CITY OF EVANSTON

SPECIFICATIONS AND BID DOCUMENTS
Construction Bid with Subcontractors

BID NUMBER: 20-05
For
Emergency Generators at Police/Fire Headquarters, Fire Station 2 and Fire Station 1
March 12, 2020

BID OPENING
TIME, DATE, PLACE: 2:00 P.M., Tuesday, April 7, 2020,
Room 2404,
Lorraine H. Morton Civic Center,
2100 Ridge Avenue,
Evanston, Illinois 60201

MANDATORY MANDATORY ATTENDANCE REQUIRED
NO ADMITTANCE AFTER 10:15 A.M.,
PRE-BID MEETING 10:00 AM, March 18, 2020,
Room #2403,
Lorraine H. Morton Civic Center,
2100 Ridge Avenue,
Evanston, Illinois 60201

BID BOND: 5% of Contract Amount

PERFORMANCE/MATERIAL & LABOR PAYMENT BOND: 110% of Contract Amount

CONTRACT PERIOD: Contract award through August 31, 2020

SEALED BIDS TO BE RETURNED TO:
CITY OF EVANSTON
PURCHASING DIVISION, ROOM 4200,
LORRAINE H. MORTON CIVIC CENTER
2100 RIDGE AVENUE, EVANSTON, IL 60201
Phone: 847/866-2935 * Fax: 847/448-8128
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*NOTE: THE SELECTED BIDDER WILL BE SUBJECT TO THE REGULATIONS
CONTAINED IN CITY OF EVANSTON ORDINANCE 60-O-14 AMENDMENTS TO THE
LOCAL EMPLOYMENT PROGRAM (LEP)
CITY OF EVANSTON

NOTICE TO BIDDERS

Sealed bids will be received by the City’s Purchasing Office in Room 4200 of the Lorraine H. Morton Civic Center located at 2100 Ridge Avenue, Evanston, Illinois 60201, until 2:00 P.M. local time Tuesday, April 7, 2020 and will be publicly read thereafter in room 2404. Bids shall cover the following:

Emergency Generators at Police/Fire Headquarters, Fire Station 2 and Fire Station 1

Bid Number: 20-05

Work on this project includes: Removal of existing generators at Fire/Police HQ and Fire #2 and replace with new generators. Replace existing generator cooling system with new pressurized cooling fluid system at Fire Station 1. A mandatory pre-bid meeting will be held at the Lorraine H. Morton Civic Center, Evanston, IL 60201 at 10:00 AM on Wednesday, March 18, 2020, Room 2403. NO ADMITTANCE AFTER 10:15 A.M. The above item shall conform to the Invitation for Bids on file in the Purchasing Office. The bid document, including all necessary plans and specifications, will be available in the Purchasing Office on March 12, 2020. Parties interested in submitting a bid should contact the Purchasing Office to receive a copy of the bid or see the City’s website at: www.cityofevanston.org/business/bids-proposals/ or Demandstar at: www.demandstar.com.

The City of Evanston (the City) in accordance with the laws of the State of Illinois, hereby notifies all Bidders that it will affirmatively ensure that the contract(s) entered into pursuant to this Notice will be awarded to the successful Bidders without discrimination on the ground of race, color, religion, sex, age, sexual orientation, marital status, disability, familial status or national origin. The State of Illinois requires under Public Works contracts that the general prevailing rate of wages in this locality be paid for each craft or type of worker hereunder. This requirement is in accordance with The Prevailing Wage Act (820 ILCS 130) as amended. The City of Evanston reserves the right to reject any or all submittals or to accept the submittal(s) deemed most advantageous to the City.

The Evanston City Council also reserves the right to award the contract to an Evanston firm if that firm's bid is within 5% of the low bid.

Each Bidder shall be required to submit with their bid a disclosure of ownership interest statement form in accordance with the provisions of City Code Section 1-18-1 et seq. Failure to submit such information will result in the disqualification of such bid.

Linda Thomas
Purchasing Specialist
INSTRUCTIONS TO BIDDERS/REQUIREMENTS FOR BIDDING
(CONTRACTS OVER $20,000)

1. **ON-LINE NOTIFICATION OF SOLICITATIONS**
   The City is utilizing Demandstar.com ([www.demandstar.com](http://www.demandstar.com)) for on-line notification purposes only for sealed bids when it is anticipated that the amount of the resulting contract will be in excess of its formal bid limit of $20,000, such as this requirement. Interested Bidders are required to submit a sealed bid to the City by the date/time indicated for this requirement on the forms provided by the City.

2. **SUBMISSION OF BIDS**
   A. All bids will be received in The City of Evanston Purchasing Office, Room 4200, Lorraine H. Morton Civic Center, 2100 Ridge Avenue, Evanston, IL 60201. Cut out and tape label included in this bid package as Exhibit O (BID/Proposal Submittal Label). All submittals are to be placed in a sealed opaque envelope addressed to: The City of Evanston Purchasing Office, Room 4200, Lorraine H. Morton Civic Center, 2100 Ridge Avenue, Evanston, Illinois 60201; clearly marked on the OUTSIDE with the following:
   - Bid name and number
   - Name and address of Firm
   - Date and time of Bid deadline

   B. **NOTE:** Purchasing will accept bid responses in one of two formats:
      1. Three (3) copies of the bid information, as well as any other information required in the solicitation document, must be submitted on the forms provided with all blank spaces for bid prices filled in ink or typewritten and containing all required information. Each copy must contain the same information (except one set must have original signatures and stamps).
      2. An electronic PDF response on a USB drive (along with any paper bid bonds as required) may be submitted in lieu of paper copies.

   C. **ANY BIDS RECEIVED AFTER THE TIME AND DATE SPECIFIED FOR THE RECEIPT OF BIDS WILL BE RETURNED TO THE BIDDER UNOPENED.** It is the sole responsibility of the Bidder to insure that his or her bid is delivered by the stated bid opening time. Mailed bids which are delivered after the specified hour will not be accepted regardless of post marked time on the envelope. THE CITY IS NOT RESPONSIBLE FOR MISDIRECTED PACKAGES.

   D. Bids will be publicly opened on the date and time specified for the receipt of bids in designated room of the Lorraine H. Morton Civic Center in Evanston, Illinois.

   E. Any Bidder may withdraw his or her bid by letter or with proper identification by personally securing his or her bid at any time prior to the stated bid opening time. No telephone request for withdrawal of bids will be honored.

   F. No bids will be received via the internet.
3. **PREPARATION OF BIDS**

The Bidder must prepare the bid on the attached bid forms. Unless otherwise stated, all blank spaces on the bid form or pages must be filled in. Either a unit price, lump sum price, or a "no-bid", as the case may be, must be stated for each and every item and must be either typed in or written in ink.

4. **SIGNING OF BIDS**

A. Bids which are signed for a partnership should be signed in the firm’s name by all partners, or in the firm’s name by Attorney-in-Fact. If signed by Attorney-in-Fact, there should be attached to the bid a Power of Attorney evidencing authority to sign the bid, dated the same date as the bid and executed by all partners of the firm.

B. Bids which are signed for a corporation should have the correct corporate name thereon and signature of an authorized officer of the corporation manually written below the corporate name following words "By: ______". title of office held by the person signing for corporation, which shall appear below signature of an officer.

C. Bids which are signed by an individual doing business under a fictitious name should be signed in the name of the individual "doing business as. ______.”

D. The name of each person signing the bid shall be typed or printed below his or her signature.

5. **CONSIDERATION OF BIDS**

The Purchasing Specialist shall represent and act for the City in all matters pertaining to this bid and the contract in conjunction therewith.

6. **WITHDRAWAL OF BIDS**

Bidders may withdraw or cancel their bids at any time prior to the advertised bid opening time. After the bid opening time, no bid shall be withdrawn or canceled for a period of sixty (60) calendar days. When contract approval is required by another agency, such as the Federal Government or the State of Illinois, no bid shall be withdrawn or canceled for a period of ninety (90) calendar days.

7. **ERRORS IN BIDS**

Bidders are cautioned to verify their bids before submission. Negligence on the part of the respondent in preparing the bid confers no right for withdrawal or modification of the bid after it has been opened. In case of error in the extension of prices in the bid, unit prices will govern.

8. **ADDENDA**

A. Any and all changes to the specifications/plans are valid only if they are included by written addendum to all Bidders. Each Bidder must acknowledge receipt of any addenda by indicating on the Bid form. Each Bidder, by acknowledging receipt of any addenda, is responsible for the contents of the addenda and any changes to the bid therein. Failure to acknowledge any addenda may cause the bid to be
rejected.

B. Addenda information is available over the internet at: City of Evanston Notices to Bidders or www.demandstar.com, or by contacting the Purchasing Office.

9. RESERVED RIGHTS
The City of Evanston reserves the right at any time and for any reason to cancel his or her solicitation, to accept or reject any or all bids or any portion thereof, or to accept an alternate response. The City reserves the right to waive any immaterial defect in any response. The City may seek clarification from any respondent at any time, and failure to respond within a reasonable time period, or as otherwise directed, will be cause for rejection.

10. AWARD
It is the intent of the City to award a contract to the lowest responsible Bidder meeting specifications. The City reserves the right to determine the lowest responsible Bidder on the basis of an individual item, groups of items, or in any way determined to be in the best interest of the City. Award will be based on the following factors (where applicable): (a) adherence to all conditions and requirements of the bid specifications; (b) price; (c) qualifications of the Bidder, including past performance, financial responsibility, general reputation, experience, service capabilities, and facilities; (d) delivery or completion date; (e) product appearance, workmanship, finish, taste, feel, overall quality, and results of product testing; (f) maintenance costs and warranty provisions; and (g) repurchase or residual value.

11. INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS
Bidder’s shall promptly notify the City of any ambiguity, inconsistency, or error that they discover upon examination of the bidding documents. Interpretations, corrections, and changes will be made by addendum. Each Bidder shall ascertain prior to submitting a bid that all addenda have been received and are acknowledged in the bid.

12. INCONSISTENCIES AND OMISSIONS
These specifications and the accompanying plans, if any, are intended to include all information necessary for the work contemplated. If, by inadvertence or otherwise, the plans or specifications omit some information necessary for that purpose, the contractor shall, nevertheless, be required to perform such work at no additional cost to the City so that the project may be completed according to the true intent and purpose of the plans and specifications.

13. CONDITIONS
Bidders are advised to become familiar with all conditions, instructions, and specifications governing his or her bid. Once the award has been made, failure to have read all the conditions, instructions and specifications of this contract shall not permit the Bidder to amend contract or to request additional compensation.
14. VERIFICATIONS OF DATA
A. It is understood and agreed that the unit quantities given in these specifications are approximate only, and the contractor shall verify these quantities before bidding as no claim shall be made against the City on, or account of, any excess or deficiency in the same.
B. The contractor shall have visited the premises and determined for itself, by actual observation, boring, test holes, or other means, the nature of all soil and water conditions (both above and below ground in the line of work) that may be encountered in all construction work under this contract. The cost of all such inspection, borings, etc. shall be borne by the contractor, and no allowance will be made for the failure of the contractor to estimate correctly the difficulties attending the execution of the work.

15. SPECIFICATIONS
Reference to brand names and numbers is meant to be descriptive, not restrictive, unless otherwise specified. Bids on equivalent items will be considered, provided the Bidder clearly states exactly what is proposed to be furnished, including complete specifications. Unless the Bidder specifies otherwise, it is understood the Bidder is offering a referenced brand item as specified or is bidding as specified when no brand is referenced, and does not propose to furnish an “equal.” The City reserves the right to determine whether a substitute offer is equivalent to, and meets the standard of quality indicated by the brand name and number.

16. SAMPLES
When samples of items are called for by the specifications, samples must be furnished free of expense, and if not destroyed in the evaluation process will be returned at the Bidder’s expense upon request. Request for the return of samples must accompany the sample and must include a UPS/Fed-Ex Pickup Slip, postage, or other acceptable mode of return. Individual samples must be labeled with Bidder’s name, invitation number, item reference, manufacturer’s brand name and number.

17. REGULATORY COMPLIANCE
Each Bidder represents and warrants that the goods or services furnished hereunder (including all labels, packages and containers for said goods) comply with all applicable standards, rules and regulations in effect under the requirements of all Federal, State, and local laws, rules and regulations as applicable, including the Occupational Safety and Health Act as amended, with respect to design, construction, manufacture, or use for their intended purpose of said goods or services. Each Bidder must furnish a “Material Safety Data Sheet” in compliance with the Illinois Toxic Substances Disclosure to Employees Act when required.

18. PRICING
The price quoted for each item is the full purchase price, including delivery to
destination, and includes all transportation and handling charges, materials or service costs, patent royalties, and all other overhead charges of every kind and nature. Unless otherwise specified, prices shall remain firm for the contract period.

19. **DISCOUNTS**

Prices quoted must be net after deducting all trade and quantity discounts. Where cash discounts for prompt payment are offered, the discount period shall begin with the date of receipt of a correct invoice or receipt or final acceptance of goods, whichever is later.

20. **INSPECTION**

Materials or equipment purchased are subject to inspection and approval at the City’s destination. The City reserves the right to reject and refuse acceptance of items which are not in accordance with the instructions, specifications, drawings or data of Seller’s warranty (express or implied). Rejected materials or equipment shall be removed by, or at the expense of, the Seller promptly after rejection.

21. **BIDS AND PLAN DEPOSITS**

A. When required on the cover sheet, all bids shall be accompanied by a bid deposit in the amount specified. Bid deposits shall be in the form of cash, a certified check, or cashier’s check drawn on a responsible bank doing business in the United States and shall be made payable to the City of Evanston. Bid Bonds are also acceptable. All bids not accompanied by a bid deposit, when required, will be rejected.

B. Within 20 days after the bid date the City will return the bid deposits of all but the 3 lowest qualified Bidders, whose deposit will be held until contract award or at the expiration of the sixty-day or ninety-day period for bid award.

C. The bid deposit of the successful Bidder will be retained until contract documents have been executed and the Contractor has submitted all the required information. Failure to comply with the terms of this specification may be cause for forfeiture of said deposit.

D. When required, plan deposits will be refunded should the plans be returned in good condition within 10 days of the bid opening.

22. **DISPUTES**

Any dispute concerning a question of fact arising under this bid shall be decided by the Purchasing Specialist, who shall issue a written decision to the Bidder. The decision of the Purchasing Specialist shall be final and binding.

23. **CATALOGS**

Each Bidder shall submit, when requested by the Purchasing Specialist, catalogs, descriptive literature, and detailed drawings, fully detailing features, designs, construction, appointments, finishes and the like not covered in the specifications, necessary to fully describe the material or work proposed to be furnished.
24. **TAXES**

A. Federal Excise Tax does not apply to materials purchased by the City of Evanston by virtue of Exemption Certificate No. A-208762, Illinois Retailers' Occupation Tax, Use Tax, and Municipal Retailers' Occupation Tax do not apply to materials or services purchased by the City of Evanston by virtue of Statute.

B. The City of Evanston is exempt from Illinois Sales Tax by virtue of Exemption Identification number E9998-1750.

C. The City's federal tax ID number is 36-6005870.

25. **PERMITS & FEES**

All Bidders awarded a contract must secure and pay for any licenses required by the City of Evanston. Necessary building permits will be required, but all permit fees will be waived and moneys for same must not be included in any bid.

26. **ROYALTIES & PATENTS**

Seller must pay all royalties and license fees. Seller must defend all suits or claims for infringement of any patent, copyright or trademark rights, and must hold the City harmless from loss on account thereof.

27. **LOCAL PREFERENCE POLICY**

The Evanston City Council reserves the right to award the contract to an Evanston firm if the firm's bid is within five (5%) percent of the low bid of a non-Evanston firm.

28. **POWER OF ATTORNEY**

An Attorney-In-Fact, who signs any and all of the bond or contract bonds submitted with this bid, must file with each bond a certified and effectively dated copy of their Power of Attorney. These dates should be the same or after the date of the contract.

29. **WARRANTY**

A. The contractor warrants that all goods and services furnished to the City shall be in accordance with specifications and free from any defects of workmanship and materials: that goods furnished to the City shall be merchantable and fit for the City's described purposes, and that no governmental law, regulation, order, or rule has been violated in the manufacture or sale of such goods.

B. The contractor warrants all equipment furnished to be in acceptable condition, and to operate satisfactorily for a period of one (1) year from delivery of, or the completion of installation, whichever is latest, unless stated otherwise in the specifications, and that if a defect in workmanship and/or quality of materials are evidenced in this period, the Seller shall remit full credit, replace, or repair at City's discretion immediately, such equipment and/or parts that are defective at no additional cost to the City.
C. The contractor warrants to the City that each item furnished hereunder, and any component part thereof, will be new and in conformity with the specifications in all respects, unless otherwise specified, and is of the best quality of its respective kind, free from faulty workmanship, materials, or design, and installed sufficiently to fulfill any operating conditions specified by the City.

D. The contractor shall repair or replace any item or component part thereof found not to be in conformity with this paragraph provided the City notified the Seller of such nonconformity within one (1) year after initial use or within eighteen (18) months after delivery, whichever occurs first. In the event Seller fails to proceed diligently to so replace or repair within a reasonable time after receipt of such notice, the City may undertake or complete such replacement or repair for Seller's account, and the seller will be responsible for any additional costs. Acceptance shall not relieve the seller of its responsibility.

30. INCURRED COSTS
The City will not be liable for any costs incurred by Bidders in replying to this invitation for bids.

31. VARIANCES
Each Bidder must state or list by reference any variations to specifications, terms and/or conditions set forth herein with its bid.

32. INDEMNIFICATION
A. The awarded Bidder/Contractor shall defend, indemnify and hold harmless the City and its officers, elected and appointed officials, agents, and employees from any and all liability, losses, or damages as a result of claims, demands, suits, actions, or proceedings of any kind or nature, including but not limited to costs, and fees, including attorney's fees, judgments or settlements, resulting from or arising out of any negligent or willful act or omission on the part of the Contractor or Contractor's subcontractors, employees, agents or subcontractors during the performance of this Agreement. Such indemnification shall not be limited by reason of the enumeration of any insurance coverage herein provided. This provision shall survive completion, expiration, or termination of this Agreement.

B. Nothing contained herein shall be construed as prohibiting the City, or its officers, agents, or employees, from defending through the selection and use of their own agents, attorneys, and experts, any claims, actions or suits brought against them. The Contractor shall be liable for the reasonable costs, fees, and expenses incurred in the defense of any such claims, actions, or suits. Nothing herein shall be construed as a limitation or waiver of defenses available to the City and employees and agents, including but not limited to the Illinois Local Governmental and Governmental Employees Tort Immunity Act, 745 ILCS 10/1-101 et seq.

C. At the City Corporation Counsel's option, Contractor must defend all suits brought
upon all such Losses and must pay all costs and expenses incidental to them, but the City has the right, at its option, to participate, at its own cost, in the defense of any suit, without relieving Contractor of any of its obligations under this Agreement. Any settlement of any claim or suit related to this Project by Contractor must be made only with the prior written consent of the City Corporation Counsel, if the settlement requires any action on the part of the City.

D. To the extent permissible by law, Contractor waives any limits to the amount of its obligations to indemnify, defend, or contribute to any sums due under any Losses, including any claim by any employee of Contractor that may be subject to the Illinois Compensation Act, 820 ILCS 305/1 et seq. or any other related law or judicial decision, including but not limited to, *Kotecki v. Cyclops Welding Corporation*, 146 Ill. 2d 155 (1991). The City, however, does not waive any limitations it may have on its liability under the Illinois Workers Compensation Act, the Illinois Pension Code or any other statute.

E. The Contractor shall be responsible for any losses and costs to repair or remedy work performed under this Agreement resulting from or arising out of any act or omission, neglect, or misconduct in the performance of its Work or its subcontractors’ work. Acceptance of the work by the City will not relieve the Contractor of the responsibility for subsequent correction of any such error, omissions and/or negligent acts or of its liability for loss or damage resulting therefrom.

F. All provisions of this Section 32 shall survive completion, expiration, or termination of this Agreement.

33. DEFAULT

Time is of the essence as to the awarded contract and, of delivery or acceptable items or rendering of services is not completed by the time promised, the City reserves the right, without liability, in addition to its other rights and remedies, to terminate the contract by notice effective when received by Seller, as to stated items not yet shipped or services not yet rendered and to purchase substitute items or services elsewhere and charge the Seller with all losses incurred. The City shall be entitled to recover its attorney’s fees and expenses in any successful action by the City to enforce this contract.

34. GOVERNING LAW

This contract shall be governed by and construed according to the laws of the State of Illinois. In the event of litigation, the venue will be Cook County, Illinois.

35. EQUAL EMPLOYMENT OPPORTUNITY

A. In the event of the contractor’s noncompliance with any provision of the Illinois Human Rights Act or Section 1-12-5 of the Evanston City Code, the contractor may be declared non-responsible and therefore ineligible for future contracts or subcontracts with the City of Evanston, and the contract may be canceled or voided.
in whole or in part, and such other sanctions or penalties may be imposed or remedies invoked as provided by Statute or regulation.

B. During the performance of this contract, the contractor agrees as follows:

1. That it will not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin or ancestry, or age or physical or mental handicap that does not impair ability to work, and further that it will examine all job classifications to determine if minority persons or women are underutilized and will take appropriate affirmative action to rectify any such under utilization. Contractor shall comply with all requirements of City of Evanston Code Section 1-12-5.

2. That, in all solicitations or advertisements for employees placed by it or on its behalf, it will state that all applicants will be afforded equal opportunity without discrimination because of race, color, religion, sex, national origin or ancestry.

3. That, if it hires additional employees in order to perform this contract, or any portion hereof, it will determine that availability (in accordance with the Fair Employment Commission's Rules and Regulations for Public Contracts) of minorities and women in the area(s) from which it may reasonably recruit and it will hire for each job classification for which employees are hired in such a way that minorities and women are not underutilized.

4. That it will send to each labor organization or representative of workers with which it has or is bound by a collective bargaining or other agreement or understanding, a notice advising such labor organization or representative of the contractor's obligations under the Illinois Fair Employment Practices Act and the Fair Employment Practices Commission's Rules and Regulations for Public Contracts. If any such labor organization or representative fails or refuses to cooperate with the contractor in its efforts to comply with such Act and Rules and Regulations, the contractor will promptly so notify the Illinois Fair Employment Practices Commission and the contracting agency and will recruit employees from other sources when necessary to fulfill its obligations hereunder.

5. That it will submit reports as required by the Illinois Fair Employment Practices Commission's Rules and Regulations for Public Contracts, furnish all relevant information as may from time to time be requested by the Fair Employment Practices Commission or the contracting agency, and in all respects comply with the Illinois Fair Employment Practices Commission's Rules and regulations for Public Contracts.

6. That it will permit access to all relevant books, records, accounts and work sites by personnel of the contracting agency, the City Manager, the Commission and the Illinois Fair Employment Practices Commission for

7. That it will include verbatim or by reference the provisions of subsections (A) through (G) of this clause in every performance subcontract as defined in Section 2.10(b) of the Fair Employment Practices Commission's Rules and Regulations for Public Contracts so that such provisions will be binding upon every such subcontractor; and that it will also include the provisions of subsections (A), (E), (F), and (G) in every supply subcontract as defined in Section 2.10(a) of the Fair Employment Practices Commission's Rules and Regulations for Public Contracts so that such provisions will be binding upon every such subcontractor. In the same manner as with other provisions of this contract, the contractor will be liable for compliance with applicable provisions of this clause by all its subcontractors; and further it will promptly notify the contracting agency and the Illinois Fair Employment Practices Commission in the event any subcontractor fails or refuses to comply therewith. In addition, no contractor will utilize any subcontractor declared by the Fair Employment Practices Commission to be non-responsible and therefore ineligible for contracts or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporations.

36. M/W/EBE GOAL
The City of Evanston has a goal of awarding 25% of its contracts to Minority-Owned, Women-Owned, and Evanston-based businesses (M/W/EBEs). All Bidders must state the proposed involvement of M/W/EBEs in completing a portion of the services required by the City by completing the attached M/W/EBE forms. Any questions regarding M/W/EBE compliance should be submitted in writing to Sharon A. Johnson, Business Workforce Compliance Coordinator at shjohnson@cityofevanston.org or Tammi Nunez Purchasing Manager at tnunez@cityofevanston.org.

37. LOCAL EMPLOYMENT PROGRAM REQUIREMENTS
In an effort to increase hiring of economically disadvantaged Evanston residents on certain City construction projects, the contractor shall comply with the provisions of the City of Evanston's Local Employment Program Ordinance (LEP) set forth in Section 1-17-1 (C) of the Evanston City Code. The intent of the LEP is to have Evanston residents employed at the construction site as laborers, apprentices and journeymen in such trades as electrical, HVAC, carpenters, masonry, concrete finishers, truck drivers and other construction occupations necessary for the project. Any questions regarding LEP compliance should be submitted in writing to Sharon A. Johnson, Business Workforce Compliance Coordinator at shjohnson@cityofevanston.org or Tammi Nunez Purchasing Manager at tnunez@cityofevanston.org.
NOTE: CITY OF EVANSTON ORDINANCE 60-O-14 AMENDMENT LOCAL EMPLOYMENT PROGRAM (LEP) available on the City website at: Ordinance 60-O-14 Amendment LEP

38. Questions
All questions related to this bid document should be submitted in writing to Linda Thomas, Purchasing Specialist at lithomas@cityofevanston.org with a copy to Anil Khatkhate, at akhatkhate@cityofevanston.org. Only inquiries received a minimum of seven (7) working days prior to the date set for the opening of bids, will be given any consideration.

39. COORDINATION OF EXISTING SITE WITH DRAWINGS
A. Before submitting a bid, bidders shall carefully examine the drawings and specifications, visit the site, and fully inform themselves as to all conditions and limitations.

B. Should a bidder find discrepancies in, or omissions from the drawings or specifications, or should be in doubt as to their meaning, the bidder should at once notify the Purchasing Specialist, who will issue necessary instructions to all bidders in the form of an addendum.

40. AFFIRMATIVE ACTION IN SUB-CONTRACTING (EXCERPT FROM RESOLUTION 59-R-73)
“Contractor agrees that he shall actively solicit bids for the subcontracting of goods or services from qualified minority businesses. At the request of the City, Contractor shall furnish evidence of his compliance with this requirement of minority solicitation. Contractor further agrees to consider the grant of subcontracts to said minority bidders on the basis of substantially equal bids in the light most favorable to said minority businesses. Contractor further affirms that in obtaining his performance and bid bonds, he will seek out and use companies who have records of, and/or who will make commitments to, the bonding of minority contractors on a rate basis comparable to their bonding of similar non-minority contractors. The contractor may be required to submit this evidence as part of the bid or subsequent to it.”

41. COMPLIANCE WITH LAWS
A. The bidder shall at all times observe and comply with all laws, ordinances and regulations of the Federal, State, Local and City Governments, which may in any manner affect the preparation of bids or the performance of the contract.

42. QUALIFICATION OF BIDDERS
A. All bidders must be qualified in accordance with the instructions, procedures and methods set forth in this specification.

B. In awarding contract, City may take into consideration, skill, facilities, capacity, experience, ability, responsibility, previous work, financial standing of bidder,
amount of work being carried on by bidder, quality and efficiency of construction equipment proposed to be furnished, period of time within which proposed equipment is furnished and delivered, necessity of prompt and efficient completion of work herein described. Inability of any bidder to meet requirements mentioned above may be cause for rejection of the bid. In addition, if the project covered by this contract is a minority set-aside project, the contractor's qualifications as a minority firm will determine the eligibility of the contractor to bid.

43. COMPETENCY OF BIDDER
A. No bid will be accepted from or contract awarded to any person, firm or corporation that is in arrears or is in default to the City of Evanston upon any debt or contract, or that is a defaulter, as surety or otherwise, upon any obligation to said City, or had failed to perform faithfully any previous contract with the City.

B. The bidder, if requested, must present within forty eight (48) hours evidence satisfactory to the Purchasing Manager of performance ability and possession of necessary facilities, pecuniary resources and adequate insurance to comply with the terms of these specifications and contract documents.

44. PREFERENCE TO CITIZENS
The Contractor shall abide by the Illinois Preference Act, 30 ILCS 570 et seq., which stipulates that whenever there is a period of excessive unemployment in Illinois, defined as any month immediately following two (2) consecutive months during which the level of unemployment in Illinois exceeds five percent (5%) as measured by the U.S. Bureau of Labor Statistics in its monthly publication of employment and unemployment figures, the Contractor shall employ only Illinois laborers unless otherwise exempted as so stated in the Act. (“Illinois laborer” means any person who has resided in Illinois for at least 30 days and intends to become or remain an Illinois resident) Other laborers may be used IF Illinois laborers are not available or are incapable of performing the particular type of work involved if so certified by the Contractor and approved by the project engineer.
GENERAL CONDITIONS

1. BASIS OF AWARD
   The City of Evanston reserves the right to award a contract to a responsive and responsible Bidder(s) who submits the lowest total bid, or to reject any or all bids and bidding, when in its opinion the best interest of the City will be served by such action. The City reserves the right to consider the specified alternates in its evaluation of the bids.

2. BIDS
   A. LUMP SUM BID
      1. The bidder is to submit a lump sum bid for each bid line on the Bid Form which includes all costs incidental to performing the specified work. It is understood and agreed that the unit quantities given in the supporting pages are approximate only and the bidder shall verify these quantities before bidding as no claim shall be made against the City on account of any excess or deficiency in the same.

3. QUANTITIES
   Any quantities shown on the Bid Form are estimated only for bid canvassing purposes, the City has made a good faith effort to estimate the quantity requirements for the Contract term. The City reserves the right to increase or decrease quantities ordered under this contract.

4. CONTRACT TERM
   Bidder must fully complete the work within the period specified herein after award of the contract by the City.

5. PURCHASE ORDER/CONTRACT
   A. Upon approval of the required bonds and insurance documents, the City will issue a Purchase Order to the Contractor for the contract amount. All Applications for Payment must reference the Purchase Order number.

   B. When it is necessary to issue a Change Order that increases/decreases the contract amount, a Change Order form will be issued and a modified Purchase Order will be issued reflecting the revised contract amount.

   C. When it is necessary to issue a Change Order that only increases/decreases the contract period, only a Change Order form will be issued establishing the revised contract period.

   D. Upon Award the contractor shall execute the Contractor Services Agreement.
6. **PAYMENT**
   A. Progress payments will be made in accordance with “Applications for Payment” and “Project Closeout” sections of the specifications, less a 10% retainage for each payment, which will be held until final acceptance of the work by the City. Certification of each Application for Payment will be made by the City's representative.

   B. All payments will be made in accordance with *Illinois Local Government Prompt Payment Act*.

7. **DECISIONS TO WITHHOLD CERTIFICATION FOR PAYMENT**
   A. The City may not certify payment and may withhold payment in whole or in part, to the extent reasonably necessary to protect the City, if the quality of the work is not in accordance with the contract documents. If the City is unable to certify payment in the amount of the invoice, the City will promptly issue payment for the amount of the Work completed in accordance with the contract documents. The City may not certify payment due to any contractor negligence or contract non-compliance.
      a. Defective work not remedied
      b. Third party claims filed or reasonable evidence indicating probable filing of such claims
      c. Failure of Contractor to make payments properly to Subcontractors for labor, materials or equipment
      d. Reasonable evidence that the work cannot be completed for the unpaid balance of the Contract Sum
      e. Damage to the City or another contractor
      f. Reasonable evidence that the work will not be completed within the Contract period and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay
      g. Persistent failure to carry out work in accordance with the Contract Documents.

8. **CHANGES IN WORK**
   A. The City reserves the right to make changes in the plans and specifications by altering, adding to, or deducting from the work, without invalidating the contract. All such changes shall be executed under the conditions of the original contract, except that any claim for extension of time caused thereby shall be adjusted at the time of ordering such change.

   B. No change shall be made unless a written Change Order and/or modified Purchase Order is issued by the City stating that the City has authorized the change, and no claim for an addition to the contract shall be valid unless so ordered.

   C. If such changes diminish the quantity of work to be done they shall not constitute a claim for damage or anticipated profits on the work, such increase shall be paid in one or more of the following ways:
1. by estimate and acceptance in lump sum
2. by unit prices named in the contract’s bid form or subsequently agreed upon

9. **DEDUCTION FOR UNCORRECTED WORK**
   If the City deems it expedient to correct work damaged or not done in accordance with the contract, the difference in value, together with a fair allowance for damage shall be deducted from the contract amount due. The value of such deduction shall be determined by the City.

10. **CITY’S RIGHT TO TERMINATE CONTRACT**
   The City reserves the right, in addition to other rights to termination, to terminate the contracts in accordance with all provisions of the executed contract.

11. **LIENS**
   A. Neither the final payment nor any part of any retained percentages, shall become due until the contractor, if required, delivers to the City, a complete release of all liens arising out of this contract, or receipts in full in lieu thereof and, if required in either case, an affidavit that so far as it has knowledge or information the releases and receipts include all the labor and material for which a lien could be filed. If any lien remains unsatisfied after all payments are made the contractor shall refund to the City all moneys that the latter may be compelled to pay in discharging such a lien, including all costs and attorney's fees.

12. **SEPARATE CONTRACTS**
   A. The City reserves the right to let other contracts in connection with this work. The contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work and shall properly connect and coordinate his or her work with theirs. If any part of the contractor's work depends on proper execution or results upon the work of any other contractor, the contractor shall inspect and promptly report to the City any defects in such work that render it unsuitable for such proper execution and results. His or her failure to so inspect and report shall constitute an acceptance of other contractor's work as fit and proper.

   B. To insure the proper execution of his or her subsequent work, the contractor shall measure work already in place and shall at once report to the City any discrepancy between the executed work and the drawings which will affect his or her work.

13. **PROTECTION & SAFEGUARDS**
   A. Unless otherwise specified, the contractor, as a part of this contract, shall provide, erect and maintain temporary roads, fences, bracing, lights, warning signs, barricades, etc. necessary for the protection of the construction materials, adjacent property and the public.
B. The contractor shall contact all utilities which will be affected by its operations and notify the owners of the utilities of its operations and their limits within forty-eight (48) hours prior to beginning construction. The contractor shall be responsible for damage to utilities and shall, at his or her own expense, restore such property to a condition equal to that which existed before its work, as may be directed by the owners.

C. The contractor shall protect all work and unused materials of this contract from any and all damage and shall be solely responsible for the condition of such work and materials.

14. MATERIAL STORAGE
   A. On-site areas may be designated for material/equipment storage. The contractor will assume all risk and liability associated with the storage of material/equipment at on-site locations.

15. CLEANING UP
   A. The contractor shall at all times keep the premises free from accumulation of waste material or rubbish caused by its employees or work and at the completion of the work it shall remove all its rubbish, tools, and surplus materials from the premises, leaving the area in a neat and workmanlike condition. In case of dispute, the City may remove the rubbish and charge the cost to the contractor.

   B. Contractor recognizes that proper cleanup and removal of construction debris is an important safety consideration. The Contractor shall be solely responsible for daily construction site/area cleanup and removal of all construction debris in accordance with City-approved disposal practices. Contractor shall be solely responsible for identifying and removing at its expense all hazardous material and waste which it uses and generates.

16. RESTORATION OF SITE
   A. Prior to final payment, contractor shall fully restore all property disturbed or damaged during the course of this work. This includes, but is not limited to public property, (walks, curbs, roadways, trees, etc.) private property, and utilities. This shall also include removal of temporary facilities erected during the course of this contract and restoration of these areas.

   B. All restoration work shall be subject to the approval of the City and shall restore the property to a condition at least equal to that existing prior to the start of this contract.

   C. All restoration work of property damaged by contractor shall be accomplished at the sole expense of the contractor.

17. PREVAILING WAGE
   A. Prospective Bidders shall thoroughly familiarize themselves with the provisions of
the above-mentioned Act and shall prepare any and all bids/bids in strict compliance therewith.

B. All contractors and subcontractors on public works projects must submit certified payrolls on a monthly basis to the City’s project manager and business work force development coordinator, along with a statement affirming that such records are true and accurate, that the wages paid to each worker are not less than the required prevailing rate and that the contractor is aware that filing records her or she knows to be false is a Class B misdemeanor.

C. The certified payroll record must include for every worker employed on the public works project the name, address, telephone number, social security number, job classification, hourly wages paid in each pay period, number of hours worked each day, and starting and ending time of work each day. These certified payroll records are considered public records and public bodies must make these records available to the public under the Freedom of Information Act, with the exception of the employee’s address, telephone number and social security number. Any contractor who fails to submit a certified payroll or knowingly files a false certified payroll is guilty of a Class B misdemeanor.

D. All certified payrolls shall be submitted in electronic format, preferably a PDF file.

E. As a condition of receiving payment, Contractor must (i) be in compliance with the Agreement, (ii) pay its employees prevailing wages when required by law (Examples of prevailing wage categories include public works, printing, janitorial, window washing, building and grounds services, site technician services, natural resource services, security guard and food services). Contractor is responsible for contacting the Illinois Dept. of Labor 217-782-6206; http://www.illinois.gov/idol/Laws-Rules/CONMED/Pages/Rates.aspx to ensure compliance with prevailing wage requirements), (iii) pay its suppliers and subcontractors according to the terms of their respective contracts, and (iv) provide lien waivers to the City upon request.

18. CONTRACTOR REQUIREMENTS

A. The Contractor shall abide by and comply with all local, State and federal laws and regulations relating to contracts involving public funds and the development/construction of public works, buildings, or facilities. The scale of wages to be paid shall be obtained from Illinois Department of Labor and posted by the Contractor in a prominent and accessible place at the project work site.

B. The Contractor certifies it has not been barred from being awarded a contract with a unit of State or local government as a result of bid rigging or bid rotating or any similar offense (720 ILCS 5/33 E-3, E-4).

C. The Contractor certifies, pursuant to the Illinois Human Rights Act (775 ILCS 5/2-105), that it has a written sexual harassment policy that includes, at a minimum, the following information: (1) the illegality of sexual harassment, (2) the definition of
sexual harassment under State law, (3) a description of sexual harassment utilizing examples, (4) the Contractor’s internal complaint process including penalties, (5) legal recourse, investigation and complaint process available through the Illinois Department of Human Rights and the Human Rights Commission and directions on how to contact both; and (6) protection against retaliation as provided by Section 6-101 of the Illinois Human Rights Act.

D. The Contractor shall abide by the “Illinois Preference Act” which stipulates that whenever there is a period of excessive unemployment in Illinois, defined as any month immediately following two (2) consecutive months during which the level of unemployment in Illinois exceeds five percent (5%) as measured by the U.S. Bureau of Labor Statistics in its monthly publication of employment and unemployment figures, the Contractor shall employ only Illinois laborers unless otherwise exempted as so stated in the Act. (“Illinois laborer” means any person who has resided in Illinois for at least 30 days and intends to become or remain an Illinois resident) Other laborers may be used IF Illinois laborers are not available or are incapable of performing the particular type of work involved if so certified by the Contractor and approved by the project engineer.

19. SUBCONTRACTORS
A. The term “Subcontract” means any agreement, arrangement or understanding, written or otherwise between a Contractor and any person (in which the parties do not stand in the relationship of an employer or an employee) for the furnishing of supplies or services or for the use of real or personal property, including lease arrangements, which, in whole or in part, is utilized in the performance of any one or more Contracts under which any portion of the Contractor’s obligation under any one or more Contracts is performed, undertaken or assumed.

B. The Bidder is specifically advised that any person, firm or party, to whom it is proposed to award a Subcontract under this contract must be acceptable to the City. Approval for the proposed Subcontract Award cannot be given by the City until the proposed Subcontractor has submitted evidence showing that it has fully complied with any reporting requirements to which it is, or was, subject.

C. The Contractor, shall, within ten (10) days after award of the Contract, submit to the City in writing, names and addresses and respective amounts of money for proposed contracts with Subcontractors/major suppliers. The City will review and may direct the Contractor that they shall not employ any that are not acceptable as provided above.

D. The subcontractor shall abide by and comply with all local, State and federal laws and regulations relating to contracts involving public funds and the development/construction of public works, buildings, or facilities.

20. PAYMENTS TO SUBCONTRACTORS
A. Within seven days after the receipt of amounts paid by the City for work performed
by a subcontractor under this contract, the Contractor shall either:

1. Pay the Subcontractor for the proportionate share of the total payment received from the City attributable to the work performed by the Subcontractor under this contract; or,

2. Notify the City and Subcontractor, in writing, of his intention to withhold all or a part of the Subcontractor's payment and the reason for non-payment.

B. The Contractor shall pay interest to the Subcontractor on all amounts owed that remain unpaid beyond the seven day period except for amounts withheld as allowed in item 2 above.

C. Unless otherwise provided under the terms of this contract, interest shall accrue at the rate of one percent per month.

D. The Contractor shall include in each of its subcontracts a provision requiring each Subcontractor to include or otherwise be subject to the same payment and interest requirements as set forth above with respect to each lower-tier subcontractor.

E. The Contractor's obligation to pay an interest charge to a Subcontractor pursuant to this provision may not be construed to be an obligation of the City.

21. **BOND – PERFORMANCE, MATERIAL, & LABOR**

A. When required by the specifications herein, the successful Bidder or Bidders shall, within ten (10) calendar days after acceptance of the Bidder's bid by the City, furnish a performance bond for 110% of the full amount of the contract from insurance companies having not less than A+ Policyholders Rating from the most recent Alfred M. Best and Co., Inc. listing available. Certification of the insurance company's rating shall be provided prior to contract implementation and quarterly thereafter until contract completion. Should such rating fall below the required A+ level during performance of the contract, it will be the contractor's responsibility to notify the City and provide a new bond from an insurance company whose rating meets the City's requirements.

