PROJECT MANUAL FOR POLICE DEPARTMENT UPS REPLACEMENT
B 2016-37

JULY 2016

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PART A

NOTICE INVITING BIDS

CITY OF TORRANCE
CALIFORNIA

NOTICE INVITING BIDS

Notice is hereby given that sealed proposals for performing the following described work will be received at the office of the City Clerk of the City of Torrance, California, until **3:00 p.m. on Wednesday, September 7, 2016** after which time they will be publicly opened and read at 3:15 p.m. in the Council Chambers of said City:

Bid for Police Department UPS Replacement

B2016-37

Plans, Bid Proposal (for reference only) and Specifications are available for viewing and printing from the City's website at http://www.torranceca.gov/25079.htm.

There will be a mandatory pre-bid conference held on Tuesday, August 16, 2016 at 10:00 a.m. commencing at Police Department, 3300 Civic Center Drive, Torrance 90503. The City of Torrance will consider the bidder as non-responsive if the bidder does not attend the mandatory pre-bid conference. **Addenda will be issued only by email and only to those attended the mandatory pre-bid conference.** All addenda must be acknowledged. Failure to acknowledge addenda on the bid forms provided may render the proposal non-responsive and cause it to be rejected.

An official bid proposal packet, which includes: bid proposal forms, and a bound Specifications booklet may be obtained at the Office of the City Clerk (310) 618-2870, $50 if picked up at City Hall, or payment of $60 if requested by mail. Both amounts include tax. Neither amount is refundable. A prospective bidder must provide to the City Clerk's office, the firm's name, address, telephone and fax number, a contact person and a valid email address.

If requesting any item(s) by mail, please send check to the following:

CITY OF TORRANCE
OFFICE OF THE CITY CLERK
3031 TORRANCE BLVD
TORRANCE, CA 90503-2970
ATTN: B2016-37

The project estimate is between $150,000 - $250,000. The work shall be completed within ninety (90) calendar days of receipt of the Notice to Proceed (NTP). The ninety (90) calendar day schedule includes: completion of contractual paperwork, submittal review and onsite work. Bids are required for the entire work described herein.

The City has determined the bidder must have the proper licensing to perform required work including a "B" General Building Contracting license, and an electrical C10 license. Bidder, as the prime contractor, must have successfully completed at least five (5) projects of a similar size and scope within the last five (5) years. Bidder must have at least five (5) years' experience under the current license and organization. References must reflect this experience.

Per Division 2, Chapter 2 of the Torrance Municipal Code, the Torrance City Council may reject any and all bids, waive any informality or irregularity in such bids, and determine the lowest responsible bidder.

No Facsimile Bids shall be accepted by the City.

By order of the City Council of the City of Torrance, California.

This contract is subject to California State Prevailing Wage- Pursuant to Section 1771 and 1773 of the Labor Code, the general prevailing wage rates in the county in which the work is to be done have been determined by the Director of the California Department of Industrial Relations. These wages are set forth in the General Prevailing Wage Rates for this project, are attached and available from the California Department of Industrial Relations' internet site at http://www.dir.ca.gov/Public-Works/Prevailing-Wage.html. Future effective general prevailing wage rates which have been predetermined and are on file with the California Department of Industrial Relations are referenced but not printed in the general prevailing wage rates.

APPRENTICESHIP EMPLOYMENT STANDARDS. Attention is directed to the provisions in Sections 1776 and 1777.5 of the California Labor Code concerning the employment of apprentices by the Contractor or any subcontractor under them.

One of the legal requirements for working on a public works project is the employment of apprentices. The Division of Apprenticeship Standards provides assistance to contractors in employing apprentices on public works sites.

Information relative to apprenticeship standards, wage schedules, and other requirements may be obtained from the Director of Industrial Relations, http://www.dir.ca.gov/das/PublicWorksForms.htm

Contractor Registration with the Department of Industrial Relations (SB 854)

- No contractor or subcontractor may be listed on a bid proposal or awarded a contract for a public works project unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)].
- This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations. All contractors and subcontractors must furnish electronic certified payroll records directly to the Labor Commissioner (aka Division of Labor Standards Enforcement). For additional information and to register online go to http://www.dir.ca.gov/Public-Works/Contractors.html

For further information, please contact Nina Schroeder, Business Manager General Services Department at 310-781-7151 or nschroeder@torranceca.gov. If emailing questions, please put project title in the subject line.

PART B

INSTRUCTIONS TO BIDDERS

CITY OF TORRANCE
CALIFORNIA

INSTRUCTIONS TO BIDDERS

A. QUALIFICATION OF BIDDERS

1. Competency of Bidders

The Bidder shall be thoroughly competent and capable of satisfactorily performing the Work covered by the Bid. As specified in the Bid Documents, the Bidder shall furnish statements of previous experience on similar work. When requested, the Bidder shall also furnish a plan of procedure proposed; organization, machinery, plant and other equipment available for the Work; evidence of financial condition and resources; and any other documentation as may be required by the City to determine if the Bidder is responsible.

2. Contractor's License

At the time of submitting the Bid, the Bidder shall be licensed as a contractor in accordance with the provisions of Chapter 9, Division 3, of the California Business and Professions Code. The required prime contractor license class for the Work is shown in the project Notice Inviting Bids. However, the City reserves the right to award the Contract to a contractor with another class if the City determines that the license is proper for the work.

B. BIDDER RESPONSIBILITY

A responsible Bidder is a Bidder who has demonstrated the attribute of trustworthiness, as well as ability, fitness, capacity and experience to satisfactorily perform the work.

Bidders are notified that, in accordance with Division 2, Chapter 2 of the Torrance Municipal Code, the City Council may determine whether the Bidder is responsible based on a review of the Bidder's performance on other contracts.

If, based on the provision and criteria in Division 2, Chapter 2 of the Torrance Municipal Code, the General Services Director proposes not to recommend the award of contract to the apparent low bidder, the Director shall notify the Bidder in writing of its intention to recommend to the City Council that the Council award the contract to the next lowest responsible bidder. If the Bidder presents evidence in rebuttal to the recommendation, the Director shall evaluate the merits of such evidence, and based on that evaluation, make a recommendation to the City Council.

C. ADDENDA TO THE CONTRACT DOCUMENTS

The City reserves the right to revise or amend these specifications prior to the date set for opening bids. Revisions and amendments, if any, will be announced by an addendum to this bid. If the revisions require additional time to enable Bidders to respond, the City may postpone the opening date accordingly. In such case, the addendum will include an announcement of the new opening date.

All addenda must be attached to the bid. Failure to attach any addendum may render the bid non-responsive and cause it to be rejected.

D. PREPARATION OF THE BID

1. Examination of Site, Plans and Specifications

Bidders shall examine the site of the work and acquaint themselves with all conditions affecting the work. By submitting a bid, the bidder shall be held to have personally examined the site and the drawings, to have carefully read the specifications, and to have satisfied itself as to its ability to meet all the difficulties attending the execution of the proposed contract before the delivery of this proposal, and agrees that if awarded the contract, will make no claim against the City based on ignorance or misunderstanding of the plans, specifications, site conditions and/or contract provisions.

The Contractor shall have included in the contract price a sufficient sum to cover all items, including labor, materials, tools, equipment and incidentals, that are implied or required for the complete improvements as contemplated by the drawings, specifications, and other contract documents.

2. Bid Instructions and Submissions

The Bid shall be submitted on the Bid Proposal forms included in the Specifications. All Bid Documents must be completed, executed and submitted with Bid by Bidder. Required seven (7) Bid Proposal Documents:

1. Bidder's Proposal
2. Addenda Acknowledgment
3. Contractor's Affidavit
4. Bid Bond (10% of Bid)
5. List of Subcontractors and DIR Registration
6. References (1 pages)
7. Bidder's Information (2 pages)

All prices submitted will be considered as including any and all sales or use taxes. In case of a discrepancy between a unit bid price and total bid, the unit price shall prevail.

E. BID FORM/BOND

The Bid must be accompanied by cash, a certified or cashier's check, or a surety bond (bid bond) payable to the City of Torrance. Bids must be submitted on the proposal forms furnished by the City Clerk's office. The Bid Guaranty shall be in an amount equivalent to at least 10% of the Total Contract Bid Price.

Within ten (I0) days after the award of the contract, the City Clerk will return the proposal guarantees accompanying those proposals, which are not to be considered in making the award. All other proposal guarantees will be held until the contract has been finally executed, after which they will be returned to the respective bidders whose proposals they accompany.

F. AFFIDAVIT

An affidavit form is enclosed. It must be completed signifying that the bid is genuine and not collusive or made in the interest or on behalf of any person not named in the bid, that the bid has not directly or indirectly induced or solicited any other Bidder to put in a sham bid or any other person, firm, or corporation to refrain from bidding, and that the Bidder has not in any manner sought by collusion to secure for itself an advantage over any other Bidder. Any bid submitted without an affidavit or in violation of this requirement will be rejected.

G. NONRESPONSIVE BIDS AND BID REJECTION

1. A Bid in which bid proposal documents are not completed, executed and submitted may be considered non-responsive and be rejected.

2. A Bid in which the Contract Unit Prices are unbalanced, which is incomplete or which shows alteration of form or irregularities of any kind, or which contains any additions or conditional or alternate Bids that are not called for, may be considered non-responsive and be rejected.

H. AWARD OF CONTRACT

In accordance with Division 2, Chapter 2 of the Torrance Municipal Code, the City Council reserves the right to reject any and all bids received, to take all bids under advisement for a period not-to-exceed sixty (60) days after date of opening thereof, to waive any informality or irregularity in the Bid, and to be the sole judge of the merits of material included in the respective bids received.

This bid does not commit the City to award a contract or to pay any cost incurred in the preparation of a bid. All responses to this bid become the property of the City of Torrance.

I. NOTICE OF INTENT TO AWARD

Approximately two (2) weeks prior to the anticipated City Council meeting awarding a contract as a result of the RFP or bid, results will be posted on the City of Torrance Web site www.Torranceca.gov and may be found by clicking on the following:

- Government
- Current Bids and RFPs
- View evaluated results of Bids and RFPs tentatively scheduled for recommendation of award to the City Council here.

J. BID PROTEST PROCEDURES

Please refer to City of Torrance website link below to obtain the City's Protest Procedures. http://www.torranceca.gov/PDF/Bid_RFP_Protest_Procedures.pdf

K. EXECUTION OF CONTRACT

After the Contract is awarded, the awarded bidder shall execute the following five (5) documents:

1. Performance Bond (100% of Bid)
2. Labor and Material Bond (100% of Bid)
3. Contract – Public Works Agreement
4. Verification of Insurance Coverage (Certificates and Endorsements)
5. Business License Application Form

The contract shall be signed by the successful bidder and returned, together with the contract bonds and evidence of required insurance coverage, **within ten (10) working days**, not including Sundays, after the bidder has received notice that the contract has been awarded. Failure to execute the contract as specified above shall be just cause for annulment of the award and forfeiture of the proposal guarantee. The Contract shall not be considered binding upon the CITY until executed by the authorized CITY officials.

Bond amounts shall be as provided in Section 2-4 of the Standard Specifications for Public Works Construction. The Performance Bond shall be required to remain in effect for one (1) year following the date specified in the City's Notice of Completion, or, if no Notice of Completion is recorded for one (1) year following the date of final acceptance by the City Manager.

L. PERMITS, LICENSES AND CONTRACT SERVICES AGREEMENT

The Contractor shall procure and execute all permits, licenses, pay all charges and fees, and give all notices necessary and incidental to completion of Work. The Contractor shall execute a Contract Services Agreement. No fee is charged for a permits issued by the City of Torrance for a City project. The Contractor shall obtain a City of Torrance Business License. To obtain a Torrance Business License please call 310-618-5923.

M. INSURANCE

The Contractor shall maintain Automobile Liability, General Liability and Workers' Compensation Insurance as specified in the Contract Services Agreement included in the Project Specifications.

N. SUBCONTRACTS

B. Each Bidder shall comply with the Chapter of the Public Contract Code including sections 4100 through 4113. The Contractor shall perform, with its own organization, Contract work amounting to at least 50 percent of the Contract price. When a portion of an item is subcontracted, the value of the work subcontracted will be based on the estimated percentage of the Contract Unit Price, determined from information submitted by the Contractor, subject to approval by the City Manager (or his designated representative). This percentage will be based on the number of direct labor hours used on the project. Supervision and overhead are not included in this calculation.

O. TRAFFIC CONTROL- Not applicable

P. PRE-BID INQUIRIES

Bidders with pre-bid inquiries must submit questions in writing to the General Services Department. Any and all questions must be emailed to Nina Schroeder, Business Manager at NSchroeder@torranceca.gov. Please list **"Police Department UPS Replacement"** in the subject line of the email. For questions of a general nature, bidders may contact Nina Schroeder directly at 310-781-7151

Q. RESPONSIBILITY OF CITY.
The City of Torrance shall not be held responsible for the care or protection of any material or parts of the work prior to final acceptance, except as expressly provided in these specifications.

R. CONSTRUCTION SCHEDULE AND PRECONSTRUCTION CONFERENCE.

The office staff of the City is currently operating on a 9/80 work week; therefore, City Hall is closed every other Friday.

In accordance with the herein Special Provisions, after notification of award and prior to start of any work, **the Contractor shall submit to the City for approval its proposed Construction Schedule within ten (10) working days from the date of Notice of Proceed.** At least two (2) days, exclusive of Saturdays, Sundays and holidays, prior to commencement of work, the Contractor shall attend a pre-construction conference.

The Contractor will provide all product and equipment submittals to the City of Torrance or designated consultant within ten (10) working days from the date of Notice to Proceed. The Contractor shall immediately order materials requiring a delivery delay upon receipt of a written notice from the City that the City Council has approved an Award of Contract. Contractor shall provide written proof(s) of timely material order(s) and shall include any delivery delays in the Construction Schedule.

S. PROGRESS OF THE WORK AND TIME FOR COMPLETION

The Contractor shall begin work after the mailing, from the City Manager to the Contractor, by first class mail, postage prepaid, of a Notice to Proceed. **The Contractor shall diligently prosecute the same to completion within ninety (90) calendar days of the start date specified in said Notice.** The ninety calendar schedule includes, completion of contractual paper work, equipment material submittal review, the lead time for materials and equipment, and on site work.

During periods when weather or other conditions are unfavorable for construction, the Contractor shall pursue only such portions of the work as shall not be damaged thereby. No portions of the work whose acceptable quality or efficiency will be affected by any unfavorable conditions shall be constructed while those conditions exist. It is expressly understood and agreed by and between the Contractor and the City that the Contract time for completion of the work described herein is a reasonable time taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the work.

The Police Department is a 24 hour 7 day a week operation. It is assumed that both temporary power and utility change overs may be necessary for proper accomplishment of the job. Any disruptions in power to the facility must be approved in advance. Requests for such work shall be requested in writing a minimum of 7 days prior to such work. The City may require utility disruptions be accomplished outside the 0600 – 1730 window. Such work would be accomplished at no additional charge.

T. LIQUIDATED DAMAGES

The Contractor agrees that failure to complete work within the time allowed will result in damages being sustained by the City. Contractor and City agree that failure to complete the project will result in inconvenience to the citizens of Torrance and the City of Torrance and their customers using the affected areas. Such delay will also result in the necessity of several inspections each day to ensure that the project is properly progressing. The parties also agree that failure to complete the project on time will prevent the City from having the use of the facility. Therefore, the parties agree such damages among others are, and will continue to be, impracticable and extremely difficult to determine, but that **seven hundred and fifty ($750) per calendar day** is the minimum value of such costs to the City and is a reasonable amount that the Contractor agrees to reimburse the City for each calendar day of delay in finishing the work in excess of the time specified for completion, plus any authorized time extensions.

Execution of the contract under these specifications shall constitute agreement by the Contractor and the City that seven hundred and fifty Dollars ($750) per calendar day is the minimum value of the costs and actual damage caused by failure of the Contractor to complete the work within the allotted time, that such sum is liquidated damages and shall not be construed as a penalty, and that such sum may be deducted from payments due the Contractor if such delay occurs. Said amount may be reduced by the City if work is sufficiently completed within the allotted time so that the damages are minimized.

The Contractor will not be assessed liquidated damages for any delay in completion of the work when such delay was caused by the failure of the City or the owner of a utility to provide for removal or relocation of the existing utility facilities; provided, however, that the

Contractor shall have given the City and the owner of a utility timely notice of the interference. "Timely notice" shall be defined as a verbal notice (to be followed up in writing) no later than one (1) hour after initial discovery of the interference unless the City Representative is present, in which case notice shall be given immediately in writing to the City Manager.

U. GENERAL PREVAILING WAGE RATE

This contract is also subject to California State Prevailing Wage-

Pursuant to Section 1771 and 1773 of the Labor Code, the general prevailing wage rates in the county in which the work is to be done have been determined by the Director of the California Department of Industrial Relations. These wages are set forth in the General Prevailing Wage Rates for this project, are attached and available from the California Department of Industrial Relations' internet site at http://www.dir.ca.gov/Public-Works/Prevailing-Wage.html. Future effective general prevailing wage rates which have been predetermined and are on file with the California Department of Industrial Relations are referenced but not printed in the general prevailing wage rates.

APPRENTICESHIP EMPLOYMENT STANDARDS. Attention is directed to the provisions in Sections 1776 and 1777.5 of the California Labor Code concerning the employment of apprentices by the Contractor or any subcontractor under them.

One of the legal requirements for working on a public works project is the employment of apprentices. The Division of Apprenticeship Standards provides assistance to contractors in employing apprentices on public works sites.

Information relative to apprenticeship standards, wage schedules, and other requirements may be obtained from the Director of Industrial Relations, http://www.dir.ca.gov/DAS/DASApprenticesOnPublicWorksSummaryOfRequirements.htm

Contractor Registration with the Department of Industrial Relations (DIR)

- No contractor or subcontractor may be listed on a bid proposal or awarded a contract for a public works project unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)].
- This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.
- All contractors and subcontractors must furnish electronic certified payroll records directly to the Labor Commissioner (aka Division of Labor Standards Enforcement).

For additional information and to register online go to http://www.dir.ca.gov/Public-Works/Contractors.html

DIR provides a searchable database of registered contractors and subcontractors on its website https://efiling.dir.ca.gov/PWCR/Search, so that all contractors can comply with the requirement to only use registered contractors and subcontractors

Labor Code Section 1813

The contractor or subcontractor shall, as a penalty to the state or political subdivision on whose behalf the contract is made or awarded, forfeit twenty-five dollars ($25) for each worker employed in the execution of the contract by the respective contractor or subcontractor for each calendar day during which the worker is required or permitted to work more than 8 hours in any one calendar day and 40 hours in any one calendar week in violation of the provisions of this article. In awarding any contract for public work, the awarding body shall cause to be inserted in the contract a stipulation to this effect. The awarding body shall take cognizance of all violations of this article committed in the course of the execution of the contract, and shall report them to the Division of Labor Standards Enforcement.

Labor Code Section 1815

Notwithstanding the provisions of Sections 1810 to 1814, inclusive, of this code, and notwithstanding any stipulation inserted in any contract pursuant to the requirements of said sections, work performed by employees of contractors in excess of 8 hours per day, and 40 hours during any one week, shall be permitted upon public work upon compensation for all hours worked in excess of 8 hours per day at not less than $1^1/_2$ times the basic rate of pay.

V. PRELIMINARY NOTICES: Preliminary Notices should be mailed to the following:
General Services Department
Attn: Nina Schroeder
3350 Civic Center Drive
Torrance, CA 90503

W. SECURITY CLEARANCE

The awarded contractor and the subcontractors will be required to submit a list of employees who will need to be fingerprinted; the list and the fingerprints will be provided to the Torrance Police Department for review prior to the start of the onsite work. The City of Torrance reserves the right to decide eligibility of an employee and to remove any employee it deems as a security risk at any time during the project. If required to meet the project's scheduled completion date, the contractor will be responsible to find a suitable replacement at no additional cost to the City.

The bidder will need to obtain the live scan fingerprint service which the prints will be taken digitally and sent to the Department of Justice (DOJ) for a background check with results sent to the Police Department for their review. All costs (fingerprinting and DOJ) and coordination of this requirement is the responsibility of the awarded bidder.

The City of Torrance Police Department uses the services of:

Safe and Secure
4172 Pacific Coast Hwy Ste. 103
Torrance, CA 90505
Phone: 310 – 373 – 3202
www.safeandsecureusa.com

The bidder may use another location to perform the services if approved by the City prior to obtaining the service.

PART C

SPECIAL PROVISIONS

SECTION A. GENERAL

The Project Specifications for all work on this project are the specifications contained in the Project Manual for Police Department UPS Replacement, prepared by Des Mahony, PE Engineer, and the City of Torrance.

These Specifications are intended to govern all aspects of the appurtenant construction including, but not limited to, materials, methods and details, except as modified herein or as inconsistent with the provisions hereof.

DEFINITIONS

Whenever the following terms are used, they shall be understood to mean and refer to the following:

CITY - City of Torrance.

Board- The City Council of the City of Torrance herein referred to as City Council.

City Manager - The General Services Director of the City of Torrance, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them.

Consulting Engineer– Des Mahony, PE
Breen Engineering, Inc.
1983 West 190th Street, Suite 200
Torrance, CA 90504
(310) 464 – 8404 x229
dmahony@breeneng.com

Laboratory - The designated laboratory authorized by the City of Torrance to test materials and work involved in the contract.

SECTION B. REFERENCE TO STANDARDS OR PUBLICATIONS

Any reference made in the Contract Documents to any specification, standard, or publication of any organization shall, in the absence of a specific designation to the contrary, be understood to refer to the latest edition of the specification, standard, or publication in effect as of the date of advertising the work, except to the extent that said standard or publication may be in conflict with applicable laws, ordinances, or governing codes. Contractors should be aware of all new code requirements (such as Cal-Green) when dealing with HVAC and other general building work. No requirements of these specifications or the drawings shall be waived because of any provisions of, or omission from, said standards or publications.

SECTION C. DESCRIPTION OF THE WORK

1. Scope of the Work. The work to be done consists of furnishing all labor, materials, tools, equipment and incidentals complete to the Police Department UPS Replacement as shown in the plans and specifications prepared by Des Mahony, Consulting Engineer and the City of Torrance.

SECTION D. GENERAL PROCEDURES

1. Specifications and Drawings Complementary. The Specifications and Drawings are complementary, and what is called for in one shall be as binding as if called for in both.

2. Order of Precedence of Contract Documents. In resolving conflicts resulting from conflicts, errors, or discrepancies in any of the Contract Documents, the order of precedence shall be as follows:

    1. Change Orders (including Plans and Specifications attached thereto).
    2. Permits Issued by other agencies.
    3. Public Works Agreement
    4. Addenda
    5. Special or General Provisions.
    6. Plans
    7. City Standard Plans
    8. Instructions to Bidders
    9. Reference Specifications

    Within the Specifications the order of precedence is as follows:

    1. Addenda/Change Orders
    2. Permits from other agencies/supplemental agreements
    3. Special or General Provisions
    4. Instructions to Bidders
    5. Referenced Standard Plans
    6. Referenced Specifications

    With reference to the Plans/Drawings the order of precedence is as follows:

    1. Change Orders plans govern over Addenda and Contract Drawings
    2. Addenda plans govern over Contract plans.
    3. Contract plans govern over standard plans
    4. Detail plans govern over general plans
    5. Figures govern over scaled dimensions

3. Discrepancies in the Contract Documents. Any discrepancies, conflicts, errors or omissions found in the Contract Documents shall be promptly reported in writing to the City Manager, who will issue a correction in writing. The Contractor shall not take advantage of any such discrepancies, conflicts, errors or omissions, but shall comply with any corrective measures regarding the same prescribed by the City Manager, and no additional payment or time shall be allowed therefor.

If discrepancies are discovered between the drawings and the specifications, and no specific interpretation is issued prior to bidding, the decision regarding this interpretation shall rest with the City Manager. The Contractor shall be compelled to act on the City Manager's decision as directed. In the event the installation is not in compliance with the direction of the City Manager, the installation shall be corrected by and at the expense of the Contractor at no additional cost to the City.

See Section E of these Special Provisions for "Claims".

4. Errors and Omissions. If the Contractor, in the course of the work, becomes aware of any claimed errors or omissions in the contract documents or in the City's field work, he shall immediately inform the City Manager. The City Manager shall promptly review the matter, and if the City Manager finds an error or omission has been made the City Manager shall determine the corrective actions and advise the Contractor accordingly. If the corrective work associated with an error or omission increases or decreases the amount of work called for in the Contract, the City shall issue an appropriate Change Order. After discovery of an error or omission by the Contractor, any related work performed by the Contractor shall be done at its risk unless authorized by the City Manager.

5. Changed Conditions. The plans for the work show conditions as they are believed by the City Manager to exist, but it is not intended or to be inferred that the conditions as shown thereon constitute a representation by the City that such conditions are actually existent, nor shall the City be liable for any loss sustained by the Contractor as a result of any variance of the conditions as shown on the plans and the actual conditions revealed during the progress of the work or otherwise. The word "conditions" as used in this paragraph includes, but is not limited to, site conditions, both surface and subsurface.

   The Contractor shall examine the site, compare it with the drawings and specifications and shall satisfy itself as to the conditions under which the work is to be performed. The Contractor shall ascertain and check the location of all existing structures, utilities and equipment, which may affect its work. The Contractor shall be responsible to re-examine the site, as necessary, for performance of change orders or other proposed changes, which may affect its work. No allowance shall subsequently be made on the Contractor's behalf for any extra expense or loss of time, which is incurred due to failure or negligence on its part to make such examination.

6. As-built Drawings. The Contractor shall maintain a control set of Plans and Specifications on the Work site at all times. All final locations determined in the field, and any deviations from the Plans and Specifications, shall be marked in red on this control set to show as-built conditions. Upon completion of the Work, the Contractor shall submit the control set to the Engineer for approval. Final payment will not be made until this requirement is met.

7. Construction Staking. The Contractor is responsible for all construction staking and shall be responsible for the cost of any re-staking required due to disturbance caused by its operations, failure to protect the work site from vandalism or other causes of loss.

8. Notice to Proceed. Notwithstanding any other provisions of the Contract, the Contractor shall not be obligated to perform any work and the City shall not be obligated to accept or pay for any work performed by the Contractor prior to delivery of a Notice to Proceed. The City's knowledge of work being performed prior to delivery of the Notice to Proceed shall

not obligate the City to accept or pay for such work. The Contractor shall provide all required contract bonds and evidences of insurance prior to commencing work at the site.

9. Delay in Obtaining Materials. No extension of time will be granted for a delay caused by the inability to obtain materials unless the Contractor either obtains advance written approval from the City Manager or obtains from the supplier and furnishes to the City Manager documentary proof that such materials could not be obtained due to war, government regulations, labor disputes, strikes, fires, floods, adverse weather necessitating the cessation of work, or other similar action of the elements. The Contractor is required to order materials in a timely manner as specified in the "Instruction to Bidders".

10. Inspection and Testing. The Work is subject to inspection and approval by the CITY or any authorized representative. It is the duty of the Contractor to notify the inspector that specific work is ready for inspection. Requests for inspections should be made through the automated phone system at 310-618-5901, using the permit number and following the prompts. Request can be made up to 11pm the night before an inspection is required. The inspection will be typically made the next day.

All rough Mechanical, Electrical and Plumbing should be inspected by the City Specialty Inspectors and approved prior to any framing inspection. 2. All framing, fire-blocking and bracing shall be in place prior to ordering a framing inspection. 3. Gypsum board shall only be installed after approved framing inspection and then order a gypsum board nailing inspection prior to tape and finishing.

The CITY will make, or have made, such inspections and tests, as he deems necessary to see that the Work is in conformance with the Contract Documents. The contractor will responsible for coordinating all inspections/tests and pay for all related costs. In the event such inspections or tests reveal noncompliance with the Contract Documents, the Contractor shall bear the cost of such corrective measures as deemed necessary by the CITY, as well as the cost of subsequent re-inspection and re-testing.

