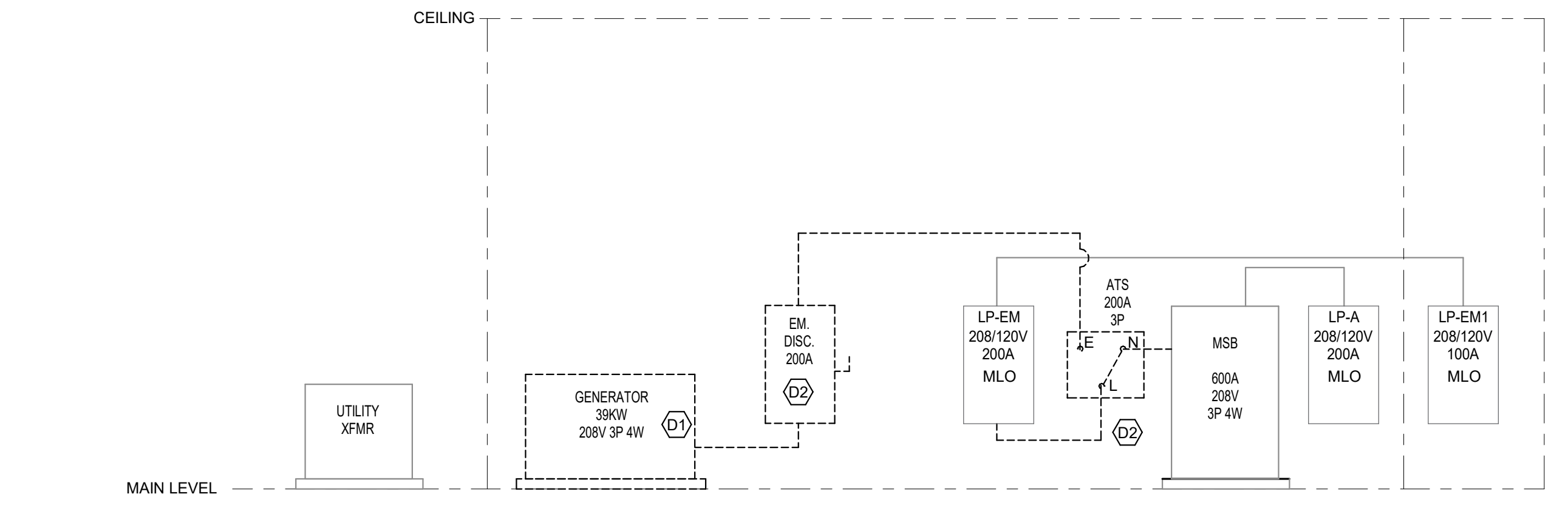
#	BT	LOAD DESCRIPTION	LT	BKR	P	PHASE A KVA	PHASE B KVA	PHASE C KVA	P	BKR	LT	LOAD DESCRIPTION	BT		
1	SPARE	--	20 A	1	0.0	0.0				1	20 A	--	SPARE	2	
3	SPARE	--	20 A	1			0.0	0.0		1	20 A	--	SPARE	4	
5	SPARE	--	20 A	1					0.0	0.0	1	20 A	--	SPARE	6
7	FUTURE EV CHARGING	--	40 A	2	0.0	0.0				1	20 A	--	SPARE	8	
9	--	--	--	--	--	--	0.0	0.0		1	20 A	--	SPARE	10	
11	FUTURE EV CHARGING	--	40 A	2					0.0	0.0	1	20 A	--	SPARE	12
13	--	--	--	--	--	0.0	0.0			1	20 A	--	SPARE	14	
15	FUTURE EV CHARGING	--	40 A	2					0.0	0.0	1	20 A	--	SPARE	16
17	--	--	--	--	--	--	--	0.0	0.0	1	20 A	--	SPARE	18	
19	FUTURE EV CHARGING	--	40 A	2	0.0	0.0				1	20 A	--	SPARE	20	
21	--	--	--	--	--	--	--	0.0	0.0	1	20 A	--	SPARE	22	
23	SPARE	--	20 A	3					0.0	0.0	1	20 A	--	SPARE	24
25	--	--	--	--	--	0.0	0.0			1	20 A	--	SPARE	26	
27	--	--	--	--	--	--	--	0.0	0.0	1	20 A	--	SPARE	28	
29	SPARE	--	20 A	3					0.0	0.0	1	20 A	--	SPARE	30
31	--	--	--	--	--	0.0	0.0			1	20 A	--	SPARE	32	
33	--	--	--	--	--	--	--	0.0	0.0	1	20 A	--	SPARE	34	
35	SPARE	--	20 A	1					0.0	0.0	1	20 A	--	SPARE	36
37	SPARE	--	20 A	1	0.0	0.0				1	20 A	--	SPARE	38	
39	SPARE	--	20 A	1					0.0	0.0	1	20 A	--	SPARE	40
41	SPARE	--	20 A	1					0.0	0.0	1	20 A	--	SPARE	42
<b>TOTAL LOAD:</b>						0 KVA	0 KVA	0 KVA							
<b>TOTAL AMPS:</b>						0 A	0 A	0 A							