B. When required by the specifications herein, all Bidders shall submit with the bid a bid bond. A letter of credit may be furnished in lieu of a bid bond only if the following conditions are met: 1) An irrevocable letter of credit must be obtained from an accredited bank which shall include an agreement that the bank will honor a demand by the City for payment due to Plaintiff failure to complete the project. 2) An irrevocable letter of credit must be in writing and signed by an authorized representative of the bank. 3) The irrevocable letter of credit must expressly state that it is irrevocable until the bid has been awarded. 4) The letter of credit must be for the percentage specified in the bid documents.

C. The City may reject the use of an irrevocable letter of credit if the financial
soundness of the issuing bank is found to be unacceptable.

D. In the event that the Bidder fails to furnish a performance bond in said period of ten (10) calendar days after acceptance of the Bidder’s bid by the City, the City may withdraw its acceptance of the bid and retain the Bidder’s deposit as liquidated damages and not as a penalty.

E. If the contractor has more than one project for which there is a contract with the City of Evanston the contractor shall provide a separate Performance Bond for each project.

22. INDEMNITY
A. The Contractor shall defend, indemnify and hold harmless the City and its officers, elected and appointed officials, agents, and employees from any and all liability, losses, or damages as a result of claims, demands, suits, actions, or proceedings of any kind or nature, including but not limited to costs, and fees, including attorney’s fees, judgments or settlements, resulting from or arising out of any negligent or willful act or omission on the part of the Contractor or Contractor’s subcontractors, employees, agents or subcontractors during the performance of this Agreement. Such indemnification shall not be limited by reason of the enumeration of any insurance coverage herein provided. This provision shall survive completion, expiration, or termination of this Agreement.

B. Nothing contained herein shall be construed as prohibiting the City, or its officers, agents, or employees, from defending through the selection and use of their own agents, attorneys, and experts, any claims, actions or suits brought against them. The Contractor shall be liable for the reasonable costs, fees, and expenses incurred in the defense of any such claims, actions, or suits. Nothing herein shall be construed as a limitation or waiver of defenses available to the City and employees and agents, including but not limited to the Illinois Local Governmental and Governmental Employees Tort Immunity Act, 745 ILCS 10/1-101 et seq.

C. At the City Corporation Counsel’s option, Contractor must defend all suits brought upon all such Losses and must pay all costs and expenses incidental to them, but the City has the right, at its option, to participate, at its own cost, in the defense of any suit, without relieving Contractor of any of its obligations under this Agreement. Any settlement of any claim or suit related to this Project by Contractor must be made only with the prior written consent of the City Corporation Counsel, if the settlement requires any action on the part of the City.

D. To the extent permissible by law, Contractor waives any limits to the amount of its obligations to indemnify, defend, or contribute to any sums due under any Losses, including any claim by any employee of Contractor that may be subject to the Illinois Workers Compensation Act, 820 ILCS 305/1 et seq. or any other related law or judicial decision, including but not limited to, Kotecki v. Cyclops Welding Corporation, 146 Ill. 2d 155 (1991). The City, however, does not waive
any limitations it may have on its liability under the Illinois Worker Compensation Act, the Illinois Pension Code or any other statute.

E. The Contractor shall be responsible for any losses and costs to repair or remedy work performed under this Agreement resulting from or arising out of any act or omission, neglect, or misconduct in the performance of its Work or its subcontractors’ work. Acceptance of the work by the City will not relieve the Contractor of the responsibility for subsequent correction of any such error, omissions and/or negligent acts or of its liability for loss or damage resulting therefrom.

23. CONTRACTOR’S LIABILITY INSURANCE
A. THE CONTRACTOR SHALL NOT COMMENCE WORK UNDER THIS CONTRACT UNTIL THEY HAVE OBTAINED ALL INSURANCE REQUIRED HEREIN AND SUCH INSURANCE HAS BEEN APPROVED BY THE CITY. Nor shall the contractor allow any subcontractor to commence work until all similar insurance required of the subcontractor has been so obtained.

B. The City of Evanston shall be named as an additional insured on the policy of the contractor for whatever the policy limits are for the contractor, but in no event shall the Comprehensive General Liability limits be less than $3,000,000.00.

C. If the contractor has more than one project for which he has a contract with the City of Evanston there shall be separate Certificates of Insurance naming the City as an additional insured on each separate policy.

D. In the event of accidents, injuries, or unusual events, whether or not any injury occurred, the contractor shall promptly furnish the City with copies of all reports of such incidents.

E. The contractor shall furnish one (1) copy of a certificate, with the City named as an additional insured, showing the following minimum coverage with insurance company acceptable to the City.

24. PRE-CONSTRUCTION MEETING
A. A pre-construction meeting will be scheduled for the successful Contractor at a date immediately following awarding of the Contracts.

25. LIQUIDATED DAMAGES
A. The Contractor must commence work within 10 days of notice from the City and the work must be completed by 08/31/2020. In the event the work is not substantially completed by 08/31/2020, then in addition to any remedies available to the City, the Contractor will pay to the City the sum of Seven Hundred and Fifty Dollars per day for each calendar day beyond those dates, until substantial completion of the work has been achieved. This payment is for liquidated damages, in addition to any other damages that may be incurred by the City, and not as a penalty. All such
liquidated damages may be set-off against any moneys that may be due the contractor.

B. Substantial Completion shall be defined as the stage in the progress of the work when the work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the City can occupy or utilize the work for its intended use. Substantial Completion will be certified by the issuance of a Certificate of Substantial Completion, to be issued by the City’s representative, when the Contractor has satisfied the above statement and billed the City for a minimum of 90% of the total value of the work.

26. Extension of Time
   A. Delays due to causes beyond the control of the contractor other than such as reasonable would be expected to occur in connection with or during the performance of the work, may entitle the contractor to an extension of time for completing the work sufficient to compensate for such delay. No extension of time shall be granted, however, unless the contractor shall notify the City in writing thereof, within ten (10) days from the initiation of the delay and unless he shall, within ten (10) days after the expiration of the delay, notify the City in writing of the extension of time claimed on account thereof and then only to the extent, if any, allowed by the City.

27. Default
   A. The City may, subject to the provisions of this section, by written notice of default to Contractor, terminate the whole or any part of this contract in any one of the following circumstances:
      1. if the Contractor fails to perform the services within the time specified herein, or any extension thereof; or
      2. if the contractor fails to perform any of the other provisions of this contract, or so fails to make progress as to endanger performance of this contract in accordance with its terms, and in either of these two circumstances does not cure failure within a period of 10 days (or such other extended period as the City may authorize in writing) after receipt of notice from the City specifying such failure

   B. In the event the City terminates this contract in whole or in part as provided in this section, the City may procure, upon such terms and in such manner as the City may deem appropriate, services similar to those so terminated, and the Contractor will be liable to the City for any excess costs for such similar services.

   C. The Contractor will not be liable for any excess of costs if acceptable evidence has been submitted to the City that the failure to perform the contract was due to causes beyond the control and without fault or negligence of the Contractor.

   D. Contractors who default may not be considered for awards of future City contracts.
28. USE OF PREMISES
A. The contractor shall confine his apparatus, the storage of materials and the
operations of his workers, to limits indicated by law, ordinances, permits or
directions of the City.

29. DISCLOSURES AND POTENTIAL CONFLICTS OF INTEREST (30 ILCS
500/50-35)
A. The City of Evanston’s Code of Ethics prohibits public officials or employees from
performing or participating in an official act or action with regard to a transaction in
which he has or knows he will thereafter acquire an interest for profit, without full
public disclosure of such interest. This disclosure requirement extends to the
spouse, children and grandchildren, and their spouses, parents and the parents of
a spouse, and brothers and sisters and their spouses.

To ensure full and fair consideration of all bids, the City of Evanston requires all
Bidders including owners or employees to investigate whether a potential or actual
conflict of interest exists between the Bidder and the City of Evanston, its officials,
and/or employees. If the Bidder discovers a potential or actual conflict of interest,
the Bidder must disclose the conflict of interest in its bid, identifying the name of
the City of Evanston official or employee with whom the conflict may exist, the
nature of the conflict of interest, and any other relevant information. The
existence of a potential or actual conflict of interest does NOT, on its own,
disqualify the disclosing Bidder from consideration. Information provided by
Bidders in this regard will allow the City of Evanston to take appropriate measures
to ensure the fairness of the bidding process.

The City of Evanston requires all bidders to submit a certification, enclosed with
this bid packet, that the bidder has conducted the appropriate investigation and
disclosed all potential or actual conflicts of interest.

By submitting a bid, all Bidders acknowledge and accept that if the City of
Evanston discovers an undisclosed potential or actual conflict of interest, the City
of Evanston may disqualify the Bidder and/or refer the matter to the appropriate
authorities for investigation and prosecution.
### INSURANCE REQUIREMENTS

<table>
<thead>
<tr>
<th>TYPE OF INSURANCE</th>
<th>MINIMUM INSURANCE COVERAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bodily Injury and Consequent Death Property Damage</td>
</tr>
<tr>
<td></td>
<td>Each Occurrence Aggregate</td>
</tr>
<tr>
<td>Commercial General Liability including:</td>
<td>$3,000,000 $3,000,000</td>
</tr>
</tbody>
</table>
1. Comprehensive form                                       |                            |
2. Premises - Operations                                    |                            |
3. Explosion & Collapse Hazard                              |                            |
4. Underground Hazard                                        |                            |
5. Products/Completed Operations Hazard                      |                            |
6. Contractual Insurance – With an endorsement on the face of the certificate that it includes the "Indemnity" paragraph of the specifications. Insurance Certificate Must State: The City Of Evanston is Named as Additional Insured |
7. Broad Form Property Damage - construction projects only   |                            |
8. Independent contractors                                  |                            |
9. Personal Injury                                           |                            |

**Automobile Liability**  
Owned, Non-owned or Rented $1,000,000 $1,000,000

**Workmen's Compensation and Occupational Diseases**  
As required by applicable laws.

**Employer's Liability** $500,000

Thirty day notice of cancellation required on all certificates.
EXHIBIT A – BID FORM
For
Emergency Generators at Police/Fire Headquarters, Fire Station 2 and Fire Station 1
(BID #20-05)

1.01 BID TO:

THE CITY OF EVANSTON
2100 Ridge Avenue
Evanston, Illinois 60201

hereinafter called “OWNER”.

1.02 BID FROM:

(Hereinafter call “BIDDER”)

Address

Telephone Number

Fax Number

1.03 BID FOR: Emergency Generators at Police/Fire Headquarters, Fire station 2 and Fire Station 1

1.04 ACKNOWLEDGEMENT:

A. The Bidder, in compliance with the Invitation for Bids, having carefully examined the Drawings and Project Manual with related documents and having visited the site of the proposed Work, and being familiar with all of the existing conditions and limitations surrounding the construction of the proposed project, including the structure of the ground, subsurface conditions, the obstacles which may be encountered, local restrictions, and all other relevant matters concerning the Work to be performed, hereby PROPOSES to perform everything required to be performed, and to provide all labor, materials, necessary tools and equipment, expendable equipment, all applicable permits and taxes and fees, and provide all utility and transportation services necessary to perform and complete in a workmanlike
manner the Project in accordance with all the plans, specifications and related Contract Documents as prepared by the City of Evanston.

B. The undersigned hereby acknowledges receipt of Invitation of Bids, Instruction to Bidder, the Project Manual, Drawings, and other Contract Documents and acknowledges receipt of the following Addenda:

Addendum No. __________ Dated _____
Addendum No. __________ Dated _____
Addendum No. __________ Dated _____

1.05 GENERAL STATEMENTS

A. The undersigned has checked all of the figures contained in this proposal and further understands that the Owner will not be responsible for any errors or omissions made therein by the undersigned.

B. It is understood that the right is reserved by the Owner to reject any or all proposals, to waive all informality in connection therewith and to award a Contract for any part of the work or the Project as a whole.

C. The undersigned declares that the person(s) signing this proposal is/are fully authorized to sign on behalf of the named firm and to fully bind the named firm to all the conditions and provisions thereof.

D. It is agreed that no person(s) or company other than the firm listed below or as otherwise indicated hereinafter has any interest whatsoever in this proposal or the Contract that may be entered into as a result thereof, and that in all respects the proposal is legal and fair, submitted in good faith, without collusion or fraud.

E. It is agreed that the undersigned has complied and/or will comply with all requirements concerning licensing and with all other local, state and national laws, and that no legal requirement has been or will be violated in making or accepting this proposal, in awarding the Contract to him, and/or in the prosecution of the Work required hereunder.

F. To be considered a bona fide offer, this proposal must be completed in full and accompanied by a bid deposit or a bid bond when required by Contract Documents or Addenda.

1.06 ALTERNATES

A. When alternate proposals are required by Contract Documents or Addenda thereto, the undersigned proposes to perform alternates for herein stated additions to or deductions from hereinbefore stated Base Bid. Additions and deductions include all modifications of Work or additional Work that the undersigned may be required to perform by reason of the acceptance of alternates.
1.07 ALLOWANCE
A. The allowance is general and should be used in the event that any unforeseen condition is discovered. After discovering the unforeseen condition, the contractor shall submit a Found Condition Report (FCR) and an Authorization to Use Allowance (AUA) to the Consultant. The Consultant will then notify the Owner and both the Owner and the Consultant will view the unforeseen condition to determine if the work will be authorized. Under no circumstances shall the contractor move forward with the work in question nor shall the contractor expend allowance without an approved AUA. At the end of the project, unspent allowance shall be credited to owner via change order.

1.08 AGREEMENT
A. In submitting this Bid, the undersigned agrees:
1. To hold this Bid open for sixty (60) days from submittal date.
2. To enter into and execute a Contract with the Owner within ten (10) days after receiving Notice of Award from the Owner.
3. To accomplish the work in accordance with the Contract Documents.
4. To complete the work by the time stipulated in the General Conditions
B. The Owner reserves the right to reject any and all Bids and to waive any informalities in Bidding.

1.09 SCHEDULE
A. See General Conditions for required schedule of completion dates.

1.10 PROPOSED PRICES
A. The Bidder hereby proposes to furnish all labor, materials, equipment, transportation, construction plant and facilities necessary to complete, in a workmanlike manner and in accordance with the contract documents, the contract of work bid upon herein for compensation in accordance with the following prices:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASE BID AMOUNT</td>
<td>$______________</td>
</tr>
<tr>
<td>ALLOWANCE (ADDITIONAL WORK – GENERAL)</td>
<td>$______________+35,000</td>
</tr>
<tr>
<td>TOTAL BASE BID AMOUNT</td>
<td>$______________</td>
</tr>
</tbody>
</table>

1.12 BID SECURITY
Accompanying this proposal is a bank draft, bid bond, Cashier's check or Certified
check as surety in the amount of not less than five percent (5%) of the Total Bid payable to the City of Evanston.

The amount of the check or draft is: $______________________________

If this bid is accepted and the undersigned shall fail to execute a contract and contract bond as required it is hereby agreed that the amount of the check or draft or bidder's bond substituted in lieu thereof, shall become the property of the City and shall be considered as payment of damages due to delay and other causes suffered by the City because of the failure to execute said contract and contract bond; otherwise said check or draft shall be returned to the undersigned.

ATTACH BANK DRAFT, BANK CASHIER’S CHECK OR CERTIFIED CHECK HERE.

In the event that one check or draft is intended to cover two or more bids, the amount must be equal to the sum of the proposal guarantees of the individual sections covered.

If the check or draft is placed on another proposal, state below where it may be found, as follows: The check or draft will be found in the proposal for: ________________________.

1.13 PERFORMANCE/PAYMENT BOND

The undersigned bidder agrees to provide Performance Bond and Payment Bond executed in accordance with Contract Performance Bond form furnished by and acceptable to the Owner written with ____________________________ in the amount of 110% of the Contract Sum (Total Base Bid and all accepted alternatives and adjustments) the cost of which is included in the Bid.

Cost of bond for change order is __________ percent of change order cost.

1.14 LIQUIDATED DAMAGES

The undersigned Bidder understands and agrees to the provisions stated under "LIQUIDATED DAMAGES" in the General Conditions and shall be assessed at the specified daily rate for each calendar day or partial calendar day until completion as defined herein.

1.15 MATERIAL SUBSTITUTION SHEET

The following is a schedule of substitute materials I propose to furnish on this job, with the difference in price being added to or deducted from the Base Bid. The Base Bid is understood to include only those items which are definitely specified by trade names or otherwise.
I understand that if no price difference is indicated, then the selection of materials is optional with the Owner, and approval or rejection of the substitution below will be indicated prior to signing of Contracts.

<table>
<thead>
<tr>
<th>PRODUCT NAME AND/OR MANUFACTURER</th>
<th>ADD</th>
<th>DEDUCT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

1.16 PROPOSAL SIGNATURE (REQUIRED)

A. SOLE PROPRIETOR

Signature of Bidder: ___________________________________________

SUBSCRIBED AND SWORN to before me this _____ day of______, 20__

___________________________________
Notary Public

Commission Expires: __________________

B. PARTNERSHIP

Signature of All Partners:

___________________________________ Name (typed or printed)

___________________________________ Name (typed or printed)

SUBSCRIBED AND SWORN to before me this ____ day of ____, 20___

___________________________________
Notary Public

Commission Expires: __________________

C. CORPORATION

Signature of Authorized Official: _________________________________

Title: _________________________________________________________

Name above (typed or printed): _________________________________

(If other than the president, attach a certified copy of that section of corporate by-laws or other authorization by the Corporation which permits the person to
execute the offer for the Corporation.)

(Corporate Seal)

Attest: _____________________________

Secretary

SUBSCRIBED AND SWORN to before me this _____ day of _____, 20___

___________________________________

Notary Public

Commission Expires: _____________________
1.17 DISCLOSURE

A. The undersigned duly sworn deposes and says on oath that the bidder has withheld no disclosures of ownership interest and the information provided herein to the best of its knowledge is current and said undersigned has not entered into any agreement with any other bidder or prospective bidder or with any other person, firm or corporation relating to the price named in said proposal or any other proposal, nor any agreement or arrangement under which any person, firm or corporation is to refrain from bidding, nor any agreement or arrangement for any act or omission in restraint of free competition among bidders and has not disclosed to any person, firm or corporation the terms of this bid or the price named herein.

Bidder: ____________________________________________

Business Address: __________________________________

_______________________________________________

Telephone Number: ________________________________

1.18 CONTACTS

A. In the event the Evanston City Council approves this bid response, list the name, address, telephone, and fax number of the person to be contacted:

Bidder: ____________________________________________

Address: __________________________________________

_______________________________________________

Telephone Number: ________________________________

Fax Number: ________________________________
1.19 REFERENCES

A. Provide three (3) references for which your firm has completed work of a similar scope in the past.

1. Name: _______________________________________
   Address: ______________________________________
   Contact Person: _________________________________
   Phone: _________________________________________
   Contract Value: _________________________________
   Contract Dates: ________________________________

2. Name: _______________________________________
   Address: ______________________________________
   Contact Person: _________________________________
   Phone: _________________________________________
   Contract Value: _________________________________
   Contract Dates: ________________________________

3. Name: _______________________________________
   Address: ______________________________________
   Contact Person: _________________________________
   Phone: _________________________________________
   Contract Value: _________________________________
   Contract Dates: ________________________________
EXHIBIT B

City of Evanston M/W/EBE Policy

A City of Evanston goal is to provide contracting and subcontracting opportunities to Minority Business Enterprises, Women Business Enterprises, and Evanston Business Enterprises. The goal of the Minority, Women and Evanston Business Enterprise Program (M/W/EBE) is to assist such businesses with opportunities to grow. To assist such growth, the City’s goal is to have general contractors utilize M/W/EBEs to perform no less than 25% of the awarded contract.

Firms bidding on projects with the City must work to meet the 25% goal or request a waiver from participation. It is advised that bidders place advertisements requesting subcontractors and that they email or contact individual firms that would be appropriate to partner in response to the project. For samples of possible advertisements, see the City of Evanston’s Business Diversity Section http://www.cityofevanston.org/business/business-diversity/ (Sample Advertisement). If you request a paper copy of the additional documents, it will be available free of charge from the Purchasing Office, 2100 Ridge Road Suite 4200, Evanston, IL 60201.

If a bidder is unable to meet the required M/W/EBE goal, the Bidder must seek a waiver or modification of the goal on the attached forms. Bidder must include:

1. A narrative describing the Bidder’s efforts to secure M/W/EBE participation prior to the bid opening.
2. Documentation of each of the assist agencies that were contacted, the date and individual who was contacted, and the result of the conversation (see form)
3. A letter attesting to instances where the bidder has not received inquiries/proposals from qualified M/W/EBEs
4. Names of owners, addresses, telephone numbers, date and time and method of contact of qualified M/W/EBE who submitted a proposal but were not found acceptable.
5. Names of owners, addresses, telephone numbers, date and time of contact of at least 15 qualified M/W/EBEs the bidder solicited for proposals for work directly related to the Bid prior to the bid opening (copies must be attached).

If a bidder is selected with a Subcontractor listed to meet the M/W/EBE goal, a “monthly utilization report” will be due to the City prior to each payment being issued to the Contractor. This report will include documentation of the name of the firm hired, the type of work that firm performed, etc. Should the M/W/EBE not be paid according to the schedule proposed in this document, the City reserves the right to cancel the contract. Examples of this monthly form can be found on the City’s website: http://www.cityofevanston.org/business/business-diversity/ (MWEBE Monthly Utilization Report).
EXHIBIT C

M/W/EBE PARTICIPATION COMPLIANCE FORM

I do hereby certify that

_________________________________________________ (Name of firm) intends to participate as a Subcontractor or General Contractor on the project referenced above.

This firm is a (check only one):

_____ Minority Business Enterprise (MBE), a firm that is at least 51% managed and controlled by a minority, certified by a certifying agency within Illinois.

_____ Women’s Business Enterprise (WBE), a firm that is at least 51% managed and controlled by a woman, certified by a certifying agency within Illinois.

_____ Evanston Based Enterprise (EBE), a firm located in Evanston for a minimum of one year and which performs a “commercially useful function”.

Total proposed price of response $_____________________

Amount to be performed by a M/W/EBE $_____________________

Percentage of work to be performed by a M/W/EBE ________________%

Information on the M/W/EBE Utilized:

Name _______________________________________________________

Address ____________________________________________________

Phone Number _______________________________________________

Signature of firm attesting to participation _________________________

Title and Date ________________________________________________

Please attach

1. Proper certification documentation if applying as a M/WBE and check the appropriate box below. This M/WBE will be applying with documentation from:

☐ Cook County ☐ Federal Certification

☐ State Certification ☐ Women’s Business Enterprise National Council

☐ City of Chicago ☐ Chicago Minority Supplier Development Council

2. Attach business license if applying as an EBE
EXHIBIT D

M/W/EBE PARTICIPATION WAIVER REQUEST

I am ______________________ of ________________________, and I have authority to execute this certification on behalf of the firm. I ______________________ do hereby certify that this firm seeks to waive all or part of this M/W/EBE participation goal for the following reason(s):

(CHECK ALL THAT APPLY. SPECIFIC SUPPORTING DOCUMENTATION MUST BE ATTACHED.)

______  1. No M/W/EBEs responded to our invitation to bid.

______  2. An insufficient number of firms responded to our invitation to bid.

  For #1 & 2, please provide a narrative describing the outreach efforts from your firm and proof of contacting at least 15 qualified M/W/EBEs prior to the bid opening. Also, please attach the accompanying form with notes regarding contacting the Assist Agencies.

______  3. No subcontracting opportunities exist.

  Please provide a written explanation of why subcontracting is not feasible.

______  4. M/W/EBE participation is impracticable.

  Please provide a written explanation of why M/W/EBE participation is impracticable.

Therefore, we request to waive _____ of the 25% utilization goal for a revised goal of _____%.

Signature: _______________________________ Date: __________

(Signature)
### EXHIBIT E

Construction Contractors' Assistance Organizations ("Assist Agencies") Form

<table>
<thead>
<tr>
<th>AGENCY</th>
<th>DATE CONTACTED</th>
<th>CONTACT PERSON</th>
<th>RESULT OF CONVERSATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Association of Asian Construction Enterprises (AACE)</td>
<td></td>
<td>Perry Nakachii, President</td>
<td></td>
</tr>
<tr>
<td>5500 Touhy Ave., Unit K Skokie, IL. 60077</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone: 847-525-9693</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black Contractors United (BCU)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400 W. 76th Street Chicago, IL 60620</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone: 773-483-4000; Fax: 773-483-4150</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Email: <a href="mailto:bcnnewera@ameritech.net">bcnnewera@ameritech.net</a></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chicago Minority Business Development Council</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>105 West Adams Street Chicago, Illinois 60603</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone: 312-755-8880; Fax: 312-755-8890</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Email: <a href="mailto:info@chicagomsdc.org">info@chicagomsdc.org</a></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shelia Hill, President</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evanston Minority Business Consortium, Inc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P.O. Box 5683 Evanston, Illinois 60204</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone: 847-492-0177</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Email: <a href="mailto:embrcinc@aol.com">embrcinc@aol.com</a></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federation of Women Contractors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5650 S. Archer Avenue Chicago, Illinois 60638</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone: 312-360-1122; Fax: 312-360-0239</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Email: <a href="mailto:FWCCChicago@aol.com">FWCCChicago@aol.com</a></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact Person: Beth Doria</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maureen Jung, President</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic American Construction Industry (HACIA)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>901 W. Jackson, Suite 205 Chicago, IL 60607</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone: 312-666-5910; Fax: 312-666-5692</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Email: <a href="mailto:info@haciaworks.org">info@haciaworks.org</a></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women's Business Development Ctr.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 S. Michigan Ave, Suite 400 Chicago, Illinois 60603</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone: 312-853-3477; Fax: 312-853-0145</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Email: <a href="mailto:wbdc@wbdc.org">wbdc@wbdc.org</a></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carol Dougal, Director</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PLEASE NOTE:** Use of Construction Contractor's Assistance Organization (Assist Agencies”) Form and agencies are for use as a resource only. The agencies and or vendors listed are not referrals or recommendations by the City of Evanston.
EXHIBIT F

CITY OF EVANSTON
LOCAL EMPLOYMENT PROGRAM (LEP) COMPLIANCE

Effective Date January 1, 2015

City of Evanston Ordinance 60-O-14, Local Employment Program (LEP) New Penalties:

- Ordinance 60-O-14, Amendment to the MWEBE/LEP revising the penalty section from a $100/per day to a 1.0% of total project value penalty can be found at: Ordinance 60-O-14 Amendment MWEBE LEP of the Evanston City Code Section 1-17-1 (C) can be found at Municode Library. The following are excerpts from Ordinance 60-O-14, Amending City Code Section 1-17-1(C)(11): Penalty.

If the contractor or subcontractor fails to comply: The City may impose a fine up to one percent (1.0%) of the approved project price in total. Contractors or subcontractors that are out of compliance due to a resident termination or resignation shall immediately notify the Business Workforce Compliance Coordinator of this occurrence within two (2) business days. Subsequently, the contractor or subcontractor shall have five (5) additional business days to replace a terminated or resigned worker with another resident.

If the contractor or subcontractor fails to comply: If the contractor or subcontractor fails to make the replacement or to notify the Business Workforce Compliance Coordinator of this occurrence, the offending party will also be subject to a penalty up to one percent (1.0%) of the approved project price. If the noncompliant contractor makes a good faith effort to replace the resident, the fine may be waived.

If the contractor or subcontractor fails to comply: At the sole discretion of the City, a contractor or subcontractor that has violated the terms of the Local Employment Program within a three-year period may be determined a non-responsible bidder and excluded from bidding on future projects for a period of not less than one year.

If the employee (LEP Evanston resident) fails to comply: At the sole discretion of the City, an employee that has been hired through the LEP may be removed from the program for a period of not less than one year for failing to adhere to program guidelines or due to termination by the contractor for cause. Such termination process will be reviewed by the Business Workforce Compliance Coordinator.

**Detailed Local Employment Program Instructions “How to Comply” can be found at: Local Employment Program Detailed Instructions**

Local Employment Program or Exhibit F Questions: City staff is available for assistance to help with compliance. Submit questions in writing to Sharon A. Johnson, Business Workforce Compliance Coordinator at shjohnson@cityofevanston.org.
EXHIBIT F

LOCAL EMPLOYMENT PROGRAM COMPLIANCE

CITY CODE SECTION 1-17-1(C): LOCAL EMPLOYMENT PROGRAM

I have read and understood the requirements of the City of Evanston Local Employment Program ("LEP") as set forth in City of Evanston Code Section 1-17-1(C): Local Employment Program. I intend to comply with the program as follows:

Estimated total labor cost = __________ 15% of total labor cost = __________

I. My total bid, including all alternates, is under $250,000, and the LEP does not apply.
II. My total bid, including all alternates, is equal to or greater than $250,000, and I already employ, and will continue to employ for the duration of the contract for which I am submitting this bid, Evanston residents (residing in zip codes 60201 or 60202) for at least 15% of all hours worked at the construction site by construction trade workers.
III. My total bid, including all alternates, is equal to or greater than $250,000, and I will employ, for the duration of the contract for which I am submitting this bid, through use of the City of Evanston database or otherwise, Evanston residents (residing in zip codes 60201 or 60202) for at least 15% of all hours worked at the construction site by construction trade workers.
IV. My total bid, including all alternates, is equal to or greater than $250,000, and I have been unable to comply with the LEP requirements but am willing to work with the City to achieve compliance.
V. My total bid, including all alternates, is equal to or greater than $250,000, and after having made sincere attempt to comply as noted below, I seek a waiver on a portion or all of the LEP requirements on this contract. Complete next section “Reasons for Waiver Request” below.

I UNDERSTAND THAT FAILURE TO COMPLY WITH THE LEP, REGARDLESS OF INTENT, MAY RESULT IN MAXIMUM PENALTY AS SET FORTH IN CITY CODE SECTION 1-17-1(C)(11), AS AMENDED.

WAIVER WILL BE GRANTED ONLY AFTER SINCERE ATTEMPT TO COMPLY*

REASONS FOR WAIVER REQUEST: PLEASE CHECK ALL THAT APPLY AND COMPLETE INFORMATION REQUESTED:

1. I have made sincere attempt as otherwise indicated below, but have nonetheless been unable to comply.
   a. I do or will employ Evanston residents for the project, but such employment amounts to ____% of total labor cost.
   2. The nature of the job is so technical that after having made sincere attempt as otherwise indicated below, I have been unable to locate any Evanston residents qualified to perform any aspects of the work. Please describe applicable job requirements/qualifications. Attach separate sheet if necessary:

*THE FOLLOWING DEMONSTRATE SINCERE ATTEMPT TO COMPLY: PLEASE CHECK EACH BOX COMPLETED, AS APPLICABLE:

3. I have utilized the local resident database and otherwise worked with the City in attempt to hire Evanston residents in compliance with LEP on this project, and have nonetheless been unable to comply;
4. I have placed one or more ads in a local newspaper seeking to hire Evanston residents in compliance with LEP on this project, and have nonetheless been unable to comply; and
5. If I am utilizing union labor, I have contacted Chicagoland labor unions to request Evanston residents for employment in compliance with LEP on this project, and have nonetheless been unable to comply.

I have read The City of Evanston, Local Employment Program (LEP) requirements as set forth in City Code Section 1-17-1(C): Local Employment Program. I understand and will comply with the LEP requirements for this project with respect to the job and/or any waiver, as applicable. I UNDERSTAND THAT IF MY APPLICATION IS NOT COMPLETE, MY BID MUST BE REJECTED.

SIGNED:

Signature __________________________ Printed Name and Title __________________________ Date __________________________

On behalf of Company: __________________________

EXHIBIT F
EXHIBIT G

CERTIFICATION OF BIDDER REGARDING
EQUAL EMPLOYMENT OPPORTUNITY
(Only if Contract Exceeds $10,000)

This certification is required pursuant to Executive Order 11246 (30 F.R. 12319-25). The implementing rules and regulations provide that any bidder or prospective contractor, or any of their proposed subcontractors, shall state as an initial part of the bid or negotiations of the contract whether it has participated in any previous contract or subcontract subject to the equal opportunity clause; and, if so, whether it has filed all compliance reports due under applicable instructions.

Where the certification indicates that the bidder has not filed a compliance report due under applicable instructions, such bidder shall be required to submit a compliance report within seven calendar days after bid opening. No contract shall be awarded unless such report is submitted.

CERTIFICATION OF BIDDER

Name and Address of Bidder (Include ZIP Code)

IRS EMPLOYER I.D. NUMBER 36-______________________________

1. Bidder has participated in a previous contract or subcontract subject to the Equal Opportunity Clause. _____Yes _____No

2. Bidder has filed all compliance reports due under applicable instructions. _____Yes _____No

3. Have you ever been or are you being considered for sanction due to violation of Executive Order 11246, as amended? _____Yes _____No

Name:____________________________

Title: __________________________

Signature: _______________________

Date: ___________________________
EXHIBIT H

DISCLOSURE OF OWNERSHIP INTERESTS

City of Evanston Ordinance 15-0-78 requires all persons (APPLICANT) seeking to do business with the City to provide the following information with their bid. Every question must be answered. If the question is not applicable, answer with "NA".

APPLICANT NAME: ___________________________________________

APPLICANT ADDRESS: ___________________________________________

TELEPHONE NUMBER: ___________________________________________

FAX NUMBER: ___________________________________________

APPLICANT is (Check One)

1. Corporation ( ) 2. Partnership ( ) 3. Sole Owner ( ) 4. Association ( )

5. Other ( ) ___________________________________________

Please answer the following questions on a separate attached sheet if necessary.

SECTION I - CORPORATION

1a. Names and addresses of all Officers and Directors of Corporation.

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________

1b. (Answer only if corporation has 33 or more shareholders.) Names and addresses of all those shareholders owning shares equal to or in excess of 3% of the proportionate ownership interest and the percentage of shareholder interest. (Note: Corporations which submit S.E.C. form 10K may substitute that statement for the material required herein.)

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________
1c. (Answer only if corporation has fewer than 33 shareholders.) Names and addresses of all shareholders and percentage of interest of each herein. (Note: Corporations which submit S.E.C. form 10K may substitute that statement for the material requested herein.)

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

SECTION 2 - PARTNERSHIP/ASSOCIATION/JOINT VENTURE

2a. The name, address, and percentage of interest of each partner whose interests therein, whether limited or general, is equal to or in excess of 3%.

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

2b. Associations: The name and address of all officers, directors, and other members with 3% or greater interest.

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

SECTION 3 - TRUSTS

3a. Trust number and institution.

__________________________________________________________________

3b. Name and address of trustee or estate administrator.

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________
3c. Trust or estate beneficiaries: Name, address, and percentage of interest in total entity.

________________________________________

________________________________________

SECTION 4 - ALL APPLICANTS - ADDITIONAL DISCLOSURE

4a. Specify which, if any, interests disclosed in Section 1, 2, or 3 are being held by an agent or nominee, and give the name and address of principal.

________________________________________

________________________________________

4b. If any interest named in Section 1, 2, or 3 is being held by a "holding" corporation or other "holding" entity not an individual, state the names and addresses of all parties holding more than a 3% interest in that "holding" corporation or entity as required in 1(a), 1(b), 1(c), 2(a), and 2(b).

____________________________________________________________________

________________________________________

________________________________________

4c. If "constructive control" of any interest named in Sections 1, 2, 3, or 4 is held by another party, give name and address of party with constructive control. ("Constructive control" refers to control established through voting trusts, proxies, or special terms of venture of partnership agreements.)

________________________________________

________________________________________
I have not withheld disclosure of any interest known to me. Information provided is accurate and current.

Date ______________________  Signature of Person Preparing Statement ______________________

Title ______________________

ATTEST: ______________________  (Notary Seal)

Notary Public

Commission Expires: ______________________
EXHIBIT I

ADDITIONAL INFORMATION SHEET

Bid/Proposal Name:______________________________________________________
Bid/Proposal Number #: _________________________________________________
Company Name: _______________________________________________________
Contact Name: _________________________________________________________
Address: ______________________________________________________________
City, State, Zip: _________________________________________________________
Telephone/FAX: #_______________________________________________________
E-mail: ________________________________________________________________

Comments: ____________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

EXHIBIT I
EXHIBIT J

CERTIFICATE OF COMPLIANCE
WITH PREVAILING WAGE RATE ACT

The undersigned, upon being first duly sworn, hereby certifies to the City of Evanston, Cook, County, Illinois, that all work under this contract shall comply with the Prevailing Wage Rate Act of the State of Illinois, 820 ILCS 130 et seq, and as amended by Public Acts 86-799 and 86-693 and current City of Evanston Resolution, with rates to be paid in effect at time work is performed. Contractors shall submit monthly certified payroll records to the city.

Name of Contractor: __________________________________________

By: __________________________________________

By: State of ________________, County of ________________

Subscribed and sworn to before me this __________ day
of __________, __________.

Notary Public
EXHIBIT K

MAJOR SUBCONTRACTORS LISTING

The following Tabulation of Major Subcontractors shall be attached and made a condition of the Bid. The Bidder expressly understands and agrees to the following provisions:

A. If awarded a Contract as a result of this Bid, the major subcontractors used in the prosecution of the work will be those listed below.

B. The following list includes all subcontractors who will perform work representing 5% (five percent) or more of the total Base Bid.

C. The subcontractors listed below are financially responsible and are qualified to perform the work required.

D. The subcontractors listed below comply with the requirements of the Contract Documents.

E. Any substitutions in the subcontractors listed below shall be requested in writing by the Contractor and must be approved in writing by the Owner. All pertinent financial, performance, insurance and other applicable information shall be submitted with the request for substitutions(s). Owner shall respond to such requests within 14 calendar days following the submission of all necessary information to the full satisfaction of the Owner.

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<tr>
<th>Category Number</th>
<th>Name of Subcontractor</th>
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</table>

(Attach additional sheets as required)

END OF SECTION
EXHIBIT L

CONFLICT OF INTEREST

[Signature], hereby certifies that it has conducted an investigation into whether an actual or potential conflict of interest exists between the Bidder, its owners and employees and any official or employee of the City of Evanston.

Bidder further certifies that it has disclosed any such actual or potential conflict of interest and acknowledges if Bidder/proposer has not disclosed any actual or potential conflict of interest, the City of Evanston may disqualify the bid/proposal.

_____________________________________________________
(Name of Bidder/proposer if the Bidder/proposer is an Individual)
(Name of Partner if the Bidder/proposer is a Partnership)
(Name of Officer if the Bidder/proposer is a Corporation)

The above statements must be subscribed and sworn to before a notary public.
Subscribed and Sworn to this _______ day of ______________, 20

_____________________________________________________
(Notary Seal)
Notary Public

Commission Expires: ______________
The undersigned hereby certifies that they have read and understand the contents of this solicitation and attached service agreements, and agree to furnish at the prices shown any or all of the items above, subject to all instructions, conditions, specifications and attachments hereto. Failure to have read all the provisions of this solicitation shall not be cause to alter any resulting contract or to accept any request for additional compensation. By signing this document, the proposer hereby certifies that they are not barred from bidding on this contract as a result bid rigging or bid rotating or any similar offense (720 ILCS 5/33 E-3, E-4).

Authorized Signature: ____________________________________________

Company Name: ________________________________________________

Typed/Printed Name: ____________________________________________

Date: __________________________________________________________

Title: __________________________________________________________

Telephone Number: _____________________________________________

E-mail __________________________ ________________________________

Fax Number: ___________________________________________________
Exhibit N

Contractor Services Agreement Acknowledgement Page

The City has attached its standard contractor services agreement as an exhibit to this bid document. Identify all exceptions to the agreement that would prevent your firm from executing it. **The City shall not consider or negotiate regarding exceptions submitted at any time after the submission of the Bidder’s response. Please check one of the following statements:**

_____ I have read the contractor services agreement and plan on executing the agreement without any exceptions.

_____ My firm cannot execute the City’s standard contractor service agreement unless the exceptions noted below or in the attached sample contractor services agreement are made.

***Please be aware that submitting exceptions to the contract may impact the likelihood of your firm being selected to perform this work.

List exceptions in the area below:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Authorized Signature: ___________________________ Company Name: ___________________________
Typed/Printed Name and Title: ___________________________ Date: ___________________________
CONTRACTOR SERVICES AGREEMENT

The parties referenced herein desire to enter into an agreement for professional services for

Emergency Generators at Police/Fire Headquarters, Fire Station 2 and Fire Station 1

(BID #20-05)

THIS AGREEMENT (hereinafter referred to as the “Agreement”) is entered into between the City of Evanston, an Illinois municipal corporation with offices located at 2100 Ridge Avenue, Evanston Illinois 60201 (hereinafter referred to as the “City”), and [Insert Contractor name here], with offices located at [Insert Contractor address here], (hereinafter referred to as the “Contractor”). Compensation (the “Compensation”) for all basic services provided by the Contractor pursuant to the terms of this Agreement shall not exceed $[Insert fee here].