Work done in the absence of inspection by the CITY may be required to be removed and replaced under the inspection of the CITY, and the entire cost of removal and replacement, including the cost of all materials which may be furnished by the CITY and used in the work thus removed, shall be borne by the Contractor, regardless of whether the work removed is found to be defective or not. Work covered without the approval of the CITY shall, if so directed, be uncovered to the extent required by the CITY, and the Contractor shall similarly bear the entire cost of performing all the work and furnishing all the materials necessary for the removal of the covering and its subsequent replacement, including all costs for additional inspection.

The CITY and any authorized representatives shall at all times have access to the Work during its construction at shops and yards as well as the Work site. The Contractor shall provide every reasonable facility for ascertaining that the materials and workmanship are in accordance with the Contract Documents.

Inspection of the Work shall not relieve the Contractor of the obligation to fulfill all conditions of the Contract.

11. Project Schedule

Within ten (10) working days after the receipt of the Notice to Proceed, the Contractor shall submit a proposed construction schedule to the CITY for approval. The schedule shall be in accordance with section 11 and shall be in sufficient detail to show chronological relationship of all activities of the Work. These include, but are not limited to: estimated starting and completion dates of various activities, submittal of shop drawings to the Engineer for approval, procurement of materials and scheduling of equipment.

No work may be started until the Schedule has been approved in writing. The work shall be scheduled to assure that construction will be completed within the specified time. The Contractor shall be responsible for coordination of all phases of the operation so that the time schedule can be met.

During construction, the Contractor shall also submit to the CITY, a two-week "look ahead" construction schedule during the construction progress meetings held biweekly.

If the Contractor decides to make a major change in the method of operations after commencing construction, or if the schedule fails to reflect the actual progress, the Contractor shall submit to the CITY a revised construction schedule in advance of beginning revised operations.

Sequence of Construction - The Contractor shall sequence the Work in a manner to expeditiously complete the project with a minimum of inconvenience to the CITY or adjacent owners.

The construction schedule shall conform to the following criteria:

1) The schedule shall be prepared using the latest version of Microsoft Project or approved equal.

2) Work activities shall be based on the following:

   a) Contract Unit Price items shall be subdivided into those portions to be constructed during each stage or phase of construction (if applicable).

   b) Lump sum items shall be subdivided into those portions to be constructed during each stage or phase of construction.

3) Utility relocations and/or coordination by the Contractor per section 14 of these Special Provisions shall be considered as activities.

4) Required submittals, working and shop drawings shall be included as activities.

5) The procurement of construction materials and equipment with long lead times for deliveries shall be included as activities.

6) Work to be performed by subcontractors shall be identified and shown as work activities.

7) Start and completion dates of each activity shall be illustrated.

8) Completion of all Work under the Contract shall be within the time specified in these Special Provisions and in accordance with the Plans and Specifications.

12. Mobilization

12.1 Scope. Mobilization shall include the provision of the Construction Schedule; Best Management Practices and Safety Plan, site review; obtaining all permits, insurance, and bonds; moving onto the site all materials and equipment; furnishing temporary construction facilities, and removal of same at completion of the project; all as required for the proper performance and completion of the work.

Mobilization shall include, but not be limited to, the following principle items.

(a) Submittal and modification, as required, of the Construction Schedule.

(b) All associated documentation and submittals as required.

(c) Installing temporary construction power and wiring.

(d) Establishing fire protection system.

(e) Developing construction water supply.

(f) Providing on-site sanitary facilities and portable water facilities, as required.

(g) Arranging for and erection of Contractor's work and storage yard.

(h) Submittal of all required insurance certificates and bonds, including subcontractors.

(i) Obtaining all required permits.

(j) Posting all OSHA required notices and establishment of safety programs.

(k) Have the Contractor's superintendent at the job site full-time.

(l) Pot-holing and other research and review as necessary to verify site conditions and utility locations, including research and review as necessary for change orders.

(m) Demobilization.

13. Markup.

The markups mentioned hereinafter shall include, but are not limited to, all costs for the services of superintendents, project managers, timekeepers and other personnel not

working directly on the change order, and pickup or yard trucks used by the above personnel. These costs shall not be reported as labor and equipment elsewhere except when actually performing work directly on the change order and then shall be reported at the labor classification of the work performed.

The following percentages shall apply for additional work:

Profit	10% maximum
Overhead	5% maximum

Subcontractor markup: maximum allowed is 5% for profit and overhead on the subcontractor's costs.

To the sum of the costs and markups provided for in this subsection, one (1) percent shall be added as compensation for bonding and one (1) percent for insurance.

For changes involving only a decrease in price, the contractor and subcontractors shall return as credit for overhead and profit those same percentages which are allowed for like changes involving increases in price. On changes involving both an increase and decrease in price, overhead and profit will be allowed only on the net increase.

For conflicts in the plans or specifications, the bidder shall include in his bid the more expensive item and/or methodology.

14. Utilities. The Contractor shall provide coordination with all the utility companies involved and shall provide protection from damage to their facilities. The Contractor shall be responsible for repair or replacement to said facilities made necessary by its failure to provide required protection. The Contractor is required to include utility requirements in the Construction Schedule.

The Contractor shall be solely responsible to check all utility record maps, books, and/or other data in the possession of the CITY, other agencies, and/or all utility companies, and no allowance shall be made for any failure to have done so.

The Contractor shall utilize the services of "Underground Service Alert - Southern California" for utility locating in all public right-of-ways by calling 1-800-227-2600 at least 48 hours prior to any excavation.

15. Completion, Acceptance and Warranty. If, in the CITY's judgment, the Work has been completed and is ready for acceptance, the CITY will so certify and will determine the date when the Work was completed. This will be the date when the Contractor is relieved from responsibility to protect the Work. The CITY may cause a Notice of Completion to be filed and recorded with the Los Angeles County Recorder's Office. At the CITY's option, the CITY may certify acceptance to the City Council who may then cause a Notice of Completion to be filed and recorded with the Los Angeles County Recorder's Office.

Manufacturer's warranties and guaranties furnished for materials used in the Work and instruction sheets and parts listed supplied with materials shall be delivered to the CITY prior to acceptance of the Work. The duration of the warranty or guaranty shall be the standard of the industry with a minimum of 1 year from the date of Notice of Completion or Date of Acceptance.

The prime contractor will be required to warranty the entire project regardless of whether warranties from subcontractors are also required. Coordination and correction of any issue related to project scope that arises during that one (1) year warranty period will be the responsibility of the prime contractor.

Manufacturer's warranties shall not relieve the Contractor of liability under these Specifications. Such warranties only shall supplement the Contractor's responsibility.

The CITY may require a manufacturer's warranty on any product offered for use.

16. Superintendent. Contractor shall employ a superintendent to be in attendance at all times on the Project site during the performance of the work. Superintendent shall represent the Contractor, and communications given to the superintendent shall be binding as if given to the Contractor. The superintendent must be able to communicate verbally and in writing to both City Representatives and all contract labor regarding all aspects of work. The superintendent shall be approved by the CITY prior to the start of the Work. If the designated superintendent is rejected, the Contractor shall immediately designate another superintendent in writing and submit to the City for consideration. A replacement must be provided before work continues. The CITY shall have the authority to require the Contractor to remove its superintendent and/or alternate superintendent at any time and at no cost to the CITY.

17. Requirements for Recycling Construction Materials

The City of Torrance requires that all demolition projects and construction or remodeling projects valued at $100,000 or more must recycle or reuse at least 50% of the materials that leave the project site and 100% of excavated soil and land-clearing debris. A Waste Management Plan (WMP) form is part of the permit process for projects that meet these criteria. The WMP form is available at the permit counter or a downloadable form is available here:

http://www.torranceca.gov/PDF/WMPFormRevised2012onestop.pdf

Step 1 - when applying for the permit, you must complete the WMP form stating that at least 50% of the waste generated by the project will be recycled or reused and that 100% of excavated soil and land-clearing debris will be recycled or reused.

Step 2 - collect and keep all receipts and records of the disposal, recycling, donations, and reuse of the materials from your project. Receipts must show material type, tonnage or weight, how the materials were treated, the facility used, and the address of the jobsite.

Step 3 - complete the WMP by attaching the receipts listing the actual disposal and recycling that occurred and submitting the WMP to Public Works for approval. This is required before your project can get its final inspection.

Failure to fulfill the requirements of the WMP process will result in penalties of $5,000 for construction projects and $10,000 for demolition projects, as per the Torrance Municipal Code.

For additional information concerning recycling or recycling facilities please visit the City of Torrance Public Works Department website at http://www.torranceca.gov/8614.htm

SECTION E. PAYMENTS TO CONTRACTOR AND CLAIMS

1. Breakdown of Contract Prices. The Contractor shall, within ten (10) working days of receipt of a request from the City, submit a complete breakdown of lump sum bid prices showing the value assigned to each part of the work, including a separate line item for profit and overhead. The breakdown shall include separate line for each subcontractor's bid and/or contract amount. For each part of the work where an application for payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the schedule of values. In submitting the breakdown, the Contractor certifies that it is not unbalanced and that the value assigned to each part of the work represents its estimate of the actual cost, including profit and overhead, of performing that part of the work. The breakdown shall be sufficiently detailed to permit its use by the City Manager as one of the bases for evaluating requests for payment. No extra costs shall be allowed for these breakdowns.

2. Payment for Labor and Materials. The Contractor shall pay and cause the subcontractors to pay any and all accounts for labor, including Worker's Compensation premiums, State Unemployment and Federal Social Security payments and all other wage and salary deductions required by law. The Contractor also shall pay and cause the subcontractors to pay any and all accounts for services, equipment and materials used by it and the subcontractors during the performance of work under this contract. All such accounts shall be paid as they become due and payable. If requested by the City Manager, the Contractor shall immediately furnish the City with proof of payment of such accounts.

3. Additional Work. Payment for additional work and all expenditures in excess of the bid amount must be authorized in writing by the City Manager. Such authorization shall be obtained by the Contractor prior to engaging in additional work. It shall be the Contractor's sole responsibility to obtain written approval from the City Manager for any change(s) in material or in the work proposed by suppliers or subcontractors. No payment shall be made to the Contractor for additional work which has not been approved in writing, and the Contractor hereby agrees that it shall have no right to additional compensation for any work not so authorized.

4. Claims. The Contractor shall not be entitled to the payment of any additional compensation for any cause, including any act, or failure to act, by the City, or the happening of any event, thing or occurrence, unless he shall have given the City due written notice of potential claim as hereinafter specified.

   The written notice of potential claim shall set forth the reasons for which the Contractor believes additional compensation will or may be due, the nature of the costs involved, and, insofar as possible, the amount of the potential claim. Said notice shall be submitted on a form approved by the City at least forty-eight (48) hours (two working days) in advance

of performing said work, unless the work is of an emergency nature, in which case the Contractor shall notify and obtain approval from the Inspector prior to commencing the work. The City Manager may require the Contractor to delay construction involving the claim, but no other work shall be delayed, and the Contractor shall not be allowed additional costs for any said delay but may be allowed on extension of time if the City Manager agrees that the work delayed is a controlling element of the Construction Schedule. The Contractor shall be required to submit any supporting data (or a detailed written explanation justifying further delay) within five (5) Work Days of a request from the City Manager and shall be responsible for any delays resulting from late and/or incomplete submittals. By submitting a Bid, the Contractor hereby agrees that this Section shall supersede Sections 6-6.3 and 6-6.4 of the Standard Specifications.

The City shall be the sole authority to interpret all plans, specifications and contract documents, and no claim shall be accepted which is based on the Contractor's ignorance, misunderstanding or noncompliance with any provision or portion thereof.
The Contractor shall be responsible to provide all data and to obtain all approvals required by said Specifications. No claims or extras shall be approved by the City unless all work was done under the direction of and subject to the approval of the Inspector.

It is the intention of this Subsection that differences between the parties arising under and by virtue of the Contract be brought to the attention of the City Manager at the earliest possible time in order that such matters may be settled, if possible, or other appropriate action promptly taken. The Contractor hereby agrees that it shall have no right to additional compensation for any claim that may be based on any such act, failure to act, event, thing or occurrence for which no written notice of potential claim as herein required was filed.

5. Noncompliance with Plans and Specifications. Failure of the Contractor to comply with any requirement of the Plans and Specifications, and/or to immediately remedy any such noncompliance upon notice from the City Manager, may result in suspension of Contract Progress Payments. Any Progress Payments so suspended shall remain in suspension until the Contractor's operations and/or submittals are brought into compliance to the satisfaction of the City Manager. No additional compensation shall be allowed as a result of suspension of Progress Payments due to noncompliance with the plans or specifications. The Contractor shall not be permitted to stop work due to said suspension of Progress Payments.

6. Request for Payment. Contractor shall submit all requests for payment on AIA Document G702 – Application and Certificate for Payment and G703- Continuation Sheet. For each item provide a column for listing: Item Number; Description of Work; Scheduled Value, Previous Application; Authorized Change Orders; Total completed and Stored to Date of Application; Percentage of Completion; Balance to Finish; and Retainage.

Prior to submittal of said form, all items for which payment is requested shall be checked and approved in writing by the City Manager (or authorized representative). No payments will be made unless all back-up data (below) is submitted with the payment request and the Progress Payment Invoice is signed by both Contractor and Manager.

Back up data required to process payment shall include but not limited to the following:

- Copies of Certified payroll covering the payment period and proof of submission to the Department of Industrial Relations (DIR). Although this project is subject to compliance monitoring and enforcement by the DIR. The City reserves the right to review the certified payroll for compliance, request additional clarification and require the contractor to provide proof of payment such as cancelled checks prior to payment of invoice.
- Conditional and Unconditional lien releases from contractor, subcontractor and suppliers from which the contractor is expecting payment. Release forms must reflect amount of draw and through date of invoice payment.

  1. Conditional releases for the current pay period shall be provided with the current payment request.

  2. Unconditional releases for the immediate prior pay period shall be provided with the current payment request. Unconditional lien release forms must match the preceding Conditional release form in amount and through date and must be signed authorized company representative. Unconditional Lien Release on Final Payment with a zero balance is required from all material suppliers and subcontractors with the request for final payment (retention). All Unconditional Lien Release on Final Payments will be signed authorized company representative and notarized. Release forms can be found at the Contractors State License Board website at http://www.cslb.ca.gov/Media_Room/Industry_Bulletins/2012/July_11.aspx. The most update current lien release forms must be used.
- Any required outside agency reports and/or written observations.

The City will retain 5 percent of the value of all work done and materials installed as part security for fulfillment of the contract by Contractor. The full 5 percent retention will be retained on all payments for 35 days after the filing of the Notice of Completion. In addition 125% of the amount of the "unreleased" STOP notice will be withheld.

There shall be no separate payment for any relocations, barriers or forms, grading or temporary construction required to construct the improvements herein. Payment for these items shall be absorbed in the Bid Prices for the applicable work to which they are appurtenant, and no extra costs shall be allowed.

The payment of amounts due to the Contractor shall be contingent upon the Contractor furnishing the City with a release of all claims against the City arising by virtue of the Contract related to said amounts. It is the contractor's responsibility to provide the correct releases in order to obtain payment by the City.

7. Preconstruction Meeting. The City will hold a preconstruction meeting with awarded contractor and discuss procedural, and mobilization issues. The contractor needs to have key administrative staff attend such as: project manager, superintendent, administrative personnel who handle the certified payroll and pay requests. Attendees can also include subcontractors and major suppliers/fabricators.

   In addition to staffing preconstruction meeting, the awarded contractor will need to bring the following to the preconstruction meeting for review and discussion.

   - Project Schedule (see section D General Procedures #11 for details)
   - Schedule of Values (see section E, Payment to Contractors #1 for details)
   - Submittal Log, list all the submittals you plan to submit for review.

- List of subcontractors and contact information
- List of principal suppliers and fabricators
- Prime Contractor's Safety Plan
- Example of Daily Project Report and Daily Sign In Sheet for Review (see #8 below for details)
- Prime contractors' signed contract, performance and labor and material bonds, insurance certificates with endorsements, workers compensation certificate and Torrance Business License. The exact verbiage of additionally insured clause for the insurance is found Item 17C of the contract. The certificate needs to be endorsed as well naming the City as additional insured.
- Signed contracts for subcontractors, insurance certificates with endorsements, workers compensation certificates. Subcontractor's insurance must also meet the contract limits and language and be endorsed.

8. Daily Project Report and Contractor Daily Sign In Sheets.

The contractor will provide daily project reports and/or contractor daily sign in sheets on a daily basis (next working day) during the entire project's onsite work. At minimum the report/sign in sheets consist of the following:

Daily Project Report

- Date, Day of the Week, and Weather
- List all staffing by prime and subcontractors each, include classification and count of persons within the specific classification and denote journeyman vs. apprentice.
- List all deliveries of equipment and materials to site.
- List onsite discussions, meetings any resolution or direction given.
- List progress of the project (i.e. was scheduled and completed).
- List all visitors to the site.

Daily Sign In Sheet

- Date and Day of the Week
- Employee Name (printed), company and classification of work, denote journeyman vs. apprentice for each classification.
- Time started and time completed, any breaks.
- Employee signature of the individual worker (confirming reported time)

PART D

BID DOCUMENTS

BIDDER'S PROPOSAL

BID FOR POLICE DEPARTMENT UPS REPLACEMENT
B2016-37

In accordance with the Notice Inviting Bids pertaining to the receiving of sealed proposals by the City Clerk of the City of Torrance for the above titled improvement, the undersigned hereby proposes to furnish all work to be performed in accordance with the Plans, Specifications and Contract Documents, prepared by Des Mahony, Engineer and City of Torrance for the bid as set forth in the following schedules.

Assignment of Contractor's values:

Item	Description	Total Amount In Figures*
Division 26 05 00	Common Work Results for Electrical	
Division 26 05 19	Low – Voltage Electrical Power Conductors & Cables	
Division 26 05 26	Grounding and Bonding for Electrical Systems	
Division 26 05 29	Hangers and Supports for Electrical Systems	
Division 26 05 33	Raceway and Boxes for Electrical Systems	
Division 26 05 48	Vibration and Seismic Controls for Electrical Systems	
Division 26 05 53	Identification for Electrical Systems	
Division 26 07 00	Electrical Equipment Noise Control, Vibration Isolation and Seismic Restraint	
Division 26 24 13	Switchboards	
Division 26 24 16	Panel Boards	
Division 26 27 26	Wiring Devices	
Division 26 28 13	Fuses	
Division 26 28 16	Enclosed Switches and Circuit Breakers	
Division 26 33 63	Uninterruptible Power Supply	
Division 26 36 00	Automatic Transfer Switches	
	B2016-37 -BID TOTAL- in figures*	

BASE BID TOTAL: _____

(In Words)*

***BID MAY BE REJECTED IF TOTAL IS NOT SHOWN IN FIGURES AND WORDS.**

The City of Torrance awards to the lowest responsible bidder per the Torrance Municipal Code. Based on the funding available, the City reserves the right to select any combination of base bid and bid alternate(s) to determine the lowest responsible bidder for award.

The undersigned furthermore agrees to enter into and execute a contract, with necessary bonds, at the prices set forth herein and in case of default in executing such contract, with necessary bonds, the check or bond accompanying this bid and the money payable thereon shall be forfeited thereby to and remain the property of the City of Torrance.

The above prices include all work appurtenant to the various items as outlined in the specifications and all work or expense required for the satisfactory completion of said item.

The undersigned declares that it has carefully examined the Specifications, and Contract Documents, and has investigated the site of the work and is familiar with the conditions thereon.

_____ _____

Company Name Signature of principal in company

_____ _____

Date Name and Title of Signer

Address: _____

Phone:_____ DIR Registration #:_____

License No. & Classifications _____

ACKNOWLEDGMENT OF ADDENDA RECEIVED

B2016-37

The Bidder shall acknowledge the receipt of addenda by placing an "X" by each addendum received.

Addendum No. 1 _____

Addendum No. 2 _____

Addendum No. 3 _____

Addendum No. 4 _____

Addendum No. 5 _____

Addendum No. 6 _____

Addendum No. 7 _____

Addendum No. 8 _____

If an addendum or addenda have been issued by the City and not noted above as being received by the Bidder, the Bid Proposal may be rejected.

_____ _____

Bidder's Signature Date

STATE OF CALIFORNIA }
}
COUNTY OF _____ }

CONTRACTOR'S AFFIDAVIT
B2016-37

_____, being first duly sworn, deposes and says:

1. That he is the _____
Title

of _____
(Name of Partnership, Corporation, or Sole Proprietorship)

Here-in-after called "Contractor," who has submitted to the City of Torrance a proposal for the Bid for Police Department UPS Replacement, B2016-37

2. That said proposal is genuine; that the same is not sham; that all statement of facts therein are true;

3. That such proposal was not made in the interest or behalf of any person, partnership, company, association, organization or corporation not named or disclosed;

4. That the Contractor did not directly or indirectly induce, solicit or agree with any-one else to submit a false or sham bid, refrain from bidding, or withdraw the bid, to raise or fix the bid price of the Contractor or anyone else, or to raise or fix any overhead, profit or cost element of the Contractor's price or the price of anyone else; and did not attempt to induce action prejudicial to the interest of the City of Torrance or any other bidder, or anyone else interested in the proposed contract;

5. That the Contractor has not in any manner sought by collusion to secure for itself an advantage over any other bidder or to induce action prejudicial to the interests of the City of Torrance, or of any other bidder or of anyone else interested in the proposed contract;

6. That the Contractor has not accepted any bid from any subcontractor or material-man through any bid depository, the bylaws, rules or regulations of which prohibit or prevent the Contractor from considering any bid from any subcontractor or material-man, which is not processed through said bid depository, or which prevent any subcontractor or material-man from bidding to any contractor who does not use the facilities of or accept bids from or through such bid depository;

CONTRACTOR'S AFFIDAVIT B2016-37 (CONTINUED)

7. That the Contractor did not, directly or indirectly, submit the Contractor's bid price or any breakdown thereof, or the contents thereof, or divulge information or data relative thereto, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, or to any individual or group of Individuals, except to the City of Torrance, or to any person or persons who have a partnership or other financial interest with said Contractor in its business.

Dated this _____ day of _____, 20_____.

Subscribed and Sworn to
before me this _____
of _____, 20_____

_____
(Contractor)

_____
(Title)

_____
Notary Public in and for said
County and State.
(Seal)

BID BOND

B2016-37

KNOW ALL MEN BY THESE PRESENTS: That we, _____
_____

as principal, and _____
as sureties, are held and firmly bound unto the City of Torrance, State of California, in the penal sum of _____ dollars ($_____), for the payment whereof we hereby bind ourselves, our successors, heirs, executors or administrators jointly and severally, firmly by these presents.

The condition of this obligation is such that, whereas the above bounded principal is about to file with and submit to the City of Torrance a bid or proposal for the performance of certain work as required in the City of Torrance, Project No. B2016-37, said work being: Police Department UPS Replacement, in compliance with the Specifications therefore under an invitation of said City contained in a notice or advertisement for bids or proposals; now if the bid or proposal of said principal shall be accepted and if said work be thereupon awarded to the principal by said City and if the said principal shall enter into a contract with the said City in accordance with said bid or proposal, or if the bid or proposal of the said principal is rejected, then this bond shall be void and of no effect and otherwise in full force and effect.

WITNESS our hands this _____ day of _____, 20 _____.

_____
Principal

_____
Surety/Attorney-in-Fact

_____
Signature

Name: _____
Local Address: _____
_____
Phone No.: _____
Fax No.: _____

LIST OF SUBCONTRACTORS

The Bidder is required to fill in the following blanks in accordance with the provisions of the Subletting and Subcontracting Fair Practices Act (Chapter 2 of Division 5, Title 1 of the Government Code of the State of California) and should familiarize itself with Section 2-3 of the Standard Specifications.

1. Name Under Which Subcontractor is Licensed: _____

Subcontractor's Address: _____

Specific Description of Sub-Contract: _____

License Number: _____ CA License Classification/Type: _____

DIR Registration #: _____

2. Name Under Which Subcontractor is Licensed: _____

Subcontractor's Address: _____

Specific Description of Sub-Contract: _____

License Number: _____ CA License Classification/Type: _____

DIR Registration #: _____

3. Name Under Which Subcontractor is Licensed: _____

Subcontractor's Address: _____

Specific Description of Sub-Contract: _____

License Number: _____ CA License Classification/Type: _____

DIR Registration #: _____

4. Name Under Which Subcontractor is Licensed: _____

Subcontractor's Address: _____

Specific Description of Sub-Contract: _____

License Number: _____ CA License Classification/Type: _____

DIR Registration #: _____

5. Name Under Which Subcontractor is Licensed: _____

Subcontractor's Address: _____

Specific Description of Sub-Contract: _____

License Number: _____ CA License Classification/Type: _____

DIR Registration #: _____

6. Name Under Which Subcontractor is Licensed: _____

Subcontractor's Address: _____

Specific Description of Sub-Contract: _____

License Number: _____ CA License Classification/Type: _____

DIR Registration #: _____

7. Name Under Which Subcontractor is Licensed: _____

Subcontractor's Address: _____

Specific Description of Sub-Contract: _____

License Number: _____ CA License Classification/Type: _____

DIR Registration #: _____

Subcontractors must be properly licensed under the laws of the State of California for the type of work which they are to perform. Do not list alternate subcontractors for the same work.

The Bidding Contractor must include each subcontractor's contract license number (AB 44). An inadvertent error in listing the subcontractor's license number shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive, if the corrected contractor's license number is submitted to the public entity by the prime contractor within 24 hours after the bid opening-provided that the correct license number corresponds to the submitted name and location of the subcontractor.

No contractor or subcontractor may be listed on a bid proposal or awarded a contract for a public works project unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)].

REFERENCES

(Bidder must have completed at least five (5) projects of a similar size and scope within the last five (5) years). The references must reflect this requirement.

1. Name (Firm/Agency): _____

Address: _____

Contact Person: _____ Telephone No.: _____

Title of Project: _____

Project Location: _____

Date of Completion _____ Contract Amount:$ _____

2. Name (Firm/Agency): _____

Address: _____

Contact Person: _____ Telephone No.: _____

Title of Project: _____

Project Location: _____

Date of Completion _____ Contract Amount:$ _____

3. Name (Firm/Agency): _____

Address: _____

Contact Person: _____ Telephone No.: _____

Title of Project: _____

Project Location: _____

Date of Completion _____ Contract Amount:$ _____

4. Name (Firm/Agency): _____

Address: _____

Contact Person: _____ Telephone No.: _____

Title of Project: _____

Project Location: _____

Date of Completion _____ Contract Amount:$ _____

Bidder's Information

The bidder must provide a detailed list of the trades and the description of the work they will perform with their own company for this project.

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

11. _____

12. _____

13. _____

14. _____

Contractor's License No.: _____ Class: _____

Date first obtained: _____

Has License ever been suspended or revoked? _____

If yes, describe when and why _____

Any current claims against License or Bond? _____

If yes, describe claims: _____

Type of entity (check one)

_____ Incorporated _____ Partnership _____ Sole Proprietorship

If incorporated, in what state _____

Federal Tax ID Number #_____

Principals in Company (List all - attach additional sheets if necessary):

NAME	**TITLE**	**LICENSE NO. (If Applicable)**
_____	_____	_____
_____	_____	_____
_____	_____	_____

PART E

DOCUMENTS TO BE COMPLETED AND DELIVERED TO CITY AS PART OF CONTRACT WITH THE CITY

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

That we, _____as Principal(s) and ____a corporation, incorporated, organized, and existing under the laws of the State of _____, and authorized to execute bonds and undertakings and to do a general surety business in the State of California, as Surety, are jointly and severally held and firmly bound unto the City of Torrance, a municipal corporation, located in the County of Los Angeles, State of California, in the full and just sum of: _____ Dollars ($_____), lawful money of the United States of America, for the payment of which sum, well and truly to be made, we bind ourselves and our respective heirs, executors, administrators, representative, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that: WHEREAS, said Principal(s) have/has entered into, or are/is about to enter into, a certain written contract or agreement, dated as of the _____ day of _____, 20____, with the said City of Torrance for the POLICE DEPARTMENT UPS REPLACEMENT, B2016-37 , all as is more specifically set forth in said contract or agreement, a full, true and correct copy of which is hereunto attached, and hereby referred to and by this reference incorporated herein and made a part hereof;

NOW, THEREFORE, if the said Principal(s) shall faithfully and well and truly do, perform and complete, or cause to be done, performed and complete, each and all of the covenants, terms, conditions, requirements, obligations, acts and things, to be met, done or performed by said Principal(s), including any guarantee period as set forth in, or required by, said contract or agreement, all at and within the time or times, and in the manner as therein specified and contemplated, then this bond and obligation shall be null and void; otherwise it shall be and remain in full force, virtue and effect.