**LOAD CLASSIFICATION**

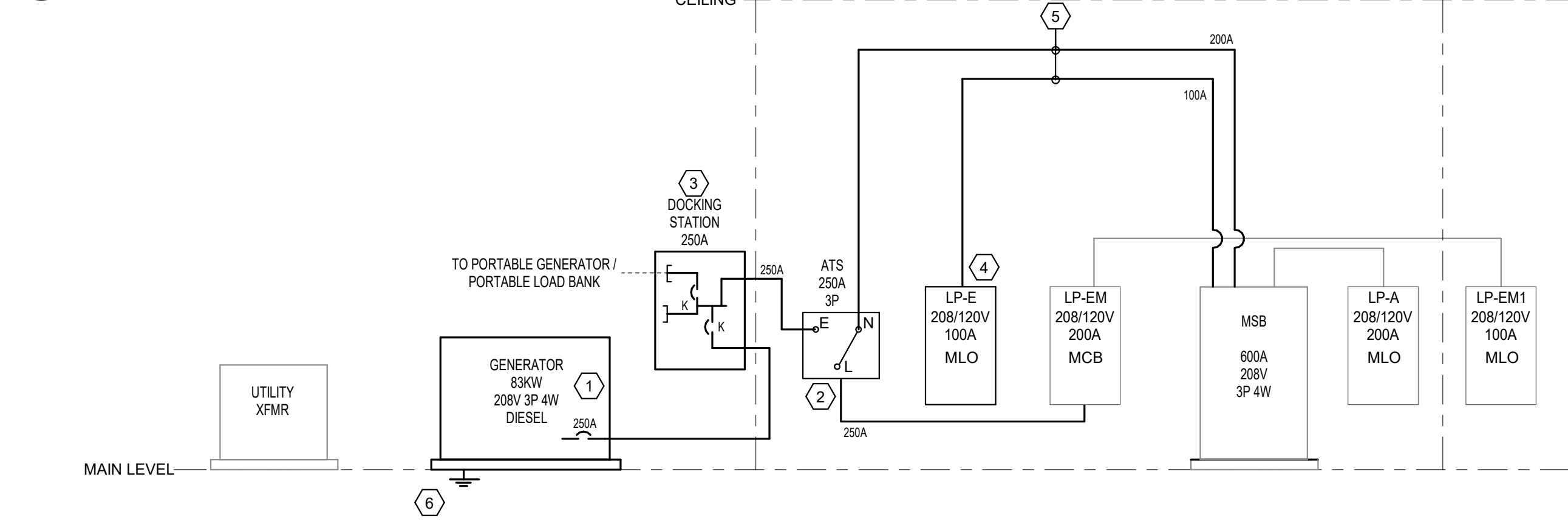
CONNECTED	DEMAND	ESTIMATED	PANEL TOTALS
			CONNECTED LOAD: 0 VA
			ESTIMATED DEMAND: 0 VA
			CONNECTED CURRENT: 0 A
			EST. DEMAND CURRENT: 0 A

Load Types (LT): COOL - Summer Cooling, ELEV - Elevator, EQ - Equipment, EX - Existing, GND - Grounding, HEAT - Winter Heating, KTCH - Kitchen, L MTR - Largest Motor, LTG - Lighting, MTR - Motor, RCPT - Receptacle  
Breaker Types (BT): AF = Arc Fault, GF = Ground Fault Circuit Interrupt, GE = Ground Fault Equipment Protection (30mA), SH = Shunt Trip, EX = Existing, NX = New Breaker For Existing Panel, M = Metered

NOTES:



**E1 ELECTRICAL RISER DIAGRAM - DEMOLITION**  
N.T.S.



**F1 ELECTRICAL RISER DIAGRAM - NEW**  
N.T.S.

**RISER - DEMOLITION - KEYED NOTES:**

D1. DEMOLISH ELECTRICAL CONNECTIONS TO GENERATOR. VILLAGE TO DEMOLISH NATURAL GAS PIPING AND REMOVE GENERATOR.

D2. DEMOLISH ELECTRICAL EQUIPMENT AND ASSOCIATED FEEDERS.