Revision June 2013
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EXHIBIT N
RECITALS

WHEREAS, the City intends to retain the services of a qualified and experienced contractor for the following:

a) Fire Station #1: The scope is to provide an easily accessible coolant refill system for generator remote radiator. Existing re-fill valve is located at attic space which creates an unsafe condition to maintenance personnel. Provide and install a complete pressure fill system for existing generator coolant loop including but not to limited to fill system, piping, valves, power circuit and required accessories.

b) Fire Station #2: The scope is to replace existing insufficient natural gas generator system to bigger capacity diesel generator to support added load. Demolish existing generator, and associated ATS, gas piping, louvers, ductwork, conduits and wires. Provide and install a complete new diesel engine emergency power generator system including but not to limited to diesel engine generator, ATS, manual transfer switch (MTS), camlock box with bollards in the parking lot, ductwork, louvers, control, fuel tank, beakers, panelboard modification, conduits, and wires.

c) Police Fire HQ: The scope is to replace aged outdoor emergency generator with new. Also, address the double lugged mobile generator tap to existing ATS without the protection. Demolish existing outdoor generator, conduits and wires. Provide and install a complete new outdoor emergency generator system including but not to limited to diesel engine generator, weather/sound protected enclosure, control, MTS, conduits and wires.

WHEREAS, this Agreement shall include the following documents which are attached hereto:

a) City of Evanston Bid 20-05, attached as Exhibit A.

b) Contractor’s response to Bid 20-05, attached as Exhibit B.

c) Any subcontractor subcontracts related to this Agreement, attached as Exhibit C.

d) Project Fee Schedule and hourly rates, attached as Exhibit D (if appropriate).

NOW, THEREFORE, in consideration of the mutual covenants hereinafter set forth, the parties agree as follows:

1 Services and Duties of the Contractor

1.1 The Contractor shall perform professional services and provide equipment (the “Work”) in accordance with Exhibits A, B, C and D. The Contractor retains the right to control the manner of performance of the services provided for in this Agreement and is an independent contractor and not agent or an employee of the City. All employees and subcontractors of the
Contractor shall likewise not be considered to be employees of the City. Contractor is solely responsible for the means and methods of all work performed under the terms of this Agreement for this Project ("the Project"). Contractor is an independent Contractor and is solely responsible for all taxes, withholdings, and other statutory or contractual obligations of any sort, including but not limited to, Worker’s Compensation Insurance. Nothing in this Agreement accords any third-party beneficiary rights whatsoever to any non-party to this Agreement that any non-party may seek to enforce. Contractor acknowledges and agrees that should Contractor or its subcontractors provide false information, or fail to be or remain in compliance with this Agreement, the City may void this Agreement.

1.2 The Contractor warrants and states that it has read the Contract Documents, and agrees to be bound thereby, including all performance guarantees as respects Contractor’s work and all indemnity and insurance requirements. Contractor further affirms that it has visited the Project site and has become familiar with all special conditions, if any, at the Project site. Contractor shall perform the Work and its obligations under this Agreement in accordance with and subject to the Contract Documents to the full extent that each such provision is applicable to the Work. Contractor shall take necessary precautions to properly protect the Work of others, if any, from damage caused by operations under this Agreement. In addition, Contractor shall protect the work during normal and adverse weather conditions until the Project is complete and accepted by the City, or until the Contractor has fully completed its work under this Agreement. Contractor’s obligations include, but are not limited to, placing and adequately maintaining at or about all locations of Project work, sufficient guards, barricades, lights, and enclosures to protect the Work.

1.3 The Contractor shall not have any public or private interest and shall not acquire directly or indirectly any such interest which conflicts in any manner with the performance of its services under this Agreement.

1.4 The Contractor shall designate, in writing, a person to act as its Project Manager for the work to be performed under this Agreement. Such person shall have complete authority to transmit instructions, receive information, interpret and define the Contractor’s policies and decisions with respect to the work covered by this Agreement.

1.5 The Contractor shall employ only persons duly licensed by the State of Illinois to perform the professional services required under this Agreement for which applicable Illinois law requires a license, subject to prior approval of the City. The Contractor shall employ only well qualified persons to perform any of the remaining services required under this Agreement, also subject to prior approval of the City. The City reserves the right to require replacement of Contractor, subcontractor, or supplier personnel for any reason. Contractor will replace the unacceptable personnel at no charge to the City. For all solicitations or advertisements placed by or on behalf of Contractor for employees for this Project it will state that the Contractor is an Equal Opportunity Employer.

1.6 Pursuant to the Illinois Freedom of Information Act, 5 ILCS 140/7(2), records in the possession of others whom the City has contracted with to perform a governmental function are covered by the Act and subject to disclosure within limited statutory timeframes (five (5) working
days with a possible five (5) working day extension). Upon notification from the City that it has received a Freedom of Information Act request that calls for records within the Contractor’s control, the Contractor shall promptly provide all requested records to the City so that the City may comply with the request within the required timeframe. The City and the Contractor shall cooperate to determine what records are subject to such a request and whether or not any exemptions to the disclosure of such records, or part thereof, is applicable. Contractor shall indemnify and defend the City from and against all claims arising from the City’s exceptions to disclosing certain records which Contractor may designate as proprietary or confidential. Compliance by the City with an opinion or a directive from the Illinois Public Access Counselor or the Attorney General under FOIA, or with a decision or order of Court with jurisdiction over the City, shall not be a violation of this Section.

1.7 The Contractor shall obtain prior approval from the City prior to subcontracting with any entity or person to perform any of the work required under this Agreement. The Contractor may, upon request of the City, submit to the City a draft subcontractor agreement for City review and approval prior to the execution of such an agreement. Any previously entered into subcontractor agreement(s) are attached as Exhibit C. If the Contractor subcontracts any of the services to be performed under this Agreement, the subcontractor agreement shall provide that the services to be performed under any such agreement shall not be sublet, sold, transferred, assigned or otherwise disposed of to another entity or person without the City’s prior written consent. The Contractor shall be responsible for the accuracy and quality of any subcontractor’s work.

1.8 The Contractor shall cooperate fully with the City, other City contractors, other municipalities and local government officials, public utility companies, and others, as may be directed by the City. This shall include attendance at meetings, discussions and hearings as requested by the City. This cooperation shall extend to any investigation, hearings or meetings convened or instituted by OSHA relative to this Project, as necessary. Contractor shall cooperate with the City in scheduling and performing its Work to avoid conflict, delay in or interference with the work of others, if any, at the Project.

1.9 The Contractor acknowledges that it shall enforce and comply with all applicable Occupational Safety and Health Administration standards (OSHA) for this Project in effect as of the date of the execution of this Agreement, or as otherwise promulgated by OSHA in the future taking effect during the pendency of this Project. Contractor shall enforce all such standards and ensure compliance thereto as to its own agents and employees, and as to the agents and employees of any subcontractor throughout the course of this Project. Contractor is solely responsible for enforcing and complying with all applicable safety standards and requirements on this Project, and is solely responsible for correcting any practices or procedures which do not comply with the applicable safety standards and requirements for this Project. Any Project specific safety requirements applicable to this Project must be followed by Contractor and any subcontractor(s) on the Project. Additionally, all such safety requirements shall be made a part of any subcontractor agreement.

1.10 The Contractor shall submit to the City a progress report each month this Agreement is in effect. The report shall include the following items:

EXHIBIT N
a) A summary of the Contractor’s project activities, and any subcontractor project activities that have taken place during the invoice period;
b) A summary of the Contractor’s project activities and any subcontractor project activities, that shall take place during the next invoice period;
c) A list of outstanding items due to or from the City; and
d) A status of the Project schedule.

1.11 The Contractor shall perform the work required under this Agreement pursuant to high quality industry standards expected by the City. The Contractor shall apply for and receive all appropriate permits before performing any work in the City. The Contractor shall also provide the appropriate permit drawings for Building Permits to be issued for the Project, if said permits are obligated by the Project. The City will assist the Contractor with obtaining the appropriate building and right-of-way permits.

1.12 The Contractor shall provide drawings of record, in the following 3 electronic formats for all locations where equipment has been installed and/or work has been performed. The electronic formats required by this Section 1.12 are AutoCad Version 2007, ArcView and PDF.

1.13 Contractor recognizes that proper cleanup and removal of construction debris is an important safety consideration. The Contractor shall be solely responsible for daily construction site/area cleanup and removal of all construction debris in accordance with City-approved disposal practices. Contractor shall be solely responsible for identifying and removing at its expense all hazardous material and waste which it uses and generates.

1.14 To the extent that there is any conflict between a provision specified in this Agreement, with a provision specified in any of the other Contract Documents, as defined in Section 1.15, this Agreement shall control. The City and the Contractor may amend this Section 1.14 as provided by Section 15 herein.

The Contractor acknowledges and agrees that the City has no retained control over any of the Work done pursuant to this Agreement, and that the City is expressly exempt from the retained control exception as defined in the Restatement of Torts, Second, Section 414. This provision shall survive completion, expiration, or termination of this Agreement.

1.15 The Contract Documents for this Project consist of:

a) This Agreement;
b) The City’s RFP/RFQ, and the plans, specifications, general conditions, drawings addenda, and modifications thereto;
c) The Contractor’s response to the RFP/RFQ/Bid;
d) Other exhibits and schedules, if any, listed in this Agreement;
e) Amendments or Other Contract Documents, if any; and
f) Amendments/Modifications to this Agreement issued after execution thereof.
1.16 As a condition of receiving payment, Contractor must (i) be in compliance with the Agreement, (ii) pay its employees prevailing wages when required by law (Examples of prevailing wage categories include public works, printing, janitorial, window washing, building and grounds services, site technician services, natural resource services, security guard and food services). Contractor is responsible for contacting the Illinois Dept. of Labor 217-782-6206; http://www.illinois.gov/idol/Laws-Rules/CONMED/Pages/Rates.aspx to ensure compliance with prevailing wage requirements), (iii) pay its suppliers and subcontractors according to the terms of their respective contracts, and (iv) provide lien waivers to the City upon request.

2 Standard Certifications

Contractor acknowledges and agrees that compliance with this section and each subsection for the term of the Agreement is a material requirement and condition of this Agreement. By executing this Agreement, Contractor certifies compliance with this section and each subsection and is under a continuing obligation to remain in compliance and report any non-compliance.

This section, and each subsection, applies to subcontractors used on this Agreement. Contractor shall include these Standard Certifications in any subcontract used in the performance of the Agreement.

If this Agreement extends over multiple fiscal years, Contractor and its subcontractors shall confirm compliance with this section in the manner and format determined by the City by the date specified by the City and in no event later than January 1 of each year that this Agreement remains in effect.

If the City determines that any certification in this section is not applicable to this Agreement, it may be stricken, subject to sole approval by the City, without affecting the remaining subsections.

2.1 As part of each certification, Contractor acknowledges and agrees that should Contractor or its subcontractors provide false information, or fail to be or remain in compliance with the Standard Certification requirements, one or more of the following sanctions will apply:

- the Agreement may be void by operation of law,
- the City may void the Agreement, and
- Contractor and its subcontractors may be subject to one or more of the following: suspension, debarment, denial of payment, civil fine, or criminal penalty.

2.2 By signing this Agreement, the Contractor certifies that it has not been barred from being awarded a contract with a unit of State or local Government as a result of bid rigging or bid rotating or similar offense, nor has it made any admission of guilt of such conduct that is a matter of public record. (720 ILCS 5/33 E-3, E-4).

2.3 In the event of the Contractor’s noncompliance with any provision of Section 1-12-5 of the Evanston City Code, the Illinois Human Rights Act or any other applicable law, the Consultant may be declared nonresponsible and therefore ineligible for future contracts or subcontracts with the
City, and the contract may be cancelled or voided in whole or in part, and such other sanctions or penalties may be imposed or remedies invoked as provided by statute or regulation.

2.4 During the term of this Agreement, the Contractor agrees as follows:

a) That it will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, marital status, national origin or ancestry, or age or physical or mental disabilities that do not impair ability to work, and further that it will examine all job classifications to determine if minority persons or women are underutilized and will take appropriate affirmative action to rectify any such underutilization. Consultant shall comply with all requirements of City of Evanston Code Section 1-12-5.

b) That, in all solicitations or advertisements for employees placed by it on its behalf, it will state that all applicants will be afforded equal opportunity without discrimination because of race, color, religion, sex, sexual orientation, marital status, national origin, ancestry, or disability.

2.5 The Contractor certifies pursuant to the Illinois Human Rights Act (775 ILCS 5/2105 et seq.), that it has a written sexual harassment policy that includes, at a minimum, the following information:

a) The illegality of sexual harassment;

b) The definition of sexual harassment under State law;

c) A description of sexual harassment utilizing examples;

d) The Contractor’s internal complaint process including penalties;

e) Legal recourse, investigation and complaint process available through the Illinois Department of Human Rights and the Human Rights Commission, and directions on how to contact both; and

f) Protection against retaliation as provided to the Department of Human Rights.

2.6 In accordance with the Steel Products Procurement Act (30 ILCS 565), Contractor certifies steel products used or supplied in the performance of a contract for public works shall be manufactured or produced in the U.S. unless the City grants an exemption.

2.7 Contractor certifies that it is properly formed and existing legal entity and as applicable has obtained an assumed name certificate from the appropriate authority, or has registered to conduct business in Illinois and is in good standing with the Illinois Secretary of State.

2.8 If Contractor, or any officer, director, partner, or other managerial agent of Contractor, has been convicted of a felony under the Sarbanes-Oxley Act of 2002, or a Class 3 or Class 2 felony under the Illinois Securities Law of 1953, Contractor certifies at least five years have passed since the date of the conviction.

2.9 Contractor certifies that if more favorable terms are granted by Contractor to any
similar governmental entity in any state in a contemporaneous agreement let under the same or similar financial terms and circumstances for comparable supplies or services, the more favorable terms will be applicable under this Agreement.

2.10 Contractor certifies that it is not delinquent in the payment of any fees, fines, damages, or debts to the City of Evanston.

2.11 The Contractor certifies that all Design Professionals performing the Work under this Agreement will ensure that the Project shall be designed in conformance with the Americans with Disabilities Act of 1990, 42 U.S.C. Section 12101, et seq., and all regulations promulgated thereunder. Design Professional means any individual, sole proprietorship, firm, partnership, joint venture, corporation, professional corporation, or other entity that offers services under the Illinois Architecture Practice Act of 1989 (225 ILCS 305/), the Professional Engineering Practice Act of 1989 (225 ILCS 325/), the Structural Engineering Licensing Act of 1989 (225 ILCS 340/), or the Illinois Professional Land Surveyor Act of 1989 (225 ILCS 330/).

2.12 The Contractor shall comply with all federal, state and local laws, statutes, ordinances, rules, regulations, orders or other legal requirements now in force or which may be in force during the term of this Agreement. The Contractor shall comply with the Illinois Human Rights Act, 775 ILCS 5/1-101 et. seq, Title VII of the Civil Rights Act of 1964, and the Illinois Prevailing Wage Act, 820 ILCS 130/0.01 et. seq.

3 Additional Services/Change Orders

3.1 If the representative of the City responsible for the Project verbally requests the Contractor to perform additional services, the Contractor shall confirm in writing that the services have been requested and that such services are additional services. Failure of the City to respond to the Contractor’s confirmation of said services within thirty (30) calendar days of receipt of the notice shall be deemed a rejection of, and refusal to pay for the additional services. Contractor shall not perform any additional services until City has confirmed approval of said additional services in writing. If authorized in writing by the City, the Contractor shall furnish, or obtain from others, additional services of the following types, which shall be paid for by the City as set forth in Section 9 of this Agreement:

a) Additional Services due to significant changes in scope of the Project or its design, including, but not limited to, changes in size, complexity or character of construction, or time delays for completion of work when such delays are beyond the control of the Contractor;

b) Revisions of previously approved studies, reports, design documents, drawings or specifications;

c) Preparation of detailed renderings, exhibits or scale models for the Project;

d) Investigations involving detailed consideration of operations, maintenance and overhead expenses for the preparation of rate schedules, earnings and expense statements, feasibility studies, appraisals and valuations, detailed quantity surveys of material and labor, and material audits or inventories required for certification of
force account construction performed by the City;
e) Services not otherwise provided for in this Agreement.

3.2 The City may, upon written notice, and without invalidating this Agreement, require changes resulting in the revision or abandonment of work already performed by the Contractor, or require other elements of the work not originally contemplated and for which full compensation is not provided in any portion of this Agreement. Any additional services, abandonment of services which were authorized by the City, or changes in services directed by the City which result in the revision of the scope of services provided for in Exhibits A, B, C, and D that cause the total Compensation due Contractor under this Agreement to exceed $20,000 or more, or increase or decrease the contract duration by more than 30 days are subject to approval by the Evanston City Council. These actions must be addressed either in a written Change Order or in a written amendment to this Agreement approved by both parties.

3.3 Contractor acknowledges and agrees that the Public Works Construction Change Order Act, 50 ILCS 525/1 et seq. shall apply to all Change Orders for the Project. It is expressly understood and agreed to by Contractor that it shall not be entitled to any damages or Compensation from the City on account of delay or suspension of all or any part of the Work. Contractor acknowledges that delays are inherent in construction projects and Contractor assessed that risk and fully included that risk assessment within its contract sum specified in its Response to the City Bid for this Project. The City shall not compensate Contractor for work that is more difficult than the contract sum specified in its Response would reflect. Delays to minor portions of the Work will not be eligible for extensions of time.

Delays to the Project caused by labor disputes or strikes involving trades not directly related to the Project, or involving trades not affecting the Project as a whole will not be eligible for an extension of time.

The City will not grant an extension of time for a delay by the Contractor’s inability to obtain materials unless the Contractor first furnishes to the City documentary proof. The proof must be provided in a timely manner in accordance with the sequence of the Contractor’s operations and accepted construction schedule.

In addition to any other changes requested by City (as described in Sections 3.1 and 3.2), the Company shall be entitled to request (and the City may grant) Change Orders with respect to:

(a) The City-caused delays;
(b) Change in Law;
(c) Force Majeure Events.

The foregoing events shall entitle the Contractor to a change in the Compensation for this Project, if the Contractor demonstrates that it will unavoidably incur reasonable costs as a result thereof and the Contractor provides reasonable and detailed documentary support with respect to any such price impact.
The parties agree to reasonably confer regarding any such disputes with respect to the issuance of a Change Order.

Any payment for compensable delay will only be based upon actual costs excluding, without limitation, what damages, if any, the Contractor may have reasonably avoided. The Contractor understands that this is the sole basis for recovering delay damages and explicitly waives any right to calculate daily damages for office overhead, profit, or other purported loss.

All Contractor Change Orders authorized under this Section 3 shall be made in writing. In remitting a Change Order, the Contractor must first show in writing that:

(a) The work was outside the scope of this Agreement,
(b) The extra work was not made necessary due to any fault of Contractor;
(c) The circumstances said to necessitate the change in performance were not reasonably foreseeable at the time the Agreement was signed;
(d) The change is germane to the original Agreement; and
(e) The Change Order is in the best interest of the City and authorized by law.

Any person who fails to first obtain the City’s written authorization for a Change Order commits a Class 4 felony. The written determination and the written Change Order resulting from that determination shall be preserved in the contract's file which shall be open to the public for inspection.

The City reserves all rights and causes of action, at law or equity, to seek redress against entities or persons who violate the requirements of this Section 3. By initialing below, Contractor hereby acknowledges that it is bound by this Section 3.

Contractor’s Initials: ___________

3.4 The Contractor is required to include the City of Evanston as a reference whenever and wherever the Contractor provides references for similar projects for a period of one (1) year from the date of Final Acceptance by the City of the Work for this Project.

4 Bonds

4.1 Before the Scheduled Construction Commencement Date, the Contractor is required to furnish unconditional performance and payment bonds in the amount of 110% of the Compensation as security for the faithful performance and completion of all the Contractor’s obligations under the Contract Documents and covering the payment of all materials used in the performance of this Agreement and for all labor and services performed under this Agreement. All Bonds shall be issued on a form acceptable to the City. The bonds must be for the entire term of the Agreement. Failure to provide these bonds shall constitute a breach of Contractor’s obligations under this Agreement. Each surety providing the Bonds must have a Best’s rating not less than A/X and be licensed in Illinois and shall be named in the current list of “Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies” as

EXHIBIT N
published in Circular 570 as published in the Federal Register and available on the website of the U.S. Department of the Treasury, Financial Management Service, at www.fms.treas.gov/c570/c570.html. All Bonds signed by an agent must be accompanied by a certified copy of his or her authority to act. It shall be the duty of the Contractor to advise the surety or sureties of any Change Orders that result in an increase to the Compensation and to ensure that the amounts of the Bonds are updated to reflect and cover any such increases throughout the course of the Project. The cost of such Bonds shall be included within the Compensation.

4.2 If the surety behind any Bond furnished by the Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in the State or it ceases to meet any of the requirements of this Contract, the Contractor shall, within [5] five days thereafter, substitute another Bond of equivalent value and surety, both of which must be acceptable to the City. In addition, no further progress payments under the Agreement will be made by the City until the Contractor complies with the provisions of this Agreement. The Contractor shall furnish to the City proof of any required bonds and proof of required insurance as one of the conditions precedent to payment under the Agreement. Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment or performance of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or authorize a copy to be furnished. All surety Bonds provided for in this Section shall incorporate by reference this Agreement, and any language that may be in any such surety Bond which conflicts with the provisions of this Agreement that define the scope of the surety(‘s) duty(ies) shall be of no force and effect.

5 Liquidated Damages in the Event Contractor Fails to Complete the Work

5.1 The parties agree that failure of Contractor to timely complete the Work required by this Agreement constitutes a default. The parties agree that this default will result in damage and injury to City. The parties further agree, however, that actual damages incurred by City as result of such default is difficult if not impossible to ascertain with any degree of certainty or accuracy. Accordingly, the parties have negotiated and have agreed that for each calendar day after written notice is delivered to Contractor and Contractor fails to cure such default, that Contractor will pay City, as and for liquidated damages, and not as a penalty, the sum of Seven Hundred and Fifty Dollars per day. Contractor shall reimburse the City for all costs, expenses and fees (including, without limitation, attorneys’ fees), if any, paid by the City in connection with such written demand by City. Contractor stipulates and agrees that the sums payable by Contractor under this Section are reasonable under the circumstances existing as of the execution of this Agreement. This Section 5.1 is not intended to limit any direct damages that may be recoverable by City related to the Contractor's failure to complete the Work in accordance with this Agreement. There shall be no early completion bonus if the Work is completed before the substantial completion date. The City, at its option, may withhold liquidated damages from progress payments payable to Contractor before the substantial completion date.

6 The City’s Responsibilities

6.1 The City may evaluate the Contractor’s and any subcontractor’s performance (interim and final). Timeliness in meeting the Project schedule and the overall relationship with the
Contractor are factors that will be considered in the Contractor’s performance rating. An unfavorable performance rating may be a factor when future assignments are being considered.

6.2 The City makes no representation or warranty of any nature whatsoever as to the accuracy of information or documentation provided by the City to the Contractor which were generated or provided by third parties.

7 Period of Service

7.1 The Contractor shall commence work on the Project after supplying the City with the Contractor’s performance and payment bonds and all required insurance documents before starting its Work on this Project. The City shall determine when the Contractor has completed the Work required pursuant to this Agreement, and shall determine the date of Final Acceptance. Contractor recognizes time is of the essence regarding its performance on this Project. Contractor shall continue to perform its obligations while any dispute concerning the Agreement is being resolved, unless otherwise directed by the City.

7.2 Each phase of the project shall be completed in accordance with the activities outlined in the City’s Bid 20-05, Exhibit A. Project phases include:

7.2.1 Phase 1: Fire/Police Headquarters Generator
7.2.2 Phase 2: Fire Station 2 Generator
7.2.3 Phase 3: Fire Station 1 Generator Cooling System

8 Payment for Services and Reimbursements

8.1 Within the first five (5) business days of each month, the Contractor shall invoice the City for Work completed during the previous month. The Contractor shall provide a detailed invoice that relates invoiced items to the Contractor’s response to Bid 20-05 in both quantity and unit cost. Any discrepancies in the monthly invoice shall be promptly brought to the attention of the Contractor by the City Project Manager and efforts shall be made to promptly resolve said discrepancies between the City and Contractor. In the event the City and Contractor cannot resolve invoice discrepancies, items in dispute will be removed from the invoice and the City shall approve the remainder of the invoice. Payment will be made as soon as possible following the City Council meeting in which the item appeared on the bills list, and in accordance with all applicable laws and rules of the City of Evanston and the State of Illinois.

8.2 In the event of termination by the City of this Agreement pursuant to paragraph 9.1 after completion of any phase of the basic services, fees due the Contractor for services rendered through such phase shall constitute final payment for such services, and no further fees shall be due to the Contractor. In the event of such termination by the City during any phase of the basic services, the Contractor shall be paid for services rendered on the basis of the proportion of work completed on the phase to date of termination.

EXHIBIT N
8.3 The City shall have the right to withhold payment to the Contractor due to the quality of a portion or all of the work performed hereunder which is not in accordance with the requirements of this Agreement, or which is unsatisfactory, or is due to the Contractor’s failure or refusal to perform any of its obligations hereunder. Compensation in excess of the total contract amount specified in this Agreement will not be allowed unless justified in the City’s sole judgment and authorized in advance as provided for in Section 3 of this Agreement. Compensation for improper performance by the Contractor is disallowed.

8.4 Upon completion of the Work performed by the Contractor, prior to the submission of a request for final payment, the City and Contractor shall perform a final acceptance test and review of the Work performed and/or equipment installed pursuant to the Agreement. A punch list of items outstanding will be jointly developed by the City and Contractor. In addition, the Contractor shall submit drawings of record for the Project for the City to approve. The Contractor shall promptly resolve all punch list items to the satisfaction of the City, and shall transmit to the City in writing confirmation that all punch list items have been resolved. The City will review, and the Contractor shall modify, as necessary, any drawings of record to the satisfaction of the City. Punch list items and drawings of record must be approved by the City prior to the Contractor submitting its final invoice for payment.

8.5 The Contractor shall submit an Affidavit and a final waiver of its lien, and all final waivers of liens of any subcontractors, suppliers, and sub-subcontractors, if applicable, with its final invoice, stating that all obligations incurred in performance of the professional services have been paid in full. The Affidavit will also include a statement stating that the professional services were performed in compliance with the terms of the Agreement. The Affidavit and all final lien waivers shall be on a form acceptable to the City.

8.6 All Project invoices shall be sent to:

City of Evanston, Public Works Agency
2100 Ridge Avenue
Evanston, Illinois 60201
Attn: Anil Khatkhate

with a copy to:

City of Evanston, Accounts Payable
2100 Ridge Avenue
Evanston, Illinois 60201

9 Notice and Cure/Termination

9.1 In furtherance of Contractor’s Work on this Project, the City and the Contractor agree that the following Notice and Cure provision in this Section 9.1 shall apply during the duration of Contractor’s work on this Project, in addition to the reserved rights of the City enumerated in this
Agreement as follows:

5.1 Liquidated Damages;
8.3 City’s right to withhold payment;
16.2 Contractor’s duty to revise and correct errors; and
16.3 Contractor’s duty to respond to City’s notice of errors and omissions.

The City may notify Contractor of its intent to terminate this Agreement within (7) seven calendar days of issuance by the City of written notice to Contractor’s Project Manager regarding defects in the Project or in Contractor’s Work. The City shall specify any such nonconforming Work or defects in the Project in its notice to Contractor under this Section 9.1. Contractor will have the opportunity to cure the non-conforming Work within (7) seven calendar days after receipt of the written notice issued by the City. All such curative work done shall be performed and completed to the City’s satisfaction. Nothing in this Section 9.1 shall otherwise affect the City’s right to exercise its rights in Section 9.2.

9.2 The City shall have the right to terminate this Agreement upon fifteen (15) days written notice for any reason. Mailing of such notice shall be equivalent to personal notice and shall be deemed to have been given at the time of receipt.

Payments made by the City pursuant to this Agreement are subject to sufficient appropriations made by the City of Evanston City Council. In the event of termination resulting from non-appropriation or insufficient appropriation by the City Council, the City’s obligations hereunder shall cease and there shall be no penalty or further payment required.

9.3 Within thirty (30) days of termination of this Agreement, the Contractor shall turn over to the City any documents, drafts, and materials, including but not limited to, outstanding work product, data, studies, test results, source documents, AutoCad Version 2007, ArcView, PDF, Word, Excel spreadsheets, technical specifications and calculations, and any other such items specifically identified by the City related to the Work herein. Upon receipt of said items, the Contractor shall be paid for labor and expenses incurred to the date of termination as provided in Section 8.2. This Agreement is subject to termination by either party if either party is restrained by a state or federal court of competent jurisdiction from performing the provisions of this Agreement. Upon such termination, the liabilities of the parties to this Agreement shall cease, but they shall not be relieved of the duty to perform their obligations through the date of termination. No lien shall be filed by the Contractor in the event of a termination of this Agreement by the City.

9.4 If, because of death or any other occurrence, including, but not limited to, Contractor becoming insolvent, it becomes impossible for any principal or principals of the Contractor to render the services set forth in this Agreement, neither the Contractor, nor its surviving principals shall be relieved of their obligations to complete the professional services. However, in the event of such an occurrence, the City at its own option may terminate this Agreement if it is not furnished evidence that competent professional services can still be furnished as scheduled.

9.5 In the event of an emergency or threat to the life, safety or welfare of the citizens of
the City, the City shall have the right to terminate this Agreement without prior written notice.

10 Insurance

10.1 The Contractor shall, at its own expense, secure and maintain in effect throughout the duration of this contract, insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the Work hereunder by the Contractor, its agents, representatives, employees or subcontractors. Contractor acknowledges and agrees that if it fails to comply with all requirements of this Section 10, the City may void the Agreement.

The Contractor must give to the City Certificates of Insurance identifying the City to be an Additional Insured for all Work done pursuant to this Agreement before City staff recommends award of the contract to City Council. Any limitations or modifications on the Certificate(s) of Insurance issued to the City in compliance with this Section that conflict with the provisions of this Section 10 shall have no force and effect.

After award of the Contract to Contractor, the Contractor shall give the City a certified copy(ies) of the insurance policy(ies) evidencing the amounts set forth in Section 10.2, and copies of the Additional Insured endorsement to such policy(ies) which name the City as an Additional Insured for all Work done pursuant to this Agreement before Contractor does any Work pursuant to this Agreement. Contractor’s certificate of insurance shall contain a provision that the coverage afforded under the policy(s) will not be canceled or reduced without thirty (30) days prior written notice (hand delivered or registered mail) to the City. Contractor shall promptly forward new certificate(s) of insurance evidencing the coverage(s) required herein upon annual renewal of the subject policies.

The policies and the Additional Insured endorsement must be delivered to the City within two (2) weeks of the request. All insurance policies shall be written with insurance companies licensed or authorized to do business in the State of Illinois and having a rating of not less than A-VII according to the A.M. Best Company. Should any of the insurance policies be canceled before the expiration date, the issuing company will mail thirty (30) days written notice to the City. The Contractor shall require and verify that all subcontractors maintain insurance meeting all of the requirements stated herein.

Any deductibles or self-insured retentions must be declared to and approved by the City. At the option of the City, either the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects the City, its officers, officials, employees and volunteers; or the Contractor shall provide a financial guarantee satisfactory to the City guaranteeing payment of losses and related investigations, claim administration and defense expenses.

10.2 Contractor shall carry and maintain at its own cost with such companies as are reasonably acceptable to City all necessary liability insurance (which shall include as a minimum the requirements set forth below) during the term of this Agreement, for damages caused or contributed to by Contractor, and insuring Contractor against claims which may arise out of or result from Contractor’s performance or failure to perform the Services hereunder.

EXHIBIT N
a) Worker’s compensation in statutory limits and employer’s liability insurance in the amount of at least five hundred thousand dollars ($500,000);
b) Comprehensive general liability coverage which designates the City as an additional insured for not less than three million dollars ($3,000,000) combined single limit for bodily injury, death and property damage, per occurrence;
c) Comprehensive automobile liability insurance covering owned, non-owned, and leased vehicles for not less than one million dollars ($1,000,000) combined single limit for bodily injury, death, or property damage, per occurrence; and

Contractor understands that the acceptance of Certificates of Insurance, policies, and any other documents by the City in no way releases the Contractor and its subcontractors from the requirements set forth herein.

Contractor expressly agrees to waive its rights, benefits and entitlements under the “Other Insurance” clause of its commercial general liability insurance policy as respects the City. Contractor expressly agrees that its insurance coverage is required to be primary by this Agreement, that its insurance coverage shall be on a primary and non-contributory basis, and that it and its insurance carrier are estopped from denying such coverage is primary. In the event Contractor fails to purchase or procure insurance as required above, the parties expressly agree that Contractor shall be in default under this Agreement, and that the City may recover all losses, attorney’s fees and costs expended in pursuing a remedy, or reimbursement, at law or in equity, against Contractor.

11 Indemnification

11.1 The Contractor shall defend, indemnify and hold harmless the City and its officers, elected and appointed officials, agents, and employees from any and all liability, losses, or damages as a result of claims, demands, suits, actions, or proceedings of any kind or nature, including but not limited to costs, and fees, including attorney’s fees, judgments or settlements, resulting from or arising out of any negligent or willful act or omission on the part of the Contractor or Contractor’s subcontractors, employees, agents or subcontractors during the performance of this Agreement. Such indemnification shall not be limited by reason of the enumeration of any insurance coverage herein provided. This provision shall survive completion, expiration, or termination of this Agreement.

11.2 Nothing contained herein shall be construed as prohibiting the City, or its officers, agents, or employees, from defending through the selection and use of their own agents, attorneys, and experts, any claims, actions or suits brought against them. The Contractor shall be liable for the costs, fees, and expenses incurred in the defense of any such claims, actions, or suits. Nothing herein shall be construed as a limitation or waiver of defenses available to the City and employees and agents, including but not limited to the Illinois Local Governmental and Governmental Employees Tort Immunity Act, 745 ILCS 10/1-101 et seq.

At the City Corporation Counsel’s option, Contractor must defend all suits brought upon all such Losses and must pay all costs and expenses incidental to them, but the City has the right, at its option, to participate, at its own cost, in the defense of any suit, without relieving Contractor of any
of its obligations under this Agreement. Any settlement of any claim or suit related to this Project by Contractor must be made only with the prior written consent of the City Corporation Counsel, if the settlement requires any action on the part of the City.

To the extent permissible by law, Contractor waives any limits to the amount of its obligations to indemnify, defend, or contribute to any sums due under any Losses, including any claim by any employee of Contractor that may be subject to the Illinois Workers Compensation Act, 820 ILCS 305/1 et seq, or any other related law or judicial decision, including but not limited to, Kotecki v. Cyclops Welding Corporation, 146 Ill. 2d 155 (1991). The City, however, does not waive any limitations it may have on its liability under the Illinois Workers Compensation Act, the Illinois Pension Code or any other statute.

11.3 The Contractor shall be responsible for any losses and costs to repair or remedy work performed under this Agreement resulting from or arising out of any act or omission, neglect, or misconduct in the performance of its Work or its subcontractors’ work. Acceptance of the work by the City will not relieve the Contractor of the responsibility for subsequent correction of any such error, omissions and/or negligent acts or of its liability for loss or damage resulting therefrom.

11.4 All provisions of this Section 11 shall survive completion, expiration, or termination of this Agreement.

12 Drawings and Documents

12.1 Any drawings, survey data, reports, studies, specifications, estimates, maps, plans, computations, and other documents required to be prepared by the Contractor for the Project shall be considered Works for Hire and the sole property of the City.

12.2 The Contractor and its subcontractor shall maintain for a minimum of three (3) years after the completion of this Agreement, or for three (3) years after the termination of this Agreement, whichever comes later, adequate books, records and supporting documents to verify the amounts, recipients and uses of all disbursements of funds passing in conjunction with the Agreement. The Agreement and all books, records and supporting documents related to the Agreement shall be available for review and audit by the City and the federal funding entity, if applicable, and the Contractor agrees to cooperate fully with any audit conducted by the City and to provide full access to all materials. Failure to maintain the books, records and supporting documents required by this Subsection shall establish a presumption in favor of the City for recovery of any funds paid by the City under the Agreement for which adequate books, records, and supporting documentation are not available to support their purported disbursement.

13 Successors and Assigns

13.1 The City and the Contractor each bind themselves and their partners, successors, executors, administrators, and assigns to the other party of the Agreement and to the partners, successors, executors, administrators, and assigns of such other party in respect to all covenants of this Agreement. Neither the City nor the Contractor shall assign, sublet, or transfer its interest in this
Agreement without the written consent of the other. Nothing herein shall be construed as creating any personal liability on the part of any officer or agent of any public body, which may be a party hereto, nor shall it be construed as giving any right or benefits hereunder to anyone other than the City and the Contractor.

14 Force Majeure

14.1 Whenever a period of time is provided for in this Agreement for the Contractor or the City to do or perform any act or obligation, neither party shall be liable for any delays or inability to perform if such delay is due to a cause beyond its control and without its fault or negligence including, without limitation:

   a) Acts of nature;
   b) Acts or failure to act on the part of any governmental authority other than the City or Contractor, including, but not limited to, enactment of laws, rules, regulations, codes or ordinances subsequent to the date of this Agreement;
   c) Acts or war;
   d) Acts of civil or military authority;
   e) Embargoes;
   f) Work stoppages, strikes, lockouts, or labor disputes;
   g) Public disorders, civil violence, or disobedience;
   h) Riots, blockades, sabotage, insurrection, or rebellion;
   i) Epidemics or pandemics;
   j) Terrorist acts;
   k) Fires or explosions;
   l) Nuclear accidents;
   m) Earthquakes, floods, hurricanes, tornadoes, or other similar calamities;
   n) Major environmental disturbances; or
   o) Vandalism.

If a delay is caused by any of the force majeure circumstances set forth above, the time period shall be extended for only the actual amount of time said party is so delayed. Further, either party claiming a delay due to an event of force majeure shall give the other party written notice of such event within three (3) business days of its occurrence or it shall be deemed to be waived.

15 Amendments and Modifications

15.1 Except as otherwise provided herein, the nature and scope of Work specified in this Agreement may only be modified by a written Change Order, or a written amendment to this Agreement, approved by both parties. This Agreement may be modified or amended from time to time provided, however, that no such amendment or modifications shall be effective unless reduced to writing and duly authorized and signed by the authorized representatives of the parties.

16 Standard of Care & Warranty

16.1 The Contractor shall perform all of the provisions of this Agreement to the
satisfaction of the City. The City shall base its determination of the Contractor’s fulfillment of the scope of the work in accordance with generally accepted professional standards applicable to the Work for this Project. The Contractor shall perform all of the provisions of this Agreement with that degree of care and skill ordinarily exercised by members of the same profession currently practicing under similar conditions.

16.2 The Contractor shall be responsible for the accuracy of its professional services under this Agreement and shall promptly make revisions or corrections resulting from its errors, omissions, or negligent acts without additional compensation. The City’s acceptance of any of the Contractor’s professional services shall not relieve the Contractor of its responsibility to subsequently correct any such errors or omissions. If a Contractor has provided the City with specifications for this Project which are determined to be incorrect or which require revision during the solicitation process (including but not limited to Requests for Proposals, Requests for Qualifications, or bids), the Contractor shall make such corrections or revisions to the specifications at no cost to the City. Further, upon receipt of an invoice from the City, the Contractor shall promptly reimburse the City for the reasonable costs associated with the preparation and dissemination of said corrections or revisions to appropriate parties, including but not limited to preparation of the corrected or revised documents, and printing and distribution costs.

16.3 During the pendency of its Work on this Project, the Contractor shall respond to the City’s notice of any errors or omissions within twenty-four (24) hours. The Contractor shall be required to promptly visit the Project site(s) if directed to by the City.

16.4 The Contractor shall comply with all federal, state, and local statutes, regulations, rules, ordinances, judicial decisions, and administrative rulings applicable to its performance under this Agreement.

16.5 Contractor guarantees and warrants to the City that:

  a) All materials and equipment furnished under this Agreement shall be of good quality and new, unless otherwise required or permitted by the Contract Documents;
  b) The Work of this Agreement shall be free from defects which are not inherent in the quality required; and
  c) The Work shall comply with the requirements set forth in the Contract Documents.

This warranty and guarantee shall be for a period of one (1) year from the date of completion and Final Acceptance of the Work by the City, or as otherwise provided in the Contract Documents.

If, within the one year warranty period, after the Contractor has received a final payment under this Agreement, any of the Work is found to be not in accordance with the requirements of this Agreement, or where defects in materials or workmanship may appear, or be in need of repair, the Contractor shall correct non-conforming and/or defective work or materials promptly after receipt of written notice from the City. Contractor shall immediately at its own expense repair, replace, restore, or rebuild any such Work. This remedy is in addition to any other legal or equitable
remedies the City may have under this Agreement or the law.

This guarantee and warranty shall not relieve Contractor of liability for latent defects, and shall be in addition to the City’s rights under the law or other guarantees or warranties, express or implied.

16.6 The provisions of this Section 16 shall survive the completion, expiration or termination of this Agreement.

17 Savings Clause

17.1 If any provision of this Agreement, or the application of such provision, shall be rendered or declared invalid by a court of competent jurisdiction, or by reason of its requiring any steps, actions, or results, the remaining parts or portions of this Agreement shall remain in full force and effect.

18 Non-Waiver of Rights

18.1 No failure or delay by the City to exercise any power given to it hereunder or to insist upon strict compliance by Contractor with its obligations hereunder, nor any payment made by the City under this Agreement, shall constitute a waiver of the City’s right to demand strict compliance with the terms hereof, unless such waiver is in writing and signed by the City.

19 Entire Agreement

19.1 This Agreement sets forth all the covenants, conditions and promises between the parties with regard to the subject matter set forth herein. There are no covenants, promises, agreements, conditions or understandings between the parties, either oral or written, other than those contained in this Agreement. This Agreement has been negotiated and entered into by each party with the opportunity to consult with its counsel regarding the terms therein. No portion of the Agreement shall be construed against a party due to the fact that one party drafted that particular portion as the rule of contra proferentem shall not apply.