The said Surety, for value received, hereby stipulates and agrees that no amendment, change, extension of time, alteration or addition to said contract or agreement, or of any feature or item or items of performance required therein or there under, shall in any manner affect its obligations on or under this bond; and said Surety does hereby waive notice of any such amendment, change, extension of time, alteration, or addition to said contract or agreement, and of any feature or item or items of performance required therein or there under.

PERFORMANCE BOND B2016-37 (CONTINUED)

In the event any suit, action or proceedings is instituted to recover on this bond or obligation, said Surety will pay, and does hereby agree to pay, as attorney's fees for said City, such sum as the Court in any such suit, action or proceeding may adjudge reasonable.

EXECUTED, SEALED AND DATED this _____ day of _____, 20____

CORPORATE SEAL

PRINCIPAL(S):

BY _____

BY _____

CORPORATE SEAL

SURETY:

BY _____

Name: _____
Local Address: _____
_____
Phone No.: _____
Fax No.: _____

LABOR AND MATERIAL BOND
B2016-37

KNOW ALL MEN BY THESE PRESENTS:

That we,_____
As Principal(s) and _____ a corporation, incorporated, organized, and existing under the laws of the State of _____, and authorized to execute bonds and undertakings and to do a general surety business in the State of California, as Surety, are jointly and severally held and firmly bound unto:

(a) The State of California for the use and benefit of the State Treasurer, as ex-officio Treasurer and custodian of the Unemployment Fund of said State; and

(b) The City of Torrance, California; and

(c) Any and all persons who do or perform or who did or performed work or labor upon or in connection with the work or improvement referred to in the contract or agreement hereinafter mentioned; and

(d) Any and all materialmen, persons, companies, firms, association, or corporations, supplying or furnishing any materials, provisions, provender, transportation, appliances or power, or other supplies used in, upon, for or about or in connection with the performance of the work or improvement contracted to be executed, done, made or performed under said contract or agreement; and

(e) Any and all persons, companies, firms, associations, or corporations furnishing, renting, or hiring teams, equipment, implements or machinery for, in connection with, or contributing to, said work to be done or improvement to be made under said contract or agreement; and

(f) Any and all persons, companies, firms, associations, or corporations who supply both work and materials;

and whose claim has not been paid by said Principal(s), in full and just sum of _____ Dollars ($_____), lawful money of the United States of America, for the payment of which will and truly to be made, said Principal(s) and said Surety do hereby bind themselves and their respective heirs, executors, administrators, representatives, successors and assigns, jointly and severally, firmly by these presents.

LABOR AND MATERIAL BOND (CONTINUED)

THE CONDITION OF THE FOREGOING OBLIGATION IS SUCH, THAT: WHEREAS, said Principal(s) have/has entered into or are/is about to enter into a certain written contract or agreement, dated as of the _____ day of _____20 ___, with the City of Torrance for the POLICE DEPARTMENT UPS REPLACEMENT, B2016-37, all as is more specifically set forth in said contract or agreement, a full, true and correct copy of which is hereunto attached, and hereby referred to and by this reference incorporated herein and made a part hereof;

NOW, THEREFORE, if the said Principal(s) (or any of his/her, its, or their subcontractors) under said contract or agreement fails or fail to pay:

(1) For any materials, provisions, provender, transportation, appliances, or power, or other supplies; or

(2) For the hire of any teams, equipment, implements, or machinery; or

(3) For any work or labor; supplies, furnished, provided, used, done or performed in, upon, for or about or in connection with the said work or improvement; or

(4) For amounts due under the Unemployment Insurance Act of the State of California with respect to such work or improvement;

the Surety on this bond will pay the same in an amount not exceeding the sum hereinabove specified in this bond; and, also, in case suit is brought upon this bond, said Surety will (and does hereby agree to) pay a reasonable attorney's fee, to be fixed and taxed as costs, and included in the judgment therein rendered.

This bond shall (and it is hereby made to) insure to the benefit of any and all persons entitled to file claims under Section 1192.1 of the Code of Civil Procedure of the State of California, so as to give a right of action to them or their assigns in any suit brought upon this bond, all as contemplated under the provisions of Section 4205 of the Government Code, and of Chapter 1 of Title 4 of Part 3 of the Code of Civil Procedure, of the State of California.

This bond is executed and filed in connection with said contract or agreement hereunto attached to comply with each and all of the provisions of the laws of the State of California above mentioned or referred to, and of all amendments thereto, and the obligors so intend and do hereby bind themselves accordingly.

LABOR AND MATERIAL BOND B2016-37 (CONTINUED)

The said Surety, for value received, hereby stipulates and agrees that no amendment, change, extension of time, alteration, or addition to said contract or agreement, or of any feature or item or items of performance required therein or thereunder, shall in any manner affect its obligations on or under this bond; and said Surety does hereby waive notice of any such amendment, change, extension of time, alteration, or addition to said contract or agreement, and of any feature or item or items of performance required therein or thereunder.

EXECUTED, SEALED AND DATED this _____ day of _____, 20 _____

CORPORATE SEAL

PRINCIPAL:

BY _____

CORPORATE SEAL

SURETY:

BY _____

Name: _____
Local Address: _____
_____
Phone No.: _____
Fax No.: _____

PUBLIC WORKS AGREEMENT

This PUBLIC WORKS AGREEMENT ("Agreement") is made and entered into as of DATE (the "Effective Date"), by and between the CITY OF TORRANCE, a municipal corporation ("CITY"), and CONTRACTOR NAME, TYPE OF ENTITY ("CONTRACTOR").

RECITALS:

A. The CITY wishes to retain the services of an experienced and qualified CONTRACTOR to construct the **PROJECT NAME & BID NUMBER**;

B. In order to obtain the desired services, The CITY has circulated a Notice Inviting Bids for the construction of the **PROJECT NAME & BID NUMBER** (the "NIB"); and

C. CONTRACTOR has submitted a Bid (the "Bid") in response to the NIB. CONTRACTOR represents that it is qualified to perform those services requested in the Plans and Specifications. Based upon its review of all Bids submitted in response to the NIB, The CITY is willing to award the contract to CONTRACTOR.

AGREEMENT:

1. SERVICES TO BE PERFORMED BY CONTRACTOR

CONTRACTOR will provide the services and install those materials listed in the Plans and Specifications, which are on file in the Public Works Department. The NIB and the Plans and Specifications are made a part of this Agreement. A copy of the Bid is attached as Exhibit A.

2. TERM

Unless earlier terminated in accordance with Paragraph 4 below, this Agreement will continue in full force and effect for two years from the Effective Date.

3. COMPENSATION

A. CONTRACTOR's Fee.

For services rendered pursuant to this Agreement, CONTRACTOR will be paid in accordance with CONTRACTOR's Bid; provided, however, that in no event will the total amount of money paid the CONTRACTOR, for services initially contemplated by this Agreement, exceed the sum of $INSERT DOLLAR AMOUNT ("Agreement Sum"), plus a contingency of $INSERT DOLLAR AMOUNT, if first approved in writing by the CITY.

B. Schedule of Payment.
Provided that the CONTRACTOR is not in default under the terms of this Agreement, upon presentation of an invoice, CONTRACTOR will be paid monthly, within 30 days after the date of the monthly invoice.

4. TERMINATION OF AGREEMENT

A. Termination by CITY for Convenience.

1. CITY may, at any time, terminate the Agreement for CITY's convenience and without cause.

2. Upon receipt of written notice from CITY of such termination for CITY's convenience, CONTRACTOR will:

   a) cease operations as directed by CITY in the notice;
   b) take actions necessary, or that CITY may direct, for the protection and preservation of the work; and
   c) except for work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

3. In case of such termination for CITY's convenience, CONTRACTOR will be entitled to receive payment for work executed; and costs incurred by reason of such termination, along with reasonable overhead and profit on the work not executed.

B. Termination for Cause.

1. If either party fails to perform any term, covenant or condition in this Agreement and that failure continues for 15 calendar days after the nondefaulting party gives the defaulting party notice of the failure to perform, this Agreement may be terminated for cause; provided, however, that if during the notice period the defaulting party has promptly commenced and continues diligent efforts to remedy the default, the defaulting party will have such additional time as is reasonably necessary to remedy the default.

2. In the event this Agreement is terminated for cause by the default of the CONTRACTOR, the CITY may, at the expense of the CONTRACTOR and its surety, complete this Agreement or cause it to be completed. Any check or bond delivered to the CITY in connection with this Agreement, and the money payable thereon, will be forfeited to and remain the property of the CITY. All moneys due the CONTRACTOR under the terms of this

Agreement will be retained by the CITY, but the retention will not release the CONTRACTOR and its surety from liability for the default. Under these circumstances, however, the CONTRACTOR and its surety will be credited with the amount of money retained, toward any amount by which the cost of completion exceeds the Agreement Sum and any amount authorized for extra services.

3. Termination for cause will not affect or terminate any of the rights of the CITY as against the CONTRACTOR or its surety then existing, or which may thereafter accrue because of the default; this provision is in addition to all other rights and remedies available to the CITY under law.

C. Termination for Breach of Law.

In the event the CONTRACTOR or any of its officers, directors, shareholders, employees, agents, subsidiaries or affiliates is convicted (i) of a criminal offense as an incident to obtaining or attempting to obtain a public or private contract or subcontract, or in the performance of a contract or subcontract; (ii) under state or federal statutes of embezzlement, theft, forgery, bribery, falsification or destruction of records, receiving stolen property, or any other offense indicating a lack of business integrity or business honesty which currently, seriously, and directly affects responsibility as a public consultant or contractor; (iii) under state or federal antitrust statutes arising out of the submission of bids or proposals; or (iv) of violation of Paragraph 20 of this Agreement; or for any other cause the CITY determines to be so serious and compelling as to affect CONTRACTOR's responsibility as a public consultant or contractor, including but not limited to, debarment by another governmental agency, then the CITY reserves the unilateral right to terminate this Agreement or to impose such other sanctions (which may include financial sanctions, temporary suspensions or any other condition deemed appropriate short of termination) as it deems proper. The CITY will not take action until CONTRACTOR has been given notice and an opportunity to present evidence in mitigation.

5. FORCE MAJEURE

If any party fails to perform its obligations because of strikes, lockouts, labor disputes, embargoes, acts of God, inability to obtain labor or materials or reasonable substitutes for labor or materials, governmental restrictions, governmental regulations, governmental controls, judicial orders, enemy or hostile governmental action, civil commotion, fire or other casualty, or other causes beyond the reasonable control of the party obligated to perform, then that party's performance shall be excused for a period equal to the period of such cause for failure to perform.

6. RETENTION OF FUNDS

CONTRACTOR authorizes the CITY to deduct from any amount payable to CONTRACTOR (whether or not arising out of this Agreement) any amounts the payment of which may be in dispute or that are necessary to compensate the CITY for any losses, costs, liabilities, or damages suffered by the CITY, and all amounts for which the CITY may be liable to third parties, by reason of CONTRACTOR's negligent acts or omissions or willful misconduct in performing or failing to perform CONTRACTOR's obligations under this Agreement. In the event that any claim is made by a third party, the amount or validity of which is disputed by CONTRACTOR, or any indebtedness exists that appears to be the basis for a claim of lien, the CITY may withhold from any payment due, without liability for interest because of the withholding, an amount sufficient to cover the claim. The failure of the CITY to exercise the right to deduct or to withhold will not, however, affect the obligations of CONTRACTOR to insure, indemnify, and protect the CITY as elsewhere provided in this Agreement.

7. THE CITY'S REPRESENTATIVE

The Public Works Director is designated as the "City Representative," authorized to act in its behalf with respect to the work and services specified in this Agreement and to make all decisions in connection with this Agreement. Whenever approval, directions, or other actions are required by the CITY under this Agreement, those actions will be taken by the City Representative, unless otherwise stated. The City Manager has the right to designate another City Representative at any time, by providing notice to CONTRACTOR.

8. CONTRACTOR REPRESENTATIVE(S)

The following principal(s) of CONTRACTOR are designated as being the principal(s) and representative(s) of CONTRACTOR authorized to act in its behalf with respect to the work specified in this Agreement and make all decisions in connection with this Agreement:

REPRESENTATIVE 1
REPRESENTATIVE 2

9. INDEPENDENT CONTRACTOR

The CONTRACTOR is, and at all times will remain as to the CITY, a wholly independent contractor. Neither the CITY nor any of its agents will have control over the conduct of the CONTRACTOR or any of the CONTRACTOR's employees, except as otherwise set forth in this Agreement. The CONTRACTOR may not, at any time or in any manner,

represent that it or any of its agents or employees are in any manner agents or employees of the CITY. CITY has no duty, obligation, or responsibility to CONTRACTOR's agents or employees under the Affordable Care Act. CONTRACTOR is solely responsible for any tax penalties associated with the failure to offer affordable coverage to its agents and employees under the Affordable Care Act and any other liabilities, claims and obligations regarding compliance with the Affordable Care Act with respect to CONTRACTOR's agents and employees. CITY is not responsible and shall not be held liable for CONTRACTOR's failure to comply with CONTRACTOR's duties, obligations, and responsibilities under the Affordable Care Act. CONTRACTOR agrees to defend, indemnify and hold CITY harmless for any and all taxes and penalties that may be assessed against CITY as a result of CONTRACTOR's obligations under the Affordable Care Act relating to CONTRACTOR's agents and employees.

10. BUSINESS LICENSE

The CONTRACTOR must obtain a City business license prior to the start of work under this Agreement, unless CONTRACTOR is qualified for an exemption.

11. OTHER LICENSES AND PERMITS

CONTRACTOR warrants that it has all professional, contracting and other permits and licenses required to undertake the work contemplated by this Agreement.

12. FAMILIARITY WITH WORK

By executing this Agreement, CONTRACTOR warrants that CONTRACTOR (a) has thoroughly investigated and considered the scope of services to be performed, (b) has carefully considered how the services should be performed, and (c) fully understands the facilities, difficulties and restrictions attending performance of the services under this Agreement. If the services involve work upon any site, CONTRACTOR warrants that CONTRACTOR has or will investigate the site and is or will be fully acquainted with the conditions there existing, prior to commencement of services set forth in this Agreement.
Should CONTRACTOR discover any latent or unknown conditions that will materially affect the performance of the services set forth in this Agreement, CONTRACTOR must immediately inform the CITY of that fact and may not proceed except at CONTRACTOR's risk until written instructions are received from the CITY.

13. CARE OF WORK

CONTRACTOR must adopt reasonable methods during the life of the Agreement to furnish continuous protection to the work, and the equipment, materials, papers, documents, plans, studies and other components to prevent losses or damages, and will be responsible for all damages, to persons or property, until acceptance of the work by the CITY, except those losses or damages as may be caused by the CITY's own negligence.

14. CONTRACTOR'S ACCOUNTING RECORDS; OTHER PROJECT RECORDS

Records of the CONTRACTOR's time pertaining to the project, and records of accounts between the CITY and the CONTRACTOR, will be kept on a generally recognized accounting basis. CONTRACTOR will also maintain all other records, including without limitation specifications, drawings, progress reports and the like, relating to the project. All records will be available to the CITY during normal working hours. CONTRACTOR will maintain these records for three years after final payment.

15. PREVAILING WAGE

All Services rendered pursuant to this agreement must be provided in accordance with all ordinances, resolutions, statutes, rules, regulations, and laws of City and any Federal, State, or local governmental agency of competent jurisdiction. Contractor is aware of the requirements of California Labor Code Sections 1720, et seq., and 1770, et seq., as well as of California Code of Regulations, Title 8, Sections 1600, et seq., (collectively, the "Prevailing Wage Laws"), which require the payment of prevailing wage rates and the performance of other requirements on "Public works" and "Maintenance" projects. If the Services are being performed as part of an applicable "Public works" or "Maintenance" project, as defined by the Prevailing Wage Laws, and if the total compensation is ONE THOUSAND DOLLARS ($1,000) or more, Contractor agrees to fully comply with the Prevailing Wage Laws including, but not limited to, requirements related to the maintenance of payroll records and the employment of apprentices.

Pursuant to California Labor Code Section 1725.5, no contractor or subcontractor may be awarded a contract for public work on a "Public works" project unless registered with the California Department of Industrial Relations ("DIR") at the time the contract is awarded. If the Services are being performed as part of an applicable "Public works" or "Maintenance" project, as defined by the Prevailing Wage Laws, this project is subject to compliance monitoring and enforcement by the California Department of Industrial Relations ("DIR"). Contractor will

maintain and will require all subcontractors to maintain valid and current DIR Public Works Contractor registration during the term of this Agreement. Contractor must notify City in writing immediately, and in no case more than twenty-four (24) hours, after receiving any information that Contractor's or any of its subcontractor's DIR registration status has been suspended, revoked, expired, or otherwise changed.

It is understood that it is the responsibility of Contractor to determine the correct salary scale. Contractor will make copies of the prevailing rates of per diem wages for each craft, classification, or type of worker needed to execute the Services available to interested parties upon request, and post copies at Contractor's principal place of business and at the project site, if any. The statutory penalties for failure to pay prevailing wage or to comply with State wage and hour laws will be enforced. Contractor must forfeit to City TWENTY FIVE DOLLARS ($25.00) per day for each worker who works in excess of the minimum working hours when Contractor does not pay overtime. In accordance with the provisions of Labor Code Sections 1810 et seq., eight (8) hours is the legal working day.

Contractor must also comply with State law requirements to maintain payroll records and must provide for certified records and inspection of records as required by California Labor Code Section 1770 et seq., including Section 1776. Contractor will defend (with counsel selected by City), indemnify, and hold City, its elected officials, officers, employees, and agents free and harmless from any claim or liability arising out of any failure or alleged failure to comply with the Prevailing Wage Laws. It is agreed by the parties that, in connection with performance of the Services, including, without limitation, any and all "Public works" (as defined by the Prevailing Wage Laws), Contractor will bear all risks of payment or non-payment of prevailing wages under California law and/or the implementation of Labor Code Section 1781, as the same may be amended from time to time, and/or any other similar law. Contractor acknowledges and agrees that it will be independently responsible for reviewing the applicable laws and regulations and effectuating compliance with those laws. Contractor will require the same of all subcontractors.

16. INDEMNIFICATION

CONTRACTOR will indemnify, defend, and hold harmless CITY, the Successor Agency to the Former Redevelopment Agency of the City of Torrance, the City Council, each member thereof, present and future, its officers, agents and employees from and against any and all liability, expenses, including defense costs and legal fees, and claims for damages whatsoever, including, but not limited to, those arising from breach of contract, bodily injury, death, personal injury, property damage, loss of use, or property loss however the same may be caused and regardless of the responsibility for negligence. The obligation to indemnify, defend and hold harmless includes, but is not limited to, any liability or expense,

including defense costs and legal fees, arising from the negligent acts or omissions, or willful misconduct of CONTRACTOR, its officers, employees, agents, subcontractors or vendors. It is further agreed, CONTRACTOR's obligations to indemnify, defend and hold harmless will apply even in the event of concurrent negligence on the part of CITY, the City Council, each member thereof, present and future, or its officers, agents and employees, except for liability resulting solely from the negligence or willful misconduct of CITY, its officers, employees or agents. Payment by CITY is not a condition precedent to enforcement of this indemnity. In the event of any dispute between CONTRACTOR and CITY, as to whether liability arises from the sole negligence of the CITY or its officers, employees, agents, subcontractors or vendors, CONTRACTOR will be obligated to pay for CITY's defense until such time as a final judgment has been entered adjudicating the CITY as solely negligent. CONTRACTOR will not be entitled in the event of such a determination to any reimbursement of defense costs including but not limited to attorney's fees, expert fees and costs of litigation.

17. NON-LIABILITY OF THE CITY'S OFFICERS AND EMPLOYEES

No officer or employee of the CITY will be personally liable to CONTRACTOR, in the event of any default or breach by the CITY or for any amount that may become due to CONTRACTOR.

18. INSURANCE

A. CONTRACTOR must maintain at its sole expense the following insurance, which will be full coverage not subject to self-insurance provisions:

1. Automobile Liability, including owned, non-owned and hired vehicles, with at least the following limits of liability:

   a. Combined single limits of $2,000,000 per occurrence.

2. General Liability including coverage for premises, products and completed operations, independent contractors, personal injury and contractual obligations with combined single limits of coverage of at least $3,000,000 per occurrence, with an annual aggregate of no less than $5,000,000.

3. Workers' Compensation with limits as required by the State of California and Employers Liability with limits of at least $1,000,000.

B. The insurance provided by CONTRACTOR will be primary and non-contributory.

C. CITY, the Successor Agency to the Former Redevelopment Agency of the City of Torrance, the City Council and each member thereof, members of boards and commissions, every officer, agent, official, employee and volunteer must be named as additional insureds under the automobile and general liability policies.

D. CONTRACTOR must provide certificates of insurance and/or endorsements to the City Clerk of the City of Torrance before the commencement of work.

E. Each insurance policy required by this Paragraph must contain a provision that no termination, cancellation or change of coverage can be made without thirty days notice to the CITY.

F. CONTRACTOR must include all subcontractors as insureds under its policies or must furnish separate certificates and endorsements for each subcontractor. All coverage for subcontractors will be subject to all of the requirements of this Paragraph 18.

19. SUFFICIENCY OF INSURERS

Insurance required by this Agreement will be satisfactory only if issued by companies admitted to do business in California, rated "B+" or better in the most recent edition of Best's Key Rating Guide, and only if they are of a financial category Class VII or better, unless these requirements are waived by the Risk Manager of the CITY ("Risk Manager") due to unique circumstances. In the event the Risk Manager determines that the work or services to be performed under this Agreement creates an increased or decreased risk of loss to the CITY, the CONTRACTOR agrees that the minimum limits of any insurance policies and/or the performance bond required by this Agreement may be changed accordingly upon receipt of written notice from the Risk Manager; provided that CONTRACTOR will have the right to appeal a determination of increased coverage by the Risk Manager to the City Council of the CITY within 10 days of receipt of notice from the Risk Manager.

20. CONFLICT OF INTEREST

A. No officer or employee of the CITY may have any financial interest, direct or indirect, in this Agreement, nor may any officer or employee participate in any decision relating to the Agreement that effects the officer or employee's financial interest or the financial interest of any corporation, partnership or association in which the officer or employee is, directly or indirectly interested, in violation of any law, rule or regulation.

B. No person may offer, give, or agree to give any officer or employee or former officer or employee, nor may any officer or employee solicit, demand, accept, or agree to accept from another person, a gratuity or an offer of employment in connection with any decision, approval, disapproval, recommendation, preparation or any part of a program requirement or a purchase request, influencing the content of any specification or procurement standard, rendering of advice, investigation, auditing, or in any other advisory capacity in any way pertaining to any program requirement, contract or subcontract, or to any solicitation or proposal.

21. NOTICE

A. All notices, requests, demands, or other communications under this Agreement will be in writing. Notice will be sufficiently given for all purposes as follows:

1. Personal delivery. When personally delivered to the recipient: notice is effective on delivery.

2. First Class mail. When mailed first class to the last address of the recipient known to the party giving notice: notice is effective three mail delivery days after deposit in an United States Postal Service office or mailbox.

3. Certified mail. When mailed certified mail, return receipt requested: notice is effective on receipt, if delivery is confirmed by a return receipt.

4. Overnight delivery. When delivered by an overnight delivery service, charges prepaid or charged to the sender's account: notice is effective on delivery, if delivery is confirmed by the delivery service.

5. Facsimile transmission. When sent by fax to the last fax number of the recipient known to the party giving notice: notice is effective on receipt. Any notice given by fax will be deemed received on the next business day if it is received after 5:00 p.m. (recipient's time) or on a non-business day.

6. Addresses for purpose of giving notice are as follows:

CONTRACTOR: CONTRACTOR'S NAME AND ADDRESS

Fax: INSERT FAX NUMBER

CITY:	City Clerk City of Torrance 3031 Torrance Boulevard Torrance, CA 90509-2970 Fax: (310) 618-2931
with a copy to:	Attn: PROJECT MANAGER'S NAME Public Works Department City of Torrance 20500 Madrona Avenue Torrance, CA 90503 Fax: (310) 781-6902

B. Any correctly addressed notice that is refused, unclaimed, or undeliverable because of an act or omission of the party to be notified, will be deemed effective as of the first date the notice was refused, unclaimed or deemed undeliverable by the postal authorities, messenger or overnight delivery service.

C. Either party may change its address or fax number by giving the other party notice of the change in any manner permitted by this Agreement.

22. PROHIBITION AGAINST ASSIGNMENT AND SUBCONTRACTING

This Agreement and all exhibits are binding on the heirs, successors, and assigns of the parties. The Agreement may not be assigned or subcontracted by either the CITY or CONTRACTOR without the prior written consent of the other.

23. INTEGRATION; AMENDMENT

This Agreement represents the entire understanding of the CITY and CONTRACTOR as to those matters contained in it. No prior oral or written understanding will be of any force or effect with respect to the terms of this Agreement. The Agreement may not be modified or altered except in writing signed by both parties.

24. INTERPRETATION

The terms of this Agreement should be construed in accordance with the meaning of the language used and should not be construed for or against either party by reason of the authorship of this Agreement or any other rule of construction that might otherwise apply.

25. SEVERABILITY

If any part of this Agreement is found to be in conflict with applicable laws, that part will be inoperative, null and void insofar as it is in conflict with any applicable laws, but the remainder of the Agreement will remain in full force and effect.

26. TIME OF ESSENCE

Time is of the essence in the performance of this Agreement.

27. GOVERNING LAW; JURISDICTION

This Agreement will be administered and interpreted under the laws of the State of California. Jurisdiction of any litigation arising from the Agreement will be in Los Angeles County, California.

28. COMPLIANCE WITH STATUTES AND REGULATIONS

CONTRACTOR will be knowledgeable of and will comply with all applicable federal, state, county and city statutes, rules, regulations, ordinances and orders.

29. WAIVER OF BREACH

No delay or omission in the exercise of any right or remedy by a nondefaulting party on any default will impair the right or remedy or be construed as a waiver. A party's consent or approval of any act by the other party requiring the party's consent or approval will not be deemed to waive or render unnecessary the other party's consent to or approval of any subsequent act. Any waiver by either party of any default must be in writing and will not be a waiver of any other default concerning the same or any other provision of this Agreement.

30. ATTORNEY'S FEES

Except as provided for in Paragraph 16, in any dispute, litigation, arbitration, or other proceeding by which one party either seeks to enforce its rights under this Agreement (whether in contract, tort or both) or seeks a declaration of any rights or obligations under this Agreement, the prevailing party will be awarded reasonable attorney's fees, together with any costs and expenses, to resolve the dispute and to enforce any judgment.

31. EXHIBITS

All exhibits identified in this Agreement are incorporated into the Agreement by this reference.