**RISER - NEW - KEYED NOTES:**

1. INSTALL 83KW DIESEL GENERATOR SUPPLIED BY VILLAGE. GENERATOR PAD BY VILLAGE. TIGHT TO EXTERIOR WALL. ROUTE CONDUITS ABOVE GRADE. PROVIDE MOUSEHOLES IN REAR ACCESS PANEL AND WORK CONDUIT UP TO TERMINATION POINTS AS REQUIRED. VILLAGE TO DELIVER AND SET GENERATOR.

2. INSTALL 250A ATS SUPPLIED BY VILLAGE.

3. PROVIDE DOCKING STATION WITH CAM LOCKS AND MECHANICAL INTERLOCKING DEVICES AS REQUIRED TO ALLOW FOR PORTABLE GENERATOR AND/OR PORTABLE LOAD BANK CONNECTION.

4. PROVIDE NEW 100A PANEL, FEED FROM SPARE 100A FUSED DISCONNECT IN MSB.

5. FEEDERS SHALL BE ROUTED THROUGH CEILING SPACE (APPROXIMATELY 22' TO BOTTOM OF STRUCTURE).

6. CONFIRM VILLAGE-SUPPLIED TRANSFER SWITCH IS 4-POLE TYPE. IF SO, PROVIDE GROUNDING AT GENERATOR AS REQUIRED TO ACHIEVE SEPARATELY DERIVED SYSTEM.



I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed PROFESSIONAL ENGINEER under the laws of the State of ILLINOIS

*Bradley R. Johanssen*  
BRADLEY R. JOHANSEN  
License Number: 43936 Date: 12/16/2023

Description	Revisions	
	Date	Num

Comm: 233151  
Date: 12/15/2023  
Drawn: D.SALAZAR  
Check: B.JOHANSEN

**ELECTRICAL  
PLANS AND  
DETAILS**



CONTRACT EXHIBIT B- SCHEDULE OF PRICES

**[Insert Schedule of Prices]**

**EXHIBIT B - SCHEDULE OF PRICES**

Name of Contractor: Kellenberger Electric  
Address of Contractor: 1540 Fleetwood Dr.  
City Elgin State IL Zip 60123 Telephone 847-888-8192  
Email Address: jake@kellenbergerelectric.com

The Contractor declares, represents and warrants that it has read and agrees to abide by the terms, conditions and obligations set forth in the Invitation to Quote. In particular, the Contractor declares, represents and warrants that it has informed itself of all the conditions under which the Work is to be performed including, but not limited to, and where applicable, the structural integrity of the building, the conditions of the ground, building codes. Contractor waives any right to additional compensation for failure to make itself aware of the afore-mentioned conditions.

Contractor further declares that if their Quote Proposal is accepted, that Contractor will enter into the Contract in the same form as set forth in Contract Documents. However, Contractor may request changes to the Contract by submitting with this Schedule of Price a list of requested changes to the Contract.

If this quote is accepted, and the undersigned fails to (i) contract as aforesaid, (ii) provide the Performance Bond required by the Contract, and (iii) provide all insurance required under the Contract within fifteen (15) calendar days after the date of the award of the Contract then the Village, at its option, may determine that the contractor has abandoned this quote, and thereupon this proposal and the acceptance thereof shall be null and void, and such security accompanying this quote shall be forfeited and shall be the property of the Village of Buffalo Grove not as penalty, but as liquidated damages.

A. Quote Total Described in the Schedule of Values \$ 70,505

**EXHIBIT B - SCHEDULE OF PRICES (cont.)**SCHEDULE OF VALUES

Scope				Base Price
Demolition (for work not performed by Owner)				\$2,000.00
Electrical				\$55,216.00
General Conditions				\$3,200.00
Overhead and Profit				\$7,359.00
Insurance				\$1,830.00
Performance Bond				\$900
<b>A. QUOTE TOTAL</b>				<b>\$70,505</b>

### EXHIBIT B - SCHEDULE OF PRICES (cont.)

#### SUBCONTRACTOR LISTING

Contractor, to employ the following listed subcontractors for the following enumerated classes of work and is not to alter or add to such list without the written consent of the Village.

<u>SUBCONTRACTOR</u>	<u>CLASS OF WORK</u>
1. <u>Kellenberger Plumbing</u>	<u>Trenching</u>
2. <u>Hard Rock Concrete</u>	<u>Coring</u>
3. _____	_____
4. _____	_____

#### ACKNOWLEDGEMENT OF ADDENDA

Acknowledgement of receipt of Addenda(s) N/A (list each addendum number)

Attach each signed addendum, if any, to the proposal packet as part of your submittal.

#### CONTRACTOR SIGNATURE and CONTACT INFORMATION

2/1/2024 Date 847.888.8192 Phone

KELLENBERGER ELECTRIC, INC Legal Entity JACK@KELLENBERGERELECTRIC.CO E-mail



(Sign here)

BRIENNE MARTIN  
(Print Name)