20 Governing Law

20.1 This Agreement shall be construed in accordance with and subject to the laws and rules of the City of Evanston and the State of Illinois both as to interpretation and performance. Venue for any action arising out of or due to this Agreement shall be in Cook County, Illinois. The City shall not enter into binding arbitration to resolve any dispute related to this Agreement. The City does not waive tort immunity by entering into this Agreement.

21 Ownership of Contract Documents

21.1 Contractor is specifically prohibited from using in any form or medium, the name or logo of the City for public advertisement, unless expressly granted written permission by the City.
Submission or distribution of documents to meet official regulatory requirements or for similar purposes in connection with this Project is not to be construed as publication in derogation of the City’s reserved rights.

22 Notice

22.1 Any notice required to be given by this Agreement shall be deemed sufficient if made in writing and sent by certified mail, return receipt requested, or by personal service, to the persons and addresses indicated below or to such other addresses as either party hereto shall notify the other party of in writing pursuant to the provisions of this Subsection:

City of Evanston Project Manager, Bid 20-05
2100 Ridge Avenue
Evanston, Illinois 60201

if to the Contractor:

22.2 Mailing of such notice as and when provided above shall be equivalent to personal notice and shall be deemed to have been given at the time of mailing.

23 Severability

23.1 Except as otherwise provided herein, the invalidity or unenforceability of any particular provision, or part thereof, of this Agreement shall not affect the other provisions, and this Agreement shall continue in all respects as if such invalid or unenforceable provision had not been contained herein.

24 Execution of Agreement

24.1 This Agreement shall be signed last by the City Manager.

25 Counterparts

25.1 For convenience, this Agreement may be executed in any number of counterparts, each of which shall be deemed to be an original.

26 Authorizations

26.1 The Contractor’s authorized representatives who have executed this Agreement warrant that they have been lawfully authorized by the Contractor’s board of directors or its bylaws to execute this Agreement on its behalf. The City Manager affirms that he/she has been lawfully authorized to execute this Agreement. The Contractor and the City shall deliver upon request to each
other copies of all articles of incorporation, bylaws, resolutions, ordinances, or other documents which evidence their legal authority to execute this Agreement on behalf of their respective parties.

27 Time of Essence

27.1 Time is of the essence with respect to each provision hereof in which time is a factor.
IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be signed by their duly authorized representatives. The effective date of this Agreement will be the date this Agreement is signed by the City Manager.

CONTRACTOR

By: ______________________________
Name: ______________________________
Its: ______________________________
Date: _____________

CITY OF EVANSTON

By: ______________________________
    Erika Storlie
Its: Interim City Manager     Date: _____________

Approved as to form:

By: ______________________________
    Kelley Gandurski
Its: Corporation Counsel

Revision: June 2013
EXHIBIT O

BID/PROPOSAL SUBMITTAL LABEL

CUT AND ATTACH LABEL ON OUTSIDE OF SEALED BID/PROPOSAL SUBMITTAL

ADDRESS SUBMITTALS: CITY OF EVANSTON - PURCHASING OFFICE, ROOM 4200
LORRAINE H. MORTON CIVIC CENTER
2100 RIDGE AVENUE - EVANSTON, ILLINOIS 60201

SUBMITTAL NUMBER:________________________________________________________

SUBMITTAL NAME:________________________________________________________

SUBMITTAL DUE DATE/TIME:__________________________________________________

COMPANY NAME:____________________________________________________________

COMPANY ADDRESS:________________________________________________________

COMPANY TELEPHONE #:____________________________________________________
SECTION 01000

PROJECT REQUIREMENTS

PART 1 – GENERAL

1.1 GENERAL NOTE
A. The following requirements are a component part of all contract divisions and form a part of each specification section in so far as they may be in any way applicable thereto.

1.2 RELATED WORK
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all other Divisions of the Project Manual, apply to this section.

1.3 SCHEDULE OF DRAWINGS
A. The following drawings form a component part of all contract documents for this project.

Title of the Drawings:
Sheet No. Drawing Title
M-001 Mechanical Symbols and Abbreviations
M-100 Mechanical Piping Plan
Fire Station #1 Generator Room
M-101 Mechanical Ventilation Plan
Fire Station #2 Generator Room
E-001 Electrical Symbols, Notes & Abbreviations
E-100 Electrical Plans Fire Stations #1 & 2
Generator Rooms and Site
E-101 Electrical Site Plan and Single Line Diagram
Police/Fire HQ

1.4 PROJECT SUMMARY
A. This project includes the following items at Fire Police Headquarters:
1. Work on this project includes the removal and replacement of existing air handler #1 with reattachment to existing ductwork, chilled water, and heating hot water. Unit will be reconnected to existing building automation system.

1.5 SPECIAL PROCEDURES AND REQUIREMENTS
A. Fire Protection
1. Regulations: The Contractor shall comply with all federal, state and local fire regulations.
2. Fires: The Contractor shall prohibit the lighting of fires about the premises and use due diligence to see that such prohibition is enforced. Debris and waste materials shall not be burned at the construction site but shall be promptly removed to prevent the accumulation of combustibles on the site.
3. Smoking: Smoking shall be restricted to designated exterior locations. The Contractor shall furnish and post “NO SMOKING” signs at appropriate locations throughout the site where operations are conducted.
4. Flammables: Gasoline and other fuels shall be kept and handled from National Board of Fire underwriter’s approved safety cans and shall be stored away from hazardous work areas.

B. Limit of Contractor’s Operations
1. Work Areas: Work areas shall be confined to the limits of the construction site. The allotment of work areas within the site to Subcontractors shall be
made by the Contractor. The general scheme of operations, work area assignments and use of the job site shall be subject to the Owner’s approval.

C. Site Access: Uncontrolled or unrestricted site access will not be permitted for materials, debris or equipment. All access routes and methods shall be controlled by the Contractor so as to minimize the disruption of the Owner’s operations and shall be subject to approval by the Owner.

D. Hoists, Scaffolds and Ladders
1. Hoists: The Contractor shall furnish, erect, operate and maintain suitable hoisting equipment as may be necessary for constructing the work. Material hoists shall be constructed and maintained in accordance with all applicable federal, state and local laws, regulations and ordinances. Location of hoists shall be subject to approval by the Owner’s representative.

2. Scaffolds and Ladders: The Contractor shall furnish, erect, maintain and move all scaffold and ladders required for his work. Scaffolds shall be constructed and maintained in accordance with all applicable federal, state and local laws, regulations and ordinances. Scaffolds and ladders shall be promptly removed after their purpose has been served.

E. Site Security: See Section 01560 Site Security Measures

F. Documentation of Existing Conditions

1. Before starting any work, the Contractor shall examine the building to be worked on and the building and grounds in the staging area and areas adjacent to the building that will be worked on for any existing damage. The Contractor should notify the City’s representative of any damage found immediately. The City’s representative will photograph and note any existing damage that has been brought to his attention by the Contractor. After the work has been completed the City will inspect the area used by the Contractor. If any damage is found that was not reported previously, this damage would be considered to have been done by the Contractor. The cost to repair said damage shall be solely borne by the Contractor.

1.6 TEMPORARY CONSTRUCTION FACILITIES

A. The following temporary utilities and facilities on the construction site shall be provided by the party indicated below:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>PROVIDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephone</td>
<td>General Contractor</td>
</tr>
<tr>
<td>Electricity</td>
<td>Owner</td>
</tr>
<tr>
<td>Water</td>
<td>Owner</td>
</tr>
<tr>
<td>Toilets</td>
<td>Owner</td>
</tr>
<tr>
<td>Parking spaces for Contractor vehicles</td>
<td>Owner</td>
</tr>
<tr>
<td>Parking spaces for workmen</td>
<td>Owner</td>
</tr>
<tr>
<td>Storage areas &amp; facilities</td>
<td>General Contractor</td>
</tr>
<tr>
<td>Job-site trailers &amp; offices</td>
<td>General Contractor</td>
</tr>
</tbody>
</table>

PART 2 – PRODUCTS
(NOT APPLICABLE)

PART 3 – EXECUTION
(NOT APPLICABLE)

END OF SECTION 01000
SECTION 01010
SUMMARY OF WORK

PART 1 – GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS
A. The Project Manual and accompanying drawings are intended to cover the work necessary to construct the various headings of work as described in detail herein.
B. The work to be performed under this contract shall consist of the furnishing of all materials, equipment, supplies, labor and transportation, and performing all work as required to strictly conform to the provisions of the specifications, schedules and drawings, all of which are made a part herein, together with such detail drawings as may be furnished by the Owner from time to time during the prosecution of the work in amplification of said drawings and specifications.

1.2 RELATED WORK
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all other Divisions of the Project Manual, apply to this section.

1.3 CONTRACT ORGANIZATION
A. This Construction Project is organized under a single contract between the Owner and the Contractor. The Contractor is responsible for all plans and specification sections divisions 0 through 16 as presented in this project manual.

1.4 WORK SEQUENCE
A. All work and sequence of operations shall be as scheduled in conjunction with all subcontractors, and the Owner in such a manner as not to hinder or delay any other contractors in the progress of their work, and to an end that will expedite the work to completion at the earliest possible date.
B. Both Contractor and Subcontractor shall cooperate to execute their work as scheduled to minimize the delays to each other and to cause the least inconvenience to the Owner and the public.

1.5 CONTRACTORS’ USE OF PREMISES
A. The Contractor shall limit his use of the premises for work and for storage to allow for:
   1. Work by other contractors
   2. Owner occupancy
B. Coordinate the use of the premises under direction of the Owner. Stage work so as to avoid disruption to Owner’s operation.
C. Assume full responsibility for the protection and safekeeping of products under this Contract, which are stored at the project site or on the Contractor’s property.
D. Move any stored products, under Contractor’s control, which interfere with operation of the Owner or separate contractor.
E. Obtain and pay for the use of additional storage or work areas needed for operations.

1.6 OWNER OCCUPANCY
A. Owner will occupy the premises during the entire period of construction. However, Owner may access the Electrical room of the facility. Cooperate with the Owner in all construction operations to minimize conflict and to facilitate owner usage.
1.7 LINES, LEVELS AND LAYOUT OF WORK
   A. The Contractor shall establish and guarantee all lines, levels, etc. called for on the drawings, including the lines, levels, etc. of all Subcontractors.

1.8 WORK HOURS
   A. Work hours permitted is 7:00 am to 7:00 pm, Monday through Friday and 8:00 am to 6:00 pm on Saturday. No work is allowed on Sundays or City holidays. Access to the site will not be allowed outside of normal work hours.

PART 2 – PRODUCTS
   (NOT APPLICABLE)

PART 3 – EXECUTION
   (NOT APPLICABLE)

END OF SECTION 01010
SECTION 01027
APPLICATIONS FOR PAYMENT

PART 1 – GENERAL

1.1 SUMMARY
A. Contractor shall comply with procedures described in this Section when applying for progress payments and final payment under the Contract.

1.2 RELATED WORK
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all other Divisions of the Project Manual, apply to this Section.
B. Payments upon Substantial Completion and Completion of the Work are described in Section 01700 – PROJECT CLOSEOUT.
C. The Owner’s approval of applications for progress payment and final payment may be contingent upon the Owner’s approval of status of Project Record Documents as described in Section 01720 – PROJECT RECORD DOCUMENTS of these Specifications.

1.3 QUALITY ASSURANCE
A. Prior to start of construction, secure the Owner’s approval of the schedule of values required to be submitted as specified below.
B. During progress of the Work, modify the schedule of values as approved by the Owner to reflect changes in the Contract Sum due to Change Orders or other modifications of the Contract.
C. All requests for payment shall be based on the approved Schedule of Values for the project.
D. All modifications to the contract shall be based on the approved Schedule of Values for the project.

1.4 SCHEDULE OF VALUES
A. Coordinate preparation of the Schedule of Values with preparation of the Contractor’s Construction Schedule.
   1. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
      a. Contractor’s construction schedule.
      b. Application for Payment forms.
      c. List of subcontractors.
      d. Schedule of alternates.
      e. List of products.
      f. List of principal suppliers and fabricators.
      g. Schedule of submittals.
   2. Submit the Schedule of Values to the Owner at the earliest feasible date, but in no case later than seven (7) days before the date scheduled for submittal of the initial Application for Payment.
B. The format and content of the Schedule of Values shall be based on the work to be performed and shall include a complete dollar value for each trade. The Contractor is strongly encouraged to utilize spreadsheet software for preparation of all pay applications.
   1. Include the following Project identification on the Schedule of Values:
      a. Project name and location.
      b. Purchase order number.
      c. Contractor’s name and address.
d. Date of submittal.
2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed: a. Itemized description.
   b. Related Specification Section
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that have affected value.
   g. Dollar value.
   h. Percentage of Contract Sum to the nearest one-hundredth percent, adjusted to total 100 percent.
3. 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 for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
4. Show line items for indirect costs and margins on actual costs, only to the extent that such items will be listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.
5. Update and resubmit the Schedule of Values when Change Orders result in a change in the Contract Sum.

1.5 PROCEDURES
A. Informal submittal
   2. Make this preliminary submittal to the Owner in accordance with the Owner’s payment schedule.
   3. Revise the informal submittal of the request for payment as directed by the Owner, initialing all copies.
B. Formal submittal
   1. Make formal submittal of request for payment by filling in the agreed data, by typewriter or neat lettering in ink, on AIA Document G702, “Application and Certification for Payment,” plus continuation sheet(s) of AIA Document G703.
   2. Sign and notarize the Application and Certificate for Payment.
   3. Reference Purchase Order number on Application for Payment
   4. Secure and file with submittal progress waivers for all materials incorporated into and labor and equipment employed on the work before payment requests are processed.
      a. Initial payment will be processed without progress waivers. Subsequent requests will require progress waivers for previous payment.
   5. Submit the original of the Application and Certificate for Payment and the continuation sheet or sheets to the Architect and Owner for approval.
   6. The Owner will compare the formal submittal with the approved informal submittal and, when approved, will sign the Application and Certificate for Payment, will make and distribute required copies. The Owner will disburse directly to the Contractor the amount certified less 10% retainage.
7. Approved formal submittals must be received by the Owner in accordance with the Owner’s payment schedule.
8. Certified payroll records must be submitted along with the formal submittal as described in Section 17 under General Conditions.

PART 2 – PRODUCTS
(NOT APPLICABLE)

PART 3 – EXECUTION
(NOT APPLICABLE)

END OF SECTION 01027
SECTION 01045
CUTTING AND PATCHING

PART 1 – GENERAL

1.1 SUMMARY
A. This Section establishes general requirements pertaining to cutting, fitting and patching of the work required.

1.2 RELATED WORK
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all other Divisions of the Project Manual, apply to this Section. B. Execute cutting, filling or patching of work, required to:
   1. Make several parts fit properly.
   2. Uncover work to provide for installation of ill-timed work.
   3. Remove and replace defective work.
   4. Remove and replace work not conforming to the Contract requirements.
   5. Remove samples of installed work as specified for testing.
   6. Install specified work in existing construction.
C. In addition to Contract requirements, upon written instruction of the Owner:
   1. Uncover work to provide for observation of covered work.
   2. Remove samples of installed materials for testing.
   3. Remove work to provide for alteration of existing work.
D. Do not cut or alter work of another contractor without written consent of the Owner.

1.3 SUBMITTALS
A. Prior to cutting which affects structural safety of Project, or work of another contractor, submit written notice to the Owner requesting consent to proceed with cutting. B. Include the following:
   1. Project identification.
   2. Description of affected work.
   4. Effect on other work and on structural integrity of Project.
   5. Description of proposed work. Designate:
      a. Scope of cutting and patching.
      b. Contractor and trades to execute the work.
      c. Products proposed to be used.
      d. Extent of refinishing.
   6. Alternatives to cutting and patching.
   7. Designation of party responsible for cost of cutting and patching.
C. Prior to cutting and patching done by instruction of Owner, submit cost estimate.
D. Should conditions of work or schedule indicate change of materials or methods, submit recommendations to the Owner, including:
   1. Conditions indicating change.
   2. Recommendation for alternative materials or methods.
E. Submit written notice to the Owner, designating time the work will be uncovered to provide for observation.

1.4 PAYMENT FOR COSTS
A. Costs caused by ill-timed or defective work, or work not conforming to Contract Documents: Party responsible for ill-timed, rejected or non-conforming work.
B. Work done on instruction of the Owner (by Change Order), other than defective or nonconforming work shall be paid for by the Owner.
1.5 QUALITY ASSURANCE
   A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

PART 2 – PRODUCTS

2.1 MATERIALS
   A. For replacement of work removed, comply with Specifications for type of work to be performed.

PART 3 – EXECUTION

3.1 INSPECTION
   A. Inspect existing conditions of work, including elements subject to movement or damage during:
      1. Cutting and patching.
   B. After uncovering work, inspect conditions affecting installation of new products.

3.2 PREPARATION
   A. Prior to cutting:
      1. Provide shoring, bracing and support as required to maintain structural integrity of project.
      2. Provide protection for other portions of the project.
      3. Provide protection from the elements.

3.3 PERFORMANCE
   A. Execute fitting and adjustment or provide finished installation to comply with specified tolerances and finishes.
   B. Execute cutting and demolition by methods which will prevent damage to other work, and will provide proper surfaces to receive installation of repairs and new work.
   C. Restore work which has been cut or removed; install new products to provide complete work in accordance with contract requirements.
   D. Refinish entire surfaces as necessary to provide an even finish.
      1. Continuous surfaces: to nearest intersection(s).
      2. Assembly: entire refinishing.

END OF SECTION 01045
SECTION 01060

REGULATORY REQUIREMENTS

PART 1 – GENERAL

1.1 SUMMARY
A. Contractors shall comply with all laws, rules and regulations governing the Work.
   1. When Contractor observes that Contract Documents are in variance with specified codes, notify the Owner in writing immediately. The Owner will issue all changes in accord with the General Conditions.
   2. When Contractor performs any Work knowing or having reason to know that the Work is contrary to such laws, rules and regulations and fails to so notify the Owner, the Contractor shall pay all costs arising therefrom. However, it will not be the Contractor’s primary responsibility to make certain that the Contract Documents are in accord with such laws, rules and regulations.

1.2 RELATED WORK
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all other Divisions of the Project Manual, apply to this Section.

1.3 DEFINITIONS AND ABBREVIATIONS
A. Definitions
   1. “Codes” means rules, regulations or statutory requirements of government agencies.
   2. “Standards” means requirements set by authorities, custom or general consent and establish accepted criteria.

B. Abbreviations
   1. ADA Americans with Disabilities Act
   2. AGCI Associated General Contractors in Illinois
   3. ANSI American National Standards Institute
   4. ASHRAE American Society of Heating, Refrigeration and Air Conditioning Engineers
   5. ASTM American Society of Testing and Materials
   6. BOCA Building Officials Code Association
   7. COE City of Evanston
   8. CPSC Consumer Product Safety Commission (Federal)
   9. FM Factory Mutual Engineering Corp.
   10. IDOL Illinois Department of Labor
   11. IDOT Illinois Department of Transportation
   12. IDPH Illinois Department of Public Health
   13. IEPA Illinois Environmental Protection Agency
   14. ISPE Illinois Society of Professional Engineers
   15. NFPA National Fire Protection Association
   16. SFM Office of State Fire Marshall
   17. UL Underwriters Laboratories, Inc.

1.4 QUALITY ASSURANCE
A. Contractor shall:
   1. Ensure that copies of specified codes and standards are readily available to Contractor’s personnel. Copies are available at Contractor’s expense from source or publisher.
2. Ensure that Contractor’s personnel are familiar with workmanship and installation requirements of specified codes and standards.

1.5 REFERENCE SPECIFICATIONS
A. The Specifications referred to herein shall be interpreted to mean the following and shall include all addenda, changes to, etc. Reference to Engineer shall mean Owner.

1.6 REGULATORY REQUIREMENTS
A. Source and requirements:
   1. EBA: “Environmental Barriers Act” Illinois Accessibility Code
   2. ADA: Americans with Disabilities Act
   4. IEPA: (current editions at date of bidding documents)
      a. Air Pollution Standards
      b. Noise Pollution Standards
      c. Water Pollution Standards
      d. Public Water Supplies
      e. Solid Waste Standards
      f. Illinois Recommended Standards for Sewage Work
   5. Illinois Purchasing Act, as amended (Illinois Compiled Statutes, 30 ILCS 505/1 et seq)
   6. OSFM:
      a. Gasoline and Volatile Oils (Illinois Compiled Statutes, 430 ILCS 15/0.01 et seq)
      b. Liquefied Petroleum Gases (Illinois Compiled Statutes, 430 ILCS 5/0.01 et seq)
      c. Liquefied Petroleum Gas Containers (Illinois Compiled Statutes, 430 ILCS 10/0.01 et seq)
      d. Boiler and Pressure Vessel Safety Act and Rules and Regulations (Illinois Compiled Statutes, 430 ILCS 75/1 et seq)
   7. CODES:
      a. City of Evanston “City Ordinances” and “Building Code”, current editions.
      b. Uniform Building Code; BOCA National Building Code (as applicable)

B. The Owner may reference other codes or standards throughout the Project Manual when deemed appropriate for proper compliance with regulatory requirements.
PART 2 – PRODUCTS  
(NOT APPLICABLE)

PART 3 – EXECUTION  
(NOT APPLICABLE)

END OF SECTION 01060
REFERENCE STANDARDS AND DEFINITIONS

PART 1 – GENERAL

1.1 RELATED WORK
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all other Divisions of the Project Manual, apply to this Section.

1.2 DEFINITIONS
A. General: basic contract definitions are included in the General Conditions.
B. Indicated: the term “indicated” refers to graphic representations, notes or schedules on the Drawings, other paragraphs or schedules in the Specifications, and similar requirements in the Contract Documents. Where terms such as “shown,” “noted,” “scheduled” and “specified” are used, it is to help the reader locate the reference; no limitation on location is intended.
C. Directed: terms such as “directed,” requested,” “authorized,” “selected,” “approved,” “required” and “permitted” mean “directed by the Owner,” “requested by the Owner” and similar phrases.
D. Approve: the term “approved,” where used in conjunction with the Owner action on the Contractor’s submittals, applications and requests, is limited to the Owner’s duties and responsibilities as stated in the General Conditions.
E. Regulation: the term “regulations” includes laws, ordinances, statutes and lawful orders issued by authorities having jurisdiction, as well as rules, conventions and agreements within the construction industry that control performance of the Work.
F. Furnish: the term “furnish” is used to mean “supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation and similar operations.”
G. Install: the term “install” is used to describe operations at project site including the actual “unloading, unpacking, assembly, installation, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations.”
H. Provide: the term “provide” means “to furnish and install, complete and ready for the intended use.
I. Installer: an “installer” is the Contractor or an entity engaged by the Contractor, either as an employee, subcontractor or sub-subcontractor, for performance of a particular construction activity, including installation, erection, application and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

1.3 INDUSTRY STANDARDS
A. Applicability of Standards: except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents. Such standards are made a part of the Contract Documents by reference.
B. Publication Dates: where the date of issue of a referenced standard is not specified, comply with the standard in effect as of date of Contract Documents.
C. Conflicting Requirements: where compliance with two or more standards is specified, and the standards establish different or conflicting requirements for minimum quantities or quality levels, refer requirements that are different, but apparently equal, and uncertainties to the Owner for a decision before proceeding.

Minimum Quality or Quantity Levels: the quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits.
complying with these requirements, indicated numeric values are minimum or maximum, as appropriate for the context of the requirements. Refer uncertainties to the Owner for a decision before proceeding.

D. Copies of Standards: each entity engaged in construction on the Project is required to be familiar with industry standards applicable to that entity’s construction activity. Copies of applicable standards are not bound with the Contract Documents.
1. Where copies of standards are needed for performance of a required construction activity, the Contractor shall obtain copies directly from the publication source.
2. Although copies of standards needed for enforcement of requirements may be included as part of required submittals, the Owner reserves the right to require the Contractor to submit additional copies as necessary for enforcement of requirements.

E. Abbreviations and Names: trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards generating organization, authority having jurisdiction or other entity applicable to the context of the text provision. Refer to the “Encyclopedia of Associations,” published by Gale Research Co., available in most libraries. The following acronyms or abbreviations as referenced in Contract Documents are defined to mean the associated names. Names and addresses are subject to change and are believed to be but are not assured to be accurate and up to date as of date of Contract Documents.

| AA       | Aluminum Assoc.  
900 19th St, NW, 
Suite 300  
Washington, DC 
20006  
(202) 862-5100 |
|----------|---------------------------------------------------------------|
| AAMA     | American Architectural Manufacturer’s Assoc.  
1540 E. Dundee Rd, Suite 310  
Palatine, IL 60067  
(708) 202-1350 |
| AAN      | American Assoc. of Nurserymen  
1250 Eye St, NW, 
Suite 500  
Washington, DC 
20005  
(202) 789-2900 |
| AASHTO   | American Assoc. of State Highway and Transportation Officials  
444 N. Capitol St, 
Suite 225  
Washington, DC 
20001  
(202) 624-5800 |
| ACI      | American Concrete Institute  
PO Box 19150  
Detroit, MI 48219-0150  
(313) 532-2600 |
| ACIL     | American Council of Independent Laboratories  
1725 K St, NW  
Washington, DC 
20006  
(202) 887-5872 |
| ACPA     | American Concrete Pipe Assoc.  
8320 Old Courthouse Rd.  
Vienna, VA 22180  
(703) 821-1990 |
| AGA      | American Gas Assoc.  
1515 Wilson Blvd.  
Arlington, VA 
22209  
(703) 841-8400 |
| AHA      | American Hardboard Assoc.  
520 N. Hicks Rd.  
Palatine, IL 60067-3609  
(708) 934-8800 |
<table>
<thead>
<tr>
<th>Acronym</th>
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<th>Address</th>
<th>Phone</th>
<th>Acronym</th>
<th>Name</th>
<th>Address</th>
<th>Phone</th>
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<tbody>
<tr>
<td>AI</td>
<td>Asphalt Institute Research Park Drive</td>
<td>PO Box 14052 Lexington, KY 40512-4052</td>
<td>(606) 288-4960</td>
<td>AIA</td>
<td>American Institute of Architects</td>
<td>1735 New York Ave, NW Washington, DC 20006</td>
<td>(202) 626-7300</td>
</tr>
<tr>
<td>AISI</td>
<td>American Institute of Steel Construction</td>
<td>1 E. Wacker Dr, Suite 3100 Chicago, IL 60601-2001</td>
<td>(312) 670-2400</td>
<td>AITC</td>
<td>American Institute of Timber Construction</td>
<td>11818 SE Mill Plain Blvd, Ste.415 Vancouver, WA 98684-5092</td>
<td>(206) 254-9132</td>
</tr>
<tr>
<td>ALI</td>
<td>Associated Laboratories</td>
<td>641 S. Vermont St. Palatine, IL 60067</td>
<td>(708) 358-7400</td>
<td>ALSC</td>
<td>American Lumber Standards Committee</td>
<td>PO Box 210 Germantown, MD 20874</td>
<td>(301) 972-1700</td>
</tr>
<tr>
<td>AOSA</td>
<td>Assoc. of Official Seed Analysts</td>
<td>C/o Jim Lair</td>
<td>Illinois Dept. of Agriculture Seed Lab Box 19281 Springfield, IL 62794</td>
<td>(217) 782-7655</td>
<td>APA</td>
<td>American Plywood Assoc.</td>
<td>PO Box 11700 Tacoma, WA 98411</td>
</tr>
<tr>
<td>ASC</td>
<td>Adhesive and Sealant Council</td>
<td>1627 K Street, NW, Suite 1000 Washington, DC 20006</td>
<td>(202) 452-1500</td>
<td>ASHRAE</td>
<td>American Society of Heating, Refrigerating and Airconditioning Engineers, Inc.</td>
<td>1791 Tullie Circle, NE Atlanta GA 30329-2305</td>
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<tr>
<td>ASPE</td>
<td>American Society of Plumbing Engineers</td>
<td>3617 Thousand Oaks Blvd, Suite 210 Westlake, CA 91362</td>
<td>(805) 495-7120</td>
<td>ASSE</td>
<td>American Society of Sanitary Engineers</td>
<td>PO Box 40362 Bay Village, OH 44140</td>
<td>(216) 835-3040</td>
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<td>ASC</td>
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<td>ASSE</td>
<td>American Society of Sanitary Engineers</td>
<td>PO Box 40362 Bay Village, OH 44140</td>
<td>(216) 835-3040</td>
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<tr>
<td>AWI</td>
<td>Architectural Woodwork Institute 2310 S. Walter Reed Dr. Arlington, VA 22206 (703) 671-9100</td>
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<tr>
<td>AWPA</td>
<td>American Wood Preservers Assoc. PO Box 286 Woodstock, MD 21163 (410) 465-3169</td>
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<tr>
<td>AWPB</td>
<td>American Wood Preservers Bureau PO Box 5283 Springfield, VA 22150 (703) 339-6660</td>
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<td>AWS</td>
<td>American Welding Society PO Box 351040 550 LeJeune Road, NW Miami, FL 33135 (305) 443-9353</td>
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<td>AWWA</td>
<td>American Water Works Assoc. 6666 W Quincy Ave Denver, CO 80235 (303) 794-7711</td>
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<td>BANC</td>
<td>Brick Assoc. of North Carolina PO Box 13290 Greensboro, NC 27415 (919) 273-5566</td>
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<td>BHMA</td>
<td>Builders Hardware Manufacturers Assoc. 355 Lexington Ave, 17th Floor New York, NY 10017 (212) 661-4261</td>
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<td>BIA</td>
<td>Brick Institute of America 11490 Commerce Park Dr. Suite 300 Reston, VA 22091 (703) 620-0010</td>
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<td>CISPI</td>
<td>Cast Iron Soil Pipe Institute 5959 Shallowford Rd, Ste 419 Chattanooga, TN 37421 (615) 892-0137</td>
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<td>CRI</td>
<td>Concrete Reinforcing Steel Institute 933 Plumb Grove Rd. Schaumburg, IL 60195 (708) 517-1200</td>
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<td>EJMA</td>
<td>Expansion Joint Manufacturers Assoc. 25 N. Broadway Tarrytown, NY 10591 (914) 332-0040</td>
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<td>ETL</td>
<td>ETL Testing Laboratories Inc. PO Box 2040 Route 11, Industrial Park Cortland, NY 13045 (607) 753-6711</td>
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<td>HMA</td>
<td>Hardwood Manufacturers Assoc. 2831 Airways Blvd., Ste 205, Bldg. B Memphis, TN 38132 (901) 346-2222</td>
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<td>HPMA</td>
<td>Hardwood Plywood Manufacturers Assoc. 1825 Michael Farraday Dr PO Box 2789 Reston, VA 22090-2789 (703) 435-2900</td>
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<td>ICEA</td>
<td>Insulated Cable Engineers Assoc. Inc. PO Box 440 South Yarmouth, MA 02664 (617) 394-4424</td>
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<tr>
<td>IEEE</td>
<td>Institute of Electrical and Electronic Engineers 345 E. 47th Street New York, NY 10017 (212) 705-7900</td>
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<td>IESNA</td>
<td>Illuminating Engineering Society of North America 345 E 47th Street New York, NY 10017 (212) 705-7926</td>
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<tr>
<td>ILI</td>
<td>Indiana Limestone Institute of America Stone City Bank Bldg, Ste 400 Bedford, IN 47421 (812) 275-4426</td>
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<td>IMSA</td>
<td>International Municipal Signal Assoc. PO Box 539 1115 N. Main Street Newark, NY 14513 (315) 331-2182</td>
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<td>IRI</td>
<td>Industrial Risk Insurers 85 Woodland St Hartford, CT 06102 (203) 520-7300</td>
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<td>LPI</td>
<td>Lightning Protection Institute PO Box 1029 Woodstock, IL 60098 (815) 337-0277</td>
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</table>
| MBMA       | Metal Building Manufacturers Assoc.  
|           | 1230 Keith Building  
|           | Cleveland, OH  
|           | 44115-2180 | MCAA       | Mechanical Contractors Assoc. of America  
|           | 5410 Grosvenor Lane, Ste 120  
|           | Bethesda, MD  
|           | 20814 (301) 897-0770 | NAAMM      | National Assoc. of Architectural Metal Manufacturers  
|           | 600 S. Federal St, Ste 400  
|           | Chicago, IL 60605 (312) 922-6222 |
| NAPA      | National Asphalt Pavement Assoc.  
|           | Calvert Building, Suite 620 6811  
|           | Kenilworth Ave.  
|           | Riverdale, MD  
|           | 20737 (301) 779-4880 | NAPF       | National Assoc. of Plastic Fabricators (Now DLPA) |
| NBHA      | National Builders hardware Assoc. (Now DHI) | NCMA       | National Concrete Masonry Assoc.  
|           | 2302 Horse Pen Rd  
|           | PO Box 781  
|           | Herndon, VA  
|           | 22070-3406 (703) 435-4900 | NEC        | National Electric Code (Now NFIPPA) |
| NECA      | National Electrical Contractors Assoc.  
|           | 7315 Wisconsin Ave  
|           | Bethesda, MD  
|           | 20814 (301) 657-3110 | NEMA       | National Electrical Manufacturers Assoc.  
|           | 2101 L St, NW, Ste 300  
|           | Washington, DC  
|           | 20037 (202) 457-8400 | NFIPPA     | National Fire Protection Assoc.  
|           | 1 Batterymarch Park  
|           | Quincy, MA 02269 (617) 770-3000 |
| NFoPA     | National Forest Products Assoc.  
|           | 1250 Connecticut Ave, NW  
|           | Suite 200  
|           | Washington DC  
|           | 20036 (202) 463-2700 | NHLA       | National Hardwood Lumber Assoc.  
|           | PO Box 34518  
|           | Memphis, TN  
|           | 38184 (901) 377-1818 | NLGA       | National Lumber Grades Authority  
|           | 1055 W Hastings St, Ste 260  
|           | Vancouver, British Columbia  
|           | Canada V6E 2H1 (604) 687-2171 |
| NPA       | National Particleboard Assoc.  
|           | 18928 Premiere Court  
|           | Gaithersburg, MD  
|           | 20879-1569 (301) 670-0604 | NPCA       | National Paint and Coatings Assoc.  
|           | 1500 Rhode Island Ave, NW  
|           | Washington, DC  
|           | 20005 (202) 462-6272 | NSF        | National Sanitation Foundation  
|           | PO Box 1468  
|           | 3475 Plymouth Rd  
|           | Ann Arbor, MI  
|           | 48106 (313) 769-8010 |
| NWMA      | National Woodwork Manufacturers Assoc. (Now NWWDA) | PCA        | Portland Cement Association  
|           | 5420 Old Orchard Road  
|           | Skokie, IL 60077-4321 (847) 966-6200 | PCI        | Prestressed Concrete Institute  
|           | 175 W Jackson Blvd  
<p>|           | Chicago, IL 60604-9773 (312) 786-0300 |</p>
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Organisation</th>
<th>Address</th>
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</thead>
<tbody>
<tr>
<td>PDI</td>
<td>Plumbing and Drainage Institute</td>
<td>C/o Saul Baker 1106 W. 77th Street, South Dr. Indianapolis, IN 4626</td>
<td>(317) 251-6970</td>
</tr>
<tr>
<td>RIS</td>
<td>Redwood Inspection Service</td>
<td>405 Enfrente Dr, Suite 300 Novato, CA 94949</td>
<td>(415) 382-0662</td>
</tr>
<tr>
<td>RMA</td>
<td>Rubber Manufacturers Assoc.</td>
<td>1400 K St, NW Washington, DC 20005</td>
<td>(202) 682-4800</td>
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<tr>
<td>SHLMA</td>
<td>Southern Hardwood Lumber Manufacturers Assoc.</td>
<td>405 Enfrente Dr, Assoc. 1106 W. 77th Street, Suite 300 1400 K St, NW South Dr. Novato, CA 94949</td>
<td>(317) 251-6970</td>
</tr>
<tr>
<td>SJI</td>
<td>Steel Joist Institute</td>
<td>Suite A 1205 48th Ave North Myrtle Beach, SC 29577</td>
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<tr>
<td>SPIB</td>
<td>Southern Pine Inspection Bureau</td>
<td>4709 Scenic Highway Pensacola, FL 32504</td>
<td>(904) 434-2611</td>
</tr>
<tr>
<td>SSPC</td>
<td>Steel Structures Painting Council</td>
<td>4400 Fifth Ave. Pittsburgh, PA 15213</td>
<td>(412) 268-3327</td>
</tr>
<tr>
<td>SSPMA</td>
<td>Sump and Pump Manufacturers Assoc.</td>
<td>560 W Washington St, Ste 301 Chicago IL, 60606</td>
<td>(312) 332-4146</td>
</tr>
<tr>
<td>TPI</td>
<td>Truss Plate Institute</td>
<td>583 D’Onofrio Drive Suite 200 Madison, WI 53719</td>
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<tr>
<td>UL</td>
<td>Underwriters Laboratories</td>
<td>333 Pflingsten Rd. Northbrook, IL 60062</td>
<td>(847) 272-8800</td>
</tr>
<tr>
<td>WCLIB</td>
<td>West Coast Lumber Inspection Bureau</td>
<td>PO Box 23145 Portland, OR 97223</td>
<td>(503) 639-0651</td>
</tr>
<tr>
<td>WIC</td>
<td>Woodwork Institute of California</td>
<td>PO Box 11428 Fresno, CA 93773</td>
<td>(209) 233-9035</td>
</tr>
<tr>
<td>WRI</td>
<td>Wire Reinforcement Institute</td>
<td>1101 Connecticut Ave, NW Washington, DC 20036-4303</td>
<td>(703) 790-9790</td>
</tr>
<tr>
<td>WWPA</td>
<td>Western Wood Products Assoc.</td>
<td>522 SW 5th Ave. Yeon Bldg. Portland,OR 97204-2122</td>
<td>(503) 224-3930</td>
</tr>
<tr>
<td>W.W.P.A.</td>
<td>Woven Wire Products Assoc.</td>
<td>2515 N. Nordica Ave. Chicago, IL 60635</td>
<td>(312) 637-1359</td>
</tr>
</tbody>
</table>

F. Federal Government Agencies: names and titles of federal government standard or specification producing agencies are often abbreviated. The following acronyms or abbreviations referenced in the Contract Documents indicate names of standard or specification producing agencies of the federal government. Names and addresses are subject to change; they are believed to be but are not assured to be accurate and up to date as of the date of the Contract Documents.
<table>
<thead>
<tr>
<th>CE</th>
<th>Corps of Engineers (US Dept of the Army) Chief of Engineers – Referral Washington, DC 20314 (202) 272-0660</th>
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<tbody>
<tr>
<td>CPSC</td>
<td>Consumer Product Safety Commission 5401 Westbard Ave, Room 700 Washington, DC 20816 (800) 638-2772</td>
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<tr>
<td>DOC</td>
<td>Department of Commerce 14th St and Constitution Ave, NW Washington, DC 20230 (202) 377-2000</td>
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<tr>
<td>DOT</td>
<td>Department of Transportation 400 7th St, SW Washington, DC 20590 (202) 366-4000</td>
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<tr>
<td>EPA</td>
<td>Environmental Protection Agency 401 M St, SW Washington, DC 20460 (202) 382-2090</td>
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<tr>
<td>FAA</td>
<td>Federal Aviation Administration (US Dept of Transportation) 800 Independence Ave, SW Washington, DC 20590 (202) 366-4000</td>
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<tr>
<td>FCC</td>
<td>Federal Communications Commission 1919 M St, NW Washington, DC 20554 (202) 632-7000</td>
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<tr>
<td>FHA</td>
<td>Federal Housing Administration (US Dept of Housing and Urban Development) Director Manufactured Housing and Construction Standards Division 451 7th St, SW, Room 9158 Washington, DC 20201 (202) 755-5210</td>
</tr>
<tr>
<td>FS</td>
<td>Federal Specification (from GSA) Supt. Of Documents, Government Printing Office 7th and D St, SW Washington, DC 20234 (202) 472-2205 or 472-2140</td>
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<tr>
<td>GSA</td>
<td>General Services Administration F St and 18th St, NW Washington, DC 20405 (202) 472-1082</td>
</tr>
<tr>
<td>MIL</td>
<td>Military Standardization Documents (US Dept of Defense) Naval Publications and Forms Center 5801 Tabor Ave Philadelphia, PA 19120</td>
</tr>
<tr>
<td>NIST</td>
<td>National Institute of Standards and Technology (US Dept of Commerce) Gaithersburg, MD 20899 (301) 975-2000</td>
</tr>
<tr>
<td>OSHA</td>
<td>Occupational Safety and Health Administration (US Dept of Labor) Government Printing Office Washington, DC 20402 (202) 523-6091</td>
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<tr>
<td>PS</td>
<td>Product Standard of NBS National Institute of Standards and (DOC) Technology Standards Management Program A 625 Administration Gaithersburg, MD 20899 (202) 783-3238</td>
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<tr>
<td>USDA</td>
<td>US Dept of Agriculture Independence Ave btwn. 12th and 14th St, SW Washington, DC 20250 (202) 447-8732</td>
</tr>
<tr>
<td>USPS</td>
<td>US Postal Service 475 L’Enfant Plaza, SW Washington, DC 20260 (202) 268-2000</td>
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1.4 GOVERNING REGULATIONS/AUTHORITIES

A. The Owner has contacted authorities having jurisdiction where necessary to obtain information necessary for preparation of Contract Documents; that information may or may not be of significance to the Contractor. Contact authorities having jurisdiction directly for information and decisions having a bearing on the Work.