32. CONTRACTOR'S AUTHORITY TO EXECUTE

The persons executing this Agreement on behalf of the CONTRACTOR warrant that (i) the CONTRACTOR is duly organized and existing; (ii) they are duly authorized to execute this Agreement on behalf of the CONTRACTOR; (iii) by so executing this Agreement, the CONTRACTOR is formally bound to the provisions of this Agreement; and (iv) the entering into this Agreement does not violate any provision of any other Agreement to which the CONTRACTOR is bound.

City of Torrance,
a municipal corporation

BUSINESS OR INDIVIDUAL NAME
TYPE OF ENTITY

_____
Patrick J. Furey, Mayor

By: _____
SIGNER, TITLE

ATTEST:

_____
Rebecca Poirier, MMC
City Clerk

APPROVED AS TO FORM:

JOHN L. FELLOWS III
City Attorney

By: _____

Attachment: Exhibit A: Bid
Revised: 12/9/15

EXHIBIT A

Bid

PART F

PREVAILING WAGE RATES

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1
FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

LOCALITY: LOS ANGELES COUNTY
DETERMINATION: LOS-2016-1

		CRAFT (JOURNEY LEVEL)	ISSUE DATE	EXPIRATION DATE	EMPLOYER PAYMENTS: BASIC HOURLY RATE	HEALTH AND WELFARE	PENSION	VACATION/ HOLIDAY	TRAINING	OTHER PAYMENTS	STRAIGHT-TIME: HOURS	TOTAL HOURLY RATE	OVERTIME HOURLY RATE: DAILY	SATURDAY	SUNDAY AND HOLIDAY
#		**BRICKLAYER, STONEMASON,** MARBLE MASON, CEMENT BLOCKLAYER, POINTER, CAULKER, CLEANER	08/22/2015	04/30/2016*	A 37.930	7.500	6.900	-	B 0.780	0.350	C 8.0	53.460	D 72.430	D 72.430	91.390
#		**BRICKLAYER:**													
		MASON FINISHER	08/22/2015	04/30/2016*	A 26.550	7.500	6.900	-	E 0.670	0.350	C 8.0	41.970	D 55.240	D 55.240	68.520
#	F	**BRICK TENDER**	08/22/2015	06/30/2016*	29.570	6.860	6.500	G 3.900	0.650	0.470	C 8.0	47.950	62.740	62.740	77.520
#		**BRICK TENDER:**													
		FORKLIFT OPERATOR	08/22/2015	06/30/2016*	30.020	6.860	6.500	G 3.900	0.650	0.470	C 8.0	48.400	63.410	63.410	78.420
#		**CARPET, LINOLEUM,**													
		RESILIENT TILE LAYER	02/22/2016	04/30/2016*	H 29.850	5.080	6.300	2.050	0.630	0.200	8.0	44.110	59.040	I 59.040	73.960
	J	MATERIAL HANDLER	02/22/2016	04/30/2016*	H 10.000	5.080	2.280	0.550	0.630	0.100	8.0	18.640	23.640	I 23.640	28.640
#		**DRYWALL FINISHER**													
	K	DRYWALL FINISHER	02/22/2016	09/30/2016*	L 32.050	7.950	5.130	3.070	0.670	0.470	8.0	49.340	65.360	M 65.360	81.390
		DRYWALL FINISHER	02/22/2016	09/30/2016*	H 36.180	7.950	5.130	3.070	0.670	0.470	8.0	53.470	71.560	M 71.560	89.650
#		**ELECTRICIAN:**													
		COMM & SYSTEM INSTALLER	02/22/2016	12/25/2016**	30.730	8.310	N 4.120	-	0.650	O 0.250	8.0	44.980	P 60.810	P 60.810	76.630
		INSIDE WIREMAN, RADIO MONITOR TECHNICIAN	02/22/2016	07/31/2016**	40.800	11.540	Q 14.170	R -	0.660	0.450	8.0	68.840	P 89.860	P 89.860	110.870
		CABLE SPLICER-WELDER	02/22/2016	07/31/2016**	42.840	11.540	Q 14.170	R -	0.660	0.450	8.0	70.950	P 93.010	P 93.010	115.070
		TUNNEL WIREMAN	02/22/2016	07/31/2016**	44.880	11.540	Q 14.170	R -	0.660	0.450	8.0	73.050	P 96.160	P 96.160	119.270
		TUNNEL CABLE SPLICER	02/22/2016	07/31/2016**	47.120	11.540	Q 14.170	R -	0.660	0.450	8.0	75.350	P 99.620	P 99.620	123.890
		TRANSPORTATION SYSTEMS ELECTRICIAN	02/22/2016	07/31/2016**	40.800	11.540	Q 14.170	R -	0.660	0.450	8.0	68.840	P 89.860	P 89.860	110.870
		TRANSPORTATION SYSTEMS ELECTRICIAN (CABLE SPLICING, WELDING, AND NETA TESTING)	02/22/2016	07/31/2016**	42.840	11.540	Q 14.170	R -	0.660	0.450	8.0	70.950	P 93.010	P 93.010	115.070
	S	TRANSPORTATION SYSTEMS TECHNICIAN	02/22/2016	07/31/2016**	30.600	11.540	Q 14.170	R -	0.660	0.450	8.0	58.340	P 74.100	P 74.100	89.860
#		**FIELD SURVEYOR:**													
	T	CHIEF OF PARTY (018.167-010)	02/22/2016	09/30/2016*	44.810	11.200	9.650	G 4.150	0.900	0.150	8.0	70.860	P 93.260	P 93.260	115.670
	T	INSTRUMENTMAN (018.167-034)	02/22/2016	09/30/2016*	42.310	11.200	9.650	G 4.150	0.900	0.150	8.0	68.360	P 89.510	P 89.510	110.670
	T	CHAINMAN/RODMAN (869.567-010)	02/22/2016	09/30/2016*	41.730	11.200	9.650	G 4.150	0.900	0.150	8.0	67.780	P 88.650	P 88.650	109.510
#		**GLAZIER**	02/22/2016	05/31/2016**	U 40.700	V 7.000	13.030	W -	0.770	0.530	8.0	62.030	X 81.380	X 81.380	100.730
#		**MARBLE FINISHER**	08/22/2015	05/31/2016**	Y 28.450	9.160	2.710	-	0.810	0.330	Z 8.0	41.460	AA 55.690	AB 55.690	AC 69.910
#		**PAINTER**													
	AD	INDUSTRIAL PAINTER	08/22/2015	06/30/2016*	L 32.020	8.050	3.040	1.050	0.790	0.820	8.0	45.770	AE 61.780	AE 61.780	AE 61.780
#		**PAINTER:**													
	AD	PAINTER, LEAD ABATEMENT	08/22/2015	06/30/2016*	L 30.720	8.050	3.040	1.050	0.690	0.820	8.0	44.370	AE 59.730	AE 59.730	AE 59.730
	AD	REPAINT PAINTER, LEAD ABATEMENT	08/22/2015	06/30/2016*	L 27.290	8.050	3.040	1.050	0.690	0.820	8.0	40.940	AF 54.580	AF 54.580	AF 54.580
	AG	PAINTER, LEAD ABATEMENT	08/22/2015	06/30/2016*	L 26.410	8.050	3.040	1.050	0.690	0.820	8.0	40.060	AE 53.260	AE 53.260	AE 53.260
	AG	REPAINT PAINTER, LEAD ABATEMENT	08/22/2015	06/30/2016*	L 24.190	8.050	3.040	1.050	0.690	0.820	8.0	37.840	AF 49.930	AF 49.930	AF 49.930
	AD	INDUSTRIAL REPAINT PAINTER	08/22/2015	06/30/2016*	L 28.450	8.050	3.040	1.050	0.790	0.820	8.0	42.200	AF 56.430	AF 56.430	AF 56.430
#		**PLASTERER**	08/22/2015	08/02/2016**	32.910	8.930	4.210	AH 5.530	0.630	0.990	AI 8.0	53.200	AE 69.650	AJ 69.650	86.110
#	AK	**PLASTER TENDER**	08/22/2015	08/02/2016**	32.710	7.000	5.900	AH 5.050	1.020	1.020	8.0	52.700	AL 69.060	AM 69.060	85.410

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1
FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

LOCALITY: LOS ANGELES COUNTY
DETERMINATION: LOS-2016-1

	CRAFT (JOURNEY LEVEL)	ISSUE DATE	EXPIRATION DATE	EMPLOYER PAYMENTS: BASIC HOURLY RATE	HEALTH AND WELFARE	PENSION	VACATION/ HOLIDAY	TRAINING	OTHER PAYMENTS	STRAIGHT-TIME: HOURS	TOTAL HOURLY RATE	OVERTIME HOURLY RATE: DAILY	SATURDAY	SUNDAY AND HOLIDAY
	PLASTER CLEAN-UP LABORER	08/22/2015	08/02/2016**	30.160	7.000	5.900	AH 5.050	1.020	1.020	8.0	50.150	AL 65.230	AM 65.230	80.310
#	**PLUMBER:**													
	PLUMBER, INDUSTRIAL AND GENERAL PIPEFITTER	08/22/2015	06/30/2016**	Y 42.930	7.110	AN 11.050	AO 3.030	2.550	AP 1.000	8.0	67.670	AQ 89.850	AQ 89.850	110.520
	SEWER AND STORM DRAIN PIPELAYER	08/22/2015	06/30/2016**	Y 33.110	7.110	AN 8.200	AO 1.000	2.170	AP 1.000	8.0	52.590	68.850	AR 68.850	84.600
AS	SEWER AND STORM DRAIN PIPE TRADESMAN	08/22/2015	06/30/2016**	Y 17.060	7.110	0.380	-	1.600	AP 0.850	8.0	27.000	34.730	AR 34.730	42.460
	LANDSCAPE/IRRIGATION FITTER	08/22/2015	06/30/2016**	Y 27.620	7.110	AN 11.050	AO 2.490	1.940	AP 0.800	AR 8.0	51.010	66.070	66.070	79.880
AT	LANDSCAPE/IRRIGATION TRADESMAN	08/22/2015	06/30/2016*	Y 13.390	2.000	AN 0.880	-	0.100	AP 0.750	AR 8.0	17.120	23.820	23.820	30.510
	REFRIGERATION SERVICE AND REPAIR (HVACR)	02/22/2016	09/04/2016*	H 42.500	10.520	AU 8.840	R -	1.300	AV 0.600	8.0	63.760	85.010	AW 85.010	AC 105.110
	REFRIGERATION SERVICE AND REPAIR TRADESMAN (HVACR)	02/22/2016	09/04/2016*	H 12.900	10.520	1.400	R -	0.500	AV 0.480	8.0	25.800	32.250	AW 32.250	AC 38.250
AX	FIRE SPRINKLER FITTER (PROTECTION AND CONTROL SYSTEMS, OVERHEAD AND UNDERGROUND)	02/22/2016	03/31/2016*	35.570	8.770	AY 11.050	-	0.450	0.250	8.0	56.090	73.880	73.880	91.660
AZ	FIRE SPRINKLER FITTER (PROTECTION AND CONTROL SYSTEMS, OVERHEAD AND UNDERGROUND)	02/22/2016	08/31/2017*	40.060	8.920	14.300	R -	1.350	BA 0.550	8.0	65.180	85.210	BB 85.210	105.240
#	**ROOFER**	02/22/2016	07/31/2016**	BC 35.320	7.560	BD 6.390	BE -	0.400	BF 0.570	8.0	50.240	AQ 66.070	AQ 66.070	81.910
	PITCH WORK	02/22/2016	07/31/2016**	BC 37.070	7.560	BD 6.390	BE -	0.400	BF 0.570	8.0	51.990	AQ 68.700	AQ 68.700	85.410
	PREPARER	02/22/2016	07/31/2016**	BC 36.320	7.560	BD 6.390	BE -	0.400	BF 0.570	8.0	51.240	AQ 67.570	AQ 67.570	83.910
# BG	**SHEET METAL WORKER**	08/22/2015	06/30/2016**	L 41.260	9.870	BH 14.710	-	0.820	0.650	8.0	67.310	BI 87.940	BI 87.940	108.570
# BJ	SHEET METAL WORKER	08/22/2015	06/30/2016**	H 31.530	9.870	BK 13.720	-	1.670	0.350	C 8.0	57.140	BL 72.900	BL 72.900	AC 88.670
BJ	LIGHT COMMERCIAL SHEET METAL WORKER UP TO AND INCLUDING 10,000 SQUARE FEET.	08/22/2015	06/30/2016**	H 25.220	9.870	BK 13.720	-	1.670	0.350	C 8.0	50.830	63.440	63.440	63.440
#	**TERRAZZO FINISHER**	08/22/2014	08/31/2015*	H 27.530	7.510	3.270	R -	0.490	0.120	AR 8.0	38.920	AA 52.690	AB 52.690	AC 66.450
#	**TERRAZZO WORKER**	08/22/2014	08/31/2015*	H 34.570	8.300	3.270	R -	0.570	0.120	AR 8.0	46.830	AA 64.110	AB 64.110	AC 81.400
#	**TILE FINISHER**	08/22/2015	05/31/2016**	Y 23.780	8.430	1.800	-	0.750	0.280	Z 8.0	35.040	AA 46.930	AB 46.930	AC 58.820
#	**TILE LAYER**	08/22/2015	05/31/2016**	Y 35.140	9.250	5.680	-	0.910	0.370	Z 8.0	51.350	AA 68.920	AB 68.920	AC 86.490

FOOTNOTES

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS
PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1
FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

LOCALITY: LOS ANGELES COUNTY
DETERMINATION: LOS-2016-1

	CRAFT (JOURNEY LEVEL)	ISSUE DATE	EXPIRATION DATE	EMPLOYER PAYMENTS: BASIC HOURLY RATE	HEALTH AND WELFARE	PENSION	VACATION/ HOLIDAY	TRAINING	OTHER PAYMENTS	STRAIGHT-TIME: HOURS	TOTAL HOURLY RATE	OVERTIME HOURLY RATE: DAILY	SATURDAY	SUNDAY AND HOLIDAY
#	**CARPET, LINOLEUM,**													
	RESILIENT TILE LAYER - SECOND SHIFT	02/22/2016	04/30/2016*	A 35.820	5.080	6.300	2.050	0.630	0.200	8.0	50.080	67.990	67.990	85.900
B	MATERIAL HANDLER - SECOND SHIFT	02/22/2016	04/30/2016*	A 10.740	5.080	2.280	0.550	0.630	0.100	8.0	19.380	24.750	24.750	30.120
#	**ELECTRICIAN:**													
	COMM & SYSTEM INSTALLER, SECOND SHIFT	02/22/2016	12/25/2016**	36.050	8.310	C 4.120	-	0.650	D 0.250	8.0	50.460	E 69.030	F 69.030	G 87.590
	COMM & SYSTEM INSTALLER, THIRD SHIFT	02/22/2016	12/25/2016**	40.380	8.310	C 4.120	-	0.650	D 0.250	8.0	54.920	E 75.720	F 75.720	G 96.510
	INSIDE WIREMAN, 2ND SHIFT	02/22/2016	07/31/2016**	47.860	11.540	H 14.170	I -	0.660	0.450	8.0	76.120	100.760	100.760	G 125.410
	INSIDE WIREMAN, 3RD SHIFT	02/22/2016	07/31/2016**	53.610	11.540	H 14.170	I -	0.660	0.450	8.0	82.040	109.650	109.650	G 137.260
	CABLE SPLICER-WELDER, 2ND SHIFT	02/22/2016	07/31/2016**	50.250	11.540	H 14.170	I -	0.660	0.450	8.0	78.580	104.460	104.460	G 130.330
	CABLE SPLICER-WELDER, 3RD SHIFT	02/22/2016	07/31/2016**	56.290	11.540	H 14.170	I -	0.660	0.450	8.0	84.800	113.790	113.790	G 142.780
	TUNNEL WIREMAN SECOND SHIFT	02/22/2016	07/31/2016**	52.640	11.540	H 14.170	I -	0.660	0.450	8.0	81.040	108.150	108.150	G 135.260
	TUNNEL WIREMAN THIRD SHIFT	02/22/2016	07/31/2016**	58.970	11.540	H 14.170	I -	0.660	0.450	8.0	87.560	117.930	117.930	G 148.300
	TUNNEL CABLE SPLICER SECOND SHIFT	02/22/2016	07/31/2016**	55.280	11.540	H 14.170	I -	0.660	0.450	8.0	83.760	112.230	112.230	G 140.700
	TUNNEL CABLE SPLICER THIRD SHIFT	02/22/2016	07/31/2016**	61.920	11.540	H 14.170	I -	0.660	0.450	8.0	90.600	122.490	122.490	G 154.380
	TRANSPORTATION SYSTEMS ELECTRICIAN (SECOND SHIFT)	02/22/2016	07/31/2016**	47.860	11.540	H 14.170	I -	0.660	0.450	8.0	76.120	E 100.760	J 100.760	G 125.410
	TRANSPORTATION SYSTEMS ELECTRICIAN (THIRD SHIFT)	02/22/2016	07/31/2016**	53.610	11.540	H 14.170	I -	0.660	0.450	8.0	82.040	E 109.650	J 109.650	G 137.260
	TRANSPORTATION SYSTEMS ELECTRICIAN (CABLE SPLICING, WELDING, AND NETA TESTING) 2ND SHIFT	02/22/2016	07/31/2016**	50.250	11.540	H 14.170	I -	0.660	0.450	8.0	78.580	E 104.460	J 104.460	G 130.330
	TRANSPORTATION SYSTEMS ELECTRICIAN (CABLE SPLICING, WELDING, AND NETA TESTING) 3RD SHIFT	02/22/2016	07/31/2016**	56.290	11.540	H 14.170	I -	0.660	0.450	8.0	84.800	E 113.790	J 113.790	G 142.780
K	TRANSPORTATION SYSTEMS TECHNICIAN (SECOND SHIFT)	02/22/2016	07/31/2016**	35.890	11.540	H 14.170	I -	0.660	0.450	8.0	63.790	E 82.270	J 82.270	G 100.750
K	TRANSPORTATION SYSTEMS TECHNICIAN (THIRD SHIFT)	02/22/2016	07/31/2016**	40.210	11.540	H 14.170	I -	0.660	0.450	8.0	68.240	E 88.940	J 88.940	G 109.650
#	**PLUMBER:**													
	PLUMBER, INDUSTRIAL AND GENERAL PIPEFITTER (2ND SHIFT)	08/22/2015	06/30/2016**	L 49.370	7.110	M 11.050	N 3.030	2.550	O 1.000	8.0	74.110	P 99.510	P 99.510	123.400
	SEWER AND STORM DRAIN PIPELAYER (2ND SHIFT)	08/22/2015	06/30/2016**	L 38.080	7.110	M 8.200	N 1.000	2.170	O 1.000	8.0	57.560	76.300	Q 76.300	94.540
R	SEWER AND STORM DRAIN PIPE TRADESMAN (2ND SHIFT)	08/22/2015	06/30/2016**	L 19.620	7.110	0.380	-	1.600	O 0.850	8.0	29.560	38.570	Q 38.570	47.580
	LANDSCAPE/IRRIGATION FITTER SECOND SHIFT	08/22/2015	06/30/2016**	L 31.760	7.110	M 11.050	N 2.490	1.940	O 0.800	Q 8.0	55.150	72.280	72.280	88.160
S	LANDSCAPE/IRRIGATION TRADESMAN SECOND SHIFT	08/22/2015	06/30/2016*	L 15.400	2.000	M 0.880	-	0.100	O 0.750	Q 8.0	19.130	26.830	26.830	34.530
	REFRIGERATION SERVICE AND REPAIR (HVACR)- 2ND SHIFT	02/22/2016	09/04/2016*	A 48.530	10.520	T 8.840	I -	1.300	U 0.600	8.0	69.790	94.060	V 94.060	W 117.170
X	FIRE SPRINKLER FITTER (PROTECTION AND CONTROL SYSTEMS, OVERHEAD AND UNDERGROUND)- 2ND SHIFT	02/22/2016	08/31/2017*	46.070	8.920	14.300	I -	1.350	Y 0.550	8.0	71.190	94.220	Z 94.220	117.260

FOOTNOTES

GENERAL PREVAILING WAGE DETERMINATION MADE BY THE DIRECTOR OF INDUSTRIAL RELATIONS PURSUANT TO CALIFORNIA LABOR CODE PART 7, CHAPTER 1, ARTICLE 2, SECTIONS 1770, 1773 AND 1773.1

FOR COMMERCIAL BUILDING, HIGHWAY, HEAVY CONSTRUCTION AND DREDGING PROJECTS

CRAFT: #LABORER AND RELATED CLASSIFICATIONS

DETERMINATION: SC-23-102-2-2015-2
ISSUE DATE: August 22, 2015
EXPIRATION DATE OF DETERMINATION: July 3, 2016** The rate to be paid for work performed after this date has been determined. If work will extend past this date, the new rate must be paid and should be incorporated in contracts entered into now. Contact the Office of the Director – Research Unit for specific rates at (415) 703-4774.

LOCALITY: All localities within Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, and Ventura counties.

		Employer Payments					Straight-Time		Overtime Hourly Rates		
Classification [a] (Journeyperson)	Basic Hourly Rate	Health and Welfare	Pension	Vacation/ and Holiday[d]	Training	Other Payment	Hours	Total Hourly Rate	Daily[b] 1 1/2X	Saturday[bc] 1 1/2X	Sunday and Holiday
CLASSIFICATION GROUPS											
Group 1	$31.39	6.86	6.50	4.47	0.64	0.62	8	50.48	66.175	66.175	81.87
Group 2	31.94	6.86	6.50	4.47	0.64	0.62	8	51.03	67.00	67.00	82.97
Group 3	32.49	6.86	6.50	4.47	0.64	0.62	8	51.58	67.825	67.825	84.07
Group 4	34.04	6.86	6.50	4.47	0.64	0.62	8	53.13	70.15	70.15	87.17
Group 5	34.39	6.86	6.50	4.47	0.64	0.62	8	53.48	70.675	70.675	87.87

# Indicates an apprenticeable craft. The current apprentice wage rates are available on the Internet @ http://www.dir.ca.gov/OPRL/PWAppWage/PWAppWageStart.asp. To obtain any apprentice wage rates as of July 1, 2008 and prior to September 27, 2012, please contact the Division of Apprenticeship Standards or refer to the Division of Apprenticeship Standards' website at http://www.dir.ca.gov/das/das.html.

[a] For classification within each group, see page 14.

[b] Any hours worked over 12 hours in a single workday are double (2) time.

[c] Saturdays in the same work week may be worked at straight-time if job is shut down during work week due to inclement weather or similar Act of God, or a situation beyond the employers control.

[d] Includes an amount per hour worked for supplemental dues

RECOGNIZED HOLIDAYS: Holidays upon which the general prevailing hourly wage rate for Holiday work shall be paid, shall be all holidays in the collective bargaining agreement, applicable to the particular craft, classification, or type of worker employed on the project, which is on file with the Director of Industrial Relations. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code. You may obtain the holiday provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/PWD. Holiday provisions for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

TRAVEL AND/OR SUBSISTENCE PAYMENT: In accordance with Labor Code Sections 1773.1 and 1773.9, contractors shall make travel and/or subsistence payments to each worker to execute the work. You may obtain the travel and/or subsistence provisions for the current determinations on the Internet at http://www.dir.ca.gov/OPRL/PWD. Travel and/or subsistence requirements for current or superseded determinations may be obtained by contacting the Office of the Director – Research Unit at (415) 703-4774.

DETERMINATION: SC-23-102-2-2015-2

CLASSIFICATION GROUPS

GROUP 1

Boring Machine Helper (Outside)
Certified Confined Space Laborer
Cleaning and Handling of Panel Forms
Concrete Screeding for Rough Strike-Off
Concrete, Water Curing
Demolition Laborer, the cleaning of brick if performed by an employee performing any other phase of demolition work, and the cleaning of lumber
Fiberoptic Installation, Blowing, Splicing, and Testing Technician on public right-of- way only
Fire Watcher, Limbers, Brush Loaders, Pilers and Debris Handlers
Flagman
Gas, Oil and/or Water Pipeline Laborer
Laborer, Asphalt-Rubber Material Loader
Laborer, General or Construction
Laborer, General Cleanup
Laborer, Jetting
Laborer, Temporary Water and Air Lines
Plugging, Filling of Shee-Bolt Holes; Dry Packing of Concrete and Patching
Post Hole Digger (Manual)
Railroad Maintenance, Repair Trackman and Road Beds; Streetcar and Railroad Construction Track Laborers
Rigging and Signaling
Scaler
Slip Form Raisers
Tarman and Mortar Man
Tool Crib or Tool House Laborer
Traffic Control by any method
Water Well Driller Helper
Window Cleaner
Wire Mesh Pulling - All Concrete Pouring Operations

GROUP 2

Asphalt Shoveler
Cement Dumper (on 1 yard or larger mixer and handling bulk cement)
Cesspool Digger and Installer
Chucktender
Chute Man, pouring concrete, the handling of the chute from readymix trucks, such as walls, slabs, decks, floors, foundations, footings, curbs, gutters and sidewalks
Concrete Curer-Impervious Membrane and Form Oiler
Cutting Torch Operator (Demolition)
Fine Grader, Highways and Street Paving, Airport, Runways, and similar type heavy construction
Gas, Oil and/or Water Pipeline Wrapper-Pot Tender and Form Man
Guinea Chaser
Headerboard Man-Asphalt
Installation of all Asphalt Overlay Fabric and Materials used for Reinforcing Asphalt
Laborer, Packing Rod Steel and Pans
Membrane Vapor Barrier Installer
Power Broom Sweepers (small)
Riprap, Stonepaver, placing stone or wet sacked concrete
Roto Scraper and Tiller
Sandblaster (Pot Tender)
Septic Tank Digger and Installer (leadman)

GROUP 2 (continued)

Tank Scaler and Cleaner
Tree Climber, Faller, Chain Saw Operator, Pittsburgh Chipper and similar type Brush Shredders
Underground Laborer, including Caisson Bellower

GROUP 3

Asphalt Installation of all fabrics
Buggymobile Man
Compactor (all types including Tampers, Barko, Wacker)
Concrete Cutting Torch
Concrete Pile Cutter
Driller, Jackhammer, 2 1/2 ft. drill steel or longer
Dri Pak-it Machine
Gas, Oil and/or Water Pipeline Wrapper - 6-inch pipe and over by any method, inside and out
High Scaler (including drilling of same)
Impact Wrench, Multi-Plate
Kettlemen, Potmen and Men applying asphalt, lay-kold, creosote, lime caustic and similar type materials
Laborer, Fence Erector
Material Hoseman (Walls, Slabs, Floors and Decks)
Operators of Pneumatic, Gas, Electric Tools, Vibrating Machines, Pavement Breakers, Air Blasting, Come-Alongs, and similar mechanical tools not separately classified herein; operation of remote controlled robotic tools in connection with Laborers work
Pipelayer's backup man, coating, grouting, making of joints, sealing, caulking, diapering and including rubber gasket joints, pointing and any and all other services
Power Post Hole Digger
Rock Slinger
Rotary Scarifier or Multiple Head Concrete Chipping Scarifier
Steel Headerboard Man and Guideline Setter
Trenching Machine, Hand Propelled

GROUP 4

Any Worker Exposed to Raw Sewage
Asphalt Raker, Luteman, Ironer, Asphalt Dumpman, and Asphalt Spreader Boxes (all types)
Concrete Core Cutter (walls, floors or ceilings), Grinder or Sander
Concrete Saw Man, Cutting Walls or Flat Work, Scoring old or new concrete
Cribber, Shorer, Lagging, Sheeting and Trench Bracing, Hand-Guided Lagging Hammer
Head Rock Slinger
Laborer, Asphalt-Rubber Distributor Bootman
Laser Beam in connection with Laborer's work
Oversize Concrete Vibrator Operator, 70 pounds and over
Pipelayer
Prefabricated Manhole Installer
Sandblaster (Nozzleman), Water Blasting, Porta Shot-Blast
Traffic Lane Closure, certified

GROUP 5

Blasters Powderman
Driller
Toxic Waste Removal
Welding, certified or otherwise in connection with Laborers' work

STATE OF CALIFORNIA
DEPARTMENT OF INDUSTRIAL RELATIONS
Office of the Director – Research Unit
455 Golden Gate Avenue, 9th Floor
San Francisco, CA 94102

EDMUND G. BROWN, JR., *Governor*

ADDRESS REPLY TO:
P.O. Box 420603
San Francisco CA 94142-0603

PREDETERMINED INCREASES FOR

LABORER AND RELATED CLASSIFICATIONS (SC-23-102-2-2015-2)

ALL LOCALITIES WITHIN IMPERIAL, INYO, KERN, LOS ANGELES, MONO, ORANGE, RIVERSIDE, SAN BERNARDINO, SAN LUIS OBISPO, SANTA BARBARA, AND VENTURA COUNTIES

These predetermined increases for the above named craft applies only to the current determination for work being performed on public works projects with bid advertisement dates on or after **September 1, 2015**, until this determination is superseded by a new determination or a predetermined increase modification notice becomes effective.