B. Copies of Regulations: Obtain copies of the applicable regulations and retain at the Project site, available for reference by parties who have a reasonable need for such reference.

1.5 SUBMITTALS

A. Permits, Licenses and Certificates: for the Owner’s records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional, settlements, notices, receipts for fee payments, judgements and similar documents, correspondence, and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION (NOT APPLICABLE)

END OF SECTION 01095
SECTION 01105
EXISTING UTILITY PROCEDURES

PART 1 – GENERAL

1.1 SUMMARY
A. Perform the work associated with existing utilities, including removal, relocation, interruption and protection, meeting requirements of this section.

1.2 RELATED WORK
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all other Divisions of the Project Manual, apply to this section.

1.3 GENERAL
A. Notification: before beginning any work, the Contractor shall notify all utility companies, public and private as applicable and any other party owning, operating or maintaining utility facilities on or in vicinity of project site in accordance with notification procedures of each utility company or any other party.

B. Protection:
1. Before beginning any work, the Contractor shall investigate and inform himself of locations and extent of all utilities on and in vicinity of project site which may be encountered in performing the work and shall take suitable care to protect and prevent damage and cessation of operation to such utilities from his operations.

2. When performing adjacent to existing sewers, drains, water and gas lines; electric, telephone or telegraph conduit or cable; pole lines or poles, or other utility facilities, equipment or structures, which are to remain in operation, contractor shall maintain such utility facilities, equipment and structures in place and protect from damage and cessation of operation and shall cooperate with applicable utility company and any other party owning, operating or maintaining such utility facilities, equipment or structures.

3. Methods of protection shall be subject to approval of utility company and any other party owning, operating or maintaining such utility, equipment or structure.

C. Damages:
1. Should existing utilities which are to remain in operation be damaged during construction operations, the Contractor shall immediately notify utility company, Owner and any other party owning, operating or maintaining such utility.

2. The Contractor shall be responsible for and shall repair or replace at the Contractor’s expense, as applicable, damages to any such utility facilities, equipment or structures caused by his acts, whether negligent or otherwise, or his omission to act, whether negligent or otherwise, and shall leave such utility facilities, equipment or structures in as good condition as existed prior to commencement of his operations as approved by utility company and any other party owning, operating or maintaining such utility. In addition, the Contractor shall be responsible for any damages or liability which the Owner may be held liable. Materials and methods of repair or replacement shall be subject to approval of utility company and other party owning, operating or maintaining such utility.

3. However, any such utility equipment or structures damaged as a result of
any act, or omission to act, of the Contractor, may, at option of applicable utility company and any other party owning, operating or maintaining such utility facilities, equipment or structures damaged, be repaired or replaced by such applicable utility company or other party. In such event cost of repairs or replacement shall be the responsibility of the Contractor at no addition to the Contract Sum.

1.4 PROCEDURES

A. Locations

1. Request all utility companies and any other party owning, operating or maintaining utility facilities on or in vicinity of project site as applicable, to locate or stakeout locations, extent, alignment and elevation of such utility facilities.

2. Approximate locations and extent of known existing utility facilities, equipment and structures may be determined by examining documents of utility companies and any other party owning, operating or maintaining such utility facilities, and available information documents and Drawings for the work.

3. Should uncharted or incorrectly charted existing utility facilities, equipment and structures be encountered during performance of the Work, consult utility companies and other party owning, operating or maintaining such utility facilities for directions.

4. After such utilities have been uncovered and their actual locations and extent determined, the Owner will furnish additional Drawings, if relocation is required, subject to approval of utility companies and any other parties owning, operating or maintaining such utility facilities.

5. Submit record drawings showing locations and extent discrepancies of utilities those indicated in available reference documents or Drawings for the Work, regardless of cause of location or extent discrepancy, meeting, requirements of the general conditions.

A. Scheduling:

1. General: existing utilities shall not be disturbed until utility companies and any other party owning, operating or maintaining such utility facilities and users of such utilities have been notified in accordance with notification procedure of such utility companies or any other parties. Contractor shall conduct work so that utility may be removed, relocated or supported during construction operations and maintained in service until the work to be provided under Contract is completed.

2. Any existing utility should be relocated only as approved by utility companies and any other parties owning, operating or maintaining such utility facilities. Contractor shall cooperate with utility companies and any other parties in performance of this work.

3. Interruptions: when Contractor desires to take an existing utility service out of operation, notify Owner at least 72 hours in advance of such time and obtain written permission of utility company or other parties owning, operating or maintaining such utility facilities prior to interrupting service. Interruption of service shall be kept to an absolute minimum.

   a. Utility company and any or other parties owning, operating or maintaining such utility facilities shall have right to require Contractor to perform work which requires such interruptions in stages and during non-standard working hours to reduce time of each interruption, at no addition to Contract Sum.
h. When necessary, provide acceptable temporary utility services during such interruptions, before taking utility service out of operation, at no addition to Contract Sum.

PART 2 – PRODUCTS
(NOT APPLICABLE)

PART 3 – EXECUTION
(NOT APPLICABLE)

END OF SECTION 01105
SECTION 01200

PROJECT MEETINGS

PART 1 – GENERAL

1.1 SUMMARY
A. This section specifies administrative and procedural requirements for project meetings including but not limited to:
   1. Pre-construction Conference
   2. Pre-installation Conferences
   3. Coordination Meetings
   4. Progress Meetings
B. Construction schedules are specified in Section 01300 – SUBMITTALS.

1.2 RELATED WORK
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all other Divisions of the Project Manual, apply to this Section.

1.3 PRE-CONSTRUCTION CONFERENCE
A. The Owner shall schedule a pre-construction conference and organizational meeting at the Project site or other convenient location no later than 15 days after execution of the Agreement and prior to commencement of construction activities. Conduct the meeting to review responsibilities and personnel assignments.
B. Attendees: The Owner, the Contractor and its superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conduct matters relating to the Work.
C. Agenda: Discuss items of significance that could affect progress including such topics as:
   1. Tentative construction schedule
   2. Critical Work sequencing
   3. Designation of responsible personnel
   4. Procedures for processing field decisions and Change Orders
   5. Procedures for processing Applications for Payment
   6. Distribution of Contract Documents
   7. Submittal of Shop Drawings, Product Data and Samples
   8. Preparation of record documents
   9. Use of the premises
   10. Office, Work and storage areas
   11. Equipment deliveries and priorities
   12. Safety procedures
   13. First aid
   14. Security
   15. Housekeeping
   16. Construction activity policies and working hours
   17. MBE/WBE/EBE requirements
   18. Coordination with affected utilities and governing jurisdictions

1.4 PRE-INSTALLATION CONFERENCE
A. Conduct a pre-installation conference at the site before each construction activity that requires coordination with other construction. The installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations
that have preceded or will follow, shall attend the meeting. Advise the Owner of
scheduled meeting dates.

B. Review the progress of other construction activities and preparations for the
particular activity under consideration at each pre-installation conference,
including requirements for:
1. Contract Documents
2. Options
3. Related Change Orders
4. Purchases
5. Deliveries
6. Shop Drawings, Product Data and quality control samples
7. Possible conflicts
8. Compatibility problems
9. Time schedules
10. Weather limitations
11. Manufacturer’s recommendations
12. Compatibility of materials
13. Acceptability of substrates
14. Temporary facilities
15. Space and access limitations
16. Governing regulations
17. Safety
18. Inspection and testing requirements
19. Required performance results
20. Recording requirements
21. Protection

C. Record significant discussions and agreements and disagreements of each
conference, along with the approved schedule. Distribute the record of the meeting
to everyone concerned, promptly, including the Owner.

D. Do not proceed if the conference cannot be successfully concluded. Initiate
whatever actions are necessary to resolve impediments to performance of Work
and reconvene the conference at the earliest feasible date.

1.5 PROGRESS MEETINGS (Minimum one (1) per week)

A. Conduct progress meetings at the Project site at regularly scheduled intervals.
Notify the Owner of scheduled meeting dates. Coordinate dates of meetings with
preparation of the payment requests.

B. Attendees: in addition to the Owner, each subcontractor, supplier or other entity
concerned with current progress or involved in planning, coordination or
performance of future activities shall be represented at these meetings by persons
familiar with the Project and authorized to conclude matters relating to progress.

C. Agenda: Review and correct or approve minutes of the previous progress meeting.
Review other items of significance that could affect progress. Include topics for
discussion as appropriate to the current status of the Project.

D. Contractor’s Construction Schedule: review progress since the last meeting.
Determine where each activity is in relation to the Contractor’s Construction
Schedule, whether on time, ahead or behind schedule. Determine how
construction behind schedule will be expedited; secure commitments from parties
involved to do so. Discuss whether schedule revisions are required to ensure that
current and subsequent activities will be completed within the Contract Period.
E. Review the present and future needs of each entity present, including such items as:
   1. Interface requirements
   2. Time
   3. Sequences
   4. Deliveries
   5. Off-site fabrication problems
   6. Access
   7. Site utilization
   8. Temporary facilities and services
   9. Hours of Work
   10. Hazards and risks
   11. Housekeeping
   12. Quality and Work standards
   13. Change Orders
   14. Documentation of information for payment requests.

F. Reporting: no later than three (3) days after each progress meeting date, distribute copies of minutes of the meeting to each party present and to other parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.

G. Schedule Updating: revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule concurrently with the report of each meeting.

PART 2 – PRODUCTS
(NOT APPLICABLE)

PART 3 – EXECUTION
(NOT APPLICABLE)

END OF SECTION 01200
SECTION 01210

ALLOWANCES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.
B. Other provisions concerning Allowances also may be stated in other Sections of these Specifications.

1.2 SUMMARY
A. The allowance is general and is to be used to provide adequate budget and bonding to cover items not able to be precisely determined by the Owner prior to bidding including any unforeseen conditions that are discovered. Allow within the proposed Total Base Bid Amount the amounts described in this Section.
B. Unless otherwise provided in the Contract Documents:
   1. Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts.
   2. Contractor’s cost for unloading and handling at the site, labor, installation costs, overhead, profit, and similar costs related to products and materials ordered by the Owner and selected by the Consultant under an allowance shall be included in the Lump Sum Base Bid Amount and not as a part of the allowance.
   3. Allowance work and estimated costs shall be pre-approved prior to the start of and during the Construction with Proposals documenting the work to be performed, with clearly stated not-to-exceed estimates and step by step method of procedures for the proposed work stated on the forms provided in the Contract Documents. Proposals must be submitted and accepted by the Owner prior to starting any allowance work. After discovering an unforeseen condition, the contractor shall submit a Proposal that includes a report summarizing the found condition. The Consultant and Owner will view the unforeseen condition to determine if the work will be authorized. Allowance work shall only be authorized by written Change Order. Under no circumstances shall the Contractor move forward with the work in question nor shall the contractor expend allowance without an approved Change Order.

1.3 ALLOWANCE RESPONSIBILITIES
A. Owner’s Responsibilities:
   1. Consult with Contractor in consideration and selection of products, suppliers and installers.
   2. Select products or services.
   3. Review method of procedure and estimated maximum costs documented on Proposals submitted by the Contractor and transmit decision to Contractor. Owner approved Change Orders are required prior to proceeding with Allowance Work.
   4. Review, recommend and transmit Change Orders for approval.
   5. Transmit decision to the Contractor.
B. Contractor’s Responsibilities:
   1. Assist Owner in selection of products, suppliers and installers.
   2. Obtain proposals from suppliers and installers and offer recommendations and review of proposals submitted. Transmit to Owner on Proposal forms provided in Contract Documents, attaching all supporting documentation. Include any bond
assessment of impact of other work.

3. On notification of selection by Owner’s representative, execute purchase agreement with designated supplier and installer.

4. Arrange for and process shop drawings, product data and samples. Arrange for delivery.

5. Promptly inspect products upon delivery for completeness, damage and defects. Submit claims for transportation damage.

6. Document thoroughly all costs related to the work.

7. Advise the Owner immediately of any material changes in estimated cost, scope or timing. Contractor may not exceed estimated maximum cost without written acceptance by Owner.

8. Provide the Owner with fully documented Change Orders detailing all allowance work performed. Including all documentation required.

1.4 ALLOWANCE DOCUMENTATION

A. All work covered by Allowances must be thoroughly documented as follows:

1. Upon encountering Allowance work or any field conditions which is not as shown in Construction Documents, the Contractor shall immediately notify the Consultant and develop a written Proposal detailing any additional work required. Proposals shall include a report summarizing the found condition to the Owner. Contractor work initiated without submitting a complete Proposal and obtaining the Owner’s written approval by Change Order is performed entirely at Contractor’s own risk and cost, regardless of any prior verbal approval.

2. The Owner shall review the Contractor’s Proposal and, if appropriate, provide written approval via Change Order for use of the Allowance.

1.5 SCHEDULE OF ALLOWANCES

Allowance Number 1, Additional Work General: $20,000.00

1.6 ALLOWANCE EXCLUSIONS

A. General

1. Additional costs related to improper scheduling, sequencing or coordination will not be covered within the Allowance, as determined solely by the Owner.

C. Existing Building Component Exclusions

1. All work required to protect existing building surfaces and components is included in the Base Bid and will not be covered within the Allowance.

PART 2 – PRODUCTS
(Not Used)

PART 3 – EXECUTION
(Not Used)

END OF SECTION 01210
SECTION 01300

SUBMITTALS

PART 1 – GENERAL

1.1 SUMMARY
A. This section specifies administrative and procedural requirements for submittals required for performance of the Work, including:
   1. Contractor’s construction schedule
   2. Submittal schedule
   3. Daily construction reports
   4. Product Data
   5. Samples
B. Administrative Submittals: refer to other Division 0 and 1 sections and other Contract Documents for requirements for administrative submittals. Such submittals include but are not limited to:
   1. Permits
   2. Applications for payment
   3. Performance and payment bonds
   4. Insurance certificates
   5. List of subcontractors
C. The Schedule of Values submittal is included in Section 1027 – APPLICATION FOR PAYMENT.

1.2 RELATED WORK
A. Drawing and general provisions of the Contract, including General and Supplementary Conditions and all other Divisions of the Project Manual, apply to this Section.

1.3 SUBMITTAL PROCEDURES
A. Coordination: coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.
   2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
      a. The Owner reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
   3. Processing: allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.
      a. Allow two weeks for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Owner will promptly advise the Contractor when a submittal being processed must be delayed for coordination.
      b. If an intermediate submittal is necessary, process the same as the initial submittal.
      c. Allow two weeks for re-processing each submittal.
d. No extension of Contract Time will be authorized because of failure to transmit submittals to the Owner sufficiently in advance of the Work to permit processing.

B. Submittal Preparation: place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
   1. Provide a space approximately 4” x 5” on the label to record the Contractor’s review and approval markings and the action taken.
   2. Include the following information on the label for processing and recording action taken.
      a. Project name
      b. Date
      c. Name and address of Owner
      d. Name and address of Contractor
      e. Name and address of subcontractor
      f. Name and address of supplier
      g. Name of manufacturer
      h. Number and title of appropriate Specification Section
      i. Drawing number and detail reference, as appropriate

C. Submittal Transmittal: package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Owner using a transmittal form. Submittals received from sources other than the Contractor will be returned without action.
   1. On the transmittal record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor’s certification that information complies with Contract Document requirements.

1.4 CONTRACTOR’S CONSTRUCTION SCHEDULE
A. Bar-Chart Schedule: prepare a fully developed, horizontal bar-chart type Contractor’s construction schedule. Submit within 30 days of the date established for “Commencement of the Work”.
   1. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated in the “Schedule of Values”.
   2. Within each time bar indicate estimated completion percentage in 10 percent increments. As Work progresses, place a contrasting mark in each bar to indicate Actual Completion.
   3. Prepare a schedule on a sheet, or series of sheets, of stable transparency, or other reproducible media, of sufficient width to show data for the entire construction period.
   4. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically sequences necessary for completion of related portions of the Work.
   5. Coordinate the Contractor’s construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress report, payment requests and other schedules.
6. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for Owner's procedures necessary for certification of Substantial Completion.

B. Phasing: Provide notations on the schedule to show how the sequence of the Work is affected by requirements for phased completion to permit Work by separate Contractors and partial occupancy by the Owner prior to Substantial Completion.

C. Work Stages: Indicate important stages of construction for each major portion of the Work, including testing and installation.

D. Area Separations: Provide a separate time bar to identify each major construction area for each major portion of the Work. Indicate where each element in an area must be sequenced or integrated with other activities.

E. Cost Correlation: At the head of the schedule, provide a two item cost correlation line, indicating "pre-calculated" and "actual" costs. On the line show dollar-volume of Work performed as of the dates used for preparation of payment requests.
   1. Refer to Section 01027 - APPLICATION FOR PAYMENT for cost reporting and payment procedures.

F. Distribution: Following response to the initial submittal, print and distribute copies to the Owner, subcontractors, and other parties required to comply with scheduled dates. Post copies in the Project meeting room and temporary field office.
   1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

G. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

1.5 SUBMITTAL SCHEDULE
A. After development and acceptance of the Contractor's construction schedule, prepare a complete schedule of submittals. Submit the schedule within 10 days of the date required for establishment of the Contractor's construction schedule.
   1. Coordinate submittal schedule with the list of subcontracts, schedule of values and the list of products as well as the Contractor's construction schedule.
   2. Prepare the schedule in chronological order; include submittals required during the construction. Provide the following information:
      1. Scheduled date for the first submittal.
      2. Related Section number.
      3. Submittal category.
      4. Name of subcontractor.
      5. Description of the part of the Work covered.
      6. Scheduled date for resubmittal
      7. Scheduled date of the Owner's final release or approval.

B. Distribution: Following response to initial submittal, print and distribute copies to the Owner, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.
   1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
C. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

1.6 DAILY CONSTRUCTION REPORTS

A. Prepare a daily construction report, recording the following information concerning events at the site; and submit duplicate copies to the Owner at weekly intervals:

1. List of subcontractors at the site.
2. Approximate count of personnel at the site.
3. High and low temperatures, general weather conditions.
4. Accidents and unusual events.
5. Meetings and significant decisions.
7. Meter readings and similar recordings.
8. Emergency procedures.
9. Orders and requests of governing authorities.
10. Change Orders received, implemented.
11. Services connected, disconnected.
12. Equipment or system tests and start-ups.
13. Partial Completions, occupancies.

1.7 PRODUCT DATA

A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as “Shop Drawings.”

1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:
   a. Manufacturer's printed recommendations.
   b. Compliance with recognized trade association standards.
   c. Compliance with recognized testing agency standards.
   d. Application of testing agency labels and seals.
   e. Notation of dimensions verified by field measurement.
   f. Notation of coordination requirements.

2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

3. Preliminary Submittal: Submit a preliminary single-copy of Product Data where selection of options is required.

4. Submittals: Submit 2 copies of each required submittal; submit 4 copies where required for maintenance manuals. The Owner will retain one, and will return the other marked with action taken and corrections or modifications required.
   a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

5. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.
1.8 SAMPLES

A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.

1. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match the Owner's Sample. Include the following:
   a. Generic description of the Sample.
   b. Sample source.
   c. Product name or name of manufacturer.
   d. Compliance with recognized standards.
   e. Availability and delivery time.

2. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
   a. Where variation in color, pattern, texture or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3), that show approximate limits of the variations.
   b. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.
   c. Refer to other Sections for Samples to be returned to the Contractor for incorporation in the Work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample submittals.

3. Preliminary submittals: Where Samples are for selection of color, pattern, texture or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.
   a. Preliminary submittals will be reviewed and returned with the Owner's mark indicating selection and other action.

4. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit 3 sets; one will be returned marked with the action taken.

5. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of construction.
   a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
   b. Sample sets may be used to obtain final acceptance of the construction associated with each set.

B. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.
C. Mock ups specified in individual Sections are special types of Samples. Mock ups are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the Work will be judged.

D. Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

1.9 CONTRACTOR'S RESPONSIBILITIES
A. Review product data and samples prior to submission.
B. Verify:
   1. Field dimensions
   2. Field construction criteria
   3. Catalog numbers and similar data
C. Coordinate each submittal with requirements of Work and of Contract Documents.
D. Contractor's responsibility for errors and omissions in submittals is not relieved by Owner's review of submittals.
E. Contractor's responsibility for deviations in submittals from Contract Document requirements is not relieved by Owner's review of submittals.
F. Notify Owner in writing at time of submission, of deviations in submittals from contract requirements.
G. Do not begin any work which requires submittals without having Owner's stamp and initials or signature indicating review.
H. After Owner's review, make response required by Owner, stamp and distribute copies.

1.10 SUBMISSION REQUIREMENTS
A. Make all submissions within 15 business days after date of Notice to Proceed.
B. Submit number of copies of project data and samples which Contractor requires for distribution plus 3 copies which will be retained by the Owner.
C. Submit number of samples specified in each of specification sections.
D. Accompany submittals with transmittal letter, in duplicate, containing:
   1. Date
   2. Project title and number
   3. Contractor's name and address
   4. The number of each shop drawing, product datum and sample submitted
   5. Notification of deviations from contract
   6. Other pertinent data
E. Submittals shall include:
   1. Date and revision dates
   2. Project title and number
   3. Names of:
      a. Contractor
      b. Subcontractor
      c. Supplier
      d. Manufacturer
      e. Separate detailer when pertinent
   4. Identification of product or material
   5. Relation to adjacent structure or material
   6. Field dimensions, clearly identified as such
   7. Specification Section and page number
   8. Applicable standards, such as ASTM number or federal specification
   9. Identification of deviation(s) from Contract Documents
   10. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements, and compliance with Contract.

1.11 RESUBMISSION REQUIREMENTS
A. Product Data and Samples:
Submit new datum and samples as required for initial submittal.

B. Make all resubmittals within 10 business days after date on Owner's stamp.

1.12 DISTRIBUTION OF SUBMITTALS AFTER REVIEW

A. Distribute copies of project datum which carry Owner's stamp:
   1. Contractor's file
   2. Job site file
   3. Record documents file
   4. Subcontractors
   5. Supplier

B. Distribute samples as directed.

1.13 OWNER'S ACTION

A. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Owner will review each submittal, mark to indicate action taken, and return promptly.
   1. Compliance with specified characteristics is the Contractor's responsibility.

B. Action Stamp: The Owner will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:
   1. Final Unrestricted Release: Where submittals are marked "Furnish as Submitted," that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
   2. Final-But-Restricted Release: When submittals are marked "Furnish as Corrected," that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
   3. Returned for Resubmittal: When submittal is marked "Revise and Resubmit", do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
   4. Returned, Improper Submittal: When submittal is marked "Rejected" do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication delivery or other activity. The submittal does not conform with project requirements. Prepare a new submittal without delay.
   5. Do not permit submittals marked "Rejected, Revise and Resubmit" to be used at the Project site, or elsewhere where Work is in progress.
   6. Other Action: Where a submittal is primarily for information or record purposes, special processing or other activity, the submittal will be returned, marked "Action Not Required".

PART 2 – PRODUCTS
(NOT APPLICABLE)

PART 3 – EXECUTION
(NOT APPLICABLE)

END OF SECTION 01300
SECTION 01400
QUALITY CONTROL SERVICES

PART 1 - GENERAL

1.1 SUMMARY
A. This Section specifies administrative and procedural requirements for quality control services.
B. Quality control services include inspections and tests and related actions including reports, performed by independent agencies, governing authorities, and the Contractor. They do not include Contract enforcement activities performed by the Owner.
C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve the Contractor of responsibility for compliance with Contract Document requirements.
D. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.

1. Specific quality control requirements for individual construction activities are specified in the Sections that specify those activities. Those requirements, including inspections and tests, cover production of standard products as well as customized fabrication and installation procedures.

2. Inspections, tests and related actions specified are not intended to limit the Contractor’s quality control procedures that facilitate compliance with Contract Document requirements.

3. Requirements for the Contractor to provide quality control services required by the Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.2 RELATED DOCUMENTS
A. Drawings and general provisions of Contract, including General and Supplementary Conditions and all other Divisions of the Project Manual, apply to this Section.

1.3 RESPONSIBILITIES
A. The Contractor shall provide inspections, tests and similar quality control services, specified in individual Specification Sections and required by governing authorities, except where they are specifically indicated to be the Owner's responsibility, or are provided by another identified entity; these services include those specified to be performed by an independent agency and not by the Contractor. Costs for these services shall be included in the Contract Sum.

1. The Owner will select and the Contractor shall employ and pay an independent agency, to perform specified quality control services.
   a. Where the Owner has engaged a testing agency or other entity for testing and inspection of a part of the Work, and the Contractor is also required to engage an entity for the same or related element, the Contractor shall not employ the entity engaged by the Owner, unless otherwise agreed in writing with the Owner.

2. Re-testing: The Contractor is responsible for re-testing where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance with Contract Document requirements, regardless of whether the original test was the Contractor's responsibility.
   a. Cost of re-testing construction revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on original construction.

3. Associated Services: The Contractor shall cooperate with agencies performing required inspections, tests and similar services and provide reasonable auxiliary
services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include but are not limited to:

a. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests.

b. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.

c. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.

d. Providing the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.

e. Security and protection of samples and test equipment at the Project site.

B. Duties of the Testing Agency: The independent testing agency engaged to perform inspections, sampling and testing of materials and construction specified in individual Specification Sections shall cooperate with the Owner and Contractor in performance of its duties, and shall provide qualified personnel to perform required inspections and tests.

1. The agency shall notify the Owner and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.

2. The agency is not authorized to release, revoke, alter or enlarge requirements of the Contract Documents, or approve or accept any portion of the Work.

3. The agency shall not perform any duties of the Contractor.

C. Coordination: The Contractor and each agency engaged to perform inspections, tests and similar services shall coordinate the sequence of activities to accommodate required services with a minimum of delay. In addition the Contractor and each agency shall coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.

1. The Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities.

1.4 SUBMITTALS

A. The independent testing agency shall submit a certified written report of each inspection, test or similar service, to the Owner, in duplicate, and a copy to the Contractor.

1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.

2. Report Data: Written reports of each inspection, test or similar service shall include, but not be limited to:

   a. Date of issue.
   b. Project title and number.
   c. Name, address and telephone number of testing agency.
   d. Dates and locations of samples and tests or inspections.
   e. Names of individuals making the inspection or test.
   f. Designation of the Work and test method.
   g. Identification of product and Specification Section.
   h. Complete inspection or test data.
   i. Test results and an interpretations of test results.
   j. Ambient conditions at the time of sample-taking and testing.
   k. Comments or professional opinion as to whether inspected or tested Work complies with Contract Document requirements.
   l. Name and signature of laboratory inspector.
   m. Recommendations on re-testing.

1.5 QUALITY ASSURANCE

1. Qualification for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, which are prequalified as complying with "Recommended Requirements for Independent Laboratory
Qualification” by the American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the State of Illinois.

B. Meet basic requirements of ASTM E329 Standard of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel Used in Construction.”

C. Submit copy of report of inspection of facilities made by Materials Reference Laboratory of National Bureau of Standards during most recent tour of inspection; with memorandum of remedies of all deficiencies reported by inspection.

D. Testing Equipment:
   1. Calibrated at maximum 12-month intervals by devices of accuracy traceable to either:
      a. National Bureau of Standards
      b. Accepted values of natural physical constants.
   2. Submit copy of certificate of calibration, made by accredited calibration agency.

1.6 LABORATORY DUTIES: LIMITS OF AUTHORITY

A. Cooperate with Owner and Contractor; provide qualified personnel promptly on notice.

B. Perform specified inspections, sampling and testing of materials and construction methods.
   1. Comply with specified Standards: ASTM, other recognized authorities, and as specified.
   2. Ascertain compliance with Contract requirements.

C. Promptly notify Owner and Contractor of irregularities or deficiencies of work which are observed during performance of services.

D. Promptly submit 5 copies of reports of inspections and tests to Owner including:
   1. Date issued
   2. Project title and number
   3. Testing Laboratory name and address
   4. Name and signature of Inspector
   5. Date of inspection and sampling
   6. Record of temperature and weather
   7. Date of test
   8. Identification of product and Specification Section
   9. Location in project
   10. Type of inspection or test
   11. Observations regarding compliance with Contract Documents

E. Perform additional services as required by Owner.

F. Laboratory is not authorized to:
   1. Release, revoke, alter or enlarge on, Contract requirements.
   2. Approve or accept any portion of work.
   3. Perform any duties of the Contractor.

1.7 CONTRACTOR’S RESPONSIBILITIES

A. Cooperate with Laboratory personnel, provide access to work, to manufacturer's operations.

B. Provide Laboratory, preliminary representative samples of materials for testing, in required quantities.

C. Furnish copies of mill test reports.

D. Furnish casual labor and facilities:
   1. To provide access to work to be tested.
   2. To obtain and handle samples at site.
   3. To facilitate inspections and tests.
   4. For Laboratory’s exclusive use for storage and curing of test samples.

E. Notify Laboratory sufficiently in advance of operations to allow for personnel assignment of test scheduling.

F. Employ, and pay for, services of a separate, equally qualified, Independent Testing Laboratory to perform additional inspections, sampling and testing required.
   1. For Contractor's convenience.
2. When initial tests indicate work does not comply with Contract.

PART 2 - PRODUCTS
(Not Applicable)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION
A. General: Upon completion of inspection, testing, sample-taking and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes. Comply with Contract Document requirements for "Cutting and Patching."
B. Protect construction exposed by or for quality control services, and protect repaired construction.
C. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing or similar services.

END OF SECTION 01400
SECTION 01560
TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

1.1 WORK INCLUDES
A. Contractors shall:
   1. Provide controls over environmental conditions at the construction site and related
      areas under the Contractor's control.
   2. Remove physical evidence of temporary controls at completion of work or as
      directed.

1.2 RELATED WORK
A. Drawings and general provisions of Contract, including General and Supplementary
   Conditions and all other Divisions of the Project Manual, apply to this Section.

1.3 NOT USED

1.4 DUST CONTROL
A. Provide dust control materials to minimize dust from construction operations. Prevent air-
   borne dust from dispersing into the adjacent occupied spaces.

1.5 NOT USED

1.6 RODENT CONTROL
A. Provide rodent control to prevent infestation of construction or storage areas.
   1. Use methods and materials, which will not adversely affect conditions at the site or
      on adjoining properties.
   2. Maintain site in clean condition.
      a. Dispose of garbage and debris.
      b. Do not keep items on site which attract rodents.
   3. When the use of rodenticides is deemed necessary, submit a copy of proposed program
      to the Owner. Clearly indicate: a. Areas to be treated.
      b. Rodenticides to be used, with copy of manufacturer's current printed
         instructions.
      c. Pollution preventative measures to be employed.
      d. Illinois licensed pesticides applicator.

1.7 DEBRIS CONTROL
A. Maintain all areas under Contractor's control free of extraneous debris.
B. Initiate and maintain a specific program to prevent accumulation of debris at construction
   site, storage and parking areas or along alley and haul routes.
   1. Provide containers specified in SECTION 01710 - CLEANING for deposit of debris.
   2. Prohibit overloading of trucks to prevent spillages on access and haul routes.
C. Schedule collection and disposal of debris is specified in SECTION 01710 - CLEANING.
   1. Provide additional collections and disposals of debris whenever regular schedule
      is inadequate to prevent accumulation.

PART 2 - PRODUCTS
(NOT APPLICABLE)

PART 3 - EXECUTION
(NOT APPLICABLE)

END OF SECTION 01560
PART 1 - GENERAL

1.1 SUMMARY
A. This Section specifies administrative and procedural requirements governing the Contractor's selection of products for use in the Project.
B. The Contractor's Construction Schedule and the Schedule of Submittals are included under Section 01300 - SUBMITTALS.

1.2 RELATED DOCUMENTS
A. Drawings and general provisions of Contract, including General and Supplementary Conditions and all other Divisions of the Project Manual, apply to this Section.

1.3 DEFINITIONS
A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms such are self-explanatory and have well recognized meanings in the construction industry.
   1. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
   2. "Named Products" are items identified by manufacturer's product name, including make or model designation, indicated in the manufacturer's published product literature, that is current as of the date of the Contract Documents.

1.4 QUALITY ASSURANCE
A. Source Limitations: To the fullest extent possible, provide products of the same kind, from a single source.
   1. When specified products are available only from sources that do not or cannot produce a quantity adequate to complete project requirements in a timely manner, consult with the Owner for a determination of the most important product qualities before proceeding. Qualities may include attributes relating to visual appearance, strength, durability, or compatibility. When a determination has been made, select products from sources that produce products that possess these qualities, to the fullest extent possible.
B. Compatibility of Options: When the Contractor is given the option of selecting between two or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.
   1. The Contractor is responsible for providing products and construction methods that are compatible with products and construction methods of subcontractors.
   2. If a dispute arises between the general Contractor and subcontractors over concurrently selectable, but incompatible products, the Owner will determine which products shall be retained and which are incompatible and must be replaced.
C. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products which will be exposed to view.
   1. Labels: Locate required product labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface that is not conspicuous.
D. Manufacturer's Instructions
   1. When contract documents specify that installation shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to all parties involved in the installation, including the Owner.
   2. Maintain one set of complete instructions with the Project Record Documents at the job site during installation and until completion.
1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle products in accordance with the manufacturer's recommendations, using means and methods that will prevent damage, deterioration and loss, including theft.
   1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
   2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, or theft.
   3. Deliver products to the site in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.
   4. Inspect products upon delivery to ensure compliance with the Contract Documents, and to ensure that products are undamaged and properly protected.
   5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
   6. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.
   7. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

B. Arrange for transportation and deliveries of materials and equipment in accord with approved current construction schedules and in ample time to facilitate inspection prior to installation. C. Coordinate deliveries to avoid conflict with work and conditions at site:
   1. Work of other contractors or Owner, or their use of premises.
   2. Limitations of storage space.
   3. Availability of equipment and personnel for handling products.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, unused at the time of installation.
   1. Provide products complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.
   2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
   3. Comply with size, make, type and quality specified.
   4. Manufactured and fabricated products:
      b. Manufacture like parts of duplicate units to standard interchangeable sizes.
      c. Two or more items of the same kind shall be identical from the same manufacturer.
      d. All system parts shall be from the same manufacturer to the greatest extent practical.
      e. Adhere to equipment capacities, sizes and dimensions shown or specified unless variations are specifically approved by Change Order.
B. Product Selection Procedures: Product selection is governed by the Contract Documents and governing regulations, not by previous Project experience. Procedures governing product selection include the following:

1. Proprietary Specification Requirements: Where only a single product or manufacturer is named, provide the product indicated. No substitutions will be permitted.

2. Semi-proprietary Specification Requirements: Where two or more products or manufacturers are named, provide one of the products indicated. No substitutions will be permitted.
   a. Where products or manufacturers are specified by name, accompanied by the term "or equal," or "or approved equal" comply with the Contract’s provisions concerning "substitutions" to obtain approval for use of an unnamed product.

3. Non-Proprietary Specifications: When the Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.

4. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.

5. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements, and are recommended by the manufacturer for the application indicated. General overall performance of a product is implied where the product is specified for a specific application.
   a. Manufacturer's recommendations may be contained in published product literature, or by the manufacturer's certification of performance.

6. Compliance with Standards, Codes and Regulations: Where the Specifications only require compliance with an imposed code, standard or regulation, select a product that complies with the standards, codes or regulations specified.

7. Visual Matching: Where Specifications require matching an established Sample, the Owner’s decision will be final on whether a proposed product matches satisfactorily.
   a. Where no product available within the specified category matches satisfactorily and also complies with other specified requirements, comply with provisions of the Contract Documents concerning "substitutions" for selection of a matching product in another product category, or for noncompliance with specified requirements.

8. Visual Selection: Where specified product requirements include the phrase "...as selected from manufacturer’s standard colors, patterns, textures..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Owner will select the color, pattern and texture from the product line selected.

C. Deliver products in undamaged condition in original containers or packaging, with identifying labels intact and legible.

D. Clearly mark partial deliveries of component parts or assemblies or equipment to permit easy identification of parts and to facilitate assembly.

E. Immediately on delivery, inspect shipment to assure:
   1. Product complies with contract documents and Owner
   2. Quantities are correct.
3. Containers and packages are intact and labels are legible.
4. Products are properly protected and undamaged.

PART 3 - EXECUTION

3.1 INSTALLATION OF PRODUCTS:
A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.
   1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
B. Provide equipment and personnel to handle products and equipment, including those furnished by the Owner. Prevent damage to products or packaging.
C. Provide additional protection during handling to prevent scraping, marring or otherwise damaging products, equipment or surrounding surfaces.
D. Handle products and equipment in manner to prevent bending or overstressing.
E. Lift packages, equipment or components only at designated lift points.

END OF SECTION 01600
SECTION 01630

SUBSTITUTIONS AND PRODUCT OPTIONS

PART 1 - GENERAL

1.1 WORK INCLUDES
A. Base all bids on providing all products exactly as specified.
B. For products specified only by reference or performance standards, select any product which meets or exceeds standards, by any manufacturer, subject to the Owner's approval.
C. For products specified by naming several products or manufacturers, select any product and manufacturer named.

1.2 RELATED WORK
A. Drawings and general provisions of Contract, including General and Supplementary Conditions, Special Provisions and all other Divisions of the Project Manual, apply to this Section.

1.3 SUBSTITUTIONS, BIDDER/CONTRACTOR OPTIONS
A. Prior to Bid Opening: The Owner will consider written requests to amend the bidding documents to add products not specified provided such requests are received at least 10 calendar days prior to bid opening date. Requests received after that time will not be considered. When a request is approved, the Owner will issue an appropriate addendum not less than three (3) calendar days prior to bid opening date.
B. With Bid: A bidder may propose substitutions with his bid by completing the Product Substitution List in the Bid Form, subject to the provisions stated thereon. The Owner will review Proposed Product Substitution List of low bidder and recommend approval or rejection by the Owner prior to award of contract.
C. After Award of Contract: No substitutions will be considered after Notice of Award except under one or more of the following conditions:
   1. Substitution required for compliance with final interpretations of code requirement or insurance regulations.
   2. Unavailability of specified products, through no fault of the Contractor.
   3. Subsequent information discloses inability of specified product to perform properly or to fit in designated space.
   4. Manufacturer/fabricator refusal to certify or guarantee performance of specified product as specified.
   5. When a substitution would be substantially to Owner's best interest.

1.4 SUBSTITUTION REQUIREMENTS
A. Submit three (3) copies of each request for substitution. Include in request:
   1. Complete date substantiating compliance of proposed substitution with contract documents.
   2. For products:
      a. Product identification, including manufacturer's name and address.
      b. Manufacturer's literature:
         1) Product description
         2) Performance and test data
         3) Reference standards
      c. Samples
      d. Name and address of similar projects on which product was used and dates of installation.
   3. For construction methods:
      a. Detailed description of proposed method.
      b. Drawings illustrating methods.
4. Itemized comparison of proposed substitution with product or method specified.
5. Data relating to changes in construction schedule.

6. Identify:
   a. Changes or coordination required.
   b. Other contracts affected.

7. Accurate cost data on proposed substitution in comparison with product or method specified.

B. In making request for substitution, bidder/contractor represents:
   1. He has personally investigated proposed product or method and determined that it is equal or superior in all respects to that specified.
   2. He will provide the same guarantee for substitution as for product or method specified.
   3. He will coordinate installation of accepted substitutions into the work, making all changes for work to be complete in all respects.
   4. Cost data is complete and includes all related costs under his contract, but excludes:
      a. Owner's redesign.
      b. Administrative costs of Owner.
      c. Costs under separate contracts.
   5. He will pay all additional costs and expenses for Owner and other contractors.

C. Substitutions will not be considered when:
   1. They are indicated or implied on shop drawings or product data submittals without formal request submitted in accordance with this Section.
   2. Acceptance will require substantial revision of contract documents.

PART 2 – PRODUCTS
(NOT APPLICABLE)

PART 3 – EXECUTION
(NOT APPLICABLE)

END OF SECTION 01630
SECTION 01700

PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 WORK INCLUDES
A. Substantial completion, final completion, closeout submittals, and application for final payment.
B. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:
   1. Inspection procedures.
   2. Project record document submittal.
   3. Operating and maintenance manual submittal.
   4. Submittal of warranties.
   5. Final cleaning.
   6. Final payment.

1.2 RELATED WORK
A. Drawings and general provisions of Contract, including General and Supplementary Conditions and all other Divisions of the Project Manual, apply to this Section.

1.3 SUBSTANTIAL COMPLETION
A. When the Contractor considers the work substantially complete, Contractor shall submit written declaration to the Owner that the work, or designated portion thereof, is substantially complete. Include list of items to be completed or corrected.
B. Owner and Contractor will make an inspection within seven days after receipt of certification.
C. Should the Owner consider that the work is substantially complete:
   1. The Owner will prepare and issue a Certificate of Substantial Completion, containing:
      a. Date of Substantial Completion.
      b. Punch list of items to be completed or corrected.
      c. The time within which Contractor shall complete or correct work of listed items. All punch list items must be completed within 30 days of substantial completion.
      d. Date and time Owner will assume possession of work or designated portion thereof.
      e. Responsibilities of Owner and Contractor for:
         (1.) Insurance
         (2.) Utilities
         (3.) Operation of mechanical, electrical and other systems.
         (4.) Maintenance and cleaning.
         (5.) Security
      f. Signatures of Owner and Contractor
D. Should the Owner consider that work is not substantially completed:
   1. The Owner shall immediately notify Contractor, in writing, stating reasons.
   2. The Contractor shall complete work and send a second written notice to Owner, certifying that project, or designated portion of project, is substantially complete.
   3. The Owner will re-inspect work.

1.4 FINAL INSPECTION
A. When the Contractor considers the work complete, the Contractor shall submit written declaration to the Owner that the work is complete. Contractor shall submit written certification that:
   1. Contract documents have been reviewed.
   2. Project has been inspected for compliance with contract.
3. Work has been completed in accord with contract.
4. Equipment and systems have been tested in the Owner’s presence and are operational.
5. Project is completed, ready for final inspection.

B. The Owner will make final inspection within seven days after receipt of certification.
C. Should the Owner consider that work is finally complete in accord with Contract Document requirements, he shall request contractor to make project closeout submittals.
D. Should the Owner consider that work is not finally complete:
   1. The Owner shall notify the Contractor, in writing, stating reasons.
   2. The Contractor shall take immediate steps to remedy the stated deficiencies, and send second written notice to the Owner certifying that the work is complete.
   3. The Owner will re-inspect work.

1.5 CLOSEOUT SUBMITTALS
   A. Project Record Documents: In accordance with requirements of SECTION 01720 - PROJECT RECORD DOCUMENTS.
   B. Deliver evidence of compliance with requirements of governing authorities.
   C. Deliver Certificate of Insurance for products and completed operations. Certificate shall include a evidence that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days prior notice has been given to the Contractor. Contractor shall include a written statement that Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents.
   D. Evidence of payments, release of liens 1. Consent of Surety to Final Payment.
      2. Other data establishing payment or satisfaction of obligations including receipts, Contractor’s releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and form as required by the City.
      3. Separate releases of waivers of liens for subcontractors, suppliers and others with lien rights against property of Owner together with list of those parties.
      4. Paid utility bills, if any.
      5. An affidavit that payrolls, bills for materials and equipment and other indebtedness connected to the work for which the City or the City’s property might be responsible or encumbered (less any amounts withheld by City) have been paid or otherwise satisfied.

1.6 INSTRUCTION
   A. Instruct Owner’s personnel in operation of all systems, mechanical, electrical and other equipment.

1.7 FINAL ADJUSTMENT OF ACCOUNTS
   A. Submit final statement of accounting to Owner.
   B. Statement shall reflect all adjustments.
      1. Original contract sum.
      2. Additions and deductions resulting from:
         a. Previous change orders.
         b. Cash allowances.
         c. Unit prices.
         d. Other adjustments.
         e. Deductions for uncorrected work.
         f. Deductions for re-inspection payments.
      3. Total contract sum, as adjusted.
      4. Previous payments.
      5. Sum remaining due.
C. The Owner will prepare final change order, reflecting approved adjustments to contract sum not previously made by change orders.

1.8 FINAL APPLICATION FOR PAYMENT
A. Contractor shall submit final application in accord with requirements of Conditions of Contract.

1.9 FINAL CERTIFICATE FOR PAYMENT
A. The Owner will issue final certificate in accord with provisions of Conditions of contract.
B. Should final completion be materially delayed through no fault of the Contractor, the Owner may issue a Semi-Final Certificate of Payment, in accord with provisions of Conditions of Contract.

PART 2 – PRODUCTS
(NOT APPLICABLE)

PART 3 – EXECUTION
(NOT APPLICABLE)

END OF SECTION 01700
SECTION 01710
CLEANING

PART 1 - GENERAL

1.1 WORK INCLUDES
A. Contractor shall maintain premises and public properties free from accumulations of waste, debris, and rubbish, caused by construction operations.
B. At completion of work, Contractor shall remove waste materials, rubbish, tools, equipment, machinery and surplus materials, clean all sight-exposed surfaces and leave project clean and ready for occupancy.

1.2 RELATED WORK
A. Drawings and general provisions of Contract, including General and Supplementary Conditions and all other Divisions of the Project Manual, apply to this Section.

1.3 SAFETY REQUIREMENTS
A. Standards: Maintain project in accord with following safety and insurance standards.
   1. Occupational Safety and Health Administration (OSHA).
B. Hazards Control:
   1. Store volatile wastes in covered metal containers and remove from premises daily.
   2. Prevent accumulation of wastes which create hazardous conditions.
   3. Provide adequate ventilation during use of volatile or noxious substances.
C. Conduct cleaning and disposal operations to comply with Federal, State and local ordinances and anti-pollution laws.
   1. Do not burn or bury debris, rubbish or other waste materials on project site.
   2. Do not dispose of volatile wastes such as mineral spirits, oil or paint thinner in storm or sanitary drains.
   3. Do not dispose of wastes into streams or waterways.

PART 2 - PRODUCTS

2.1 MATERIALS
A. Select and use all cleaning materials and equipment with care to avoid scratching, marring, defacing, staining or discoloring surfaces cleaned.
B. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.1 DURING CONSTRUCTION
A. Execute cleaning to ensure that grounds and public properties are maintained free from accumulations of waste materials and rubbish.
B. At reasonable intervals during progress of work, clean site and public properties, and dispose of waste materials, debris and rubbish.
C. Provide on-site metal containers for collection of waste materials, debris and rubbish.
D. Remove waste materials, debris and rubbish from site and legally dispose of at public or private dumping areas off Owner's property.
E. Handle waste materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.
F. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.
3.2 FINAL CLEANING

A. General: Provide final cleaning operations when indicated. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of Work to the condition expected from a commercial building cleaning and maintenance program. Comply with manufacturer’s instructions.

B. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.

C. Clean the Project site, yard and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste materials, litter and foreign substances. Sweep paved areas broom clean. Remove petro-chemical spills, stains and other foreign deposits. Rake grounds that are neither planted nor paved, to a smooth even-textured surface.

1. Remove tools, construction equipment, machinery and surplus material from the site.

2. Clean exposed exterior hard-surfaced finishes to a dirt-free condition, free of stains, films and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

3. Remove debris and surface dust from limited access spaces.

4. Touch-up and otherwise repair and restore marred exposed finishes and surfaces. Replace finishes and surfaces that can not be satisfactorily repaired or restored, or that show evidence of repair or restoration. Do not paint over “UL” and similar labels, including mechanical and electrical nameplates.

5. Leave the Project clean and ready for occupancy.

E. Repair, patch and touch up marred surfaces to specified finish, to match adjacent surfaces.

F. Broom clean paved surfaces; rake clean other surfaces on grounds.

G. Maintain cleaning until project, or designated portion thereof, is occupied by Owner.

END OF SECTION 01710
SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 WORK INCLUDES
A. Maintenance of Documents
B. Contractor shall:
   1. At project site, maintain one (1) copy of:
      (a.) Contract drawings.
      (b.) Project Manual.
      (c.) Interpretations and supplemental instructions.
      (d.) Addenda.
      (e.) Reviewed, approved shop drawings and product data.
      (f.) Other modifications to contract.
      (g.) All schedules.
      (h.) Correspondence file.
      (i.) Change Orders
   2. File documents in format in accord with Project Manual Table of Contents.
   3. Maintain documents in clean, dry, legible condition.
   4. Do not use record documents for field construction purposes.
   5. Make documents available at all times for inspection by Owner.
   6. Furnish one (1) additional as-built record set (on CD) of contract documents at the completion of the project. This set is not to be the set kept and updated periodically at the job site, but a clean set free of extraneous markings, notations, and erasures showing on a record of final conditions.

1.2 RELATED REQUIREMENTS
A. Drawings and general provisions of Contract, including General and Supplementary Conditions and all other Divisions of the Project Manual, apply to this Section.

1.3 MARKING DEVICES
A. Provide ballpoint pens, red color.

1.4 RECORDING
A. Label each document “PROJECT RECORD DOCUMENTS” in 2” high printed letters.
B. Keep record documents current, updated not less often than monthly.
C. Do not permanently conceal any work until specified information has been recorded.
D. Contract drawings: Legibly mark to record actual construction:
   1. Changes made by change order.
   2. Details not on original contract drawings.
E. Specifications and addenda: Legibly mark-up each section to record:
   1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
   2. Changes made by change order or field order.
   3. Other matters not originally specified.
F. Shop drawings: Maintain as record documents; legibly annotate drawings to record changes made after review.

1.5 SUBMITTAL
A. At completion of project, deliver record documents to Owner.
B. Accompany submittal with transmittal letter, in duplicate, containing:
   1. Date.
   2. Project title and number.
   3. Contractor’s name and address.
   4. Title and number of each record document.
5. Certification that each document submitted is complete and accurate.
6. Signature of contractor, or his authorized representative.

PART 2 - PRODUCTS
(NOT APPLICABLE)

PART 3 - EXECUTION
(NOT APPLICABLE)

END OF SECTION 01720
1.1 WORK INCLUDES
A. Contractor shall:
   1. Compile product data and related information appropriate for Owner's maintenance and operation of products and equipment provided under the Contract.
   2. Instruct Owner's personnel in operation and maintenance of products, equipment and systems.

1.2 RELATED REQUIREMENTS
A. Drawings and general provisions of Contract, including General and Supplementary Conditions and all other Divisions of the Project Manual, apply to this Section.

1.3 QUALITY ASSURANCE
A. Maintenance Manual Preparation: In preparation of Maintenance Manuals, use personnel thoroughly trained and experienced in operation and maintenance of the equipment or system involved.
   1. Where written instructions are required, use personnel skilled in technical writing to the extent necessary for communication of essential data.
   2. Where Drawings or diagrams are required, use draftsmen capable of preparing Drawings clearly in an understandable format.
B. Instructions for the Owner's Personnel: For instruction of the Owner's operating and maintenance personnel, use experienced instructors thoroughly trained and experienced in the operation and maintenance of the equipment or system involved.

1.4 SUBMITTALS
A. Form: Manufacturer's standard product or equipment data of same type and form furnished to manufacturer's maintenance personnel.
B. Provide sturdy manila or kraft envelope, properly labelled, of sufficient size to contain all submittals.
C. Submit one copy of data in final form at least fifteen days before final inspection. This copy will be returned within fifteen days after final inspection, with comments.
   1. After final inspection make corrections or modifications to comply with the Owner's comments. Submit the specified number of copies of each approved manual to the Owner within fifteen days of receipt of the Owner's comments.
D. Form of Submittal: Prepare operating and maintenance manuals in the form of an instructional manual for use by the Owner's operating personnel. Organize into suitable sets of manageable size. Where possible, assemble instructions for similar equipment into a single binder.
E. Binders: For each manual, provide heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, in thickness necessary to accommodate contents, sized to receive 8-1/2" by 11" paper. Provide a clear plastic sleeve on the spine, to hold labels describing the contents. Provide pockets in the covers to receive folded sheets.
F. Text Material: Where written material is required as part of the manual use the manufacturer's standard printed material, or if it is not available, specially prepared data, neatly typewritten, on 8 1/2" by 11", 20 pound white bond paper.
G. Drawings: Where drawings or diagrams are required as part of the manual, provide reinforced punched binder tabs on the drawings and bind in with the text.

1.5 MANUAL CONTENT
A. Neatly typewritten table of contents for each volume, arranged in systematic order. Follow Project Manual format.
In each manual include information specified in the individual Specification Section, and the following information for each major component of equipment and its controls:

1. General system or equipment description.
2. Design factors and assumptions.
3. Copies of applicable Shop Drawings and Product Data.
4. System or equipment identification, including:
   a. Name of manufacturer.
   b. Model number.
5. Maintenance procedures and schedules.
6. Precautions against improper use and maintenance.
8. Sources of required maintenance materials and related services.
10. Contractor, name of responsible principal, address and telephone number.
11. List with each product, the name, address and telephone number of:
   a. Subcontractor.
   b. Maintenance contractor, as appropriate.
   c. Identify area of responsibility of each.

Manual shall contain a title page, a table of contents, copies of Product Data, supplemented by drawings and written text, and copies of each warranty, bond and service Contract issued.

General Information: Provide a general information Section immediately following the Table of Contents, listing each product included in the manual, identified by product name. Under each product, list the name, address, and telephone number of the Subcontractor or installer, and the maintenance contractor. Clearly delineate the extent of responsibility of each of these entities.

Product Data: Where manufacturer’s standard printed data is included in the manuals, include only sheets that are pertinent to the part or product installed. Mark each sheet to identify each product included in the installation. Where more than one item in a tabular format is included, identify each item, using appropriate references from the Contract Documents. Identify data that is applicable to the installation and delete references to information that is not applicable.

Written Text: Where manufacturer’s standard printed data is not available, and information is necessary for proper maintenance of systems, or it is necessary to provide additional information to supplement data included in the manual, prepare written text to provide necessary information. Organize the text in a consistent format under separate headings for different procedures. Where necessary, provide a logical sequence of instruction for each maintenance procedure.

Drawings: Provide specially prepared drawings where necessary to supplement manufacturer’s printed data to illustrate the relationship of component parts of equipment or systems, or to provide control or flow diagrams. Coordinate these drawings with information contained in Project Record Drawings to assure correct illustration of the completed installation.

Do not use original Project Record Documents as part of the Maintenance Manuals.

Warranties, Bonds and Service Contracts: Provide a copy of each warranty, bond or service contract in the appropriate manual for the information of the Owner’s operating personnel. Provide written data outlining procedures to be followed in the event of product failure. List circumstances and conditions that would affect validity of the warranty or bond.

1. Contractor, name of responsible principal, address and telephone number.
2. List of each product specified to be included, indexed to volume content.
3. List with each product, the name, address and telephone number of:
   a. Subcontractor.
   b. Maintenance contractor, as appropriate.
   c. Identify area of responsibility of each.
d. Local supply source for parts and replacement.

J. Product Data:
1. Include only sheets pertinent to specific product.
2. Annotate each sheet to:
   a. Clearly identify specific product or part installed.
   b. Clearly identify data applicable to installation.
   c. Delete references to inapplicable installation.

K. Drawings:
1. Supplement product data with drawings to clearly illustrate relationship of component parts of equipment and systems and control and flowdiagrams.
2. Coordinate drawings with information in Product Record Documents to assure correct illustration of completed installation.
3. Do not use Project Record Documents as maintenance drawings.

L. Written text to supplement product data for particular installation:
1. Organize in consistent format under separate headings for different procedures.
2. Provide logical sequence of instructions for each procedure.

M. Copy of each warranty, bond and service contract issued.
1. Provide information sheet for Owner personnel. Give:
   a. Proper procedures in event of failure.
   b. Instances which might affect validity of warranties or bonds.

1.6 MANUAL FOR MATERIALS AND FINISHES
A. Submit two (2) copies of complete manual in final form.
B. Refer to individual Specification Sections for additional requirements on care and maintenance of materials and finishes.
C. Content for products, applied materials and finishes:
   1. Manufacturer's data, giving full information on products.
      a. Catalog number, size, composition.
      b. Color and texture designations.
      c. Information for re-ordering special-manufactured products.
   2. Instructions for care and maintenance.
      a. Manufacturer's recommendations for periodic inspections.
D. Moisture-Protection and Weather-Exposed Products: Provide complete manufacturer's data with instructions on inspection, maintenance and repair of products exposed to the weather or designed for moisture-protection purposes.
E. Manufacturer's Data: Provide manufacturer's data giving detailed information, including the following, as applicable:
   1. Applicable standards.
   2. Chemical composition.
   3. Installation details.
   4. Inspection procedures.
   5. Maintenance information.
   6. Repair procedures.

PART 2 - PRODUCTS
(NOT APPLICABLE)

PART 3 - EXECUTION
(NOT APPLICABLE)

END OF SECTION 01730
PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Applications.
B. General requirements.
C. Globe valves.
D. Ball valves.
E. Butterfly valves.
F. Check valves.
G. Plug valves.
H. Chainwheels.

1.02 ABBREVIATIONS AND ACRONYMS

A. CWP: Cold working pressure.
B. EPDM: Ethylene propylene copolymer rubber.
C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
D. NRS: Nonrising stem.
E. OS&Y: Outside screw and yoke.
F. PTFE: Polytetrafluoroethylene.
G. RS: Rising stem.
H. SWP: Steam working pressure.
I. TFE: Tetrafluoroethylene.

1.03 REFERENCE STANDARDS

A. ASME B1.20.1 - Pipe Threads, General Purpose (Inch); 2013.


E. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.


G. ASME B31.9 - Building Services Piping; 2014.

H. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing and Fusing Operators; 2017.


M. MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service; 2010a.

N. MSS SP-78 - Cast Iron Plug Valves, Flanged and Threaded Ends; 2011.

O. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; 2013.


Q. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.


1.04 SUBMITTALS

A. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

B. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.
C. Maintenance Materials: Furnish Board with one wrench for every five plug valves, in each size of square plug valve head.
1. See Section 01 60 00 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE

A. Manufacturer:
1. Obtain valves for each valve type from single manufacturer.

B. Welding Materials and Procedures: Conform to ASME BPVC-IX.

C. ASME Compliance: ASME B31.9 for building services piping valves.

D. ASME Compliance for Ferrous Valves: ASME B16.10 and ASME B16.34 for dimension and design criteria.

E. NSF Compliance: NSF 61 for valve materials for potable-water service.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:
1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.
2. Protect valve parts exposed to piped medium against rust and corrosion.
3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.
4. Adjust globe and angle valves to the closed position to avoid clattering.
5. Secure check valves in either the closed position or open position.
6. Adjust butterfly valves to closed or partially closed position.

B. Use the following precautions during storage:
1. Maintain valve end protection and protect flanges and specialties from dirt.
   a. Provide temporary inlet and outlet caps.
   b. Maintain caps in place until installation.
2. Store valves in shipping containers and maintain in place until installation.
   a. Store valves indoors in dry environment.
   b. Store valves off the ground in watertight enclosures when indoor storage is not an option.

C. Exercise the following precautions for handling:
1. Handle large valves with sling, modified to avoid damage to exposed parts.
2. Avoid the use of operating handles or stems as rigging or lifting points.

PART 2 - PRODUCTS

2.01 APPLICATIONS

A. See drawings for specific valve locations.

B. Provide the following valves for the applications if not indicated on drawings:
1. Throttling (Hydronic): Butterfly, Ball, and Globe.
2. Throttling (Steam): Butterfly.
3. Isolation (Shutoff): Butterfly, Ball, and Plug.
4. Swing Check (Pump Outlet):
   a. 2 NPS and Smaller: Bronze with bronze disc.
   b. 2-1/2 NPS and Larger: Iron with lever and spring.

C. Substitutions of valves with higher CWP classes or SWP ratings for same valve types are permitted when specified CWP ratings or SWP classes are not available.

D. Chilled Water and Condenser Water Valves:
   1. 2 NPS and Smaller, Bronze Valves:
      a. Ball: Full port, two piece, bronze trim.
      b. Swing Check: Bronze disc, Class 125.
      c. Globe: Bronze disc, Class 150.
   2. 2-1/2 NPS and Larger, Iron Valves:
      a. Single-Flange Butterfly: 2-1/2 NPS to 12 NPS, aluminum-bronze disc, EPDM seat, 150 CWP.
      b. Swing Check: Metal seats, Class 125.
      c. Center-Guided Check: Compact-wafer, metal seat, Class 125.
      d. Globe: Class 125.

E. Heating Hot Water Valves:
   1. 2 NPS and Smaller, Bronze Valves:
      a. Threaded ends.
      b. Ball: Full port, two piece, bronze trim.
      c. Swing Check: Bronze disc, Class 125.
      d. Globe: Bronze disc, Class 125.
   2. 2-1/2 NPS and Larger, Iron Valves:
      a. Ball: 2-1/2 NPS to 10 NPS, Class 150.
      b. Single-Flange Butterfly: 2-1/2 NPS to 12 NPS, aluminum-bronze disc, EPDM seat, 200 CWP.
      c. Single-Flange Butterfly: 14 NPS to 24 NPS, aluminum-bronze disc, EPDM seat, 150 CWP.
      d. Swing Check: 2-1/2 NPS to 12 NPS, lever and spring closure control, Class 125.
      e. Center-Guided Check: Compact-wafer, metal seat, Class 125.
      f. Globe: 2-1/2 NPS to 12 NPS, Class 125.

F. Low Pressure Steam Valves (15 PSIG or Less):
   1. 2 NPS and Smaller, Bronze Valves:
      a. Ball: Full port, twopiece, bronze trim.
      b. Swing Check: Bronze disc, Class 125.
      c. Globe: Bronze disc, Class 125.
   2. 2-1/2 NPS and Larger, Iron Valves:
      a. 2-1/2 NPS to 4 NPS: Flanged ends.
      b. Ball: 2-1/2 NPS to 10 NPS, Class 150.
      c. Swing Check: 2-1/2 NPS to 12 NPS, lever and spring closure. control, Class 125.
      d. Globe: 2-1/2 NPS to 12 NPS: Class 125.

G. Steam-Condensate Valves:
1. 2 NPS and Smaller, Bronze Valves:
   a. Gate: NRS, Class 125.
   b. Ball: Full port, two piece, bronze trim.
   c. Globe: Bronze disc, Class 125.
2. 2-1/2 NPS and Larger, Iron Valves:
   a. Ball: 2-1/2 NPS to 10 NPS, Class 150.
   b. Swing Check: Lever and spring closure control, Class 125.
   c. Gate: OSY, Class 125.
   d. Globe: 2-1/2 NPS to 12 NPS, Class 125.
   e. Lubricated Plug: Threaded, cylindrical, threaded, Class 125.

2.02 GENERAL REQUIREMENTS

A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.

B. Valve Sizes: Match upstream piping unless otherwise indicated.

C. Valve Actuator Types:
   1. Gear Actuator: Quarter-turn valves 8 NPS and larger.
   2. Handwheel: Valves other than quarter-turn types.
   5. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator, of size and with chain for mounting height, as indicated in the "Valve Installation" Article.

D. Valves in Insulated Piping: Provide 2 NPS stem extensions and the following features:
   1. Gate Valves: Rising stem.
   2. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
   4. Memory Stops: Fully adjustable after insulation is installed.

E. Valve-End Connections:

F. General ASME Compliance:

G. Source Limitations: Obtain each valve type from a single manufacturer.

2.03 BRONZE GLOBE VALVES

A. Class 125: CWP Rating: 200 psig.; and Class 150: CWP Rating: 300 psig.:  
   1. Comply with MSS SP-80, Type 1.
3. Ends: Threaded or solder joint.
4. Stem: Silicon Bronze-alloy
5. Disc: Bronze or PTFE.
   a. Handwheel: Malleable iron.
   b. Manufacturers:
      1) Crane Co.
      2) Milwaukee Valve Company
      3) NIBCO, Inc.
      4) Apollo Valve

2.04 IRON GLOBE VALVES

A. Class 125: CWP Rating: 200 psig:
   1. Comply with MSS SP-85, Type I.
   2. Body: Gray iron; ASTM A126, with bolted bonnet.
   4. Trim: Bronze.
   5. Packing and Gasket: Asbestos free, teflon-impregnated packing with bronze nut.
   6. Operator: Aluminum or malleable-iron handwheel or chainwheel.
   7. Manufacturers:
      a. Crane Co.
      b. Milwaukee Valve Company
      c. NIBCO, Inc.
      d. Apollo Valve

2.05 BRONZE BALL VALVES

A. Two Piece, Full Port with Bronze or Brass Trim:
   1. Comply with MSS SP-110.
   2. SWP Rating: 150 psig.
   3. CWP Rating: 600 psig.
   5. Ends: Threaded or soldered.
   7. Stem: Bronze or brass.
   8. Ball: Chrome plated brass.
   9. Manufacturers:
      a. Conbraco Industries
      b. Crane Co.
      c. NIBCO, Inc.
      d. Watts Industries
      e. Apollo Valve

2.06 IRON BALL VALVES

A. Split Body, Full Port:
   1. Comply with MSS SP-72.
   2. CWP Rating: 200 psig.
5. Seats: PTFE.

2.07 IRON, SINGLE FLANGE BUTTERFLY VALVES

A. Lug type: Bi-directional dead end service without downstream flange.
   1. Comply with MSS SP-67, Type I.
   2. CWP Rating: 200 psig.
   4. Stem: One or two-piece stainless steel.
   5. Seat: NBR.
   6. Disc: Coated ductile iron.
   7. Operator:
      a. Sizes 2 Inches to 6 Inches: Standard lever handle with memory stop.
      b. Sizes 8 Inches to 24 Inches: Gear operator with position indicator.
      c. Sizes 8 Inches and Larger, 96 Inches or Higher above Floor: Chain-wheel operator.
   8. Manufacturers:
      a. Crane Co.
      b. Milwaukee Valve Company
      c. NIBCO, Inc.
      d. Watts Industries
      e. Apollo Valve

2.08 BRONZE SWING CHECK VALVES

A. Class 125: CWP Rating: 200 psig (1380 kPa) and Class 150: CWP Rating: 300 psig (2070 kPa).
   1. Comply with MSS SP-80, Type 3.
   2. Body Design: Horizontal flow.
   4. Ends: Threaded.
   5. Disc: Bronze.
   6. Manufacturers:
      a. Crane Co.
      b. Milwaukee Valve Company
      c. NIBCO, Inc.
      d. Watts Industries
      e. Apollo Valve

2.09 IRON, CENTER-GUIDED CHECK VALVES

A. Class 125, Compact-Wafer:
   1. Comply with MSS SP-125.
   2. 2-1/2 NPS to 12 NPS, CWP Rating: 200 psig.
   5. Resilient Seat: Buna N.
   6. Manufacturers:
      a. Crane Co.
2.10 LUBRICATED PLUG VALVES

A. Regular Gland and Cylindrical with Threaded Ends:
   1. Comply with MSS SP-78, Type II.
   2. Class 125: 2-1/2 NPS to 12 NPS, CWP Rating: 200 psig.
   3. Body Material: Cast iron with lubrication sealing system.
   4. Pattern: Regular or short.
   5. Plug: Cast iron or bronze with sealant groove.
   6. Operator:
      a. Lever for valves 5” and smaller
      b. Worm and gear with handwheel for valves 6” and larger
      c. Worm and gear with chain wheel, sizes 6 inches and larger, 96 inches or higher above floor.
   7. Manufacturers:
      a. General Signal; DeZurik Unit.
      b. Grinnell Corporation.

2.11 CHAINWHEELS

A. Description: Valve actuation assembly with sprocket rim, brackets, and chain.
   1. Brackets: Type, number, size, and fasteners required to mount actuator on valve.
   2. Attachment: For connection to ball, butterfly, and plug valve stems.
   3. Sprocket Rim with Chain Guides: Ductile iron include zinc coating.

B. Manufacturers:
   1. Babbitt Steam Specialty Co.
   2. RotoHammer Industries, Inc.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Discard all packing materials and verify that valve interior, including threads and flanges are completely clean without signs of damage or degradation that could result in leakage.

B. Examine piping system for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
D. Verify valve parts to be fully operational in all positions from closed to fully open.

E. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.

F. Should valve is determined to be defective, replace with new valve.

G. Examine threads on valve and mating pipe for form and cleanliness.

H. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

I. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

J. Confirm valve component material is appropriate for hydronic systems using propylene or ethylene glycol.

3.02 INSTALLATION

A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.

B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.

C. Locate valves for easy access and provide separate support where necessary.

D. Install valves in horizontal piping with stem at or above center of pipe.

E. Install valves in position to allow full stem movement.

F. Install chainwheel operators on valves NPS 4 and larger and more than 96 inches above floor. Extend chains to 60 inches above finished floor elevation.

G. Install check valves for proper direction of flow and as follows:
   1. Swing Check Valves: In horizontal position with hinge pin level.

H. Provide chainwheels on operators for valves 4 NPS and larger where located 96 NPS or more above finished floor, terminating 60 NPS above finished floor.

END OF SECTION 23 05 23
SECTION 23 07 13

DUCT INSULATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Duct insulation.
B. Duct liner.
C. Insulation jackets.

1.02 REFERENCE STANDARDS

F. ASTM C450 - Standard Practice for Fabrication of Thermal Insulating Fitting Covers for NPS Piping, and Vessel Lagging; 2008 (Reapproved 2014).


1.03 SUBMITTALS

A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

B. Shop Drawings:
1. Detail insulation application at elbows, fittings, flanges, and specialties for each type of insulation.
2. Detail removable insulation at equipment connections, and access panels.
3. Detail application of field-applied jackets.
4. Detail application of identification
5. Detail application at linkages of control devices.
6. Detail field application for each equipment type.
7. Detail outdoor duct insulation installation.

C. Samples: For each type of insulation jacket, and identification indicated. Identify each Sample, describing product and intended use.
1. Sample Sizes:
   a. Sheet Form Insulation Materials: 12 inches square.
   b. Sheet Jacket Materials: 12 inches square.
   c. Manufacturer’s Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

D. Manufacturer’s Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

E. LEED Submittal if project is pursuing LEED certification.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labelled with manufacturer’s identification, including product density and thickness.
B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.06 SCHEDULING

A. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.07 WARRANTY

A. Special Warranty: Submit a written warranty, signed by the manufacturer and Installer, agreeing to replace components that fail in material or workmanship within 18 months from date of delivery, or one year from date of Preliminary Acceptance / Substantial Completion, whichever is longer.

PART 2 - PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

B. Regulatory Requirements: Insulation installations shall comply with the City of Chicago Building Code, Chapter 18-13, "Energy Conservation," and the Illinois Energy Conservation Code. Where conflicts exist between the codes identified above and this section, the more stringent requirement shall apply.

2.02 GLASS FIBER, FLEXIBLE

A. Manufacturer:
   2. Owens Corning Corporation; ______: www.ocbuildingspec.com/#sle.

B. Insulation: ASTM C553; flexible, noncombustible blanket.
   1. ‘K’ value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.
   2. Maximum Service Temperature: 1200 degrees F.
   3. Maximum Water Vapor Absorption: 5.0 percent by weight.

C. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
   3. Secure with pressure sensitive tape.

D. Vapor Barrier Tape:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

E. Outdoor Vapor Barrier Mastic:
   1. Vinyl emulsion type acrylic or mastic, compatible with insulation, white color.
F. Tie Wire: Annealed steel, 16 gage, 0.0508 inch diameter.

2.03 GLASS FIBER, RIGID

A. Manufacturer:
   1. Johns Manville
   2. Owens Corning Corporation; 700 Series FIBERGLAS Insulation
   3. CertainTeed Corporation

B. Insulation: ASTM C612; rigid, noncombustible blanket.
   1. ’K’ Value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.
   2. Maximum Service Temperature: 450 degrees F.
   3. Maximum Water Vapor Absorption: 5.0 percent.

C. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
   3. Secure with pressure sensitive tape.

D. Vapor Barrier Tape:
   1. Manufacturers:
      a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
      b. Compac Corporation; 110 and 111.
      c. Ideal Tape Co., Inc., an American Biltrite Company; 491 AWF FSK.
      d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.
   2. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

2.04 CALCIUM SILICATE INSULATION:

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Industrial Insulation Group, LLC (IIG).

B. Properties:
   1. Compressive Strength: ASTM C165; 100 psi, minimum, at 5 percent deformation.
   2. Dry Density, Average: ASTM C302; 14.0 pcf, minimum.
   3. Fire-Test-Response Characteristics: ASTM E84; flame spread index of 0 and smoke developed index of 0, as determined by testing identical products per ASTM E84 by UL or another testing and inspecting agency acceptable to the authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

C. Preformed Pipe Sections: Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C533, Type I.

D. Prefabricated Fitting Covers: Comply with ASTM C450 and ASTM C585 for dimensions used in preforming insulation to cover valves, elbows, tees, and flanges.
2.05 SECUREMENTS

A. Bands:
1. Products: Subject to compliance with requirements, provide one of the following:
   a. ITW Insulation Systems; Gerrard Strapping and Seals.
   b. RPR Products, Inc.; Insul-Mate Strapping, Seals, and Springs.
2. Stainless Steel: ASTM A240/A240M, Type 304; 0.020-inch thick, 3/4 inch wide with wing seal or closed seal.
   a. Type 304 for interior installations.
   b. Type 316 for exterior installations, and interior installations subject to high humidity.

B. Insulation Pins and Hangers:
1. Capacitor-Discharge-Weld Pins: Copper-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch diameter shank, length to suit depth of insulation indicated.
   a. Products: Subject to compliance with requirements, provide one of the following:
      1) AGM Industries, Inc.; CWP-1.
      2) GEMCO; CD.
      3) Midwest Fasteners, Inc.; CD.
      4) Nelson Stud Welding; TPA, TPC, and TPS.
2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
   a. Products: Subject to compliance with requirements, provide one of the following:
      1) AGM Industries, Inc.; CHP-1.
      2) GEMCO; Cupped Head Weld Pin.
      3) Midwest Fasteners, Inc.; Cupped Head.
      4) Nelson Stud Welding; CHP.
3. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following:
   a. Products: Subject to compliance with requirements, provide one of the following:
      1) AGM Industries, Inc.; Tactoo Perforated Base Insul-Hangers.
      2) GEMCO; Perforated Base.
      3) Midwest Fasteners, Inc.; Spindle.
   b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
   c. Spindle: Copper- or zinc-coated, low carbon steel, fully annealed, 0.106-inch diameter shank, length to suit depth of insulation indicated.
   d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
4. Nonmetal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate fastened to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following:
   a. Products: Subject to compliance with requirements, provide one of the following:
      1) GEMCO; Nylon Hangers.
      2) Midwest Fasteners, Inc.; Nylon Insulation Hangers.
   b. Baseplate: Perforated, nylon sheet, 0.030 inch thick by 1-1/2 inches in diameter.
   c. Spindle: Nylon, 0.106-inch- diameter shank, length to suit depth of insulation indicated, up to 2-1/2 inches.
   d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

5. Self-Sticking-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
   a. Products: Subject to compliance with requirements, provide one of the following:
      1) AGM Industries, Inc.; Tactoo Self-Adhering Insul-Hangers.
      2) GEMCO; Peel & Press.
      3) Midwest Fasteners, Inc.; Self Stick.
   b. Baseplate: Galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
   c. Spindle: Copper- or zinc-coated, low carbon steel, fully annealed, 0.106-inch- diameter shank, length to suit depth of insulation indicated.
   d. Adhesive: back with a peel-off protective cover.

6. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick, galvanized-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
   a. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

7. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

C. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

D. Wire: 0.062-inch soft-annealed, stainless steel.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      c. ITW Insulation Systems / PABCO Metals Corporation.
      d. RPR Products, Inc.
2.06  JACkets

   1. Thickness: 0.016 inch sheet.
   2. Finish: Smooth.
   4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
   5. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

B. Stainless Steel Jacket: ASTM A240/A240M
   1. Sheet and roll stock ready for shop or field sizing.
   2. Material, finish, and thickness are indicated in field-applied jacket schedules.
   4. Moisture Barrier for Outdoor Applications: 2.5-mil-thick polysurlyn.
   5. Factory-Fabricated Fitting Covers: Fabricated from the same material, finish, and thickness as jacket. Provide factory-fabricated covers for preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows; tee covers; flange and union covers; end caps; beveled collars; and valve covers. Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

2.07  Fire-Rated Insulation Systems

A. Fire-Rated Blanket: High-temperature, flexible, blanket insulation with FSK jacket that is tested and certified to provide a 2-hour fire rating by UL or another testing and inspecting agency acceptable to the authorities having jurisdiction.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. CertainTeed Corp.; FlameChek.
      b. Johns Manville; Firetemp Wrap.
      d. Thermal Ceramics; FireMaster Duct Wrap.
      e. 3M; Fire Barrier Wrap Products.
      f. Unifrax Corporation; FyreWrap.

2.08  duct liner

Part 3 - execution

3.01  examination

A. Verify that ducts have been tested before applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.02  installation

A. Install in accordance with manufacturer's instructions.

B. Keep insulation materials dry during application and finishing.
C. Install insulation with least number of joints practical.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

F. Install multiple layers of insulation with longitudinal and end seams staggered.

G. Insulated ducts conveying air below ambient temperature:
1. Provide insulation with vapor barrier jackets.
2. Finish with tape and vapor barrier jacket.
3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

H. Insulated ducts conveying air above ambient temperature:
1. Provide with or without standard vapor barrier jacket.
2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.

I. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
   a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
   b. On duct sides with dimensions larger than 18 inches space pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
   c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
   d. Do not over compress insulation during installation.
   e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

J. Weatherproof Rectangular Duct Insulation
1. Provide flexible elastomeric insulation as required to provide the required R-values indicated in the schedule at the end of Part 3. Provide on the exterior of all supply and return ducts exposed to the weather. Cover insulation with a field-applied jacket.
2. Install duct insulation in shingled fashion to shed water, beginning at the bottom and working to the top of the duct. Top of duct insulation shall overlap the side of
duct insulation. Side of duct insulation shall overlap the bottom of duct insulation. Provide corner angles at each corner.

3. The ductwork shall be sloped to prevent water from accumulating. Ducts shall be sloped not less than 1/4-inch per foot (2 percent) from the high point to the low points at the outside edges. Insulation thickness shall be the minimum required to provide the R-values indicated in the schedule at the end of Part 3. Duct pitch shall be provided by the duct supports.

4. Flexible elastomeric insulation shall be completely adhered directly to clean, oil-free surfaces with a full coverage of waterproof adhesive recommended by the insulation manufacturer.

5. Butt-edge seams shall be adhered using adhesives recommended by the insulation manufacturer. Provisions for expansion and contraction shall be made. Overlap the insulation 1/4-inch at the butt-edge seams and compress the edges into place.

6. Standing metal duct seams shall be insulated as required to provide the R-values indicated in the schedule at the end of Part 3.

7. Insulation seams shall be staggered when applying multiple layers of insulation. Secure each layer of insulation to duct with manufacturer's recommended adhesive.

8. Longitudinal seams and end joints shall be sealed with adhesive recommended by insulation manufacturer, as required to eliminate openings in insulation and prevent passage of outside air to surface of duct being insulated.

9. Vapor retarder type mastic, or joint sealer, shall be applied on longitudinal and butt joints to prevent moisture and moisture vapor infiltration. Vapor retarder butt joints shall be sealed with 3-inch wide vapor retarder tape.

10. Tightly wrap the insulation circumferentially with saran film. Overlap the seams by a minimum of 2 inches. Seal the overlapped seams with vapor retarder tape.

11. Jacketing shall be secured with 1/2-inch wide stainless steel bands on 12-inch centers. Rivets, screws, staples, or any other fastener capable of penetrating the underlying vapor retarder shall not be used.

K. Weatherproof Round Duct Insulation

1. Provide flexible elastomeric insulation as required to provide the required R-values indicated in the schedule at the end of Part 3. Provide on the exterior of all supply and return ducts exposed to the weather. Cover insulation with a field-applied jacket.

2. Blanket type insulation shall be used on all round ductwork. Insulation shall be wrapped around the duct - stretching of insulation is not acceptable. Longitudinal seams shall be located on the lower half of round ductwork.

3. Flexible elastomeric insulation shall be completely adhered to clean oil-free surfaces with a full coverage of waterproof adhesive recommended by the insulation manufacturer.

4. Butt-edge seams shall be adhered using adhesives recommended by the insulation manufacturer. Provisions for expansion and contraction shall be made. Overlap the insulation 1/4-inch at the butt-edge seams and compress the edges into place.

5. Standing metal duct seams shall be insulated as required to provide the required R-values shown in the schedule at the end of Part 3.

6. Vapor retarder type mastic, or joint sealer, shall be applied on longitudinal and butt joints to prevent moisture and moisture vapor infiltration. Vapor retarder butt joints shall be sealed with 3-inch wide vapor retarder tape.
7. Insulation seams shall be staggered when applying multiple layers of insulation. Secure each layer of insulation to duct with adhesive recommended by insulation manufacturer.

8. Tightly wrap the insulation circumferentially with saran film. Overlap the seams by a minimum of 2 inches. Seal the overlapped seams with vapor retarder tape.

9. Jacketing shall be secured with 1/2-inch wide stainless steel bands on 12-inch centers. Rivets, screws, staples, or any other fastener capable of penetrating the underlying vapor retarder shall not be used.

L. Exterior Applications: Provide insulation with vapor barrier jacket. Cover with with calked aluminum jacket with seams located on bottom side of horizontal duct section.

3.03 INSTALLATION OF CALCIUM SILICATE INSULATION

A. Insulation Installation on Boiler Breechings and Ductwork:
   1. Secure single-layer insulation with stainless-steel bands at 12-inch intervals and tighten bands without deforming insulation material.
   2. Install 2-layer insulation with joints tightly butted and staggered at least 3 inches. Secure inner layer with 0.062-inch, soft-annealed, stainless steel wire spaced at 12-inch intervals. Secure outer layer with stainless-steel bands at 12-inch intervals.
   3. On exposed applications without metal jacket, finish insulation surface with a skim coat of mineral-fiber, hydraulic-setting cement. When cement is dry, apply flood coat of lagging adhesive and press on one layer of glass cloth. Overlap edges at least 1 inch. Apply finish coat of lagging adhesive over glass cloth. Apply a thin finish coat to achieve smooth, uniform finish.

B. Insulation Installation on Straight Pipes and Tubes:
   1. Secure single-layer insulation with stainless-steel bands at 12-inch intervals and tighten bands without deforming insulation materials.
   2. Install 2-layer insulation with joints tightly butted and staggered at least 3 inches. Secure inner layer with wire spaced at 12-inch intervals. Secure outer layer with stainless-steel bands at 12-inch intervals.
   3. Apply a skim coat of mineral-fiber, hydraulic-setting cement to insulation surface. When cement is dry, apply flood coat of lagging adhesive and press on one layer of glass cloth or tape. Overlap edges at least 1 inch. Apply finish coat of lagging adhesive over glass cloth or tape. Apply a thin finish coat to achieve smooth, uniform finish.