When referencing our prevailing wage determinations, please note that if the prevailing wage rate determination which was in effect on the bid advertisement date of a project has a single asterisk (*) after the expiration date, the rate will be good for the life of the project. However, if a prevailing wage rate determination has double asterisks (**) after the expiration date, the rate must be updated on the following date to reflect the predetermined rate change(s).

LABORER
Determination SC-23-102-2-2015-2 is currently in effect and expires on July 3, 2016**.

Effective July 4, 2016, the increase of $1.60 is allocated as follows: $0.95 to the Basic Hourly Rate, $0.20 to Health and Welfare, $0.25 to Pension, $0.10 to Vacation, $0.05 to Training and $0.05 to Other Payment.

Effective July 3, 2017, there will be an increase of $1.65 allocated as follows: $0.25 to Pension and 1.45 to be allocated to wages and/or employer payments

There will be no further increases applicable to this determination.

Issued 8/22/2015, Effective 9/1/2015.

This page will be updated when wage rate breakdown information becomes available.
Last Updated: July 11, 2016

GENERAL PREVAILING WAGE APPRENTICE RATES

APPRENTICE INFORMATION

Determination: **2016--1** *Issue Date:* **02-22-2016** *Expire Date:* **07-31-2016** ** *Page:* **1**

Craft/Classification: **Electrician, Inside Wireman** *Shift:* **1**

County: Los Angeles

Period	Duration Months	OJT Hours	Hourly Basic Rate	Health & Welfare	Pension	Vacation /Holiday	Training	Other	Hourly Total Rate
1	6		$16.320	$10.540	$.490		$.710	$.450	$28.510
2	6		$18.360	$10.540	$.550		$.710	$.450	$30.610
3	6		$20.400	$11.540	$7.700		$.710	$.450	$40.800
4	6		$22.440	$11.540	$8.460		$.710	$.450	$43.600
5	6		$24.480	$11.540	$9.230		$.710	$.450	$46.410
6	6		$26.520	$11.540	$10.010		$.710	$.450	$49.230
7	6		$28.560	$11.540	$10.780		$.710	$.450	$52.040
8	6		$30.600	$11.540	$11.550		$.710	$.450	$54.850
9	6		$32.640	$11.540	$12.320		$.710	$.450	$57.660
10	6		$34.680	$11.540	$13.080		$.710	$.450	$60.460

Footnote(s):

Pension -- includes amounts for defined contribution and benefit plans for apprentices above Period 2. In addition, an amount equal to 3% of the basic hourly rate is added to the total hourly rate and overtime hourly rates for the National Employees Benefit Board. Pursuant to Labor Code Sections 1773.1 and 1773.8 the amount paid for this employer payment may vary resulting in a lower taxable basic hourly wage rate, but the total hourly rates for straight time and overtime may not be less than the general prevailing rate of per diem wages.

Vacation/Holiday included in the Basic Hourly Rate.

Journeyman Predetermined Increases:
8/1/16 $1.00 to be allocated to wages and/or fringes
1/30/17 $1.00 to be allocated to wages and/or fringes .
7/31/17 $0.05 to Training, $0.05 to Other, and $1.00 to be allocated to wages and/or fringes .
1/29/18 $1.00 to be allocated to wages and/or fringes .
7/30/18 $1.00 to be allocated to wages and/or fringes .
1/28/19 $1.00 to be allocated to wages and/or fringes .

There may be corresponding predetermined increase(s) to the apprentices associated with this journeyman craft/classification. Please fax a request to (415) 703-4771 or send to the following address:

Department of Industrial Relations, Office of the Director - Research Unit
P.O. Box 420603
San Francisco, CA 94142-0603

Apprentice Prevailing Wage Rates are paid only to apprentices registered with the State of California, Division of Apprenticeship Standards, for work the registered apprentice performs in his/her specific craft or trade. You may check whether an Apprentices is registered at http://www.dir.ca.gov/DAS/appcertpw/AppCertSearch.asp

GENERAL PREVAILING WAGE APPRENTICE RATES

APPRENTICE INFORMATION

Determination: **2016--1** *Issue Date:* **02-22-2016** *Expire Date:* **07-31-2016** ** *Page:* **2**

Craft/Classification: **Electrician, Inside Wireman** *Shift:* **2**

County: Los Angeles

Period	Duration Months	OJT Hours	Hourly Basic Rate	Health & Welfare	Pension	Vacation /Holiday	Training	Other	Hourly Total Rate
1	6		$19.140	$10.540	$.570		$.710	$.450	$31.410
2	6		$21.540	$10.540	$.650		$.710	$.450	$33.890
3	6		$23.930	$11.540	$7.800		$.710	$.450	$44.430
4	6		$26.320	$11.540	$8.580		$.710	$.450	$47.600
5	6		$28.720	$11.540	$9.360		$.710	$.450	$50.780
6	6		$31.110	$11.540	$10.140		$.710	$.450	$53.950
7	6		$33.500	$11.540	$10.920		$.710	$.450	$57.120
8	6		$35.890	$11.540	$11.700		$.710	$.450	$60.290
9	6		$38.290	$11.540	$12.480		$.710	$.450	$63.470
10	6		$40.680	$11.540	$13.260		$.710	$.450	$66.640

Footnote(s):

Pension -- includes amounts for defined contribution and benefit plans for apprentices above Period 2. In addition, an amount equal to 3% of the basic hourly rate is added to the total hourly rate and overtime hourly rates for the National Employees Benefit Board. Pursuant to Labor Code Sections 1773.1 and 1773.8 the amount paid for this employer payment may vary resulting in a lower taxable basic hourly wage rate, but the total hourly rates for straight time and overtime may not be less than the general prevailing rate of per diem wages.

Vacation/Holiday included in the Basic Hourly Rate.

Journeyman Predetermined Increases:
8/1/16 $1.00 to be allocated to wages and/or fringes.
1/30/17 $1.00 to be allocated to wages and/or fringes.
7/31/17 $0.05 to Training, $0.05 to Other, and $1.00 to be allocated to wages and/or fringes.
1/29/18 $1.00 to be allocated to wages and/or fringes.
7/30/18 $1.00 to be allocated to wages and/or fringes.
1/28/19 $1.00 to be allocated to wages and/or fringes.

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GENERAL PREVAILING WAGE APPRENTICE RATES

APPRENTICE INFORMATION

Determination: **2016-1** *Issue Date:* **02-22-2016** *Expire Date:* **07-31-2016** ** *Page:* **3**

Craft/Classification: **Electrician, Inside Wireman** *Shift:* **3**

County: Los Angeles

Period	Duration Months	OJT Hours	Hourly Basic Rate	Health & Welfare	Pension	Vacation /Holiday	Training	Other	Hourly Total Rate
1	6		$21.440	$10.540	$.640		$.710	$.450	$33.780
2	6		$24.130	$10.540	$.720		$.710	$.450	$36.550
3	6		$26.810	$11.540	$7.890		$.710	$.450	$47.400
4	6		$29.490	$11.540	$8.670		$.710	$.450	$50.860
5	6		$32.170	$11.540	$9.470		$.710	$.450	$54.340
6	6		$34.850	$11.540	$10.260		$.710	$.450	$57.810
7	6		$37.530	$11.540	$11.040		$.710	$.450	$61.270
8	6		$40.210	$11.540	$11.830		$.710	$.450	$64.740
9	6		$42.890	$11.540	$12.620		$.710	$.450	$68.210
10	6		$45.570	$11.540	$13.410		$.710	$.450	$71.680

Footnote(s):

Pension -- includes amounts for defined contribution and benefit plans for apprentices above Period 2. In addition, an amount equal to 3% of the basic hourly rate is added to the total hourly rate and overtime hourly rates for the National Employees Benefit Board. Pursuant to Labor Code Sections 1773.1 and 1773.8 the amount paid for this employer payment may vary resulting in a lower taxable basic hourly wage rate, but the total hourly rates for straight time and overtime may not be less than the general prevailing rate of per diem wages.

Vacation/Holiday included in the Basic Hourly Rate.

Journeyman Predetermined Increases:
8/1/16 $1.00 to be allocated to wages and/or fringes
1/30/17 $1.00 to be allocated to wages and/or fringes .
7/31/17 $0.05 to Training, $0.05 to Other, and $1.00 to be allocated to wages and/or fringes .
1/29/18 $1.00 to be allocated to wages and/or fringes .
7/30/18 $1.00 to be allocated to wages and/or fringes .
1/28/19 $1.00 to be allocated to wages and/or fringes .

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GENERAL PREVAILING WAGE APPRENTICE RATES

APPRENTICE INFORMATION

Determination: **2016--1** *Issue Date:* **02-22-2016** *Expire Date:* **05-31-2016** ** *Page:* **1**

Craft/Classification: **Electrical Utility Lineman**

Counties: Alameda, Alpine, Amador, Butte, Calaveras, Colusa, Contra Costa, El Dorado, Fresno, Glenn, Humboldt, Imperial, Inyo, Kern, Kings, Lake, Lassen, Los Angeles, Madera, Marin, Mariposa, Mendocino, Merced, Mono, Monterey, Napa, Nevada, Orange, Placer, Plumas, Riverside, Sacramento, San Benito, San Bernardino, San Diego, San Francisco, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Shasta, Sierra, Solano, Sonoma, Stanislaus, Sutter, Tehama, Trinity, Tulare, Tuolumne, Ventura, Yolo, Yuba

Period	Duration Months	OJT Hours	Hourly Basic Rate	Health & Welfare	Pension	Vacation /Holiday	Training	Other	Hourly Total Rate
1		1,000	$31.710	$5.750	$8.350		$.160	$.370	$46.340
2		1,000	$34.350	$5.750	$8.430		$.170	$.390	$49.090
3		1,000	$37.000	$5.750	$8.510		$.190	$.440	$51.890
4		1,000	$39.640	$5.750	$8.590		$.200	$.460	$54.640
5		1,000	$42.280	$5.750	$8.670		$.210	$.480	$57.390
6		1,000	$44.920	$5.750	$8.750		$.220	$.510	$60.150
7		1,000	$47.570	$5.750	$8.830		$.240	$.550	$62.940

Footnote(s):

An amount equal to 3% of the Basic Hourly Rate is added to Pension and overtime hourly rates for the National Employees Benefit Fund (NEBF).

TRAINING - This amount is factored at the applicable overtime rate.

PREDETERMINED INCREASES:

06-01-2016: (JM) $1.59 to BHR.

There may be corresponding predetermined increase(s) to the apprentices associated with this journeyman craft/classification. Please fax a request to (415) 703-4771 or send to the following address:

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GENERAL PREVAILING WAGE APPRENTICE RATES

APPRENTICE INFORMATION

Determination: **2016-1** *Issue Date:* **08-22-2015** *Expire Date:* **07-03-2016** ** *Page:* **1**

Craft/Classification: **Laborer**

Counties: Imperial, Inyo, Kern, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, Ventura

Period	Duration Months	OJT Hours	Hourly Basic Rate	Health & Welfare	Pension	Vacation /Holiday	Training	Other	Hourly Total Rate
1		500	$17.200	$4.800	$1.300	$3.130	$.640	$.620	$27.690
2		500	$18.910	$4.800	$1.300	$3.130	$.640	$.620	$29.400
3		500	$20.630	$4.800	$1.300	$3.130	$.640	$.620	$31.120
4		500	$24.070	$4.800	$1.300	$3.130	$.640	$.620	$34.560
5		500	$27.510	$4.800	$1.300	$3.130	$.640	$.620	$38.000
6		500	$29.230	$4.800	$1.300	$3.130	$.640	$.620	$39.720

Footnote(s):

Note: Apprentice rates are based on JM Laborer Group V rates.

Vacation -- Includes an amount for supplemental dues.

Other -- Includes amounts for Center for Contract Compliance, Industry Fund, and Administrative Trust Fund, Contract Administration Fund and Partnership for Jobs Industry Advancement Fund.

**Journeyman Predetermined Increases

Effective 7/4/2016: $0.25 to Pension and 1.35 to be allocated to wages and/or employer payments

Effective 7/3/2017: $0.25 to Pension and 1.40 to be allocated to wages and/or employer payments (See Important Notice issued 9/23/15)

There may be corresponding predetermined increase(s) to the apprentices associated with this journeyman craft/classification. Please fax a request to (415) 703-4771 or send to the following address:

Department of Industrial Relations
Office of the Director - Research Unit
P.O. Box 420603
San Francisco, CA 94142-0603

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GENERAL PREVAILING WAGE APPRENTICE RATES

APPRENTICE INFORMATION

Determination: **2016-1** *Issue Date:* **08-22-2015** *Expire Date:* **06-30-2016** * *Page:* **1**

Craft/Classification: **Painter** *Shift:* **1**

Counties: Imperial, Los Angeles, Orange, Riverside, San Bernardino, San Diego

Period	Duration Months	OJT Hours	Hourly Basic Rate	Health & Welfare	Pension	Vacation /Holiday	Training	Other	Hourly Total Rate
1	6	900	$11.800	$7.180	$.140	$.300	$.690	$.820	$20.930
2	6	900	$13.170	$7.890	$.140	$.300	$.690	$.820	$23.010
3	6	900	$14.560	$8.050	$.680	$.300	$.690	$.820	$25.100
4	6	900	$15.940	$8.050	$1.280	$.400	$.690	$.820	$27.180
5	6	900	$17.310	$8.050	$1.340	$1.050	$.690	$.820	$29.260
6	6	900	$18.690	$8.050	$2.050	$1.050	$.690	$.820	$31.350
7	6	900	$20.080	$8.050	$2.520	$1.050	$.930	$.820	$33.450
8	6	900	$21.450	$8.050	$2.520	$1.050	$1.640	$.820	$35.530

Footnote(s):

Basic Hourly Rate – includes amount withheld for working dues.
Other –includes LMCC Fund contribution.

Apprentice Prevailing Wage Rates are paid only to apprentices registered with the State of California, Division of Apprenticeship Standards, for work the registered apprentice performs in his/her specific craft or trade. You may check whether an Apprentices is registered at http://www.dir.ca.gov/DAS/appcertpw/AppCertSearch.asp

GENERAL PREVAILING WAGE APPRENTICE RATES

APPRENTICE INFORMATION

Determination: **2016-1** *Issue Date:* **08-22-2015** *Expire Date:* **06-30-2016** * *Page:* **2**

Craft/Classification: **Painter** *Shift:* **1**

REPAINT WAGES

Counties: Imperial, Los Angeles, Orange, Riverside, San Bernardino

Period	Duration Months	OJT Hours	Hourly Basic Rate	Health & Welfare	Pension	Vacation /Holiday	Training	Other	Hourly Total Rate
1	6	900	$11.630	$7.050	$.140	$.300	$.690	$.820	$20.630
2	6	900	$12.790	$7.650	$.140	$.300	$.690	$.820	$22.390
3	6	900	$13.960	$8.050	$.320	$.300	$.690	$.820	$24.140
4	6	900	$15.140	$8.050	$.720	$.500	$.690	$.820	$25.920
5	6	900	$16.300	$8.050	$.770	$1.050	$.690	$.820	$27.680
6	6	900	$17.470	$8.050	$1.360	$1.050	$.690	$.820	$29.440
7	6	900	$18.630	$8.050	$1.960	$1.050	$.690	$.820	$31.200
8	6	900	$19.800	$8.050	$2.520	$1.050	$.720	$.820	$32.960

Footnote(s):

Repaint Wages (excludes San Diego County).

Basic Hourly Rate -- includes amount withheld for working dues.

Other –includes LMCC Fund contribution.

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GENERAL PREVAILING WAGE APPRENTICE RATES

APPRENTICE INFORMATION

Determination: **2016--1** *Issue Date:* **08-22-2015** *Expire Date:* **06-30-2016** * *Page:* **1**

Craft/Classification: **Painter** *Shift:* **1**

Counties: Inyo, Kern, Los Angeles (Antelope Valley Area), Mono

Period	Duration Months	OJT Hours	Hourly Basic Rate	Health & Welfare	Pension	Vacation /Holiday	Training	Other	Hourly Total Rate
1	6	900	$11.860	$7.160	$.140	$.300	$.690	$.820	$20.970
2	6	900	$12.930	$7.710	$.140	$.300	$.690	$.820	$22.590
3	6	900	$14.010	$8.050	$.330	$.300	$.690	$.820	$24.200
4	6	900	$15.080	$8.050	$.680	$.500	$.690	$.820	$25.820
5	6	900	$16.170	$8.050	$.680	$1.050	$.690	$.820	$27.460
6	6	900	$17.210	$8.050	$1.220	$1.050	$.690	$.820	$29.040
7	6	900	$18.290	$8.050	$1.770	$1.050	$.690	$.820	$30.670
8	6	900	$19.360	$8.050	$2.320	$1.050	$.690	$.820	$32.290

Footnote(s):

Includes Antelope Valley (LA)

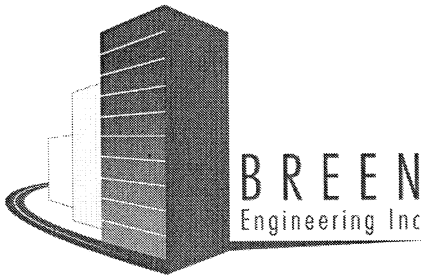
Basic Hourly Rate -- includes amount withheld for working dues.

Other --includes LMCC Fund contribution.

Apprentice Prevailing Wage Rates are paid only to apprentices registered with the State of California, Division of Apprenticeship Standards, for work the registered apprentice performs in his/her specific craft or trade. You may check whether an Apprentices is registered at http://www.dir.ca.gov/DAS/appcertpw/AppCertSearch.asp

PART G

SPECIFICATIONS



City of Torrance
General Services Department
Torrance Police Department
UPS Replacement Project
3300 Civic Center Drive, Torrance, CA 90505

Engineering Specifications

Bid Documents
June 2016

Breen Engineering, Inc. Project Number #307-16-001

Table of Contents

SECTION 26 05 00 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Sleeves for raceways and cables.
   2. Sleeve seals.
   3. Grout.
   4. Common electrical installation requirements.

1.2 SUBMITTALS

A. Product Data: For sleeve seals.

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
C. Sleeves for Rectangular Openings: Galvanized sheet steel.
   1. Minimum Metal Thickness:
      a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
      b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE SEALS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Advance Products & Systems, Inc.
      b. Calpico, Inc.
      c. Metraflex Co.
      d. Pipeline Seal and Insulator, Inc.
   2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
   3. Pressure Plates: Stainless steel. Include two for each sealing element.
   4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. 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.

D. 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.

E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

E. Cut sleeves to length for mounting flush with both surfaces of walls.

F. Extend sleeves installed in floors 2 inches above finished floor level.

G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.

H. Seal space outside of sleeves with grout for penetrations of concrete and masonry

1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.

I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.

J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials.

K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

M. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL INSTALLATION

A. Install to seal exterior wall penetrations.

B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly.

END OF SECTION 260500

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

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Building wires and cables rated 600 V and less.
   2. Connectors, splices, and terminations rated 600 V and less.
   3. Sleeves and sleeve seals for cables.

1.2 SUBMITTALS

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

B. Field quality-control test reports.

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 NFPA 70.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Alcan Products Corporation; Alcan Cable Division.
   2. American Insulated Wire Corp.; a Leviton Company.
   3. General Cable Corporation.
   4. Senator Wire & Cable Company.
   5. Southwire Company.

B. Aluminum and Copper Conductors: Comply with NEMA WC 70.

C. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN XHHW USE and SO.

D. Multi-conductor Cable: Comply with NEMA WC 70 for armored cable Type AC, metal clad cable Type MC and non-metallic sheathed cable Type NM.

2.2 CONNECTORS AND SPLICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. AFC Cable Systems, Inc.
   2. Hubbell Power Systems, Inc.

3. O-Z/Gedney; EGS Electrical Group LLC.
4. 3M; Electrical Products Division.
5. Tyco Electronics Corp.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SLEEVES FOR CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

C. Coordinate sleeve selection and application per code.

2.4 SLEEVE SEALS

A. Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. Advance Products & Systems, Inc.
2. Calpico, Inc.
3. Metraflex Co.
4. Pipeline Seal and Insulator, Inc.

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

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper for feeders smaller than No. 4 AWG; Copper for feeders No. 4 AWG and larger; Stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper; Stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN-THWN, single core conductors in raceway or Type SE or USE multi-conductor cable.

B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN-THWN, single conductors in raceway or metal-clad Type MC.

C. Feeders Concealed in Concrete, below Slabs-on-Grade, and underground: Type THHN-THWN, single conductors in raceway.

D. Exposed Branch Circuits, Including in Crawlspaces: Type THHN-THWN, single conductors in raceway, or metal-clad Type MC.

E. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway, or metal-clad Type MC.

F. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and underground: Type THHN-THWN, single conductors in raceway.

G. Class 1 Control Circuits: Type THHN-THWN, in raceway.

H. Class 2 Control Circuits: Type THHN-THWN, in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

B. 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.

C. Use pulling means; including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

E. Support cables per code.

F. Identify and color-code conductors and cables per code.

G. 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.

H. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.

I. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

3.4 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Coordinate sleeve selection and application per code.

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

D. Cut sleeves to length for mounting flush with both wall surfaces.

E. Extend sleeves installed in floors 2 inches above finished floor level.

F. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and cable unless sleeve seal is to be installed or unless seismic criteria require different clearance.

G. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.

H. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and cable, using joint sealant appropriate for size, depth, and location of joint per code.

I. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at cable penetrations. Install sleeves and seal with firestop materials per code.

J. Roof-Penetration Sleeves: Seal penetration of individual cables with flexible boot-type flashing units applied in coordination with roofing work.

K. Aboveground Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeves to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

L. Underground Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch annular clear space between cable and sleeve for installing mechanical sleeve seals.

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.

3.6 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly per code.

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors, and conductors feeding the following critical equipment and services for compliance with requirements.
    a. Diesel generator
    b. Emergency panelboard
    c. Main distribution panel circuit breakers
    d. Fire Alarm system
2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.
    a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
    b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken and observations after remedial action.

C. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 260519

SECTION 26 05 26 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Grounding systems and equipment.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.
B. Field quality-control reports.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:
   1. Solid Conductors: ASTM B 3.
   2. Stranded Conductors: ASTM B 8.
   3. Tinned Conductors: ASTM B 33.
   4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, and 1/4 inch in diameter.
   5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
   6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
   7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.2 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
   1. Pipe Connectors: Clamp type, sized for pipe.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel, sectional type; 3/4 inch by 10 feet in diameter.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Use Stranded conductors only.

B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum. Bury at least 24 inches below grade.

C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.

D. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 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. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.
7. Armored and metal-clad cable runs.
8. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.
9. Computer and Rack-Mounted Electronic Equipment Circuits: Install insulated equipment grounding conductor in branch-circuit runs from equipment-area power panels and power-distribution units.

B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

C. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

D. Signal and Communication Equipment: In addition to grounding and bonding required by NFPA 70, provide a separate grounding system complying with requirements in TIA/ATIS J-STD-607-A.

1. For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
2. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-4-by-12-inch grounding bus.
3. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

E. Metal Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

3.3 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

C. Test Wells: Ground rod driven through drilled hole in bottom of hand hole. Hand holes must follow code and shall be at least 12 inches deep, with cover.

1. Test Wells: Install at least one test well for each service unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.

D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

E. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

F. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install tinned bonding jumper to bond across flexible duct connections to achieve continuity.

3.4 LABELING

A. The label or its text shall be green.

B. Install labels at the telecommunications bonding conductor and grounding equalizer [and at the grounding electrode conductor where exposed].

1. Label Text: "If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Make tests at ground rods before any conductors are connected.

B. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity of 500 kVA and less: 10 ohms.
2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
4. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ohm(s).

C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 26 05 29 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.3 SUBMITTALS

A. Product Data: For steel slotted support systems.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:

1. Trapeze hangers. Include Product Data for components.
2. Steel slotted channel systems. Include Product Data for components.
3. Equipment supports.

C. Welding certificates.

1.4 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Allied Tube & Conduit.
   b. Cooper B-Line, Inc.; a division of Cooper Industries.

c. ERICO International Corporation.
d. GS Metals Corp.
e. Thomas & Betts Corporation.
f. Unistrut; Tyco International, Ltd.
g. Wesanco, Inc.

2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
5. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      1) Hilti Inc.
      2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
      3) MKT Fastening, LLC.
      4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      1) Cooper B-Line, Inc.; a division of Cooper Industries.
      2) Empire Tool and Manufacturing Co., Inc.
      3) Hilti Inc.
      4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
      5) MKT Fastening, LLC.
3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.1 APPLICATION

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.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as scheduled in NECA 1, where it's Table 1 lists maximum spacing's less than stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps.

D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT IMC RMC EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
6. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements for site-fabricated metal supports code.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete per code.

C. Anchor equipment to concrete base.

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Touchup: Comply with requirements for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal per code.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

SECTION 26 05 33 – RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

B. Review code for exterior duct banks, manholes, underground handholes, boxes, and utility construction.

1.2 SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, details, and attachments to other work.

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 NFPA 70.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit: ANSI C80.1.

B. IMC: ANSI C80.6.

C. EMT: ANSI C80.3.

D. FMC: Zinc-coated steel.

E. LFMC: Flexible steel conduit with PVC jacket.

F. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
2. Fittings for EMT: Steel type.

2.2 NONMETALLIC CONDUIT AND TUBING

A. ENT: NEMA TC 13.

B. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.

C. LFNC: UL 1660.

D. Fittings for ENT and RNC: NEMA TC 3; match to conduit or tubing type and material.

E. Fittings for LFNC: UL 514B.

2.3 METAL WIREWAYS

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

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper B-Line, Inc.
2. Hoffman.
3. Square D; Schneider Electric.

C. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 3R, unless otherwise indicated.

D. Fittings and Accessories: Include 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.

E. Wireway Covers: Hinged type.

F. Finish: Manufacturer's standard enamel finish.

2.4 NONMETALLIC WIREWAYS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hoffman.
2. Lamson & Sessions; Carlon Electrical Products.

B. Description: PVC plastic, extruded and fabricated to size and shape indicated, with snap-on cover and mechanically coupled connections with plastic fasteners.

C. Fittings and Accessories: Include 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.

2.5 SURFACE RACEWAYS

A. Surface Metal Raceways: Galvanized steel with snap-on covers. Manufacturer's standard enamel finish in color selected by Architect.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Thomas & Betts Corporation.
   b. Walker Systems, Inc.; Wiremold Company (The).
   c. Wiremold Company (The); Electrical Sales Division.

B. Surface Nonmetallic Raceways: Two-piece construction, manufactured of rigid PVC with texture and color selected by Architect from manufacturer's standard custom colors.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Butler Manufacturing Company; Walker Division.
   b. Enduro Systems, Inc.; Composite Products Division.
   c. Hubbell Incorporated; Wiring Device-Kellems Division.
   d. Lamson & Sessions; Carlon Electrical Products.
   e. Panduit Corp.
   f. Walker Systems, Inc.; Wiremold Company (The).
   g. Wiremold Company (The); Electrical Sales Division.