C. Insulation Installation on Pipe Flanges:
   1. Install preformed pipe insulation to outer diameter of pipe flange.
   2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
   3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of block insulation of same material and thickness as pipe insulation.
   4. Finish flange insulation same as pipe insulation.

D. Insulation Installation on Pipe Fittings and Elbows:
1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.

2. When preformed insulation sections of insulation are not available, install mitered sections of calcium silicate insulation. Secure insulation materials with stainless steel wire.

3. Finish fittings insulation same as pipe insulation.

E. Insulation Installation on Valves and Pipe Specialties:
1. Install mitered segments of calcium silicate insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For check valves, arrange insulation for access to strainer basket without disturbing insulation.

2. Install insulation to flanges as specified for flange insulation application.

3. Finish valve and specialty insulation same as pipe insulation.

F. Metal Jacket: Where indicated, apply metal jacket over finished insulation as specified in this Section for installation of metal jackets.

3.04 FIRE-RATED INSULATION SYSTEM INSTALLATION

A. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.

B. Insulate duct access panels and doors to achieve same fire rating as duct.

C. Install firestopping at penetrations through fire-rated assemblies in accordance with Division 07 Section "Penetration Firestopping."

3.05 FIELD QUALITY CONTROL

A. Testing Agency: Contractor shall engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:
1. Inspect ductwork, randomly selected by Architect/Engineer of Record, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location for each duct system defined in the Article "Duct Insulation Schedule, General”.

2. Inspect field-insulated equipment, randomly selected by Architect/Engineer of Record, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location for each type of equipment requiring insulation for this project. For large equipment, remove only a portion adequate to determine compliance.

3. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect/Engineer of Record, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged
valves for each pipe service defined in the Article "Piping Insulation Schedule, General".

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements. Architect/Engineer of Record may reject all work if sample work is found to be defective.

3.06 SCHEDULES

A. Duct Insulation Application

1. Plenums and Ducts Requiring Insulation:
   a. Indoor, supply and outdoor air.
   b. Indoor, concealed return located in non-conditioned space.
   c. Indoor, return located in non-conditioned space.
   d. Indoor, kitchen hood exhaust.
   e. Indoor, exhaust between isolation damper and penetration of building exterior.
   f. Outdoor, supply and return air.

2. Items Not Insulated:
   a. Factory-insulated flexible ducts.
   b. Factory-insulated plenums and casings.
   c. Flexible connectors.
   d. Vibration-control devices.
   e. Factory-insulated access panels and doors.

B. Duct Systems Insulation Schedule

<table>
<thead>
<tr>
<th>Duct Location</th>
<th>Outdoor Air, Supply Air, Exhaust Air (Downstream of Damper) Insulation-Installed R-Value</th>
<th>Return Air Insulation-Installed R-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exterior of Building (Notes 5,6,8)</td>
<td>12.0</td>
<td>12.0</td>
</tr>
<tr>
<td>Ventilated Attic (Notes 5,7)</td>
<td>12.0</td>
<td>12.0</td>
</tr>
<tr>
<td>Unvented Attic Above Insulated Ceiling (Notes 5,7)</td>
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<td>12.0</td>
</tr>
<tr>
<td>Unvented Attic with Roof Insulation (Notes 1,5,7)</td>
<td>6.0</td>
<td>N/A</td>
</tr>
<tr>
<td>Unconditioned Space (Notes 2,5,6,7)</td>
<td>12.0</td>
<td>12.0</td>
</tr>
<tr>
<td>Indirectly Conditioned Space (Notes 7)</td>
<td>6.0</td>
<td>N/A</td>
</tr>
<tr>
<td>Ceiling Cavity/ Shafts/ Soffits/ Mechanical Spaces and Rooms (Notes 4,5,6)</td>
<td>6.0</td>
<td>N/A</td>
</tr>
<tr>
<td>Exposed Locations within Conditioned Space</td>
<td>6.0</td>
<td>N/A</td>
</tr>
</tbody>
</table>
1. INSULATION R-VALUES, MEASURED IN \((H \times FT^{2} \times F)/BTU\), ARE FOR THE INSULATION AS INSTALLED AND DO NOT INCLUDE FILM RESISTANCE. WHERE EXTERIOR WALLS ARE USED AS PLENUM WALLS, WALL INSULATION SHALL BE AS REQUIRED BY APPLICABLE CODES AND AUTHORITIES HAVING JURISDICTION. INSULATION RESISTANCE MEASURED ON A HORIZONTAL PLANE IN ACCORDANCE WITH ASTM C518 AT A MEAN TEMPERATURE OF 75 DEG F AT THE INSTALLED THICKNESS.

2. INCLUDING CRAWL SPACES (BOTH VENTILATED/NON-VENTILATED), FRAMED CAVITIES IN WALLS, FLOOR AND CEILING ASSEMBLIES WHICH (A) SEPARATE CONDITIONED SPACE FROM UNCONDITIONED SPACE OR OUTSIDE AIR, AND (B) ARE UNINSULATED ON THE SIDE FACING AWAY FROM CONDITIONED SPACE.

3. CAVITY CONTAINED WITHIN THE INSULATED BUILDING ENVELOPE.

4. VAPOR BARRIER REQUIRED.

5. FIELD APPLIED JACKET (STAINLESS STEEL, OR ALUMINUM, FOR EXTERIOR APPLICATIONS, PVC FOR INTERIOR EXPOSED LOCATIONS).

6. PROVIDE MINERAL FIBER BOARD WITH FIELD APPLIED JACKET (SS, OR AL, ALL SERVICE INTERIOR) IN EXPOSED LOCATIONS IN LIEU OF MINERAL FIBER BLANKET.

7. PROVIDE FLEXIBLE ELASTOMERIC INSULATION FOR OUTDOOR DUCTWORK

C. Kitchen Exhaust Ducts Schedule

<table>
<thead>
<tr>
<th>Material</th>
<th>Form</th>
<th>Thickness (In.)</th>
<th>Vapor Barrier Required?</th>
<th>Field-Applied Jacket</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire Rated Blanket</td>
<td>Blanket</td>
<td>Note 1</td>
<td>No</td>
<td>None</td>
</tr>
</tbody>
</table>

1. As required to provide a 2-Hour Fire Rating, minimum 2 layers.

D. Convection Oven and Dishwasher Exhaust Ducts Schedule

<table>
<thead>
<tr>
<th>Material</th>
<th>Form</th>
<th>Thickness (In.)</th>
<th>Vapor Barrier Required?</th>
<th>Field-Applied Jacket</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass Fiber</td>
<td>Board</td>
<td>2</td>
<td>No</td>
<td>(SS) Exposed Duct</td>
</tr>
<tr>
<td>Fire-Rated Blanket</td>
<td>Blanket</td>
<td>Note 1</td>
<td>No</td>
<td>None</td>
</tr>
</tbody>
</table>

1. As required to provide a 2-Hour Fire Rating, minimum 2 layers.

END OF SECTION 23 07 13
SECTION 23 07 19
HVAC PIPING INSULATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.
B. Flexible removable and reusable blanket insulation.
C. Jackets and accessories.

1.02 REFERENCE STANDARDS

A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
M. ASTM C585 - Standard Practice for Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing; 2010 (Reapproved 2016).


1.03 SUBMITTALS

A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

B. Shop Drawings:
1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing, if any, inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties, equipment connections, and access panels.
6. Detail application of field-applied jackets. Include outdoor piping insulation installation.
7. Detail application of identification
8. Detail application at linkages of control devices.
9. Detail field application for each equipment type.

C. Samples: For each type of insulation jacket, and identification indicated. Identify each Sample, describing product and intended use.
1. Sample Sizes:
   b. Sheet Form Insulation Materials: 12 inches square.
   d. Sheet Jacket Materials: 12 inches square.
   e. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

D. Manufacturer’s Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.
1.04 QUALITY ASSURANCE
   A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

1.05 DELIVERY, STORAGE, AND HANDLING
   A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.
   B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.06 COORDINATION
   A. Coordinate size and location of supports, hangers, and insulation shields specified in other Division 23 Sections.
   B. Coordinate clearance requirements with piping Installer for piping insulation application, duct Installer for duct insulation application, and equipment Installer for equipment insulation application. Before preparing piping and ductwork shop drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
   C. Coordinate installation and testing of heat tracing, if required for the Project.

1.07 SCHEDULING
   A. Schedule insulation application after pressure testing systems and after installation and testing of heat tracing, if required for the Project. Insulation application may begin on segments that have satisfactory test results.
   B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.01 REGULATORY REQUIREMENTS
   A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.
   B. Regulatory Requirements: Insulation installations shall comply with the City of Chicago Building Code, Chapter 18-13, "Energy Conservation," and the Illinois Energy Conservation Code. Where conflicts exist between the codes identified above and this section, the more stringent requirement shall apply.

2.02 GLASS FIBER
   A. Manufacturers:
1. Johns Manville Corporation; Micro-Lok
2. Knauf Insulation; Earthwool 1000 Degree Pipe Insulation
3. Owens Corning Corporation; Fiberglas Pipe Insulation ASJ

B. Insulation(Hot Pipes): ASTM C547 and ASTM C795; rigid molded, noncombustible.
   1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
   2. Maximum Service Temperature: 850 degrees F.
   3. Maximum Moisture Absorption: 0.2 percent by volume.

C. Insulation(Cold Pipes): ASTM C547 and ASTM C795; rigid molded, noncombustible, with wicking material to transport condensed water to the outside of the system for evaporation to the atmosphere.
   1. 'K' Value: ASTM C177, 0.23 at 75 degrees F.
   2. Maximum Service Temperature: 220 degrees F.
   3. Maximum Moisture Absorption: 0.2 percent by volume.

D. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.

E. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

F. Vapor Barrier Lap Adhesive: Compatible with insulation.
   1. Manufacturers:
      b. Vimasco Corporation; 749.
   2. Water-Vapor Permeance: ASTM E96/E96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
   3. Service Temperature Range: Minus 20 to plus 180 deg F
   4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.

G. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.

H. Outdoor Vapor Barrier Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

I. Outdoor Breather Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.


2.03 CALCIUM SILICATE INSULATION

A. Manufacturers: Subject to compliance with requirements, provide products by one of the ASTM C533 following:
   1. Industrial Insulation Group, LLC (IIG).

B. Properties:
   1. Compressive Strength: ASTM C165; 100 psi, minimum, at 5 percent deformation.
2. Dry Density, Average: ASTM C302; 14.0 pcf, minimum.
3. Fire-Test-Response Characteristics: ASTM E84; flame spread index of 0 and smoke developed index of 0, as determined by testing identical products per ASTM E84 by UL or another testing and inspecting agency acceptable to the authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

C. Preformed Pipe Sections: Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C533, Type I.

D. Prefabricated Fitting Covers: Comply with ASTM C450 and ASTM C585 for dimensions used in preforming insulation to cover valves, elbows, tees, and flanges.

2.04 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Manufacturer:
   1. Aeroflex USA, Inc
   2. Armacell LLC; AP Armaflex
   3. K-Flex USA LLC; K-Flex Titan

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
   1. Minimum Service Temperature: Minus 40 degrees F.
   2. Maximum Service Temperature: 180 degrees F.

C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.
   1. Manufacturers:
      a. Aeroflex USA Inc.; Aeroseal.
      b. Armacell LCC; Armaflex 520 Adhesive.
      d. K-Flex USA; R-373 Contact Adhesive.

2.05 JACKETS

A. PVC Plastic.
   1. Manufacturers:
      a. Johns Manville Corporation
      b. IC Plastics, Inc.
      c. Proto Corp.
   2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
      a. Minimum Service Temperature: 0 degrees F.
      b. Maximum Service Temperature: 150 degrees F.
      c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
      d. Thickness: 10 mil.
      e. Connections: Brush on welding adhesive.
   1. Manufacturers
      b. ITW Insulation Systems; Aluminum and Stainless Steel Jacketing.
      c. RPR Products, Inc.; Insul-Mate.
   2. Thickness: 0.016 inch sheet.
   5. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
   6. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

C. Stainless Steel Jacket: ASTM A666, Type 304 stainless steel.
   1. Manufacturers
      b. ITW Insulation Systems; Aluminum and Stainless Steel Jacketing.
      c. RPR Products, Inc.; Insul-Mate.
   2. Thickness: 0.010 inch.
   4. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.
   5. Provide moisture barrier for outdoor installation.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer’s instructions.

B. Exposed Piping: Locate insulation and cover seams in least visible locations.

C. Coordinate insulation installation with the trade installing heat tracing, if any.

D. Insulated pipes conveying fluids below ambient temperature; insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

E. Glass fiber insulated pipes conveying fluids below ambient temperature:
   1. Provide vapor barrier jackets, factory-applied or field-applied; secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
   2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
F. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

G. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.

H. Glass fiber insulated pipes conveying fluids above ambient temperature.
   1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
   2. Insulate fittings, joints, strainers, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.

I. Inserts and Shields:
   1. Application: Piping 1-1/2 inches diameter or larger.
   2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
   3. Insert location: Between support shield and piping and under the finish jacket.
   4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
   5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

J. Continue insulation continuously through walls and partitions, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 84 00.

K. Install removable insulation covers at locations where access is required (e.g. - unions, flanges, strainers, and valves)

L. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping. Provide two coats of UV resistant finish for flexible elastomeric cellular insulation without jacketing.

M. Buried Piping: Provide factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with one mil thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with a polyester film.

N. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

3.03 SCHEDULE

<table>
<thead>
<tr>
<th>Pipe System</th>
<th>Operating Temp (F)</th>
<th>Insulation Type</th>
<th>Thickness (In.)</th>
</tr>
</thead>
</table>

City of Evanston
Generator Upgrade

23 07 19 - 7
<table>
<thead>
<tr>
<th>Pipe Type</th>
<th>Insulation</th>
<th>&lt;1</th>
<th>1 to 1/4</th>
<th>1 1/2 to 6</th>
<th>8 and larger</th>
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<tr>
<td>Glass Fiber</td>
<td>Flexible Elastomeric</td>
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<tr>
<td>Steam-Medium Pressure</td>
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<td></td>
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<td>1.0</td>
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</tr>
</tbody>
</table>

1. GLASS-FIBER INSULATION ONLY FOR HYDRONIC PIPING.
2. PVC, ALUMINUM, OR STAINLESS STEEL FIELD-APPLIED JACKET ON OUTDOOR INSTALLATIONS, EXPOSED AND CONCEALED.
3. FOR OUTDOOR USE ONLY.
4. PIPING INSULATION IS NOT REQUIRED BETWEEN THE CONTROL VALVE AND COIL ON RUNOUTS, WHEN THE CONTROL VALVE IS WITHIN 4-FEET OF THE COIL AND THE PIPE SIZE IS 1-INCH OR LESS.
5. FOR PIPING EXPOSED TO OUTDOOR AIR, INCREASE INSULATION THICKNESS BY 1-INCH.
6. INSULATION THICKNESS IS BASED ON INSULATION HAVING A THERMAL CONDUCTIVITY OF 0.27 BTU-INCH/(H-FT2-deg F).
7. VAPOR BARRIER REQUIRED.

END OF SECTION 23 07 19
PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Hydronic system requirements.
B. Heating water piping, buried.
C. Heating water and dual temperature piping, above grade.
D. Chilled water piping, buried.
E. Chilled water and makeup water piping, above grade
F. Condenser water piping, buried.
G. Condenser water piping, above grade
H. Equipment drains and overflows
I. Pipe hangers and supports.
J. Unions, flanges, mechanical couplings, and dielectric connections.

1.02 REFERENCE STANDARDS

A. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing and Fusing Operators; 2017.
C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
E. ASME B31.9 - Building Services Piping; 2014.


M. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2016.


P. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2011 (Amended 2012).


V. AWWA C606 - Grooved and Shouldered Joints; 2015.


1.03 SUBMITTALS

A. Product Data:
   1. Include data on pipe materials, pipe fittings, valves, and accessories.
   2. Provide manufacturers catalogue information.
   3. Indicate valve data and ratings.
   4. Show grooved joint couplings, fittings, valves, and specialties on drawings and product submittals, specifically identified with the manufacturer's style or series designation.

B. Provide 1/4" scale layout/fabrication shop drawings for all piping systems.

C. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.
D. Maintenance Data: Include record drawings, installation instructions, spare parts lists, exploded assembly views.

1.04 QUALITY ASSURANCE

A. Installer Qualifications:
   1. Installers of Pressure-Sealed Joints: Installers shall be certified by the pressure-seal joint manufacturer as having been trained and qualified to join piping with pressure-seal pipe couplings and fittings.

B. Steel Support Welding: Qualify processes and operators according to AWS D1.1/D1.1M.

C. Welding: Qualify processes and operators according to ASME BPVC-IX.
   1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
   2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
   3. All welders certificates shall be on file at project site
   4. ASME Compliance: Comply with ASME B31.9 for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with ASME BPVC-VIII-1.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 - PRODUCTS

2.01 HYDRONIC SYSTEM REQUIREMENTS

A. Comply with ASME B31.9 and applicable federal, state, and local regulations.

B. Piping: Provide piping, fittings, hangers and supports as required, as indicated, and as follows:
   1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.
   2. Use non-conducting dielectric connections whenever jointing dissimilar metals.
   3. Grooved mechanical joints may be used in accessible locations only.
      a. Accessible locations include those exposed on interior of building, in pipe chases, and in mechanical rooms, aboveground outdoors, and as approved by Architect/Engineer of Record.
b. Grooved mechanical connections and joints comply with AWWA C606.
   1) Ductile Iron: Comply with ASTM A536, Grade 65-45-12.
   2) Steel: Comply with ASTM A106/A106M, Grade B or ASTM A53/A53M.

4. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.

C. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges, unions, or grooved couplings to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.
   1. Where grooved joints are used in piping, provide grooved valve/equipment connections if available; if not available, provide flanged ends and grooved flange adapters.

D. Valves: Provide valves where indicated:
   1. Provide drain valves where indicated, and if not indicated provide at least at main shut-off, low points of piping, bases of vertical risers, and at equipment. Use 3/4 inch ball valves with cap; pipe to nearest floor drain.
   2. On discharge of condenser water pumps, use spring loaded check valves.
   3. For throttling, bypass, or manual flow control services, use globe, ball, or butterfly valves.
   4. For throttling and isolation service in chilled and condenser water systems, use only butterfly valves.
   5. For shut-off and to isolate parts of systems or vertical risers, use ball or butterfly valves.

2.02 HEATING WATER PIPING, BURIED

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black, with AWWA C105/A21.5 polyethylene jacket, or double layer, half-lapped polyethylene tape.

B. Steel Pipe Sizes 12 inch and Greater: ASTM A53/A53M, 3/8 inch wall, black with AWWA C105/A21.5 polyethylene jacket, or double layer, half-lapped polyethylene tape.
   1. Fittings: ASTM A234/A234M, wrought steel welding type with double layer, half-lapped polyethylene tape.
   2. Joints: Welded in accordance with AWS D1.1/D1.1M.
   3. Casing: Closed glass cell insulation.

2.03 HEATING WATER AND DUAL TEMPERATURE PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black, using one of the following joint types:

B. Steel Pipe Sizes 12 Inch and Greater: ASTM A53/A53M, 3/8 inch wall, black, using one of the following joint types:
2. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.

C. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), drawn, using one of the following joint types:
      a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
      b. Braze: AWS A5.8M/A5.8 BCuP copper/silver alloy.
   2. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.

2.04 CHILLED WATER PIPING, BURIED

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black with AWWA C105/A21.5 polyethylene jacket, or double layer, half-lapped polyethylene tape.
   1. Fittings: ASTM A234/A234M, wrought steel welding type with double layer, half-lapped polyethylene tape.
   2. Joints: Welded in accordance with AWS D1.1/D1.1M.
   3. Casing: Closed glass cell insulation.

B. Steel Pipe Sizes 12 Inch and Greater: ASTM A53/A53M, 3/8 inch wall, black with AWWA C105/A21.5 polyethylene jacket, or double layer, half-lapped polyethylene tape.
   1. Fittings: ASTM A234/A234M, wrought steel welding type with double layer, half-lapped polyethylene tape.
   2. Joints: Welded in accordance with AWS D1.1/D1.1M.
   3. Casing: Closed glass cell insulation.

   2. Joints: AWWA C111/A21.11, Styrene butadiene rubber (SBR) or vulcanized SBR gasket with 3/4 inch diameter rods.

2.05 CHILLED WATER PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black; using one of the following joint types:

B. Steel Pipe Sizes 12 Inch and Greater: ASTM A53/A53M, 3/8 inch wall, black; using one of the following joint types:
2. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.

C. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), hard drawn; using one of the following joint types:
      a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
   2. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.

2.06 CONDENSER WATER PIPING, BURIED

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black with AWWA C105/A21.5 polyethylene jacket, or double layer, half-lapped polyethylene tape.
   1. Fittings: ASTM A234/A234M, wrought steel welding type with double layer, half-lapped polyethylene tape.
   2. Joints: Threaded for pipe 2 inch and under; AWS D1.1/D1.1M, welded for pipe over 2 inch.

B. Steel Pipe Sizes 12 Inch and Greater: ASTM A53/A53M, 3/8 inch wall, black with AWWA C105/A21.5 polyethylene jacket, or double layer, half-lapped polyethylene tape.
   1. Fittings: ASTM A234/A234M, wrought steel welding type with double layer, half-lapped polyethylene tape.
   2. Joints: Welded in accordance with AWS D1.1/D1.1M.


2.07 CONDENSER WATER PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M, Schedule 80, black.

B. Steel Pipe Sizes 12 Inch and Greater: ASTM A53/A53M, 3/8 inch wall, black; using one of the following joint types:
   2. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.
C. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), drawn; using one of the following joint types:
      a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
   2. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.

2.08 EQUIPMENT DRAINS AND OVERFLOWS, AND MAKEUP WATER.

A. Steel Pipe: ASTM A53/A53M, Schedule 40 galvanized; using one of the following joint types:
   1. Threaded Joints: Galvanized cast iron, or ASME B16.3 malleable iron fittings.
   2. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.

B. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), drawn; using one of the following joint types:
   1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings; ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.

2.09 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.
   3. Hangers for Cold Pipe Sizes 2 Inches and Greater: Carbon steel, adjustable, clevis.
   5. Hangers for Hot Pipe Sizes 6 Inches and Greater: Adjustable steel yoke, cast iron roll, double hanger.
   6. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
   7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Greater: Steel channels with welded spacers and hanger rods, cast iron roll.
   8. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
  10. Wall Support for Hot Pipe Sizes 6 Inches and Greater: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
  12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
13. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
14. Floor Support for Hot Pipe Sizes 6 Inches and Greater: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
15. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
16. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
17. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

B. In grooved installations, use rigid couplings with offsetting angle-pattern bolt pads or with wedge shaped grooves in header piping to permit support and hanging in accordance with ASME B31.9.

2.10 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS

A. Unions for Pipe 2 Inches and Less:
   1. Ferrous Piping: 150 psig malleable iron, threaded.
   2. Copper Pipe: Bronze, soldered joints.

B. Flanges for Pipe 2 Inches and Greater:
   1. Ferrous Piping: 150 psig forged steel, slip-on.
   2. Copper Piping: Bronze.
   3. Gaskets: 1/16 inch thick preformed neoprene.

C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
   1. Dimensions and Testing: In accordance with AWWA C606.
   2. Mechanical Couplings: Comply with ASTM F1476.
   3. Housing Material: Ductile iron, galvanized complying with ASTM A536.
   4. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.
   5. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
   6. When pipe is field grooved, provide coupling manufacturer's grooving tools.
   7. Manufacturers:
      a. Grinnell Products, a Tyco Business
      b. Victaulic Company
      c. Anvil

D. Dielectric Connections:
   1. Waterways:
      a. Water impervious insulation barrier capable of limiting galvanic current to 1 percent of short circuit current in a corresponding bimetallic joint.
      b. Dry insulation barrier able to withstand 600 volt breakdown test.
      c. Construct of galvanized steel with threaded end connections to match connecting piping.
      d. Suitable for the required operating pressures and temperatures.
   2. Flanges:
a. Dielectric flanges with same pressure ratings as standard flanges.
b. Water impervious insulation barrier capable of limiting galvanic current to 1 percent of short circuit current in a corresponding bimetallic joint.
c. Dry insulation barrier able to withstand 600 volt breakdown test.
d. Construct of galvanized steel with threaded end connections to match connecting piping.
e. Suitable for the required operating pressures and temperatures.

PART 3 - EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
B. Prepare pipe for grooved mechanical joints as required by coupling manufacturer.
C. Remove scale and dirt on inside and outside before assembly.
D. Prepare piping connections to equipment using jointing system specified.
E. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
F. After completion, fill, clean, and treat systems. Refer to Section 23 25 00 - HVAC Water Treatment for additional requirements.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Install heating water, glycol, chilled water, condenser water, and engine exhaust piping to ASME B31.9 requirements.
C. Route piping in orderly manner, parallel to building structure, and maintain gradient.
D. Install piping to conserve building space and to avoid interfere with use of space.
E. Group piping whenever practical at common elevations.
F. Sleeve pipe passing through partitions, walls and floors.
G. Install firestopping to preserve fire resistance rating of partitions and other elements.
H. Slope piping and arrange to drain at low points.
I. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 23 05 16 - Expansion Fittings and Loops for HVAC Piping.
   1. Flexible couplings may be used in header piping to accommodate thermal growth, thermal contraction in lieu of expansion loops.
   2. Use flexible couplings in expansion loops.
J. Grooved Joints:
1. Install in accordance with the manufacturer’s latest published installation instructions.
2. Gaskets to be suitable for the intended service, molded, and produced by the coupling manufacturer.

K. Inserts:
1. Provide inserts for placement in concrete formwork.
2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.

L. Pipe Hangers and Supports:
1. Install in accordance with ASME B31.9, ASTM F708, or MSS SP-58.
2. Support horizontal piping as scheduled.
3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
4. Place hangers within 12 inches of each horizontal elbow.
5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
8. Provide copper plated hangers and supports for copper piping.
9. Prime coat exposed steel hangers and supports. Refer to Section 09 91 23. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

M. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 23 07 19 - HVAC Piping Insulation.

N. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.

O. No dual-temperature piping shall be installed below ground and within slabs.

3.03 FIELD QUALITY CONTROL

A. Prepare hydronic piping according to ASME B31.9 and as follows:
1. Leave joints, including welds, uninsulated and exposed for examination during test.
2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.

4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.

5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

B. Perform the following tests on hydronic piping:
1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used (compressed air may not be used).
2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
3. Isolate expansion tanks and determine that hydronic system is full of water.
4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A in ASME B31.9.
5. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
6. Prepare written report of testing.

C. Perform the following before operating the system:
1. Open manual valves fully.
2. Inspect pumps for proper rotation.
3. Set makeup pressure-reducing valves for required system pressure.
4. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
5. Set temperature controls so all coils are calling for full flow.
6. Inspect and set operating temperatures of hydronic equipment, such as boilers, chillers, cooling towers, to specified values.
7. Verify lubrication of motors and bearings.

3.04 SCHEDULES

A. Hanger Spacing for Copper Tubing.
1. 1/2 inch and 3/4 inch: Maximum span, 5 feet; minimum rod size, 1/4 inch.
2. 1 inch: Maximum span, 6 feet; minimum rod size, 1/4 inch.
3. 1-1/2 inch and 2 inch: Maximum span, 8 feet; minimum rod size, 3/8 inch.
4. 2-1/2 inch: Maximum span, 9 feet; minimum rod size, 3/8 inch.
5. 3 inch: Maximum span, 10 feet; minimum rod size, 3/8 inch.
6. 4 inch: Maximum span, 12 feet; minimum rod size, 1/2 inch.

B. Hanger Spacing for Steel Piping.
1. 1/2 inch, 3/4 inch, and 1 inch: Maximum span, 7 feet; minimum rod size, 1/4 inch.
2. 1-1/4 inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
3. 1-1/2 inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.
4. 2 inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.
5. 2-1/2 inches: Maximum span, 11 feet; minimum rod size, 3/8 inch.
6. 3 inches: Maximum span, 12 feet; minimum rod size, 3/8 inch.
7. 4 inches: Maximum span, 14 feet; minimum rod size, 1/2 inch.
8. 6 inches: Maximum span, 17 feet; minimum rod size, 1/2 inch.
9. 8 inches: Maximum span, 19 feet; minimum rod size, 5/8 inch.
10. 10 inches: Maximum span, 20 feet; minimum rod size, 3/4 inch.
11. 12 inches: Maximum span, 23 feet; minimum rod size, 7/8 inch.
12. 14 inches: Maximum span, 25 feet; minimum rod size, 1 inch.
13. 16 inches: Maximum span, 27 feet; minimum rod size, 1 inch.
14. 18 inches: Maximum span, 28 feet; minimum rod size, 1-1/4 inch.
15. 20 inches: Maximum span, 30 feet; minimum rod size, 1-1/4 inch.

END OF SECTION 23 21 13
SECTION 23 21 14
HYDRONIC SPECIALTIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Expansion tanks.
B. Air vents.
C. Air separators.
D. Strainers.
E. Suction diffusers.
F. Pressure-temperature test plugs.
G. Balancing valves.
H. Combination flow controls.
I. Relief valves.
J. Automatic fill valves.
K. Glycol or makeup water pressure fill system.

1.02 REFERENCE STANDARDS


1.03 SUBMITTALS

A. Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description and model.
B. Certificates: Inspection certificates for pressure vessels from authority having jurisdiction.
C. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.
D. Project Record Documents: Record actual locations of flow controls.
E. Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.
1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 - PRODUCTS

2.01 EXPANSION TANKS

A. Manufacturers:
   1. Amtrol Inc
   2. Armstrong International, Inc
   3. ITT Bell & Gossett
   4. Taco, Inc
   5. Wessels

B. Construction: Welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; supplied with National Board Form U-1, rated for working pressure of 125 psi, with flexible EPDM diaphragm or bladder sealed into tank, and steel support stand.

C. Accessories: Pressure gauge and air-charging fitting, tank drain; precharge to 12 psi.

2.02 AIR VENTS

A. Manufacturers:
   1. Armstrong International, Inc
   2. ITT Bell & Gossett
   3. Taco, Inc

B. Manual Type: Short vertical sections of 2 inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.

C. Float Type:
   1. Brass or semi-steel body, copper, polypropylene, or solid non-metallic float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.
   2. Cast iron body and cover, float, bronze pilot valve mechanism suitable for system operating temperature and pressure; with isolating valve.
2.03 AIR SEPARATORS

A. Centrifugal Air Separators/Strainers:
   1. Manufacturers:
      a. Armstrong International, Inc
      b. ITT Bell & Gossett
      c. Taco, Inc
   2. Steel, tested and stamped in accordance with ASME BPVC-VIII-1; for 125 psi operating pressure, with integral bronze strainer, tangential inlet and outlet connections, and internal stainless steel air collector tube.
   3. Size inlet and outlet to match system capacity.

2.04 STRAINERS

A. Manufacturers:
   1. Armstrong International, Inc
   2. Flexicraft Industries
   3. Grinnell Products, a Tyco Business
   4. The Metraflex Company; LPD Y Strainer

B. Size 2 inch and Under:
   1. Screwed brass or iron body for 175 psi working pressure, Y pattern with 1/32 inch stainless steel perforated screen. Include blow down valve with hose connection.

C. Size 2-1/2 inch to 4 inch:
   1. Provide flanged iron body for 175 psi working pressure, Y pattern with 1/16 inch, or 3/64 inch stainless steel perforated screen. Include blow down valve with hose connection.

D. Size 5 inch and Larger:
   1. Provide flanged iron body for 175 psi working pressure, Y pattern with 1/8 inch stainless steel perforated screen. Include blow down valve with hose connection.

2.05 SUCTION DIFFUSERS

A. Manufacturers:
   1. ITT Bell & Gosset
   2. Armstrong International, Inc;
   3. Taco, Inc;
   4. Victaulic Company of America

B. Fitting: Angle pattern, cast-iron body, threaded for 2 inch and smaller, flanged for 2-1/2 inch and larger, rated for 175 psi working pressure, with inlet vanes, cylinder strainer with 3/16 inch diameter openings, disposable 5/32 inch mesh strainer to fit over cylinder strainer, 20 mesh start up screen, and permanent magnet located in flow stream and removable for cleaning.

C. Accessories: Adjustable foot support, blowdown tapping in bottom, gauge tapping in side.
2.06 PRESSURE-TEMPERATURE TEST PLUGS

A. Manufacturers:
   1. Ferguson Enterprises Inc
   2. Peterson Equipment Company Inc
   3. Sisco Manufacturing Company Inc

B. Construction: Brass body designed to receive temperature or pressure probe with removable protective cap, and Neoprene rated for minimum 200 degrees F.

C. Application: Use extended length plugs to clear insulated piping.

2.07 BALANCING VALVES

A. Manufacturers:
   1. Armstrong International, Inc
   2. ITT Bell & Gossett
   3. Taco, Inc
   4. Griswold Controls.
   5. Nexus.
   6. Hays
   7. Victaulic

B. Size 2 inch and Smaller:
   1. Provide ball or globe style with flow balancing, flow measurement, and shut-off capabilities, memory stops, minimum of two metering ports and NPT threaded or soldered connections.
   2. Metal construction materials consist of bronze or brass.
   3. Non-metal construction materials consist of Teflon, EPDM, or engineered resin.

C. Size 2.5 inch and Larger:
   1. Provide ball, globe, or butterfly style with flow balancing, flow measurement, and shut-off capabilities, memory stops, minimum of two metering ports and flanged connections.
   2. Valve body construction materials consist of cast iron or carbon steel.
   3. Internal components construction materials consist of brass, bronze, Teflon, or EPDM.

2.08 COMBINATION FLOW CONTROLS

A. Manufacturers:
   1. Flow Design Inc.
   2. Griswold Controls.
   3. Nexus

B. Construction: Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet with blowdown/backflush drain.

C. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, minimum pressure 3.5 psi.
D. Control Mechanism: Stainless steel or nickel plated brass piston or regulator cup, operating against stainless steel helical or wave formed spring.

2.09 RELIEF VALVES

A. Manufacturers:
   1. Armstrong International, Inc
   2. ITT Bell & Gossett
   3. Conbraco Industries

B. Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labelled.

2.10 AUTOMATIC FILL VALVES

A. Manufacturers:
   1. Amtrol Inc.
   2. Armstrong International, Inc
   3. ITT Bell & Gossett
   4. Taco, Inc
   6. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

B. Operation: Automatically feeds make-up water to the hydronic system whenever pressure in the system drops below the pressure setting of the valve. Refer to Section 23 21 13 - Hydronic Piping.

C. Materials of Construction:
   1. Valve Body: Constructed of bronze or brass.
   2. Internal Components: Construct of stainless steel or brass and engineered plastics or composition material.

D. Connections:
   1. NPT threaded: 0.50 inch, or 0.75 inch.
   2. Soldered: 0.50 inch.

E. Provide integral check valve and strainer.

F. Maximum Inlet Pressure: 100 psi.

G. Maximum Fluid Temperature: 180 degrees F.

H. Operating Pressure Range: Between 10 psi and 25 psi.

2.11 GLYCOL OR MAKEUP WATER PRESSURE FILL SYSTEM

A. Manufacturers:
   1. Armstrong International, Inc
   2. ITT Bell & Gossett
   3. Taco, Inc
B. Provide a complete factory packaged automatic glycol / make-up water fill system unit per system. The unit shall consist of a base, 55 gallon tank (steel or polyethylene) with removable lid, fill vent opening, observable fluid level indicator scale (gallons), Y-strainers, isolation valves, triple combination shut off – Non slam check – calibrated balance valves, open drip proof motor, pump, expansion tank, motor contactor, pressure controls, interconnecting piping, low level safety shut down, remote alarm contacts, indicator light, fill valve (automatic for water systems, manual for glycol systems), discharge pressure gauge, discharge line pressure reducing valve, isolation valves, pressure gauge and single point power connection.

C. Glycol Solution for glycol systems:
   1. Inhibited propylene glycol and water solution mixed 30 percent glycol - 70 percent water, suitable for operating temperatures from -20 degrees F to 250 degrees F.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install specialties in accordance with manufacturer's instructions and CPS standard mechanical details.

B. Provide manual air vents at system high points and as indicated.

C. For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.

D. Provide air separator on suction side of system circulation pump and connect to expansion tank in accordance with CPS standard mechanical details.

E. Install piping from boiler air outlet or air separator to expansion tank with a 2 percent upward slope toward tank.

F. Provide valved drain and hose connection on strainer blow down connection.

G. Provide pump suction fitting on suction side of base mounted centrifugal pumps where indicated and in accordance with CPS standard mechanical details. Remove temporary strainers after cleaning systems.

H. Support pump fittings with floor mounted pipe and flange supports.

I. Provide relief valves on pressure tanks, low pressure side of reducing valves, heat exchangers, and expansion tanks.

J. Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment.

K. Pipe relief valve outlet to nearest floor drain.
L. Where one line vents several relief valves, make cross sectional area equal to sum of individual vent areas.

M. Chemically clean and flush glycol system before adding glycol solution. Refer to Section 23 25 00 - HVAC Water Treatment.

N. Feed glycol solution to system through make-up line with pressure regulator, venting system high points.

END OF SECTION 23 21 14
SECTION 23 31 00
HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Metal ductwork.
B. Buried ductwork.
C. Manufactured ductwork and fittings
D. Kitchen hood ductwork.
E. Dishwasher hood ductwork
F. Laboratory fume hood ductwork
G. Natatorium ductwork

1.02 REFERENCE STANDARDS


M. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Rev. 2009).


1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. See Section 01 33 29 - LEED Sustainable Design Reporting, when required.

C. Product Data: Provide data for duct materials.

D. Shop Drawings: Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for all systems. Drawn at a scale of not less than 1/4" = 1'-0".
   1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
   2. Duct layout indicating sizes and pressure classes.
   3. Elevations of top and bottom of ducts.
   4. Dimensions of main duct runs from building grid lines.
   5. Fittings.
   6. Reinforcement and spacing.
   7. Seam and joint construction.
   8. Penetrations through fire-rated and other partitions.
   9. Equipment installation based on equipment being used on Project.
  10. Duct accessories, including access doors and panels.
  11. Hangers and supports, including methods for duct and building attachment and vibration isolation.

E. Delegated-Design Submittal:
   1. Spacing of hangers and supports.
   2. Design calculations: Calculations, including analysis data, signed and sealed by the qualified professional engineer responsible for their preparation for selecting hangers and supports.

F. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
1. Ceiling suspension assembly members.
2. Other systems installed in same space as ducts.
3. Ceiling- and wall-mounting access doors and panels required to provide access to dampers and other operating devices.
4. Ceiling-mounting items, including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

G. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA (LEAK).

H. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.04 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D9.1/D9.1M for duct joint and seam welding.

1.05 DELIVERY, STORAGE AND HANDLING

A. All materials shall be stored in a designated area and protected from inclement weather.

B. All materials shall be secured so as not to be a hazard during the construction process.

C. Store ductwork with tight-fitting seals on open ends to ensure ductwork is free of all dirt, debris and moisture during the installation process.

1.06 FIELD CONDITIONS

A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G90/Z275 coating.


C. Stainless Steel for Ducts: ASTM A480/A480M, Type 304 and 316.

D. Carbon-Steel Sheets: ASTM A36/A36M, cold-rolled sheets; commercial quality; with oiled, matte finish for exposed ducts.
E. PVC Coating for Steel Ducts: 4 mils polyvinyl chloride plastic on both sides.

F. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
   1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
   2. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.

G. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.
   1. Hangers Installed in Corrosive Atmospheres: All-thread rods used in pool areas, pool equipment rooms, and pool supporting spaces shall be aluminum if the ducts are aluminum and stainless steel if the ducts are stainless steel.
   2. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for steel sheet width and thickness and for steel rod diameters.
   3. Galvanized-steel straps attached to aluminum ducts shall have contact surfaces painted with zinc-chromate primer.

H. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
   1. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
      a. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
      b. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

I. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

J. Trapeze and Riser Supports: Steel shapes complying with ASTM A36/A36M.

K. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.

L. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

M. Insulated Flexible Ducts: Flexible ducts wrapped with flexible glass fiber insulation, enclosed by seamless aluminum pigmented plastic vapor barrier jacket; maximum 0.23 K value at 75 degrees F.

N. Sealant Materials
1. Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes combinations of open-weave fabric strips and mastics.
2. Water-Based Joint and Seam Sealant: Flexible, adhesive sealant, resistant to UV light when cured, UL 723 listed, and complying with NFPA requirements for Class 1 ducts.
3. Flanged Joint Mastic: One-part, acid-curing, silicone, elastomeric joint sealant complying with ASTM C920, Type S, Grade NS, Class 25, Use O.
4. Flange Gaskets: Butyl rubber or EPDM polymer with polyisobutylene plasticizer.

2.02 DUCTWORK FABRICATION

A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.
B. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
C. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.
D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
E. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).
F. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

2.03 MANUFACTURED DUCTWORK AND FITTINGS

A. Flat Oval Ducts: Machine made from round spiral lockseam duct.
   1. Manufacture in accordance with SMACNA (DCS).
   2. Fittings: Manufacture at least two gages heavier metal than duct.
   3. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
   4. Manufacturers:
      a. Ductmate Industries, Inc.
      b. Lindab.
      c. McGill Airflow.
      d. Semco, Inc.