2.6 BOXES, ENCLOSURES, AND CABINETS

A. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

B. Cast-Metal Outlet and Device Boxes: NEMA FB 1, aluminum, Type FD, with gasketed cover.

C. Nonmetallic Outlet and Device Boxes: NEMA OS 2.

D. Metal Floor Boxes: Cast or sheet metal, fully adjustable, rectangular.

E. Nonmetallic Floor Boxes: Nonadjustable, round.

F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

G. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, galvanized, cast iron with gasketed cover.

H. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.
   1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
   2. Nonmetallic Enclosures: Plastic finished inside with radio-frequency-resistant paint.

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

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
   1. Exposed Conduit: Rigid steel conduit IMC RNC.
   2. Concealed Conduit, Aboveground: Rigid steel conduit IMC EMT RNC.
   3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.
   4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
   5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Comply with the following indoor applications, unless otherwise indicated:
   1. Exposed, Not Subject to Physical Damage: EMT or RNC.
   2. Exposed, Not Subject to Severe Physical Damage: EMT identified for such use.
   3. Exposed and Subject to Severe Physical Damage: Rigid steel conduit. Includes raceways in the following locations:
      a. Loading dock.
      b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
      c. Mechanical rooms.
   4. Concealed in Ceilings and Interior Walls and Partitions: EMT or RNC, Type EPC-40-PVC.
   5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
   6. Damp or Wet Locations: Rigid steel conduit.
   7. Raceways for Optical Fiber or Communications Cable: EMT.

8. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel in damp or wet locations.

C. Minimum Raceway Size: 3/4-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

3.2 INSTALLATION

A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Support raceways as specified per code.

E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.

G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.

H. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Change from ENT to RNC, rigid steel conduit, before rising above the floor.

I. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.

J. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.

K. Raceways for Optical Fiber and Communications Cable: Install as follows:

1. 3/4-Inch Trade Size and Smaller: Install raceways in maximum lengths of 50 feet.
2. 1-Inch Trade Size and Larger: Install raceways in maximum lengths of 75 feet.
3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.

L. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where otherwise required by NFPA 70.

M. Expansion-Joint Fittings for RNC: Install in each run of aboveground conduit that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet.

1. Install expansion-joint fittings for each of the following locations, and provide type and quantity of fittings that accommodate temperature change listed for location:
   a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.

b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.

c. Indoor Spaces: Connected with the Outdoors without Physical Separation: 125 deg F temperature change.

d. Attics: 135 deg F temperature change.

2. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change.

3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at the time of installation.

N. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for recessed and semi recessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.

2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

O. 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.

P. Set metal floor boxes level and flush with finished floor surface.

Q. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom per code for pipe less than 6 inches in nominal diameter.

2. Install backfill per code.

3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hands tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction per code.

4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.

5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.

a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.

b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.

6. Warning Planks: Bury warning planks approximately 12 inches above direct-buried conduits, placing those 24 inches o.c. Align planks along the width and along the centerline of conduit.

3.4 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly per code.

END OF SECTION 260533

SECTION 26 05 48 – VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Isolation pads.
   2. Spring isolators.
   3. Restrained spring isolators.
   4. Channel support systems.
   5. Restraint cables.
   6. Hanger rod stiffeners.
   7. Anchorage bushings and washers.

1.2 PERFORMANCE REQUIREMENTS

A. Wind-Restraint Loading:
   1. Basic Wind Speed: 110mph, exposure C
   2. Building Importance Factor: I = 1.0.
   3. Minimum 25 lb/sq. ft. multiplied by the maximum area of the component projected on a vertical plane that is normal to the wind direction, and 45 degrees either side of normal at the roof level.

B. Seismic-Restraint Loading:
   1. Seismic coefficients per CBC 2013: S_{ms}=1.605, S_{m1} =.907, S_{ds} =1.07, S_{d1} =0.604, Seismic Design Category = D.
   2. Site Class: D.
   3. Assigned Seismic Occupancy: II.
      a. Component Importance Factor: 1.5.
      b. Component Response Modification Factor: ASCE 7-10 Table 13.6-1

1.3 SUBMITTALS

A. Product Data: For the following:
   1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
   2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.
      a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an evaluation service member of ICC-ES.
      b. Annotate to indicate application of each product submitted and compliance with requirements.
   3. Restrained-Isolation Devices: Include ratings for horizontal, vertical, and combined loads.

B. Delegated-Design Submittal: For [vibration isolation and seismic]-restraint details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
   1. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, seismic forces required to select vibration isolators and seismic restraints.

a. Coordinate design calculations with wind-load calculations required for equipment mounted outdoors per code.

2. Indicate materials and dimensions and identify hardware, including attachment and anchorage devices.
3. Field-fabricated supports.
4. Seismic-Restraint Details:
   a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
   b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacing's. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
   c. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

C. Welding certificates.
D. Field quality-control test reports.

1.4 QUALITY ASSURANCE

A. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

D. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

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

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
C. Basis-of-Design Product: Subject to compliance with requirements, provide a comparable product by one of the following:

1. Ace Mountings Co., Inc.
2. Amber/Booth Company, Inc.
3. California Dynamics Corporation.
4. Isolation Technology, Inc.
5. Kinetics Noise Control.
6. Mason Industries.
7. Vibration Eliminator Co., Inc.

8. Vibration Isolation.
9. Vibration Mountings & Controls, Inc.

D. Pads: Arrange in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
   1. Resilient Material: Oil- and water-resistant neoprene.

E. Spring Isolators: Freestanding, laterally stable, open-spring isolators.
   1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
   2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
   3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
   4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
   5. Baseplates: Factory drilled for bolting to structure and bonded to 1/4-inch- thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to 500 psig.
   6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

F. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic or limit-stop restraint.
   1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to weight being removed; factory-drilled baseplate bonded to 1/4-inch-thick, neoprene or rubber isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
   2. Restraint: Seismic or limit-stop as required for equipment and authorities having jurisdiction.
   3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
   4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
   5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
   6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.2 SEISMIC-RESTRAINT DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Amber/Booth Company, Inc.
   2. California Dynamics Corporation.
   3. Cooper B-Line, Inc.; a division of Cooper Industries.
   4. Hilti Inc.
   5. Loos & Co.; Seismic Earthquake Division.
   6. Mason Industries.
   7. TOLCO Incorporated; a brand of NIBCO INC.
   8. Unistrut; Tyco International, Ltd.

B. General Requirements for Restraint Components: Rated strengths, features, and application requirements shall be as defined in reports by an evaluation service member of ICC-ES
   1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.

C. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at

the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.

D. Restraint Cables: ASTM A 492 stainless-steel cables with end connections made of steel assemblies with thimbles, brackets, swivels, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.

E. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod. Do not weld stiffeners to rods.

F. Bushings for Floor-Mounted Equipment Anchor: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchors and studs.

G. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices.

H. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

I. Mechanical Anchor: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchors with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.

J. Adhesive Anchor: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Multiple Raceways or Cables: Secure raceways and cables to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.

B. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.

C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.2 SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Equipment and Hanger Restraints:

1. Install restrained isolators on electrical equipment.
2. Install resilient, bolt-isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
3. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.

B. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.

C. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

D. Drilled-in Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the

structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.

2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
5. Set anchors to manufacturer's recommended torque, using a torque wrench.
6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.3 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Install flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where they terminate with connection to equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

3.4 FIELD QUALITY CONTROL

A. Tests and Inspections:
   1. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
   2. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
   3. Test to 90 percent of rated proof load of device.
   4. Measure isolator restraint clearance.
   5. Measure isolator deflection.
   6. Verify snubber minimum clearances.
   7. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.

B. Remove and replace malfunctioning units and retest as specified above.

C. Prepare test and inspection reports.

3.5 ADJUSTING

A. Adjust isolators after isolated equipment is at operating weight.

B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

C. Adjust active height of spring isolators.

D. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION 260548

SECTION 26 05 53 – IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Identification for raceways.
   2. Identification of power and control cables.
   3. Identification for conductors.
   4. Underground-line warning tape.
   5. Warning labels and signs.
   6. Instruction signs.
   7. Equipment identification labels.
   8. Miscellaneous identification products.

1.2 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

1.3 QUALITY ASSURANCE

A. Comply with ANSI A13.1.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

PART 2 - PRODUCTS

2.1 POWER RACEWAY IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.

B. Colors for Raceways Carrying Circuits at 600 V or Less:
   1. Black letters on an orange field.
   2. Legend: Indicate voltage and system or service type.

C. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

D. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

F. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
   1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
   2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Colors for Raceways Carrying Circuits at 600 V and Less:
   1. Black letters on an orange field.
   2. Legend: Indicate voltage and system or service type.

C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

D. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches (50 mm) wide; compounded for outdoor use.

2.3 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

C. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
   1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
   2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

D. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

2.4 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tapes not less than 3 mils thick by 1 to 2 inches wide.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

C. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

D. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
   1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
   2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.5 FLOOR MARKING TAPE

A. 2-inch-wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.6 UNDERGROUND-LINE WARNING TAPE

A. Tape:
   1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
   2. Printing on tape shall be permanent and shall not be damaged by burial operations.
   3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing:
   1. Comply with ANSI Z535.1 through ANSI Z535.5.
   2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE.
   3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE

C. Tag: Type I:
   1. Pigmented polyolefin, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
   2. Thickness: 4 mils
   3. Weight: 18.5 lb/1000 sq. ft.
   4. 3-Inch Tensile According to ASTM D 882: 30 lbf, and 2500 psi.

D. Tag: Type ID:
   1. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored, continuous-printed on one side with the inscription of the utility compounded for direct-burial service.
   2. Overall Thickness: 5 mils
   3. Foil Core Thickness: 0.35 mil
   4. Weight: 28 lb/1000 sq. ft.
   5. 3-Inch Tensile According to ASTM D 882: 70 lbf and 4600 psi

2.7 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Baked-Enamel Warning Signs:
   1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
   2. 1/4-inch grommets in corners for mounting.
   3. Nominal size, 7 by 10 inches

D. Metal-Backed, Butyrate Warning Signs:
   1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for application.
   2. 1/4-inch grommets in corners for mounting.
   3. Nominal size, 10 by 14 inches

E. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

2.8 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch.

C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

2.9 EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

B. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch

C. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

2.10 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Select paint system applicable for surface material and location (exterior or interior) per code.

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Apply identification devices to surfaces that require finish after completing finish work.

C. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

D. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

E. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

F. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

G. Painted Identification: Comply with requirements for surface preparation and paint application per code.

3.2 IDENTIFICATION SCHEDULE

A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Install labels at 10-foot maximum intervals.

B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:

1. Emergency Power.
2. Power.
3. UPS.

C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded feeder and branch-circuit conductors.
   a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
   b. Colors for 208/120-V Circuits:
      1) Phase A: Black.
      2) Phase B: Red.
      3) Phase C: Blue.
   c. Colors for 480/277-V Circuits:
      1) Phase A: Brown.
      2) Phase B: Orange.
      3) Phase C: Yellow.
   d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

D. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.

E. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source.

F. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.

G. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.

1. Limit use of underground-line warning tape to direct-buried cables.
2. Install underground-line warning tape for both direct-buried cables and cables in raceway.

H. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

I. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Baked-enamel warning signs.

1. Comply with 29 CFR 1910.145.
2. Identify system voltage with black letters on an orange background.
3. Apply to exterior of door, cover, or other access.
4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
    a. Power transfer switches.
    b. Controls with external control power connections.

J. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

K. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer.

L. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance 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: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.
    b. Outdoor Equipment: Engraved, laminated acrylic, Stenciled legend 4 inches high.
    c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
    d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

M. Label each individual electrical device (outlets, switches, etc.) describing the panel and breaker number feeding it; clear white label with 3/16" high black font.

END OF SECTION 260553

SECTION 26 07 00 – ELECTRICAL EQUIPMENT NOISE CONTROL, VIBRATION ISOLATION AND SEISMIC RESTRAINT

PART 1 - GENERAL

1.1 SCOPE.

A. Work included in this Section is used for studies.

1. Work included in this Section.
   a. Vibration isolation of transformers.
   b. Vibration isolation of distribution panels connected to transformers.
   c. Flexible conduits at transformer connections.
   d. Electrical box-pads at stud partitions where sound insulation is provided.
   e. Seismic restraint for vibration isolated equipment.
   f. Flexible conduits at connections to motors and other vibrating equipment.

1.2 GENERAL REQUIREMENTS

A. Coordination.

1. The contractor shall coordinate his work with other trades to avoid rigid contact between isolated transformers, raceways and the building. He shall inform other trades following his work to avoid any contact that would reduce the vibration isolation.

B. Conflicts and Discrepancies.

1. The contractor shall bring to the architect's attention prior to installation any conflicts with other trades which will result in unavoidable contact to the equipment, raceways, etc., described herein, due to inadequate space, etc. Corrective work necessitated by conflicts after installation shall be at the responsible contractor's expense.

2. The contractor shall bring to the architect's attention any discrepancies between the specifications and field conditions, changes required due to specific equipment selection, etc., prior to installation. Corrective work necessitated by discrepancies after installation shall be at the contractor's expense.

C. Inspection and Instruction.

1. The contractor shall obtain inspection and approval from the architect of any installation to be covered or enclosed prior to such closure.

2. The contractor shall obtain written and/or oral instructions from the vibration isolation manufacturer as to the proper installation and adjustment of vibration isolation devices and seismic restraints.

1.3 SUBMITTAL

A. Reference shall be made to general conditions for requirements pertaining to submittals, including preparation and transmittals. The submittal shall contain the following information:

1. Catalog cuts and data sheets on specific vibration isolators, electrical box pads and other equipment to be utilized, showing compliance with the specification.

2. An itemized list showing the items of equipment to be isolated, the isolator type and model number selected, isolator loading and deflection.

3. The contractor shall obtain written and/or oral instructions from the vibration isolation manufacturer as to the proper installation and adjustment of vibration isolation devices and seismic restraints.

1.4 ISOLATOR CONFIGURATION FOR FLOOR MOUNTED OR SUSPENDED EQUIPMENT.

A. A minimum of four vibration isolators shall be provided, located at the corners of the equipment unless approval is obtained for additional isolators.

B. Mounting frames and/or brackets shall be provided to carry the load of the equipment without causing mechanical distortion or stress to the equipment.

C. Installation of flexible electrical connections to vibration isolated equipment shall in no way impair or restrain the function of the aforementioned vibration isolation.

1.5 SEISMIC RESTRAINT REQUIREMENTS

A. Seismic restraint shall be furnished and installed in accordance with all relevant State and local Code requirements.

1.6 RESPONSIBILITY OF MANUFACTURER.

A. Vibration isolation manufacturer shall have the following responsibilities:

1. To determine vibration isolation sizes and locations.
2. To provide equipment isolation system as scheduled or specified.
3. To guarantee specified isolation system deflection.
4. To provide installation instructions and drawings.
5. To provide calculations signed by a structural engineer licensed in the State in which the work is to take place certifying that the seismic restraints will act in accordance with the relevant State and local codes and will maintain equipment in captive position.
6. To provide approved resilient restraining devices as required to limit transformer motion in excess of 3/8 inch.
7. To provide signature of a licensed structural engineer for all calculations on the seismic snubber.

1.7 VIBRATION ISOLATION AND NOISE CONTROL REQUIREMENTS.

A. Floor Mounted Transformers and UPS Equipment.

1. Type E, 0.15 inch static deflection.
2. Locate at 4 corners of transformer.
3. Bolt to floor.
4. Wall mounted not permitted.

B. Distribution Panels Connected to Transformers.

1. Floor mounted connected to adjacent transformers within buildings by flexible conduit.
2. Type E, 0.1 inch static deflection.
3. Locate at 4 corners.
4. Wall mounted not permitted.

C. Flexible Electrical Connections.

1. At all transformers within building.

2. At connections to motors or other vibrating equipment.

1.8 ELECTRICAL BOX PADS.

A. Provide at all junction boxes located within sound insulated drywall partitions.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS.

A. General Properties

1. All vibration isolators shall have either known undeflected heights or other markings so that, after adjustment, when carrying their load, the deflection under load can be verified, thus determining that the load is within the proper range of the device and that the correct degree of vibration isolation is being provided according to the design.
2. All isolators shall operate in the linear portion of their load versus deflection curve. Load versus deflection curves shall be furnished by the manufacturer and must be linear over a deflection range 50% above the design deflection.
3. The ratio of lateral to vertical stiffness shall not be less than 1.0 or greater than 2.0.
4. The vertical natural frequency for each support point, based upon the load per isolator and isolator stiffness, shall not differ by more than + or - 10%.
5. All vibration isolation equipment exposed to moisture or an outdoor environment shall be coated as follows:
   a. All steel parts to be hot-dipped galvanized.
   b. All bolts to be cadmium plated.
   c. All springs to be cadmium plated and neoprene coated.

B. Isolator Types and Descriptions.

1. Type E is a neoprene isolator capable of resisting a seismic load of 1.0 G in all directions. The mount shall consist of a captive steel insert embedded into a neoprene element that is enclosed by a steel housing which also includes floor mounting holes. The isolator shall have a rated deflection of 0.15 inches in compression, 0.12 inches in tension and 0.09 inches in shear.

2.2 FLEXIBLE CONNECTIONS.

A. Conduit over 1 inch OD: Make electrical connections to vibrating equipment via flexible expansion/deflection conduit coupling sized as required. Coupling shall have a flexible and watertight outer jacket, an internal grounding strap, plastic inner sleeve to maintain smooth wireway and end hubs with threads to fit standard threaded metal conduit. Acceptable units include:

1. XD Expansion Deflection Coupling by Crouse-Hinds of Syracuse, N.Y.
2. Type DF Expansion and Deflection fitting by Spring City Electrical Mfg. Co. of Spring City, PA.

B. For conduit under 1 inch OD: Use "flexible" conduit with slack at least 3 feet or 15 diameters long, whichever is the longer or provide a flexible coupling as defined above.

2.3 ELECTRICAL BOX PADS.

A. Equal to Lowry's Outlet Box Pads as manufactured by Harry A. Lowry Associates, Sun Valley, California.

2.4 EQUIPMENT FRAMES.

A. General.

1. Mounting frames and/or brackets shall be provided to carry the load of the equipment without causing mechanical distortion or stress to the equipment.

B. Frame Types.

1. Type WFB frame is a wide flange structural steel frame with brackets as shown on the drawings. The maximum allowable deflection of any point on the loaded frame relative to the unloaded frame shall be 0.005 inch. A wide flange section depth greater than 1/10th the length of the longest frame member will be accepted as satisfying the deflection requirement.

2. Type CSB frame is a channel steel structural frame with brackets as shown on the drawings. The section depth shall be greater than 1/10th the length of the longest frame member.

3. Type SBG frame is a steel bracket or gusset welded or bolted directly to the machine frame in order to accommodate the isolator.

2.5 SEISMIC RESTRAINTS.

A. Vibration Isolated Distribution Panels.

1. Isolation mounts shall be provided with integral seismic restraints.

PART 3 - EXECUTION

3.1 INSTALLATION OF VIBRATION ISOLATION DEVICES.

A. Transmission of perceptible vibration or structureborne noise to occupied areas by equipment installed under this Contract will not be permitted.

B. Vibration isolators shall be installed per manufacturer's directions.

C. Flexible electrical connections.

1. Installation of flexible electrical connections to vibration isolated equipment shall in no way impair or restrain the function of the aforementioned vibration isolation.

2. Option 1: Install the flexible conduit in a grossly slack loop form or shallow "U" form. Install the stranded conductors with sufficient slack to accommodate maximum possible movement.

3. Option 2: The flexible coupling shall be free and not in contact with any nearby building construction and shall be installed slack and free of strain in any direction. Install stranded conductors as above.

D. All vibration isolation devices, including auxiliary steel bases shall be designed and furnished by a single manufacturer or supplier, who will be responsible for adequate coordination of all phases of this work.

E. The vibration isolation manufacturer, or his representative, shall be responsible for providing such supervision as may be necessary to assure correct installation and adjustment of the isolators. Upon completion of the installation and after the system is put into operation, the manufacturer, or his representative, shall make a final inspection and submit his report to the Architect in writing, certifying the correctness of installation and compliance with approved submittal data.

3.2 OUTLET BOX PADS.

A. All holes in outlet boxes in sound rated walls shall be completely covered with electrical box pads molded and pressed to the back side of the box.

3.3 COORDINATION.

A. The contractor shall coordinate his work with other trades to avoid rigid contact between isolated equipment and raceways with the building. He shall inform other trades following his work to avoid any contact that would reduce the vibration isolation.

END OF SECTION 260700

SECTION 26 24 16 – PANEL BOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes distribution panelboards and lighting and appliance branch-circuit panelboards.

1.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.3 SUBMITTALS

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

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
2. Detail enclosure types and details for types other than NEMA 250, Type 1.
3. Detail bus configuration, current, and voltage ratings.
4. Short-circuit current rating of panelboards and overcurrent protective devices.
5. Include evidence of NRTL listing for series rating of installed devices.
6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
7. Include wiring diagrams for power, signal, and control wiring.
8. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards.

C. Seismic Qualification Certificates: Submit certification that panelboards, overcurrent protective devices, accessories, and components will withstand seismic forces per code.

D. Field quality-control reports.

E. Panelboard schedules for installation in panelboards.

F. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NEMA PB 1.

C. Comply with NFPA 70.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Fabricate and test panelboards per code.

B. Enclosures: Flush Surface 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 and Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
      d. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
   2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
   3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
   4. Directory Card: Inside panelboard door, mounted in transparent card holder.

C. Incoming Mains Location: Bottom or top – to suit site conditions.

D. Phase, Neutral, and Ground Buses: Hard-drawn copper, 98 percent conductivity.

E. 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: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
   5. Subfeed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.

F. Service Equipment Label: NRTL labeled for use as service equipment for panelboards with one or more main service disconnecting and overcurrent protective devices.

G. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

H. Panelboard Short-Circuit Current Rating: Rated for series-connected system with integral or remote upstream overcurrent protective devices and labeled by an NRTL. Include size and type of allowable upstream and branch devices, and listed and labeled for series-connected short-circuit rating by an NRTL.

I. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.2 DISTRIBUTION PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   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.** ***(Preferred to match existing panel board "EH")***

B. Panelboards: NEMA PB 1, power and feeder distribution type.

C. Doors: No locks are necessary.

D. Mains: Circuit breaker.

E. Branch Overcurrent Protective Devices: For Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.

F. Branch Overcurrent Protective Devices: For Circuit-Breaker Frame Sizes Larger than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.

G. Branch Overcurrent Protective Devices: Fused switches.

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

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

1. Eaton Electrical Inc "EZ Front" type (per City standard).

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

C. Mains: Circuit breaker

D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

E. Contactors in Main Bus: NEMA ICS 2, Class A, electrically held, general-purpose controller, with same short-circuits interrupting rating as panelboard.

1. External Control-Power Source: 120-V branch circuit.

F. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

G. Column-Type Panelboards: Narrow gutter extension, with cover, to overhead junction box equipped with ground and neutral terminal buses.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

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

B. Basis-of-Design Product: Subject to compliance with requirements, provide a comparable product 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.

C. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with series-connected rating 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. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.

8. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:

   a. Standard frame sizes, trip ratings, and number of poles.

   b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.

   c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.

   d. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.

   e. Communication Capability: Din-rail-mounted communication module with functions and features compatible with power monitoring and control system per code.

   f. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.

   g. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handles in on or off position.

   h. Handle Clamp: Loose attachment, for holding circuit-breaker handles in on position.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Receive, inspect, handle, store and install panelboards and accessories according to NEMA PB 1.1.

B. Comply with mounting and anchoring requirements per code.

C. Mount top of trim 90 inches above finished floor unless otherwise indicated.

D. 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.

E. Install overcurrent protective devices and controllers not already factory installed.

   1. Set field-adjustable, circuit-breaker trip ranges.

F. Install filler plates in unused spaces.

G. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.

H. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

I. Comply with NECA 1.

3.2 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying per code.

B. Create a directory to indicate installed circuit loads and incorporating Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

C. Panelboard Nameplates: Label each panelboard with a nameplate per code.

D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate per code.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Panelboards will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection report, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken and observations after remedial action.

END OF SECTION 262416

SECTION 26 27 26 – WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Receptacles, receptacles with integral GFCI, and associated device plates.
   2. Wall-box motion sensors.
   3. Snap switches and wall-box dimmers.
   4. Solid-state fan speed controls.
   5. Wall-switch and exterior occupancy sensors.
   6. Communications outlets.

1.2 SUBMITTALS

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

B. Shop Drawings: List of legends and description of materials and process used for pre-marking wall plates.

C. Samples: One for each type of device and wall plate specified, in each color specified.

D. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

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 NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
   1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
   2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
   3. Leviton Mfg. Company Inc. (Leviton).
   4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).

2.2 STRAIGHT BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Cooper; 5351 (single), 5352 (duplex).
      b. Hubbell; HBL5351 (single), CR5352 (duplex).
      c. Leviton; 5891 (single), 5352 (duplex).

d. Pass & Seymour; 5381 (single), 5352 (duplex).

2.3 GFCI RECEPTACLES

A. General Description: Straight blade, non-feed-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Cooper; GF20.
   b. Pass & Seymour; 2084.

2.4 SNAP SWITCHES

A. Comply with NEMA WD 1 and UL 20.

B. Switches, 120/277 V, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Cooper; 2221 (single pole), 2222 (two pole), 2223 (three way), 2224 (four way).
   b. Hubbell; CS1221 (single pole), CS1222 (two pole), CS1223 (three way), CS1224 (four way).
   c. Leviton; 1221-2 (single pole), 1222-2 (two pole), 1223-2 (three way), 1224-2 (four way).
   d. Pass & Seymour; 20AC1 (single pole), 20AC2 (two pole), 20AC3 (three way), 20AC4 (four way).

C. Pilot Light Switches, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Cooper; 2221PL for 120 V and 277 V.
   b. Hubbell; HPL1221PL for 120 V and 277 V.
   c. Leviton; 1221-PLR for 120 V, 1221-7PLR for 277 V.
   d. Pass & Seymour; PS20AC1-PLR for 120 V.
2. Description: Single pole, with neon-lighted handle, illuminated when switch is "ON."

D. Key-Operated Switches, 120/277 V, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Cooper; 2221L.
   b. Hubbell; HBL1221L.
   c. Leviton; 1221-2L.
   d. Pass & Seymour; PS20AC1-L.
2. Description: Single pole, with factory-supplied key in lieu of switch handle.

E. Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Cooper; 1995.
   b. Hubbell; HBL1557.
   c. Leviton; 1257.
   d. Pass & Seymour; 1251.

F. Key-Operated, Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors, with factory-supplied key in lieu of switch handle.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Cooper; 1995L.

b. Hubbell; HBL1557L.

c. Leviton; 1257L.

d. Pass & Seymour; 1251L.

2.5 WALL-BOX DIMMERS

A. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.

B. Control: Continuously adjustable slider; with single-pole or three-way switching. Comply with UL 1472.

C. Incandescent Lamp Dimmers: 120 V; control shall follow square-law dimming curve. On-off switch positions shall bypass dimmer module.

1. 600 W; dimmers shall require no de-rating when ganged with other devices. Illuminated when "OFF."

D. Fluorescent Lamp Dimmer Switches: Modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming with low end not greater than 20 percent of full brightness.

2.6 FAN SPEED CONTROLS

A. Modular, 120-V, full-wave, solid-state units with integral, quiet on-off switches and audible frequency and EMI/RFI filters. Comply with UL 1917.

1. Continuously adjustable slider, 5 A.

2. Three-speed adjustable slider, 1.5 A.

2.7 OCCUPANCY SENSORS

A. Wall-Switch Sensors:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Cooper; 6111 for 120 V, 6117 for 277 V.

b. Hubbell; WS1277.

c. Leviton; ODS 10-ID.

d. Pass & Seymour; WS3000.

e. Watt Stopper (The); WS-200.

2. Description: Passive-infrared type, 120/277 V, adjustable time delay up to 30 minutes, 180-degree field of view, with a minimum coverage area of 900 sq. ft.

B. Wall-Switch Sensors:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Hubbell; AT120 for 120 V, AT277 for 277 V.

b. Leviton; ODS 15-ID.

2. Description: Adaptive-technology type, 120/277 V, adjustable time delay up to 20 minutes, 180-degree field of view, with a minimum coverage area of 900 sq. ft.

C. Long-Range Wall-Switch Sensors:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Hubbell; ATP1600WRP.

b. Leviton; ODWWV-IRW.

c. Pass & Seymour; WA1001.

d. Watt Stopper (The); CX-100.

2. Description: Passive-infrared type, 120/277 V, adjustable time delay up to 30 minutes, 110-degree field of view, with a minimum coverage area of 1200 sq. ft.

D. Long-Range Wall-Switch Sensors:
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Hubbell; ATD1600WRP.
      b. Leviton; ODW12-MRW.
      c. Watt Stopper (The); DT-200.
   2. Description: Dual technology, with both passive-infrared- and ultrasonic-type sensing, 120/277 V, adjustable time delay up to 30 minutes, 110-degree field of view, and a minimum coverage area of 1200 sq. ft.

E. Wide-Range Wall-Switch Sensors:
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Hubbell; ATP120HBRP.
      b. Leviton; ODWHB-IRW.
      c. Pass & Seymour; HS1001.
      d. Watt Stopper (The); CX-100-3.
   2. Description: Passive-infrared type, 120/277 V, adjustable time delay up to 30 minutes, 150-degree field of view, with a minimum coverage area of 1200 sq. ft.

F. Exterior Occupancy Sensors:
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Leviton; PS200-10.
      b. Watt Stopper (The); EW-100-120.
   2. Description: Passive-infrared type, 120/277 V, weatherproof, adjustable time delay up to 15 minutes, 180-degree field of view, and 110-foot detection range. Minimum switch rating: 1000-W incandescent, 500-VA fluorescent.

2.8 COMMUNICATIONS OUTLETS

A. Telephone Outlet:
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Cooper; 3560-6.
      b. Leviton; 40649.
   2. Description: Single RJ-45 jack for terminating 100-ohm, balanced, four-pair UTP; TIA/EIA-568-B.1 complying with Category 5e. Comply with UL 1863.

B. Combination TV and Telephone Outlet:
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Cooper; 3562.
      b. Leviton; 40595.
   2. Description: Single RJ-45 jack for 100-ohm, balanced, four-pair UTP; TIA/EIA-568-B.1; complying with Category 5e; and one Type F coaxial cable connector.

2.9 WALL PLATES

A. Single and combination types to match corresponding wiring devices.
   1. Plate-Securing Screws: Metal with head color to match plate finish.
   2. Material for Finished Spaces: 0.035-inch- thick, satin-finished stainless steel.
   3. Material for Unfinished Spaces: Galvanized steel.
   4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations."

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant, die-cast aluminum with lockable cover.

2.10 FINISHES

A. Color: Wiring device catalog numbers in Section Text do not designate device color.
   1. Wiring Devices Connected to Normal Power System: As selected by Architect, unless otherwise indicated or required by NFPA 70 or device listing.
   2. Wiring Devices Connected to Emergency Power System: Red.
   3. TVSS Devices: Blue.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.

B. Wrap all back-boxes in drywall partitioning with 3M (or equal) putty for soundproofing and fire rating.

C. Coordination with Other Trades:
   1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
   2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
   3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
   4. Install wiring devices after all wall preparation, including painting, is complete.

D. Conductors:
   1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
   2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
   3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
   4. Existing Conductors:
      a. Cut back and pigtail, or replace all damaged conductors.
      b. Straighten conductors that remain and remove corrosion and foreign matter.
      c. Pigtailing existing conductors is permitted provided the outlet box is large enough.

E. Device Installation:
   1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
   2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
   3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
   4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
   5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
   6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
   7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.

8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

F. Receptacle Orientation:
1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.

G. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

H. Dimmers:
1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

I. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

3.2 IDENTIFICATION

A. Comply with "Identification for Electrical Systems" code.
1. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with black white red-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.
1. Test Instruments: Use instruments that comply with UL 1436.
2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.

B. Tests for Convenience Receptacles:
1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new, and retest as specified above.

END OF SECTION 262726

SECTION 26 28 13 – FUSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Cartridge fuses rated 600-V ac and less for use in enclosed switches.

1.2 SUBMITTALS

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

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NEMA FU 1 for cartridge fuses.

C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Cooper Bussmann, Inc.
2. Edison Fuse, Inc.
3. Ferraz Shawmut, Inc.
4. Littelfuse, Inc.

2.2 CARTRIDGE FUSES

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

PART 3 - EXECUTION

3.1 FUSE APPLICATIONS

A. Motor Branch Circuits: Class RK5, time delay.

B. Control Circuits: Class CC, time delay.

3.2 INSTALLATION

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

3.3 IDENTIFICATION

A. Install labels complying with requirements for identification and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block and holder per code.

END OF SECTION 262813

SECTION 26 28 16 – ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Fusible switches.
   2. Nonfusible switches.
   3. Receptacle switches.
   4. Shunt trip switches.
   5. Molded-case circuit breakers (MCCBs).
   6. Enclosures.

1.2 DEFINITIONS

A. NC: Normally closed.

B. NO: Normally open.

C. SPDT: Single pole, double throw.

1.3 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Enclosed switches and circuit breakers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
   1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.4 SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated.

B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.
   1. Wiring Diagrams: For power, signal, and control wiring.

C. Seismic Qualification Certificates: For enclosed switches and circuit breakers, accessories, and components, from manufacturer.

D. Field quality-control reports.

E. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide equipment from one of the following manufacturers:

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.

B. Type GD, General Duty, Single Throw, 240-V ac, 800 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with cartridge fuse interiors to accommodate specified fuses, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

C. Type HD, Heavy Duty, Single Throw, 240 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

D. Type HD, Heavy Duty, Double Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

E. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Lugs: Suitable for number, size, and conductor material.
5. Service-Rated Switches: Labeled for use as service equipment.

2.2 NONFUSIBLE SWITCHES

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

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.

B. Type GD, General Duty, Single Throw, 600 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

C. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

D. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Lugs: Suitable for number, size, and conductor material.

2.3 RECEPTACLE SWITCHES

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

B. Type HD, Heavy-Duty, Single-Throw Fusible Switch: 600-V ac, 100 A; UL 98 and NEMA KS 1; horsepower rated, with clips or bolt pads to accommodate specified fuses; lockable handle with capability to accept three padlocks; interlocked with cover in closed position.

C. Type HD, Heavy-Duty, Single-Throw Nonfusible Switch: 600-V ac, 100 A; UL 98 and NEMA KS 1; horsepower rated, lockable handle with capability to accept three padlocks; interlocked with cover in closed position.

D. Interlocking Linkage: Provided between the receptacle and switch mechanism to prevent inserting or removing plug while switch is in the on position, inserting any plug other than specified and turning switch on if an incorrect plug is inserted or correct plug has not been fully inserted into the receptacle.

2.4 MOLDED-CASE CIRCUIT BREAKERS

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

B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

C. 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.

D. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Comply with mounting and anchoring requirements per code.

C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

D. Install fuses in fusible devices.

E. Comply with NECA 1.

3.2 IDENTIFICATION

A. Comply with "Identification for Electrical Systems" code.

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken and observations after remedial action.

END OF SECTION 262816

SECTION 26 33 63 - SOLID STATE UNINTERRUPTIBLE POWER SUPPLY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.2 SUMMARY

A. Scope: Provide design and engineering, labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for a solid state uninterruptible power supply (UPS) as required for the complete performance of the work, and as shown on the Drawings and as herein specified.

B. Section Includes: The work specified in this Section includes, but shall not be limited to, a three-phase, on-line, double conversion, solid state UPS. The UPS shall operate in conjunction with the existing building electrical system to provide high quality power conditioning, back-up power protection, and distribution for electronic equipment loads. The system shall consist of a solid state IGBT rectifier/inverter, power factor corrected rectifier, a 100 percent rated for continuous duty static switch, battery plant, graphical status/control panel, and synchronizing circuitry as described herein.

1.3 REFERENCES

A. General: The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.

B. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

1. ANSI/IEEE C62.41, "Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits" (copyrighted by IEEE, ANSI approved).

C. International Organization for Standardization (ISO):

1. ISO 9001, "Quality Management Systems - Requirements."

D. National Electrical Manufacturers Association (NEMA):

1. NEMA PE 1, " Uninterruptible Power Systems (UPS) - Specification and Performance Verification."

E. National Fire Protection Association (NFPA):

1. NFPA 70, "National Electrical Code" (copyrighted by NFPA, ANSI approved) - hereinafter referred to as NEC.

F. Underwriters Laboratories, Inc. (UL):

1. UL 1778, "Standard for Uninterruptible Power Supply Equipment" (copyrighted by UL, ANSI approved). "
2. UL 924, "Emergency Lighting and Power Equipment"

1.4 SYSTEM DESCRIPTION

A. UPS Design Requirements:

1. Output Power Continuous Rating: The continuous output power rating of the UPS shall be 100 kVA at a 0.9 lagging power factor.

2. Field-Powered Upgrade: The following power ratings may be upgraded in the field to provide more output power with no increase in footprint:
   a. 100 kVA/90 kW UPS modules shall upgrade to 130 kVA/117 kW.
3. Input Voltage: 480 volts AC, -15 percent +10 percent, three-phase, 3 wires, grounded wye, configuration plus ground.
4. Output Voltage: 208/120 volts AC, three-phase, 3 wires plus ground.
5. Input Current: 150 amps @ 480 volts AC maximum charging
6. Output Current: 277 amps @ 208 volts AC
7. Battery Autonomy: UPS shall be capable of operating at full load for 17 minutes at 0.9 PF output at a temperature of 77 °F (25 °C) on battery power.
8. Battery Type: Valve regulated sealed lead acid (VRLA).

B. AC Input Characteristics:
1. Voltage: 480 volts AC, -15 percent +10 percent, three-phase, 3 wires, grounded wye, configuration plus ground.
2. Frequency: 60 hertz, ±5 percent.
3. Power Factor: Greater than 0.98 lagging.
4. Total Harmonic Distortion: Less than 5 percent at full load.
5. Inrush Current: Less than nominal input current for less than one cycle.
6. Input Surge Protection: UPS shall be equipped to withstand surges per ANSI/IEEE C62.41.

C. AC Output Characteristics:
1. Voltage: 208 volts AC, ±1 percent steady state variation phase-to-phase voltage volts AC, three-phase, 3 wires plus ground. 4 wire output shall be available through optional transformer.
2. Frequency: 60 hertz, ±1.0 percent (or selectable up to 4 percent); 60 hertz, ±0.1 percent when free running.
3. Voltage Regulation: ±1.0 percent for balanced load, ±1.75 percent for 50 percent unbalanced load, ±2.5 percent for 100 percent unbalanced load.
4. Voltage Distortion: Maximum 2 percent total (THD) and 1 percent any single harmonic on 100 percent linear loads.
5. Voltage Transient (Step Load) Response: ±2 percent for load step changes from 100 percent to 0 and from 0 to 100 percent. The system returns to the ±1 percent range in rms value in less than 100 ms.
6. Voltage Recovery Time: Return to within 1 percent of nominal value within 16.67 milliseconds (one cycle).
7. Phase Angle Displacement: 120 degrees, +1 degree for balanced load; 120 degrees, +3 degrees for 100 percent unbalanced load.
8. Non-Linear Load Capability: Output voltage total harmonic distortion shall be less than 3 percent when connected to a 100 percent non-linear load with a crest factor not to exceed 3 percent.
9. Slew Rate: 1.0 hertz/second maximum (or selectable up to 2.0 hertz/second).
10. Power Factor: 0.9 at the rated volt amperes (VA).
11. Inverter Overload Capability: 125 percent of rated load for 10 minutes, 150 percent of rated load for 1 minute.
12. Bypass Overload Capability: Greater than 212 percent for one cycle; greater than 150 percent for 1 minute.

D. Battery:
1. Battery Voltage: 356 volts DC minimum before cutoff; 432 volts DC nominal; 490 volts DC equalization voltage.
2. Maximum DC Current: Maximum DC current at cutoff voltage shall be 273 amperes.

3. The battery charger is equipped with a temperature probe to enable temperature compensated charging.

1.5 FACTORY TEST

A. Prior to delivery to site, the contractor shall arrange for the fully assembled UPS unit to be load tested to 100% rated capacity (at the rated output voltage) using a portable load bank comprising (4) 20kW resistive elements. The testing shall take place at the vendor's factory (in LA or Orange County) or other off-site facility as agreed with the Engineer. The contractor shall invite both the Owner and Engineer to witness the test procedures outlined below.

B. The load test shall last for a minimum duration of 4 hours while connected to the utility supply. Provide infrared temperature hot-spot scan of the main circuit breakers and switch components at regular intervals. Record the values in the test log.

C. After 4 hours switch the UPS in to bypass and operate on full load for 1 hour. Rescan all the main switches and circuit breakers with IR scanner. Record all the values in the test log.

D. Reset the bypass switch to normal and feed the UPS from the utility. Open the input breaker and connect the load to the battery for a period of 12 minutes under full load. Scan battery terminations and main circuit breakers and switches using the IR scanner. Close the input breaker and observe the UPS battery charging cycle.

E. Power down the load banks switch off the UPS.

1.6 SUBMITTALS

A. General: See general contract conditions for submittal requirements.

B. Product Data: Submit product data showing material proposed. Submit sufficient information to determine compliance with the Drawings and Specifications. Product data shall include, but shall not be limited to, the following:

1. Catalog sheets and technical data sheets to indicate physical data and electrical performance, electrical characteristics, and connection requirements.
2. Manufacturer's installation instructions indicating application conditions and limitations of use stipulated by product inspecting and testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of the product. Include equipment installation outline, connection diagram for external cabling, internal wiring diagram, and written instruction for installation.

C. Shop Drawings: Submit shop drawings for each product and accessory required. Include information not fully detailed in manufacturer's standard product data, including, but not limited to, complete electrical characteristics and connection requirements. Provide detailed equipment outlines with cabinet dimensions and spacing requirements; location of conduit entry/exit paths; location of floor/seismic mounting; available battery types/sizes; cabinet weights; heat rejection and air flow requirements; single-line diagram; and control and external wiring.

D. Wiring Diagrams: Submit wiring diagrams detailing power, signal, and control systems, clearly differentiating between manufacturer-installed wiring and field-installed wiring, and between components provided by the manufacturer and those provided by others.

E. Contract Closeout Submittals:

1. Project Record Documents: Submit a complete set of installation drawings showing all the information specified elsewhere in this Section.
2. Operation and Maintenance Data: Submit operation and maintenance data to include in operation and maintenance manuals including, but not limited to, safe and correct operation of UPS functions.

1.7 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Manufacturer shall be a firm engaged in the manufacture of solid state UPS of types and sizes required, and whose products have been in satisfactory use in similar service for a minimum of 20 years.
    a. The manufacturer shall be ISO 9001 certified and shall be designed to internationally accepted standards.
2. Installer Qualifications: Installer shall be a firm that shall have a minimum of five years of successful installation experience with projects utilizing solid state UPS similar in type and scope to that required for this Project.

B. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.

1. The UPS shall meet the requirements of the following standards:
    a. UL-listed under UL 1778.
    b. UL Canada (cUL).
    c. FCC rules and regulations of Part 15, Subpart J, Class A.
    d. ANSI/IEEE C62.41.
    e. ISO 9001.
2. The UPS shall be designed in accordance with the applicable sections of the documents published by:
    a. National Fire Protection Association (NFPA); NEC.
    b. National Electrical Manufacturers Association (NEMA); NEMA PE 1.
    c. Occupational Safety and Health Administration (OSHA).

C. Factory Testing: Prior to shipment the manufacturer shall complete a documented test procedure to test functions of the UPS module and batteries (via a discharge test), when supplied by the UPS manufacturer, and warrant compliance with this Section. The factory test shall be performed in the presence of the Owner providing the manufacturer receives adequate prior notice. The manufacturer shall provide a copy of the test report upon request.

D. Pre-Installation Conference: Prior to commencing the installation, meet at the Project site to review the material selections, installation procedures, and coordination with other trades. Pre-installation conference shall include, but shall not be limited to, the Owner, the Engineer of Record, the Contractor, the Installer, and any trade that requires coordination with the work. Date and time of the pre-installation conference shall be acceptable to the Owner and the Architect/Engineer.

E. Source Responsibility: Materials and parts comprising the UPS shall be new, of current manufacture, and shall not have been in prior service, except as required during factory testing. Active electronic devices shall be solid state and shall not exceed the manufacturer's recommended tolerances for temperature or current to ensure maximum reliability. Semiconductor devices shall be sealed. Relays shall be provided with dust covers. The manufacturer shall conduct inspections on incoming parts, modular assemblies, and final products.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the Project site in supplier's or manufacturer's original wrappings and containers, labeled with supplier's or manufacturer's name, material or product brand name, and lot number, if any.

B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

C. Products shall be packaged in a manner to prevent penetration by debris and to allow safe delivery by modes of ground transportation and air transportation where specified.

D. Prior to shipping, products shall be inspected at the factory for damage.

E. Equipment shall be protected against extreme temperature and humidity and shall be stored in a conditioned or protected environment.

F. Equipment containing batteries shall not be stored for a period exceeding three months without powering up the equipment for a period of eight hours to recharge the batteries.

1.9 PROJECT CONDITIONS

A. Environmental Requirements: Do not install solid state UPS until space is enclosed and weatherproof, wet work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.

1. The UPS shall operate under the following environmental conditions:
   a. Temperature:
      1) UPS Module Operating: 32 °F (0 °C) to 104 °F (40 °C).
      2) Non-Operating: -4 °F (-20 °C) to 113 °F (45 °C).
   b. Relative Humidity (Operating and Storage): 0 percent to 95 percent non-condensing.
   c. Barometric Pressure: Up to 3281 feet (1000 meters) above sea level (up to 6562 feet [2000 meters] with ambient temperature less than 82 °F [28 °C]) / up to 39,370 feet (12,000 meters) above sea level non-operating.
   d. Audible Noise: 69 dBA at 3 feet (914 mm).

1.10 WARRANTY

A. General: See general contract conditions for warranty details.

B. Special Warranty: The Contractor shall warrant the work of this Section to be in accordance with the Contract Documents and free from faults and defects in materials and workmanship for period indicated below. This special warranty shall extend the one-year period of limitations contained in the General Conditions. The special warranty shall be countersigned by the Installer and the manufacturer.

1. UPS Module: The UPS shall be covered by a full parts and labor warranty from the manufacturer for a period of 12 months from date of installation or acceptance by the Owner or 18 months from date of shipment from the manufacturer, whichever occurs first.
2. Battery: The battery manufacturer's warranty shall be passed through to the final Owner and shall have a minimum period of one year.

C. Additional Owner Rights: The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

1.11 MAINTENANCE

A. The manufacturer shall, upon request, provide spare parts kits for the UPS module in a timely manner as well as provide access to qualified factory-trained first party service personnel to provide preventative maintenance and service on the UPS module when required.

B. UPS subassemblies, as well as the battery, shall be accessible from the front. UPS design shall provide maximum reliability and minimum MTTR (mean time to repair). To that end, the UPS shall be equipped with a self-test function to verify correct system operation. The self-test function shall identify the subassembly requiring repair in the event of a fault. The electronic UPS control and monitoring assembly shall therefore be fully microprocessor-based, thus doing away with potentiometer settings. This shall allow:

1. Auto-compensation of component drift.
2. Self-adjustment of replaced subassemblies.

3. Extensive acquisition of information vital for computer-aided diagnostics (local or remote).
4. Socket connection to interface with computer-aided diagnostics system.

C. The UPS shall be repairable by replacing standard subassemblies requiring no adjustments. Communication via a modem with a remote maintenance system shall be possible.

D. The manufacturer shall offer additional preventative maintenance and service contracts covering both the UPS and the battery bank. Accredited professional service engineers employed exclusively in the field of critical power systems service shall perform maintenance and service. The manufacturer shall also offer extended warranty contracts.

E. The contractor shall include for (2) complete maintenance visits (at 6 month intervals) during the initial 12-month period after handover of the installation and acceptance by the owner. During these two field visits, the contractor shall provide a full maintenance report and shall repair and replace all defective components and parts at no cost to the owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Product specified is "MGE Galaxy 5000" as manufactured by APC by Schneider Electric. Items specified are to establish a standard of quality for design, function, materials, and appearance. Equivalent products by other manufacturers are acceptable. The Architect/Engineer will be the sole judge of the basis of what is equivalent.

2.2 MODES OF OPERATION

A. UPS module shall be designed to operate as a double conversion, on-line reverse transfer system in the following modes.

1. Normal: The inverter shall continuously supply power to the critical load. The PFC rectifier shall derive power from the utility AC source and supply DC power to the inverter while simultaneously float charging the battery.
2. Emergency: Upon failure of the utility AC power source, the critical load shall be supplied by the inverter, which, without any interruption, shall obtain its power from the battery.
3. Recharge: Upon restoration of the utility AC power source (prior to complete battery discharge), the PFC rectifier shall power the inverter and simultaneously recharge the battery.
4. Bypass Mode: The static bypass transfer switch shall be used to transfer the load to the bypass without interruption to the critical power load. This shall be accomplished by turning the inverter off. Automatic re-transfer or forward transfer of the load shall be accomplished by turning the inverter on.

2.3 COMPONENT DESCRIPTION

A. PFC Rectifier and Battery Charger: Incoming AC power shall be converted to a regulated DC output voltage by an IGBT (insulated gate bipolar transistor) power factor correction (PFC) rectifier. The PFC rectifier shall provide high quality DC power to charge the batteries and power the inverter and shall have the following characteristics:

1. Input Power Factor Correction (PFC): The PFC rectifier shall be power factor corrected so as to maintain an input power factor of 0.98 lagging to unity at 75 percent or above load levels to ensure generator compatibility and avoid reflected harmonics from disturbing loads sharing the utility power.
2. Input Harmonic Current Suppression: The PFC rectifier shall produce a sinusoidal input AC current on each phase with low harmonic content, limiting THD on the UPS input to below 5 percent.

3. Battery Charger Current Limiting: The UPS shall be equipped with a system designed to limit the battery recharge current (from 0.05 C10 to 0.1 C10).
4. Charging Levels: The battery charging circuitry shall be capable of being set for automatic battery recharge operation, float service, manual battery charge service, and equalizing or commissioning operation.
5. Intermittent Charging: The battery charge level shall be maintained by an intermittent charging technique between two values Vfmin and Vfmax very close to the floating voltage. This technique shall be based on a cycle made up of a short charge period (a few seconds) from Vfmin to Vfmax followed automatically by a slow discharge period (a few minutes) from Vfmax to Vfmin. This cycle shall be repeated continuously to maintain the battery charge level. In this way the battery shall actually be charging only for a small part of the time, which shall considerably increase its service life.
6. Temperature Compensated Charging: The battery charger shall be equipped with a temperature probe to enable temperature compensated charging and shall adjust the battery float voltage to compensate for the ambient temperature using a negative temperature coefficient of 3 mV per cell per degree Celsius at a nominal temperature of 25 °C.
7. Battery Capacity: The battery charger shall have sufficient capacity to support a fully loaded inverter and shall fully recharge the battery to 95 percent of its full capacity within 6 to 8 hours up to four battery cabinets.

B. Inverter: The UPS output shall be derived from a variable frequency Pulse Width Modulated (PWM) IGBT inverter design. The inverter shall be capable of providing the specified precise output power characteristics while operating over the battery voltage range.

C. Static Bypass - 100 Percent Rated, Continuous Duty: The static bypass transfer switch shall be solid state, rated for 100 percent continuous duty without mechanical contactor device in parallel for higher reliability and consistent response time and shall operate under the following conditions:
1. Uninterrupted Transfer: The static bypass transfer switch shall automatically cause the bypass source to assume the critical load without interruption after the logic senses one of the following conditions:
   a. Inverter overload exceeds unit's rating.
   b. Battery protection period expired and bypass current is available.
   c. Inverter failure.
2. Interrupted Transfer: If the bypass source is beyond the conditions stated below, the UPS shall make an interrupted transfer (not less than 100 milliseconds in duration).
   a. Bypass voltage greater than +10 percent, -10 percent from the UPS rated output voltage.
   b. Bypass frequency greater than ±2 hertz from the UPS rated output frequency.
3. Automatic Uninterrupted Forward Transfer: The static bypass transfer switch shall automatically forward transfer power, without interruption, after the UPS inverter is turned on after an instantaneous overload-induced reverse transfer has occurred and the load current returns the UPS's nominal rating or less.
4. Manual Transfer: A manual static transfer shall be initiated from the UPS control panel by turning the UPS inverter off.
5. Overload Ratings: The static bypass transfer switch shall have the following overload characteristics:
   a. 1000 percent of UPS output rating for 0.016 seconds (one cycle).
   b. 150 percent for 1 second.
   c. 125 percent of UPS for 1 minute.

D. Output Static Switch - 100 percent Rated, Continuous Duty: UPS output shall be equipped with a 100 percent rated output static switch without mechanical contactor device in parallel for higher reliability and consistent response time of 16.66 milliseconds.

2.4 SYSTEM CONTROLS AND INDICATORS

A. Microprocessor-Controlled Logic:

1. The full UPS operation shall be provided through the use of microprocessor-controlled logic. Operation and parameters shall be firmware-controlled, thus eliminating the need for manual adjustments or potentiometers. The logic shall include, but shall not be limited to, a self-test and diagnostic circuitry such that a fault shall be isolated down to the printed circuit assembly or plug-in power assembly level. Every printed circuit assembly or plug-in power assembly shall be monitored. Diagnostics shall be performed via a PC through the local diagnostics port on the UPS. UPS shall be microprocessor-controlled.
2. The UPS shall include, but shall not be limited to, a standard easy-to-use control and indicator panel. Included shall be a backlit, color graphic animated LCD display and LED indicators. The UPS panel shall include, but shall not be limited to, UPS on and UPS off pushbuttons that shall permit the Owner to safely command the UPS on or off without risk of load loss.
3. Display shall facilitate operation by offering the functions listed below:
   a. Operating information supplied on the screens.
   b. The graphic display shall assist the Owner by providing step-by-step help in the Owner's language.
   c. LED mimic diagram. The mimic diagram shall enable display of installation parameters, configuration, operating status and alarms and indication of operator instructions for switching operations (i.e., bypass).
   d. It shall be possible to display the following measurements:
      1) Inverter output phase-to-phase voltages.
      2) Inverter output currents.
      3) Inverter output frequency.
      4) Voltage across battery bank.
      5) Battery charge or discharge current.
      6) Rectifier/charger input phase-to-phase voltages.
      7) Rectifier/charger input currents.
      8) Active and apparent power.
      9) Power factor of the load.
      10) Battery temperature.
      11) Display of status conditions and events.
   e. It shall be possible to display the following indications:
      1) Load on battery power.
      2) Load on UPS.
      3) Load on automatic bypass.
      4) General alarm.
      5) Battery fault.
      6) Remaining battery backup time.
      7) Low battery warning.
      8) Bypass AC source outside tolerances.
   f. Additional information shall be provided in view of accelerating servicing of the system.
   g. Log of time-stamped events. This function shall store in memory and make available, for automatic or manually initiated recall, time-stamped logs of important status changes, faults, and malfunctions, complete with an analysis and display of troubleshooting procedures. It shall be possible to time stamp and store at least 2000 events.

B. Front Panel LCD Display: The UPS control panel shall provide a backlit, color graphic display with choice of over 15 operating languages for indication of UPS status, metering, battery status, alarm/event log, and advanced operational features.

1. Access: The display shall provide access to:
   a. Mimic diagram indicating UPS power flow.
   b. Measurements, status indications, and events.
   c. Personalization menu protected by a password, used to make specific settings.
   d. Event log with time stamping.
   e. Access to measurements.
2. System Parameters Monitored: The visual display shall display the following system parameters based on true RMS metering:
   a. Measurements:
      1) Input voltage (Ph-Ph).
      2) Input current per phase.
      3) Bypass voltage.
      4) Bypass input frequency.
      5) UPS output voltage (Ph-Ph and Ph-N).
      6) UPS output current per phase.
      7) UPS output frequency.
      8) UPS output percent load.
      9) UPS output kVA.
      10) UPS output power factor.
      11) Battery voltage.
      12) Crest factor.
      13) Battery current.
      14) Battery backup time and remaining service life.
   b. Status Indications and Events:
      1) Load on battery.
      2) Load on UPS.
      3) Load on automatic bypass.
      4) Low battery warning.
      5) General alarm.
      6) Battery fault.
      7) Remaining back-up time during operation on battery power.
      8) Bypass source outside tolerances.
      9) Additional indications shall provide maintenance assistance.
3. Time-Stamped Historical Events: This function shall time stamp and store important status changes, anomalies, and faults and make this information available for automatic or Owner-requested consultation.

C. LED Status Indicators: The UPS control panel shall provide three LEDs that shall signal the following status conditions:

1. Green LED: Load protected.
2. Yellow LED: Minor fault.
3. Red LED: Major fault, load not protected.

D. On/Off Switch: The UPS shall provide the on and off buttons to start and stop the inverter. The switch shall provide a built-in time delay to eliminate the risk of inadvertent operation (additional confirmation shall be requested). It shall be possible to remotely activate the off function via an isolated dry contact to create an emergency power off function, resulting in:

1. Inverter shutdown.
2. Opening of the automatic bypass.
3. Opening of the input, bypass, output, and battery switches/circuit breakers.
4. Opening of the isolated dry contact on the programmable relay card.

E. Audible Alarm Reset: The UPS shall provide an audible alarm that can be stopped using the user interface. If a new alarm is sensed after the original alarm has been silenced, it shall reactivate the audible alarm.

F. Remote Emergency Power Off (REPO): The UPS shall be equipped with provisions for remote emergency power off and dry contact input that shall be used to command UPS shutdown remotely. Activation of this command shall lead to the following actions:

1. Inverter shutdown.
2. Opening of the static bypass switch and the battery circuit breaker.
3. Opening of an isolated dry contact on the programmable relay board.

G. DB-9 Connector: One DB-9 connector with serial output shall be provided for field diagnostics.

H. Dry Contacts: The UPS shall be provided standard with a programmable input/output relay board. This board shall have eight dry contacts (i.e., six for input signals and two for output signals).

1. Contacts shall be programmed as:
   a. UPS on-line.
   b. Load on bypass.
   c. UPS on battery.
   d. UPS battery low.
   e. General alarm.
   f. Battery fault.
   g. Remote UPS on (input).
   h. Remote UPS off (input).
2. The contacts shall be normally open and shall change state to indicate the operating status. The contacts shall be rated at 2.0 amperes (250 volts AC/30 volts DC).

2.5 MECHANICAL DESIGN AND VENTILATION

A. Enclosure: The UPS shall be housed in a freestanding enclosure with dead front construction. The mechanical structure of the UPS shall be sufficiently strong and rigid to withstand handling and installation operations without risk. The sheet metal elements in the structure shall be protected against corrosion by a suitable treatment, such as zinc electroplating, bi-chromating, epoxy paint, or an equivalent.

B. Cable Access: The standard UPS available shall accommodate top entry cables..

C. Cabinet Weights and Dimensions: The width of the UPS shall be 28 inches and shall have a maximum weight of 1,168 pounds.

D. Ventilation and Heat Rejection: The UPS shall be designed for forced air cooling. Air inlets shall be provided from the front bottom of the UPS enclosure. Air exhaust shall be from the top portion of the unit. Full load heat rejection shall be 19,610 BTUs per hour.

2.6 BATTERY

A. General: The UPS module shall use a valve-regulated sealed lead acid heavy duty industrial battery, designed for auxiliary power service in an UPS application. The primary battery shall be furnished with impact-resistant plastic cases and housed in a matching cabinet(s) next to the UPS module.

B. Protection Against Deep Discharge and Self-Discharge: The UPS shall be equipped with a device designed to protect the battery against deep discharge, depending on discharge conditions, with isolation of the battery by a circuit breaker. In particular, a monitoring device shall adjust the battery shutdown voltage as a function of a discharge coefficient to avoid excessive discharge at less than the rated output. A second device shall avoid self-discharge of the battery into the UPS control circuits during an extended shutdown of the UPS (over two hours).

C. Battery Self-Tests:
   1. The battery monitoring system shall be able to perform the following automatic functions:
      a. Battery circuit checks every 12 hours.
      b. Open circuit battery test once a month.
      c. Partial discharge test every three months.
   2. This self-test system shall signal faults via LEDs on the front panel or a message to remote supervision systems.

2.7 OPTIONAL ACCESSORIES

A. StruxureWare Data Center Expert: A centralized infrastructure management platform hereafter referred to as Data Center Expert shall be available for purposes of complete system monitoring and management of all components outlined in this specification used as a single solution for small IT or part of the StruxureWare software stack providing data to systems such as Data Center Operation.
   1. Monitoring - Data Center Expert shall be capable of monitoring a PDU through a network of Cat 5 cable and a switch supplied by the user. This switch shall relay information to Data Center Expert, which in turn shall allow access to this information via the user's public network via a single IP address.
   2. Monitored Values: Data Center Expert shall be capable of monitoring alarms, general status parameters, voltage and current of the PDU.
   3. Thresholds: For individualized customer needs, Data Center Expert shall allow for user configurable thresholds for alarm notification. With this feature, Data Center Expert can notify clients of reaching thresholds for PDU capacity, or branch circuit breaker capacity. Other custom programmable alarm points for non- APC products shall also be available via dry contact input signal.
   4. Public Network Monitoring: Data Center Expert shall also be capable of monitoring other APC devices that are connected to the client's public network.

B. Extended Battery Cabinet: Matching battery cabinets shall be furnished in both adjacent or stand alone versions. The cabinet shall match the height and depth of the UPS module and shall have a width of 26 inches (660 mm), 36 inches (914 mm), or 48 inches (1219 mm) per battery cabinet. Power wiring and control cables shall be included for adjacent models (remote cabinet cables will be provided by the Owner).

C. External Control and Communications Devices: Up to three of the following control and communications devices may be installed in the UPS module:
   1. RS-232/U-Talk or Dry Contacts Card (66060): The U-Talk protocol shall be used with Solution-Pac 2 for remote monitoring or graceful shutdown for most popular file servers. The dry contacts shall close on predefined conditions to monitor UPS operations. This shall require one communication slot and optional cables.
      a. The dry contacts shall close on the conditions listed below, but shall be Owner-programmable to close on preset thresholds of other Owner UPS parameters:
         1) UPS on-line.

2) Load on bypass.
3) UPS on battery.
4) Low battery warning.
5) Battery fault.
6) General alarm.

b. Two dry contact inputs shall also be provided to turn the UPS inverter on and off remotely upon closure of the contacts. This feature may also be disabled if required.

2. RS-232 or RS-485 JBus/Modbus Card (66061): The U-Talk protocol shall be used with Solution-Pac 2 for remote monitoring or graceful shutdown for most popular file servers. The JBus protocol shall be used with third party Building Management Systems (BMS) to monitor detailed three-phase information. This shall require one communication slot and optional cables.

3. High Voltage 6 Alarm Relays Card (66069): A second set (one set shall be provided standard with the UPS module) of six normally open dry contact outputs rated at 2.0 A (250 volts DC/30 volts DC) shall be available to monitor UPS operation.

a. The dry contacts shall close on the conditions listed below, but shall be Owner-programmable to close on preset thresholds of other Owner UPS parameters:

1) UPS on-line.
2) Load on bypass.
3) UPS on battery.
4) Low battery warning.
5) Battery fault.
6) General alarm.

b. Two dry contact inputs shall also be provided to turn the UPS inverter on and off remotely upon closure of the contacts. This feature may also be disabled if required.

4. Network Management Card (66074): The Network Management Card (NMC) shall provide a web interface, SNMP (Simple Network Management Protocol), logging, and email capabilities. The NMC shall be used for remote monitoring or graceful shutdown for most popular file servers.

5. IBM AS/400 Volt-Free Contact/Remote Power Off Card (66068): The UPS shall interface with an IBM AS400-UPS signal interface providing the following signals via dry contacts:

a. Load on battery.
b. Load on bypass.
c. Low battery shutdown warning.
d. Load powered by UPS.

6. Multi-Slot Communications Card Expander (66071): The Multi-Slot shall provide three additional communication slots. The U-Talk Acquisition Card (66063) shall be included.

D. Distribution 208 Volt Panelboard: Single or dual, 42 pole front-facing distribution panelboard shall be provided with the UPS in a matching adjacent wide cabinet. The panelboard shall be a Square D, NQO Panel accommodating 10 to 100 ampere breakers. The panelboard shall accommodate any combination or one, two, or three pole breakers and shall have a submain circuit breaker (optional) feeding the panelboard.

E. Two or Three Circuit Breaker External Maintenance Bypass: The maintenance bypass option shall provide for two or three circuit breakers mounted inside either freestanding adjacent or remote or wall-mounted enclosure to provide a wrap-around bypass configuration for total UPS isolation during maintenance. Maintenance bypass transfers shall be without interruption and shall have mechanical keyed interlocks to protect the UPS from damage in the event of out-of-sequence transfers. Electrically based solenoid-activated key release shall be available to control the removal of the keys from the key interlock.

F. Remote Alarm Status Panel (RASP): A wall-mounted panel, 17.5 inches high by 12 inches wide by 4 inches deep, with eight indicating LED's shall display UPS status and any active alarms. The alarms shall be a latching type, such that if an alarm is triggered, the LED shall stay on (latch) even if the alarm is corrected. This feature shall provide the operator the chance to verify the occurrence of the alarm.

1. The parameters monitored and controls provided on the RASP shall include, but shall not be limited to, the following:
   a. UPS on-line (green LED).
   b. UPS on battery (yellow LED).
   c. Load on bypass (yellow LED).
   d. UPS summary alarm (red LED).
   e. Low battery shutdown.
2. The RASP shall also be equipped with:
   a. Alarm test/reset pushbutton (white LED) to reset the latching alarm.
   b. Audible alarm for alarm annunciation.
   c. Audible alarm reset pushbutton (white LED) to silence the audible alarm.
3. The RASP door shall be equipped with a key lock. The recommended maximum distance from the UPS module shall be 500 feet (152 m).

G. Seismic Anchors: Seismic Zone 4 anchors shall be available for system cabinets.

H. Dual Input: Provide dual input to accommodate a separate input source.

I. Bypass Input Fuses: Bypass input fuses shall be optionally provided on the bypass for current limiting of 65 k AIC.

J. Top Entry Cabinet: 16 inch cabinet shall allow cable entry to UPS unit when MBC or transformer cabinets are not selected.

K. Transformer Cabinet: Provide single or dual K20 transformer, 208 volts, 220 volts, 480 volts, and 600 volts are available. Top entry power cables to the UPS can be achieved via these cabinets.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Architect/Engineer, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

1. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

3.2 INSTALLATION

A. Preparation and installation shall be in accordance with reviewed product data, final shop drawings, manufacturer's written recommendations, and as indicated on the Drawings.

3.3 FIELD QUALITY CONTROL

A. Field Service Engineer Qualifications: The manufacturer shall employ a 7 x 24 nationwide (international where applicable) field service organization with rapid access to all regions of the nation. The responding service professionals shall be factory-trained engineers with an accredited and proven competence to service three-phase UPS.

B. Spare Parts: Field Engineers shall have immediate access to recommended spare parts with additional parts storage located in regional depots. Additional spare parts shall be accessible on a 7 x 24 basis

from the national depot and shall be expedited on a next available flight basis or via direct courier (whichever mode is quickest).

3.4 DEMONSTRATION

A. Provide the services of a factory-authorized service representative of the manufacturer to provide on-site start-up service and to demonstrate and train the Owner's personnel.

1. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.
2. Train the Owner's maintenance personnel on procedures and schedules related to start-up and shutdown, troubleshooting, servicing, and preventive maintenance.
3. Review data in operation and maintenance manuals with the Owner's personnel.
4. Schedule training with the Owner, through the Architect/Engineer, with at least seven day's advanced notice.

3.5 PROTECTION

A. Provide final protection and maintain conditions in a manner acceptable to the Installer, that shall ensure that the solid state UPS shall be without damage at time of Substantial Completion.

END OF SECTION 263363

SECTION 26 36 00 - AUTOMATIC TRANSFER SWITCHES

PART 1 - GENERAL

1.1 Scope

A. Furnish and install automatic transfer switches (ATS) with number of poles, amperage, voltage, withstand and close-on ratings as shown on the plans. Each automatic transfer switch shall consist of an inherently double throw power transfer switch mechanism and a microprocessor controller to provide automatic operation. All transfer switches and controllers shall be the products of the same manufacturer.

1.2 Codes and Standards

The automatic transfer switches and controls shall conform to the requirements of:

A. UL 1008 - Standard for Transfer Switch Equipment

B. CSA certified to CSA 22.2 No. 178 – 1978 Automatic Transfer Switches

C. IEC 60947-6-1 Low-voltage Switchgear and Controlgear; Multifunction equipment; Automatic Transfer Switching Equipment

D. NFPA 70 - National Electrical Code

E. NFPA 99 - Essential Electrical Systems for Health Care Facilities

F. NFPA 110 - Emergency and Standby Power Systems

G. IEEE Standard 446 - IEEE Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications

H. NEMA Standard ICS10-1993 (formerly ICS2-447) - AC Automatic Transfer Switches

I. UL 508 Industrial Control Equipment

1.3 Acceptable Manufacturers

Automatic transfer switches shall be ASCO 7000 Series. Any alternate shall be submitted for approval to the Engineer at least 10 days prior to bid. Alternate bids must list any deviations from this specification.

PART 2 - PRODUCTS

2.1 Mechanically Held Transfer Switch

A. The transfer switch shall be electrically operated and mechanically held. The electrical operator shall be a momentarily energized, single-solenoid mechanism. Main operators which include overcurrent disconnect devices, linear motors or gears shall not be acceptable. The switch shall be mechanically interlocked to ensure only two possible positions, normal or emergency.

B. All transfer switch sizes shall use only one type of main operator for ease of maintenance and commonality of parts.

C. The switch shall be positively locked and unaffected by momentary outages, so that contact pressure is maintained at a constant value and contact temperature rise is minimized for maximum reliability and operating life.

D. All main contacts shall be silver composition. Switches rated 800 amperes and above shall have segmented, blow-on construction for high withstand and close-on capability and be protected by separate arcing contacts.

E. Inspection of all contacts shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. Switches rated 800 amps and higher shall have front removable and replaceable contacts. All stationary and moveable contacts shall be replaceable without removing power conductors and/or bus bars.

F. Designs utilizing components of molded-case circuit breakers, contactors, or parts thereof, which are not intended for continuous duty, repetitive switching or transfer between two active power sources are not acceptable.

G. Where neutral conductors must be switched as shown on the plans, the ATS shall be provided with fully rated overlapping neutral transfer contacts. The neutrals of the normal and emergency power sources shall be connected together only during the transfer and retransfer operation and remain connected together until power source contacts close on the source to which the transfer is being made. The overlapping neutral contacts shall not overlap for a period greater than 100 milliseconds. Neutral switching contacts which do not overlap are not acceptable.

H. Where neutral conductors are to be solidly connected as shown on the plans, a neutral conductor plate with fully rated AL-CU pressure connectors shall be provided.

2.2 Microprocessor Controller

A. The controller's sensing and logic shall be provided by a single built-in microprocessor for maximum reliability, minimum maintenance, and the ability to communicate serially through an optional serial communication module.

B. A single controller shall provide twelve selectable nominal voltages for maximum application flexibility and minimal spare part requirements. Voltage sensing shall be true RMS type and shall be accurate to ± 1% of nominal voltage. Frequency sensing shall be accurate to ± 0.2%. The panel shall be capable of operating over a temperature range of -20 to +60 degrees C and storage from -55 to +85 degrees C.

C. The controller shall be connected to the transfer switch by an interconnecting wiring harness. The harness shall include a keyed disconnect plug to enable the controller to be disconnected from the transfer switch for routine maintenance. Sensing and control logic shall be provided on multi-layer printed circuit boards. Interfacing relays shall be industrial grade plug-in type with dust covers. The panel shall be enclosed with a protective cover and be mounted separately from the transfer switch unit for safety and ease of maintenance. The protective cover shall include a built-in pocket for storage of the operator's manuals.

D. All customer connections shall be wired to a common terminal block to simplify field-wiring connections.

E. The controller shall meet or exceed the requirements for Electromagnetic Compatibility (EMC) as follows:

1.	EN 55011:1991	Emission standard - Group 1, Class A
2.	EN 50082-2:1995	Generic immunity standard, from which:
	EN 61000-4-2:1995	Electrostatic discharge (ESD) immunity
	ENV 50140:1993	Radiated Electro-Magnetic field immunity
	EN 61000-4-4:1995	Electrical fast transient (EFT) immunity
	EN 61000-4-5:1995	Surge transient immunity
	EN 61000-4-6:1996	Conducted Radio-Frequency field immunity

2.3 Enclosure

A. The ATS shall be furnished in a Type 1 enclosure unless otherwise shown on the plans.

B. All standard and optional door-mounted switches and pilot lights shall be 16-mm industrial grade type or equivalent for easy viewing & replacement. Door controls shall be provided on a separate removable

plate, which can be supplied loose for open type units.

PART 3 - OPERATION

3.1 Controller Display and Keypad

A. A four line, 20-character LCD display and keypad shall be an integral part of the controller for viewing all available data and setting desired operational parameters. Operational parameters shall also be available for viewing and limited control through the serial communications input port. The following parameters shall only be adjustable via DIP switches on the controller:

1. Nominal line voltage and frequency
2. Single or three phase sensing
3. Operating parameter protection
4. Transfer operating mode configuration
   (Open transition, Closed transition, or Delayed transition)

All instructions and controller settings shall be easily accessible, readable and accomplished without the use of codes, calculations, or instruction manuals.

3.2 Voltage, Frequency and Phase Rotation Sensing

A. Voltage and frequency on both the normal and emergency sources (as noted below) shall be continuously monitored, with the following pickup, dropout, and trip setting capabilities (values shown as % of nominal unless otherwise specified):

Parameter	Sources	Dropout / Trip	Pickup / Reset
Undervoltage	N&E,3ϕ	70 to 98%	85 to 100%
Overvoltage	N&E,3ϕ	102 to 115%	2% below trip
Underfrequency	N&E	85 to 98%	90 to 100%
Overfrequency	N&E	102 to 110%	2% below trip
Voltage unbalance	N&E	5 to 20%	1% below dropout

B. Repetitive accuracy of all settings shall be within ± 0.5% over an operating temperature range of -20°C to 60°C.

C. Voltage and frequency settings shall be field adjustable in 1% increments either locally with the display and keypad or remotely via serial communications port access.

D. The controller shall be capable (when activated by the keypad or through the serial port) of sensing the phase rotation of both the normal and emergency sources. The source shall be considered unacceptable if the phase rotation is not the preferred rotation selected (ABC or CBA).

E. Source status screens shall be provided for both normal & emergency to pro-vide digital readout of voltage on all 3 phases, frequency, and phase rotation.

F. The controller shall include a user selectable algorithm to prevent repeated transfer cycling to a source on an installation which experiences primary side, single phase failures on a Grounded Wye – Grounded Wye transformer which regenerates voltage when unloaded. The algorithm shall also inhibit retransfer to the normal (utility) source upon detection of a single phasing condition until a dedicated timer expires, the alternate source fails, or the normal source fails completely and is restored during this time delay period. The time delays associated with this feature shall be adjustable by the user through the controller keypad and LCD.

3.3 Time Delays

A. An adjustable time delay of 0 to 6 seconds shall be provided to override momentary normal source outages and delay all transfer and engine starting signals. Capability shall be provided to extend this time delay to 60 minutes by providing an external 24 VDC power supply.

B. A time delay shall be provided on transfer to emergency, adjustable from 0 to 60 minutes, for controlled timing of transfer of loads to emergency.

C. Two time delay modes (which are independently adjustable) shall be provided on re-transfer to normal. One time delay shall be for actual normal power failures and the other for the test mode function. The time delays shall be adjustable from 0 to 60 minutes. Time delay shall be automatically bypassed if the emergency source fails and the normal source is acceptable.

D. A time delay shall be provided on shut down of engine generator for cool down, adjustable from 0 to 60 minutes.

E. A time delay activated output signal shall also be provided to drive an external relay(s) for selective load disconnect control. The controller shall have the ability to activate an adjustable 0 to 5 minute time delay in any of the following modes:

1. Prior to transfer only.
2. Prior to and after transfer.
3. Normal to emergency only.
5. Emergency to normal only.
6. Normal to emergency and emergency to normal.
7. All transfer conditions or only when both sources are available.

F. The controller shall also include the following built-in time delays for optional Closed Transition and Delayed Transition operation:

1. 1 to 5 minute time delay on failure to synchronize normal and emergency sources prior to closed transition transfer.
2. 0.1 to 9.99 second time delay on an extended parallel condition of both power sources during closed transition operation.
3. 0 to 5 minute time delay for the load disconnect position for delayed transition operation.

G. All time delays shall be adjustable in 1 second increments, except the extended parallel time, which shall be adjustable in .01 second increments.

H. All time delays shall be adjustable by using the LCD display and keypad or with a remote device connected to the serial communications port.

3.4 Additional Features

A. A three position momentary-type test switch shall be provided for the ***test / automatic / reset*** modes. The test position will simulate a normal source failure. The reset position shall bypass the time delays on either transfer to emergency or retransfer to normal.

B. A SPDT contact, rated 5 amps at 30 VDC, shall be provided for a low-voltage engine start signal. The start signal shall prevent dry cranking of the engine by requiring the generator set to reach proper output, and run for the duration of the cool down setting, regardless of whether the normal source restores before the load is transferred.

C. Auxiliary contacts, rated 10 amps, 250 VAC shall be provided consisting of one contact, closed when the ATS is connected to the normal source and one contact closed, when the ATS is connected to the emergency source.

D. LED indicating lights (16 mm industrial grade, type 12) shall be provided; one to indicate when the ATS is connected to the normal source (green) and one to indicate when the ATS is connected to the emergency source (red).

E. LED indicating lights (16 mm industrial grade, type 12) shall be provided and energized by controller outputs. The lights shall provide true source availability of the normal and emergency sources, as determined by the voltage sensing trip and reset settings for each source.

The following features shall be built-in to the controller, but capable of being activated through keypad programming or the serial port only when required by the user:

F. Provide the ability to select "commit/no commit to transfer" to determine whether the load should be transferred to the emergency generator if the normal source restores before the generator is ready to accept the load.

G. An Inphase monitor shall be provided in the controller. The monitor shall control transfer so that motor load inrush currents do not exceed normal starting currents, and shall not require external control of power sources. The inphase monitor shall be specifically designed for and be the product of the ATS manufacturer. The inphase monitor shall be equal to ASCO Feature 27.

H. The controller shall be capable of accepting a normally open contact that will allow the transfer switch to function in a non-automatic mode using an external control device.

I. **Engine Exerciser –** Not needed as the generator and ATA operation is checked every two weeks manually.

J. Terminals shall be provided for a remote contact which opens to signal the ATS to transfer to emergency and for remote contacts which open to inhibit transfer to emergency and/or retransfer to normal. Both of these inhibit signals can be activated through the keypad or serial port.

K. System Status - The controller LCD display shall include a "System Status" screen which shall be readily accessible from any point in the menu by depressing the "ESC" key a maximum of two times. This screen shall display a clear description of the active operating sequence and switch position. For example,

Normal Failed

Load on Normal

TD Normal to Emerg

2min15s

Controllers that require multiple screens to determine system status or display "coded" system status messages, which must be explained by references in the operator's manual, are not permissible.

L. Self Diagnostics - The controller shall contain a diagnostic screen for the purpose of detecting system errors. This screen shall provide information on the status input signals to the controller which may be preventing load transfer commands from being completed.

M. Data Logging – The controller shall have the ability to log data and to maintain the last 99 events, even in the event of total power loss. The following events shall be time and date stamped and maintained in a non-volatile memory:

1. Event Logging
   a. Data and time and reason for transfer normal to emergency.
   b. Data and time and reason for transfer emergency to normal.
   c. Data and time and reason for engine start.
   d. Data and time engine stopped.
   e. Data and time emergency source available.
   f. Data and time emergency source not available.
2. Statistical Data
   a. Total number of transfers.
   b. Total number of transfers due to source failure.
   c. Total number of days' controller is energized.
   d. Total number of hours both normal and emergency sources are available.

N. Communications Module – Shall provide remote interface module to support monitoring of vendor's transfer switch, controller and optional power meter. Module shall provide status, analog parameters,

event logs, equipment settings & configurations over embedded webpage and open protocol. Features shall include:

1. Email notifications and SNMP traps of selectable events and alarms may be sent to a mobile device or PC.
2. Modbus TCP/IP, SNMP, HTTP, SMTP open protocols shall be simultaneously supported.
3. Web app interface requiring user credentials to monitor and control the transfer switch supporting modern smart phones, tablets and PC browsers. User will be able to view the dynamic one-line; ATS controls status, alarms, metering, event logging as well as settings.
4. Secure access shall be provided by requiring credentials for a minimum of 3 user privilege levels to the web app, monitor (view only), control (view and control) and administrator (view, control and change settings). 128-Bit AES encryption standard shall be supported for all means of connectivity.
5. Shall allow for the initiating of transfers, retransfers, bypassing of active timers and the activating/deactivating of engine start signal shall be available over the embedded webpage and to the transfer switch vendor's monitoring equipment.
6. An event log displaying a minimum of ninety-nine (99) events shall be viewable and printable from the embedded webpages and accessible from supported open protocols.
7. Four (4) 100 Mbps Ethernet copper RJ-45 ports, five (5) serial ports, Termination dip-switches and LEDs for diagnostics.
8. DIN rail mountable.

This option shall be equivalent to ASCO accessory 72EE2

O. External DC Power Supply – An optional provision shall be available to connect an external 24 VDC power supply to allow the LCD and the door mounted control indicators to remain functional when both power sources are dead. This option shall be equivalent to ASCO accessory 1G.

PART 4 - ADDITIONAL REQUIREMENTS

4.1 Withstand and Closing Ratings

A. The ATS shall be rated to close on and withstand the available RMS symmetrical short circuit current at the ATS terminals with the type of overcurrent protection shown on the plans.

B. The ATS shall be UL listed in accordance with UL 1008 and be labeled in accordance with that standard's 0.025 and 0.05 second, time based ratings. ATSs which are not tested and labeled with time based ratings and have series, or specific breaker ratings only, are not acceptable.

4.2 Tests and Certification

A. The complete ATS shall be factory tested to ensure proper operation of the individual components and correct overall sequence of operation and to ensure that the operating transfer time, voltage, frequency and time delay settings are in compliance with the specification requirements.

B. The ATS manufacturer shall be certified to ISO 9001:2008 International Quality Standard and the manufacturer shall have third party certification verifying quality assurance in design/development, production, installation and servicing in accordance with ISO 9001:2008

4.3 Service Representation

A. The ATS manufacturer shall maintain a national service organization of company-employed personnel located throughout the contiguous United States. The service center's personnel must be factory trained and must be on call 24 hours a day, 365 days a year.

B. The manufacturer shall maintain records of each switch, by serial number, for a minimum of 20 years.

END OF SECTION 263600