B. Double Wall Insulated Flat Oval Ducts: Machine made from round spiral lockseam duct.
   1. Manufacture in accordance with SMACNA (DCS).
   2. Fittings: Manufacture with solid inner wall.
   3. Inner wall: Solid galvanized steel.
   4. Insulation:
   1) Maximum "R" Value: R = 5.0 for interior ducts., R = 8.0 for exterior ducts.
   2) Install spacers that position the inner duct at uniform distance from outer duct without compressing insulation.
   3) Coat insulation with antimicrobial coating.

5. Manufacturers:
   a. Lindab Inc.
   b. McGill AirFlow LLC.
   c. SEMCO Incorporated.
   d. Sheet Metal Connectors, Inc.

C. Double Wall Insulated Round Ducts: Round spiral lockseam duct with galvanized steel outer wall, solid galvanized steel inner wall; fitting with solid inner wall.
   1. Manufacture in accordance with SMACNA (DCS).
   2. Insulation:
         1) Maximum "R" Value: R = 5.0 for interior ducts., R = 8.0 for exterior ducts.
         2) Install spacers that position the inner duct at uniform distance from outer duct without compressing insulation.
         3) Coat insulation with antimicrobial coating.
      3. Manufacturers:
         a. Lindab Inc.
         b. McGill AirFlow LLC.
         c. SEMCO Incorporated.
         d. Sheet Metal Connectors, Inc.

D. Duct Joints:
   1. Ducts up to 20 Inches in Diameter: Interior, center-beaded slip coupling, sealed before and after fastening, attached with sheet metal screws.
   2. Ducts 21 to 72 Inches in Diameter: Three-piece, gasketed, flanged joint consisting of two internal flanges with sealant and one external closure band with gasket.
   3. Ducts Larger Than 72 Inches in Diameter: Companion angle flanged joints per SMACNA (DCS), Figure 3-2.
   4. Round Ducts: Prefabricated connection system consisting of double-lipped, EPDM rubber gasket. Manufacture ducts according to connection system manufacturer's tolerances.
   5. Flat-Oval Ducts: Prefabricated connection system consisting of two flanges and one synthetic rubber gasket.

E. 90-Degree Tees and Laterals and Conical Tees: Fabricate to comply with SMACNA (DCS) with metal thicknesses specified for longitudinal-seam straight ducts.

F. Diverging-Flow Fittings: Fabricate with reduced entrance to branch taps and with no excess material projecting from fitting onto branch tap entrance.
G. Fabricate elbows using die-formed, gored, pleated, or mitered construction. Bend radius of die-formed, gored, and pleated elbows shall be 1-1/2 times duct diameter. Unless elbow construction type is indicated, fabricate elbows as follows:

1. Mitered-Elbow Radius and Number of Pieces: Welded construction complying with SMACNA (DCS) unless otherwise indicated.

2. Round Mitered Elbows: Welded construction with the following metal thickness for pressure classes from minus 2- to plus 2-inch wg:
   a. Ducts 3 to 36 Inches in Diameter: 0.034 inch.
   b. Ducts 37 to 50 Inches in Diameter: 0.040 inch.
   c. Ducts 52 to 60 Inches in Diameter: 0.052 inch.
   d. Ducts 62 to 84 Inches in Diameter: 0.064 inch.

3. Round Mitered Elbows: Welded construction with the following metal thickness for pressure classes from 2- to 10-inch wg:
   a. Ducts 3 to 26 Inches in Diameter: 0.034 inch.
   b. Ducts 27 to 50 Inches in Diameter: 0.040 inch.
   c. Ducts 52 to 60 Inches in Diameter: 0.052 inch.
   d. Ducts 62 to 84 Inches in Diameter: 0.064 inch.

4. Flat-Oval Mitered Elbows: Welded construction with same metal thickness as longitudinal-seam flat-oval duct.

5. 90-Degree, 2-Piece, Mitered Elbows: Use only for supply systems or for material-handling Class A or B exhaust systems and only where space restrictions do not permit using radius elbows. Fabricate with single-thickness turning vanes.

6. Round Elbows 8 Inches and Less in Diameter: Fabricate die-formed elbows for 45- and 90-degree elbows and pleated elbows for 30, 45, 60, and 90 degrees only. Fabricate nonstandard bend-angle configurations or nonstandard diameter elbows with gored construction.

7. Round Elbows 9 through 14 Inches in Diameter: Fabricate gored or pleated elbows for 30, 45, 60, and 90 degrees unless space restrictions require mitered elbows. Fabricate nonstandard bend-angle configurations or nonstandard diameter elbows with gored construction.

8. Round Elbows Larger Than 14 Inches in Diameter and All Flat-Oval Elbows: Fabricate gored elbows unless space restrictions require mitered elbows.

9. Die-Formed Elbows for Sizes through 8 Inches in Diameter and All Pressures 0.040 inch thick with 2-piece welded construction.

10. Flat-Oval Elbow Metal Thickness: Same as longitudinal-seam flat-oval duct specified above.

11. Pleated Elbows for Sizes through 14 Inches in Diameter and Pressures through 10-Inch wg: 0.022 inch.

H. PVC-Coated Elbows and Fittings: Fabricate elbows and fittings as follows:

1. Round Elbows 4 to 8 inches in Diameter: Two piece, die stamped, with longitudinal seams spot welded, bonded, and painted with PVC aerosol spray.

2. Round Elbows 9 to 26 Inches in Diameter: Standing-seam construction.

3. Round Elbows 28 to 60 Inches in Diameter: Standard gored construction, riveted and bonded.

4. Other Fittings: Riveted and bonded joints.

5. Couplings: Slip-joint construction with a minimum 2-inch insertion length.
2.04 KITCHEN HOOD EXHAUST DUCTWORK
   A. Fabricate in accordance with ductwork manufacturer's installation instructions, SMACNA (DCS), SMACNA (KVS), and NFPA 96.

2.05 FUME HOOD EXHAUST DUCTWORK
   A. Type 316, stainless-steel sheet. Welded seams and joints.

2.06 NATATORIUM DUCTWORK
   A. Aluminum or PVC coated galvanized steel (inside and out)
   B. Welded/flanged seams and joints.

2.07 LOCKER ROOM/SHOWER ROOM EXHAUST DUCTWORK
   A. Aluminum or PVC coated galvanized steel, with seams and laps arranged on top of duct.

PART 3 - EXECUTION

3.01 DUCT APPLICATIONS
   A. Static-Pressure Classes: Unless otherwise indicated, construct ducts according to the following:
      1. Supply Ducts (constant volume units): +2”.
      2. Supply Ducts (before Air Terminal Units): +4”.
      3. Supply Ducts (after Air Terminal Units): +2”.
      4. Supply Ducts (between fan and first system fire damper): +8”.
      5. Return Ducts (Negative Pressure): -2”.
      6. Return Ducts (between nearest fire damper and return fan inlet): -4”.
      7. Return Ducts (return fan discharge and AHU intake / exhaust damper): -4”.
      8. Exhaust Ducts (Negative Pressure): -2”.

   B. All ducts shall be galvanized steel except as follows:
      1. Range Hood Exhaust Ducts: Comply with NFPA 96.
         a. Concealed: 16 Gauge carbon-steel sheet or 18 gauge, Type 304 stainless steel.
         b. Exposed: 18 gauge, Type 304, stainless steel with finish to match kitchen equipment and range hood.
         c. Welded seams and joints.
      2. Dishwasher Hood Exhaust Ducts:
         a. Aluminum or type 304, stainless steel with finish to match dishwasher equipment and hood. Welded/flanged seams and joints.
      3. Acid-Resistant (Laboratory Fume-Handling) Ducts:
         a. Type 316, stainless-steel sheet. Welded seams and joints.
      4. Locker room / shower room / green house ducts:
         a. Aluminum or PVC coated galvanized steel, with seams and laps arranged on top of duct.
      5. Natatorium ducts:
a. Aluminum or PVC coated galvanized steel (inside and out)
b. Welded/flanged seams and joints.

6. Exposed Supply Ducts In Occupied Spaces (Gymnasiums / Wrestling / Fitness / Multipurpose / Cafetorium / Library / etc.):
a. Spiral round/oval galvanized sheet steel with paint grip finish.

7. Underground Ducts: Concrete-encased (2" thick minimum) PVC-coated galvanized steel with thicker coating on duct exterior.

3.02 INSTALLATION

A. Install, support, and seal ducts in accordance with SMACNA (DCS).

B. Install in accordance with manufacturer's instructions.

C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

D. Buried Metal Ductwork: Encase according to SMACNA (DCS).
1. Provide adequate tie-down points to prevent ducts from floating during concrete placement.
2. Introduce no heat into ducts for 20 days following placement of concrete.

E. Kitchen Hood Exhaust:
1. Provide residue traps at base of vertical risers with provisions for clean out.
2. Install ducts to allow for thermal expansion through 2000 deg F temperature range.
3. Install ducts without dips or traps that may collect residues unless traps have continuous or automatic residue removal.
4. Install access panels at each change in direction and at intervals defined by NFPA 96; locate on sides of duct a minimum of 1-1/2 inches from bottom; and fit with grease-tight covers of same material as duct.
5. Do not penetrate fire-rated assemblies except as permitted by applicable building codes.

F. PVC Coated Metal Ductwork: Tape with PVC tape. Repair damage to PVC coating with manufacturers recommended materials.

G. Underground Ducts: Slope to plenums or low pump out points at 1:500. Provide access doors for inspection.

H. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.

I. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

J. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
K. At exterior wall louvers, seal duct to louver frame and install blank-out panels.

L. Identify and label all fire dampers and reheat coil locations on the ceiling or on a set of drawings.

M. Provide a paint grip finish on all ductwork that is indicated on drawings to be painted.

3.03 CLEANING

A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment that could be harmed by excessive dirt with temporary filters, or bypass during cleaning.

B. Unless otherwise noted, do not clean existing ductwork.

3.04 SEAM AND JOINT SEALING

A. Seal all duct seams and joints to the most severe requirement between the latest Chicago Building Code and SMACNA (DCS) for duct pressure class indicated.

B. Utilize sealant designed for outdoor use with ductwork exposed to the outdoors.

C. Seal ducts before external insulation is applied.

3.05 HANGING AND SUPPORTING

A. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.

B. Support vertical ducts at maximum intervals of 16 feet and at each floor.

C. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.

D. For concrete structure installations: Install concrete inserts before placing concrete.

E. For concrete structure installations: Install powder-actuated concrete fasteners after concrete is placed and completely cured.

   1. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

3.06 CONNECTIONS

A. Make connections to equipment with flexible connectors according to Division 23 Section "Air Duct Accessories."

B. Comply with SMACNA (DCS) for branch, outlet and inlet, and terminal unit connections.
3.07 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections according to SMACNA (LEAK) and prepare test reports:
   1. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
   2. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If pressure classes are not indicated, test entire system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure. Give seven days' advance notice for testing.
   3. Maximum Allowable Leakage: Comply with requirements for Leakage Class 3 for round and flat-oval ducts, Leakage Class 12 for rectangular ducts in pressure classes lower than and equal to 2-inch wg (both positive and negative pressures), and Leakage Class 6 for pressure classes from 2- to 10-inch wg.
   4. Remake leaking joints and retest until leakage is equal to or less than maximum allowable.

END OF SECTION 23 31 00
PART 1 - GENERAL

1.01 SECTION INCLUDES
A. Air turning devices/extractors.
B. Backdraft dampers - metal.
C. Duct access doors.
D. Duct test holes.
E. Fire dampers.
F. Flexible duct connectors.
G. Flexible ductwork
H. Volume control dampers.
I. Duct silencers

1.02 REFERENCE STANDARDS

I. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Rev. 2009).

J. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; current edition, including all revisions.


1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.

C. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers.

D. Manufacturer's Installation Instructions: Provide instructions for fire dampers.

E. Project Record Drawings: Record actual locations of access doors and test holes.

1.04 QUALITY ASSURANCE

A. Comply with NFPA 90A and NFPA 90B

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

B. Materials delivered to the site must be coordinated with the site supervisor prior to delivery.

C. All materials shall be stored in a designated area and protected from the environment.

D. All materials shall be secured so as not to be a hazard during the construction process.

E. All materials must be free of all dirt, debris and moisture during the installation process.

PART 2 - PRODUCTS

2.01 SHEET METAL MATERIALS

A. Comply with SMACNA (DCS) for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated.
B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A653/A653M and having G90 coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.

C. Stainless Steel: ASTM A480/A480M Type 304 (specify Type 314 as required by the application).

D. Aluminum Sheets: ASTM B209 alloy 3003, temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.


F. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

G. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

H. All accessories installed in harsh environments (Natatorium, shower, fume hood exhaust, etc.) shall be provided with corrosion protection appropriate to the application.

2.02 AIR TURNING DEVICES/EXTRACTORS

A. Manufacturers:
   1. Carlisle HVAC Products; Dynair Hollow Vane and Rail (Double Wall Vane)
   2. Krueger-HVAC, Division of Air System Components
   3. Ruskin Company, a brand of Johnson Controls
   4. Titus HVAC, a brand of Johnson Controls

B. Fabricate to comply with SMACNA (DCS) for vanes and vane runners. Vane runners shall automatically align vanes.

C. Manufactured Turning Vanes: Fabricate 1-1/2-inch wide, single-vane, curved blades of galvanized sheet steel set 3/4 inch o.c.; support with bars perpendicular to blades set 2 inches o.c.; and set into vane runners suitable for duct mounting.


2.03 BACKDRAFT DAMPERS - METAL

A. Manufacturers:
   2. Ruskin Company, a brand of Johnson Controls; ______: www.ruskin.com/#sle.
   3. Greenheck
   4. Vent Products Co.
   5. Price
B. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: Galvanized steel, with center pivoted blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

C. Frame: 0.063-inch thick extruded aluminum, with welded corners and mounting flange.

D. Blades: 0.050-inch thick aluminum sheet.

E. Blade Seals: Neoprene.

F. Blade Axles: Galvanized steel.

G. Tie Bars and Brackets: Galvanized steel.

H. Return Spring: Adjustable tension.

2.04 DUCT ACCESS DOORS

A. Manufacturers:
   1. Nailor Industries, Inc
   2. Ruskin Company, a brand of Johnson Controls
   3. CESCO Products
   4. Ductmate Industries
   5. Greenheck
   6. Vent Products Co.

B. Fabricate in accordance with SMACNA (DCS) and as indicated.

C. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1 inch thick insulation with sheet metal cover.
   1. Less Than 12 inches Square: Secure with sash locks.
   2. Up to 18 inches Square: Continuous hinge and two sash locks.
   3. Up to 24 by 48 inches: Continuous hinge and two compression latches with outside and inside handles.
   4. Access doors shall be double wall construction.

2.05 DUCT TEST HOLES

A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.
   1. Manufacturers:
      a. Carlisle HVAC Products; Dynair Test Port with Red Cap with O-Ring Seal: www.carlislehvac.com/#sle.
2.06 FIRE DAMPERS

A. Manufacturers:
   1. Nailor Industries, Inc
   2. Ruskin Company, a brand of Johnson Controls
   3. Greenheck
   4. Vent Products Co.
   5. Price

B. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.

C. Ceiling Dampers: Galvanized steel, 22 gage, 0.0299 inch frame and 16 gage, 0.0598 inch flap, two layers 0.125 inch ceramic fiber on top side and one layer on bottom side for round flaps, with locking clip.

D. Horizontal Dampers: Galvanized steel, 22 gage, 0.0299 inch frame, stainless steel closure spring, and lightweight, heat retardant non-asbestos fabric blanket.

E. Curtain Type Dampers: Galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades out of air stream except for 1.0 inch pressure class ducts up to 12 inches in height.

F. Multiple Blade Dampers: 16 gage, 0.0598 inch galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 by 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.

G. Fusible Links: UL 33, separate at 160 degrees F with adjustable link straps for combination fire/balancing dampers.

2.07 FLEXIBLE DUCT CONNECTIONS

A. Manufacturers:
   2. Ductmate Industries
   3. Ventfabrics, Inc.
   4. Ward Industries

B. Fabricate in accordance with SMACNA (DCS) and as indicated.

C. Indoor Flexible Duct Connections: Fabric crimped into metal edging strip.
   1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd.

D. Outdoor Flexible Duct Connections: shall be constructed of hypalon material for UV and water resistance.
2.08 FLEXIBLE DUCTS

A. Insulated-Duct Connectors: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; aluminized vapor barrier film.
   1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
   3. Temperature Range: Minus 10 to plus 160 deg F

B. Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes 3 through 18 inches to suit duct size.

2.09 MANUAL VOLUME CONTROL DAMPERS

A. Manufacturers:
   2. Ruskin Company, a brand of Johnson Controls
   3. Vent Products Co.
   4. Price
   5. Greenheck
   6. TAMCO

B. Fabricate in accordance with SMACNA (DCS) and as indicated.

C. Splitter Dampers:
   1. Material: Same gage as duct to 24 inches size in either direction, and two gages heavier for sizes over 24 inches.
   2. Blade: Fabricate of single thickness sheet metal to streamline shape, secured with continuous hinge or rod.

D. Single Blade Dampers:
   1. Fabricate for duct sizes up to 6 by 30 inch.
   2. Blade: 24 gage, 0.0239 inch, minimum.

E. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 by 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
   1. Steel Frames (For use in steel ductwork): Hat-shaped, galvanized sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.
   2. Roll-Formed Steel Blades (For use with steel frames): 0.064-inch- thick, galvanized sheet steel.
   3. Aluminum Frames (For use in stainless steel or aluminum ductwork): Hat-shaped, 0.10-inch- thick, aluminum sheet channels; frames with flanges where indicated for attaching to walls; and flangeless frames where indicated for installing in ducts.
   4. Roll-Formed Aluminum Blades (For use with aluminum frames): 0.10-inch- thick aluminum sheet.
5. Extruded-Aluminum Blades (For use with aluminum frames): 0.050-inch thick extruded aluminum.
6. Blade Axles: Galvanized steel. Drive shaft will be the full length of the blade.
8. Tie Bars and Brackets: Aluminum (aluminum or stainless steel ductwork applications), Galvanized steel (galvanized steel ductwork applications).

F. Low-Leakage Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, low-leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications.
   1. Steel Frames (For use in steel ductwork): galvanized sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.
   2. Roll-Formed Steel Blades (For use with steel frames): 0.064-inch thick, galvanized sheet steel.
   3. Aluminum Frames (For use in stainless steel or aluminum ductwork): 0.10-inch thick, aluminum sheet channels; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.
   4. Roll-Formed Aluminum Blades (For use with aluminum frames): 0.10-inch thick aluminum sheet.
   5. Extruded-Aluminum Blades (For use with aluminum frames): 0.050-inch thick extruded aluminum.
   6. Blade Axles: Galvanized steel. Drive shaft will be the full length of the blade.
   7. Bearings: Stainless-steel sleeve thrust or ball.
   10. Tie Bars and Brackets: Aluminum (aluminum or stainless steel ductwork applications), Galvanized steel (galvanized steel ductwork applications).

G. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon, thermoplastic elastomer, or sintered bronze bearings.

2.10 DUCT SILENCERS

A. Manufacturers
   1. Ruskin Company, a brand of Johnson Controls
   2. Vibro-Acoustics
   3. Price

B. General Description: Factory-fabricated and -tested, round or rectangular silencers with performance characteristics and physical requirements as indicated.

C. Fire Performance: Adhesives, sealants, packing materials, and accessory materials shall have fire ratings not exceeding 25 for flame-spread index and 50 for smoke-developed index when tested according to ASTM E84.

D. Rectangular Units: Fabricate casings with a minimum of 0.034-inch thick, solid galvanized sheet metal for outer casing and 0.022-inch thick, ASTM A653/A653M, G90 perforated galvanized sheet metal for inner casing.
E. Round Units:
   1. Outer Casings:
      b. Up to 24 Inches in Diameter: 0.034 inch thick.
      c. 26 through 40 Inches in Diameter: 0.040 inch thick.
      d. 42 through 52 Inches in Diameter: 0.052 inch thick.
      e. 54 through 60 Inches in Diameter: 0.064 inch thick.
      f. Casings fabricated of spiral lock-seam duct may be one size thinner than that indicated.

   2. Interior Casing, Partitions, and Baffles:
      b. At least 0.034 inch thick and designed for minimum aerodynamic losses.

F. Sheet Metal Perforations: 1/8-inch diameter for inner casing and baffle sheet metal.

G. Fill Material: Moisture-proof nonfibrous material. Provide mylar or tedlar cover over fill material. Fill material shall not be exposed to the airstream.
   1. Erosion Barrier: Polymer bag enclosing fill and heat-sealed before assembly.

H. Fabricate silencers to form rigid units that will not pulsate, vibrate, rattle, or otherwise react to system pressure variations.
   1. Do not use nuts, bolts, or sheet metal screws for unit assemblies.
   2. Lock form and seal or continuously weld joints.
   3. Suspended Units: Factory-installed suspension hooks or lugs attached to frame in quantities and spaced to prevent deflection or distortion.
   4. Reinforcement: Cross or trapeze angles for rigid suspension.

I. Source Quality Control:
   1. Acoustic Performance: Test according to ASTM E477.
   2. Record acoustic ratings, including dynamic insertion loss and self-noise power levels with an airflow of at least 2000-fpm face velocity.

PART 3 - EXECUTION

3.01 PREPARATION

   A. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

   A. Install accessories in accordance with manufacturer’s instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 31 00 - HVAC Ducts and Casings for duct construction and pressure class.

   B. Provide backdraft dampers on exhaust fans or exhaust ducts (300 cfm or less) nearest to outside and where indicated. Provide motorized isolation damper on exhaust fans/ducts greater than 300 cfm.

   C. Install duct access doors to allow for inspecting, adjusting, and maintaining duct accessories, control devices - sensors and terminal units as follows:
1. On both sides of duct coils. On terminal units coordinate upstream coil access door with equipment supplier.
2. Downstream from volume dampers, turning vanes, and duct mounted equipment.
3. Adjacent to fire dampers, providing access to reset or reinstall fusible links.
4. To interior of ducts for cleaning; before and after each change in direction, at maximum 50-foot spacing.
5. On sides of ducts where adequate clearance is available.
6. Where indicated on plans.
7. Upstream and downstream of ducted fans.

D. Provide turning vanes in all short radius / square elbows (>45 degrees) and tees.

E. Provide duct test holes where indicated and required for testing and balancing purposes.

F. Provide fire dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

G. Demonstrate re-setting of fire dampers to Board's representative.

H. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.

I. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
   1. Refer to Section 23 05 48 - Vibration Controls for HVAC Piping and Equipment.

J. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.

K. Use splitter dampers only where indicated.

L. Install duct silencers rigidly to ducts.

M. Connect terminal units to supply ducts directly or with maximum 12-inch lengths of flexible duct. Do not use flexible ducts to change directions.

N. Connect diffusers or light troffer boots to low pressure ducts directly or with maximum 60-inch lengths of flexible duct clamped or strapped in place.

O. Connect flexible ducts to metal ducts with adhesive plus sheet metal screws.

3.03 ADJUSTING

A. Adjust duct accessories for proper settings.

B. Adjust fire dampers for proper action.
C. Final positioning of manual-volume dampers is specified in Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC.

END OF SECTION 23 33 00
SECTION 26 05 00
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
   1. Electrical equipment coordination and installation.
   2. Sleeves for raceways and cables.
   3. Sleeve seals.
   5. Common electrical installation requirements.

1.03 DEFINITIONS

A. EPDM: Ethylene-propylene-diene terpolymer rubber.

B. NBR: Acrylonitrile-butadiene rubber.

1.04 SUBMITTALS

A. Product Data: For sleeve seals.

1.05 COORDINATION

A. Coordinate arrangement, mounting, and support of electrical equipment:
   1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
   2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
   3. To allow right of way for piping and conduit installed at required slope.
   4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."

D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

PART 2 - PRODUCTS

2.01 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. 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 (400 mm), 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.

2.02 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:
      a. Advance Products & Systems, Inc.
      b. Calpico, Inc.
      c. Metraflex Co.
      d. Pipeline Seal and Insulator, Inc.
      e. Or Equal.

   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: Plastic. Include two for each sealing element.
   4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.
2.03 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

3.01 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.

3.02 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. Comply with requirements in Division 07 Section “Joint Sealants.”

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. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.03 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.

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

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

PART 1 - GENERAL

1.01 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.

1.02 DEFINITIONS

A. EPDM: Ethylene-propylene-diene terpolymer rubber.
B. NBR: Acrylonitrile-butadiene rubber.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated.
B. Qualification Data: For testing agency.

1.04 CLOSEOUT

A. Field quality-control test reports.

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
   1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

B. 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.

C. Comply with NFPA 70.
1.06 COORDINATION
A. Set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

PART 2 - PRODUCTS

2.01 CONDUCTORS AND CABLES
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. Alcan Products Corporation; Alcan Cable Division.
   3. General Cable Corporation.
   4. Senator Wire & Cable Company.
   5. Southwire Company.
   6. Or Equal.

C. Copper Conductors: Comply with NEMA WC 70.

D. Conductor Insulation: Comply with NEMA WC 70 for Types THHN/THWN and XHHW.

2.02 CONNECTORS AND SPLICES
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:
   2. O-Z/Gedney; EGS Electrical Group LLC.
   3. 3M; Electrical Products Division.
   4. Tyco Electronics Corp.
   5. AFC Cable Systems, Inc.
   6. Or Equal.

C. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.
PART 3 - EXECUTION

3.01 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid or stranded for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.02 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Underground Service Entrance: Type XHHW, single conductors in raceway.

B. Exposed Feeders: Type THHN-THWN, single conductors in raceway

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-THWN, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type XHHW, single conductors in raceway

E. Exposed Branch Circuits, Including in Crawlspace: Type THHN-THWN, single conductors in raceway

F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway

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

H. Branch Circuits Installed below Raised Flooring: N/A

I. Branch Circuits in Cable Tray: N/A

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

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

3.03 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. Support cables according to Division 26 Section "Hangers and Supports for Electrical
Systems."

E. Identify and color-code conductors and cables according to Division 26 Section
"Identification for Electrical Systems."

3.04 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer’s published
torque-tightening values. If manufacturer’s torque values are not indicated, use those
specified in UL 486A and UL 486B.

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

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.05 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Coordinate sleeve selection and application with selection and application of
firestopping specified in Division 07 Section "Penetration Firestopping."

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. Rectangular Sleeve Minimum Metal Thickness:
   1. For sleeve rectangle perimeter less than 50 inches and no side greater than 16
      inches thickness shall be 0.052 inch
   2. For sleeve rectangle perimeter equal to, or greater than, 50 inches and 1 or more
      sides equal to, or greater than, 16 inches thickness shall be 0.138 inch

E. 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.

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

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

H. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and cable
unless sleeve seal is to be installed.
I. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.

J. 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 according to Division 07 Section "Joint Sealants."

K. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at cable penetrations. Install sleeves and seal with firestop materials according to Division 07 Section "Penetration Firestopping."

L. Roof-Penetration Sleeves: Seal penetration of individual cables with flexible boot-type flashing units applied in coordination with roofing work. Coordinate all roof related work with John Mansville and Owner to maintain existing roof warranty.

M. 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.

N. 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.

3.06 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.

3.07 FIRESTOPPING

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

3.08 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to 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. Panelboards
b. Busways
c. Standby Generator output
d. Automatic Transfer Switches


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
PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
   1. UTP cabling.
   2. Low-voltage control cabling.
   3. Control-circuit conductors.
   4. Identification products.

1.03 DEFINITIONS

A. EMI: Electromagnetic interference.

B. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.

C. Plenum: A space forming part of the air distribution system to which one or more air ducts are connected. An air duct is a passageway, other than a plenum, for transporting air to or from heating, ventilating, or air-conditioning equipment.

D. RCDD: Registered Communications Distribution Designer.

E. UTP: Unshielded twisted pair.

1.04 SUBMITTALS

A. Product Data: For each type of product.

B. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.

C. Source quality-control reports.
1.05 CLOSEOUT
   A. Field quality-control reports.

1.06 QUALITY ASSURANCE
   A. Testing Agency Qualifications: Member company of NETA or an NRTL.
      1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

PART 2 - PRODUCTS

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

2.02 PERFORMANCE REQUIREMENTS
   A. Flame Travel and Smoke Density in Plenums: As determined by testing identical products according to NFPA 262 by a qualified testing agency. Identify products for installation in plenums with appropriate markings of applicable testing agency.
      1. Flame Travel Distance: 60 inches or less.
      2. Peak Optical Smoke Density: 0.5 or less.
      3. Average Optical Smoke Density: 0.15 or less.
   B. Flame Travel and Smoke Density for Riser Cables in Non-Plenum Building Spaces: As determined by testing identical products according to UL 1666.
   C. Flame Travel and Smoke Density for Cables in Non-Riser Applications and Non-Plenum Building Spaces: As determined by testing identical products according to UL 1685.

2.03 BACKBOARDS
   A. Description: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches. Comply with requirements for plywood backing panels in Section 061053 "Misc. Rough Carpentry."
   B. Painting: Paint plywood on all sides and edges with flat white latex paint. Comply with requirements in Section 099100 "Painting."
2.04 UTP CABLE

A. Description: 100-ohm, four-pair UTP, 24-pair UTP, formed into four-pair binder groups with no overall jacket, 25-pair UTP covered with a thermoplastic jacket.
   2. Comply with TIA-568-C.1 for performance specifications.
   4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with NEMA WC 66, UL 444 and NFPA 70 for the following types:
      a. Communications, Plenum Rated: Type CM, Type CMG, Type CMP, Type CMR, or Type CMX in metallic conduit installed per NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."
      b. Communications, Riser Rated: Type CMP or Type CMR in metallic conduit installed per NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."
      c. Communications, General Purpose: Type CM, Type CMG, Type CMP, Type CMR, or Type CMX in metallic conduit installed per NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."

2.05 UTP CABLE HARDWARE

A. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-C.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.

B. Connecting Blocks: 110-style IDC for Category 6. Provide blocks for the number of cables terminated on the block, plus 25 percent spare. Integral with connector bodies, including plugs and jacks where indicated.

C. Cross-Connect: Modular array of connecting blocks arranged to terminate building cables and permit interconnection between cables.
   1. Number of Terminals per Field: One for each conductor in assigned cables.

D. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.
   1. Number of Jacks per Field: One for each four-pair UTP cable indicated.

E. Jacks and Jack Assemblies: 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular. Comply with TIA/EIA-568-C.1.

F. Patch Cords: Factory-made, four-pair cables in 36-inch lengths; terminated with eight-position modular plug at each end.
   1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6 performance. Patch cords shall have latch guards to protect against snagging.
G. Workstation Outlets: Two-port-connector assemblies mounted in single or multigang faceplate.

H. Faceplates:
   1. Plastic Faceplate: High-impact plastic. Coordinate color with Section 262726 "Wiring Devices."
   2. Metal Faceplate: Stainless steel, complying with requirements in Section 262726 "Wiring Devices."
   3. For use with snap-in jacks accommodating any combination of UTP, optical-fiber, and coaxial work area cords.

I. Legend:
   1. Machine printed, in the field, using adhesive-tape label.
   2. Snap-in, clear-label covers and machine-printed paper inserts.

2.06 RS-485 CABLE

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

2.07 LOW-VOLTAGE CONTROL CABLE

A. Paired Cable: NFPA 70, Type CMG.
   1. One pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
   2. PVC 600-Volt insulation.
   3. Unshielded.
   4. PVC jacket.
   5. Flame Resistance: Comply with UL 1685.

2.08 CONTROL-CIRCUIT CONDUCTORS

A. Class 1 Control Circuits: Stranded copper, Type THHN-2-THWN-2, in raceway, complying with UL 83.

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

C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type THHN-2-THWN-2, in raceway, complying with UL 83.
2.09 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate cables.
B. Factory test UTP cables according to TIA-568-C.2.
C. Factory test optical-fiber cables according to TIA-568-C.3.
D. Cable will be considered defective if it does not pass tests and inspections.
E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Test each pair of UTP cable for open and short circuits.

3.02 INSTALLATION OF RACEWAYS AND BOXES

A. Comply with requirements in Section 260533 "Raceways and Boxes for Electrical Systems" for raceway selection and installation requirements for boxes, conduits, and wireways as supplemented or modified in this Section.
   1. Outlet boxes shall be no smaller than 4 inches wide, 4 inches high, and 2-1/2 inches deep.
   2. Flexible metal conduit shall not be used unless raceway must be fished through existing finished walls.
B. Comply with TIA-569-B for pull-box sizing and length of conduit and number of bends between pull points.
C. Install manufactured conduit sweeps and long-radius elbows if possible.
D. Raceway Installation in Equipment Rooms:
   1. Position conduit ends adjacent to a corner on backboard if a single piece of plywood is installed, or in the corner of the room if multiple sheets of plywood are installed around perimeter walls of the room.
   2. Install cable trays to route cables if conduits cannot be located in these positions.
   3. Secure conduits to backboard if entering the room from overhead.
   4. Extend conduits 3 inches above finished floor.
   5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
E. Backboards: Install backboards with 96-inch dimension vertical. Butt adjacent sheets tightly and form smooth gap-free corners and joints.
3.03 INSTALLATION OF CONDUCTORS AND CABLES

A. Comply with NECA 1 and NFPA 70.

B. General Requirements for Cabling:
   2. Terminate all conductors and optical fibers; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
   3. Cables may not be spliced.
   4. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems" and Ch. 6, "Optical Fiber Structured Cabling Systems." Install lacing bars and distribution spools.
   5. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
   6. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
   7. Cold-Weather Installation: Bring cable to room temperature before dereeling. Do not use heat lamps for heating.
   8. Pulling Cable: Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems" and Ch. 6, "Optical Fiber Structured Cabling Systems." Monitor cable pull tensions.
   9. Support: Do not allow cables to lay on removable ceiling tiles.
   10. Secure: Fasten securely in place with hardware specifically designed and installed so as to not damage cables.

C. UTP Cable Installation:
   2. Install termination hardware as specified in Section 271500 "Communications Horizontal Cabling" unless otherwise indicated.
   3. Do not untwist UTP cables more than 1/2 inch at the point of termination to maintain cable geometry.

D. Installation of Control-Circuit Conductors:
   1. Install wiring in raceways. Comply with requirements specified in Section 260533 "Raceway and Boxes for Electrical Systems."

E. Open-Cable Installation:
   1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
   2. Suspend copper cable not in a wireway or pathway a minimum of 8 inches above ceilings by cable supports not more than 30 inches apart.
   3. Cable shall not be run through or on structural members or in contact with pipes, ducts, or other potentially damaging items. Do not run cables between structural members and corrugated panels.
F. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA-569-B recommendations for separating unshielded copper voice and data communications cable from potential EMI sources including electrical power lines and equipment.

2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
   a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 5 inches.
   b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 12 inches.
   c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 24 inches.

3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
   a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 2 1/2 inches.
   b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 6 inches.
   c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 12 inches.

4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
   a. Electrical Equipment or Circuit Rating Less Than 2 kVA: No requirement.
   b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 3 inches.
   c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 6 inches.

5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or 5 HP and Larger: A minimum of 48 inches.

6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.04 REMOVAL OF CONDUCTORS AND CABLES

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

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

3.06 FIRESTOPPING

A. Comply with requirements in Section 078413 "Penetration Firestopping."
B. Comply with TIA-569-B, Annex A, "Firestopping."
C. Comply with BICSI TDMM, "Firestopping" Chapter.

3.07 GROUNDING

A. For data communication wiring, comply with ANSI-J-STD-607-A and with BICSI TDMM, "Bonding and Grounding (Earthing)" Chapter.
B. For low-voltage control wiring and cabling, comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

3.08 IDENTIFICATION

A. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
B. Identify data and communications system components, wiring, and cabling according to TIA-606-A; label printers shall use label stocks, laminating adhesives, and inks complying with UL 969.

3.09 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
C. Perform the following tests and inspections:
   1. Visually inspect UTP and optical-fiber cable jacket materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA-568-C.1.
2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.

3. Test UTP cabling for direct-current loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not after cross-connection.

   a. Test instruments shall meet or exceed applicable requirements in TIA-568-C.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

D. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.

E. End-to-end cabling will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

END OF SECTION
PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes methods and materials for grounding systems and equipment for electrical.

B. Furnish and install complete grounding and bonding system as shown or as implied in the Contract Documents:
   1. Equipment grounding.
   2. Wiring device grounding.
   3. Panelboard grounding.
   4. Switchboard grounding.
   5. Isolated grounding.

C. Furnish and install a complete equipotential ground system for data processing systems in strict conformance with NEC, Article 250.

1.03 DEFINITIONS

A. Equipment Grounding Conductor: (EGC):
   1. The conductor that connects the non-current-carrying metal parts of equipment to the grounding electrode conductor or ground bus.

B. Grounding Electrode Conductor: (GEC)
   1. The conductor that connects the grounding electrodes to the grounded circuit conductor and/or the equipment grounding conductor.

C. Grounded Circuit Conductor: (GCC)
   1. A circuit conductor, usually the neutral that is intentionally connected to ground.

D. Made Electrode: (ME)
   1. Any item, such as a ground rod, which is used to provide a ground connection.
E. Isolated Ground: (IG)

1. A conductor or system that connects equipment directly to the grounding electrode. Also referred to as single point ground.

1.04 SUBMITTALS

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

B. Other Informational Submittals: Plans showing dimensioned as-built locations of grounding features, including the following:

1. Ground rods.
2. Grounding arrangements and connections for separately derived systems.

C. Operation and Maintenance Data: For grounding to include the following in emergency, operation, and maintenance manuals:

1. Instructions for periodic testing and inspection of grounding features at grounding connections for separately derived systems based on NETA MTS.
   a. Tests shall be to determine if ground resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if they do not.
   b. Include recommended testing intervals.

1.05 CLOSEOUT

A. Field quality-control test reports. Indicate overall resistance to ground.

1.06 QUALITY ASSURANCE

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

B. Manufacturer’s Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

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

D. Comply with NEC and local authorities having jurisdiction including amendments.


F. A licensed electrical contractor shall perform installation and termination of the main bonding conductor to the building service entrance ground.
G. Listing and Labeling: Provide products specified in this Section that are listed and labeled.

1. The Terms “Listed” and “Labeled”: As defined in the National Electrical Code, Article 100.
2. Listing and Labeling Agency Qualifications: A “Nationally Recognized Testing Laboratory” (NRTL) as defined in OSHA Regulation 1910.7.

1.07 DELIVERY, STORAGE AND HANDLING – NOT APPLICABLE

1.08 REFERENCES

B. TIA/EIA-606 – Administration Standard for the Telecommunications Infrastructure.
C. TIA J-STD-607 – Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications; Rev A. 2002.
D. TIA-942 – Telecommunications Infrastructure Standard for Data Centers.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

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

1. Electrodes:
   a. Burndy.
   b. Harger.
   c. NSI Industries.
   d. Thomas and Betts.
   e. Or Equal.

2. Mechanical Connectors: Bronze
   a. Burndy.
   b. Harger.
   c. NSI Industries.
   d. Thomas and Betts.
   e. Or Equal.

3. Exothermic Connections:
   a. Burndy.
   b. Cadweld.
   c. Ultraweld (Harger).
   d. Or Equal.
2.02 CONDUCTORS

A. Equipment Grounding Conductors: Insulated with green color insulation.

B. Grounding-Electrode Conductors: Stranded cable.

C. Underground Conductors: Bare, tinned, stranded, except as otherwise indicated.

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

E. Bare Copper Conductors:
   4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) 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 (41 mm) wide and 1/16 inch (1.6 mm) thick.

F. Grounding Bus: Rectangular bars of annealed copper, 1/4 by 2 inches in cross section, unless otherwise indicated; with insulators.

G. Bonding Straps: Soft copper, 0.05 inch thick and 2 inches wide, except as indicated.

H. Cable assemblies shall be UL Listed and CSA Certified. Cables shall be a distinctive green (equipment ground) or green/yellow tracer (isolated ground) in color, and all jackets shall be UL, VW-1 flame rated.

2.03 CONNECTORS

A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.
   1. Heavy duty Pipe Clamps: Pipe clamps shall be high copper alloy or cast bronze with silicon bronze threaded fasteners; saddle type designed for the size of conductor indicated or required by Contract Documents.
   2. Beam Clamps: Beam clamps shall be compression type; heavy duty bronze construction; provide a minimum of 8 square inches of bonding surface; and designed for copper rope-lay cable.
   3. Grounding Bushings: Groundings bushings shall be malleable iron, threaded, with insulated liner and solderless lug.
C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

D. Pressure Connectors: High –conductivity plated units.

E. Terminating Lugs:
   1. Exothermic weld or crimp compression type.

2.04 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel.

PART 3 - EXECUTION

3.01 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger, unless otherwise indicated.

   1. 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. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
   1. Install bus on insulated spacers 1 inch, minimum, from wall 6 inches above finished floor, unless otherwise indicated.
   2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, down to specified height above floor, and connect to horizontal bus.

E. Conductor Terminations and Connections:
   1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
   2. Underground Connections: Welded connectors, except at test wells and as otherwise indicated.
   3. Connections to Ground Rods at Test Wells: Bolted connectors.
3.02 EQUIPMENT GROUNDING

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

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 and Heat-Tracing: 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. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.

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.

3.03 GROUNDING OF TELECOMMUNICATIONS SYSTEMS

A. Install grounding electrodes at locations indicated only.

B. Utilize equipment manufacturer furnished grounding terminals where provided.

C. Thread-forming screws and paint piercing grounding washers will be used to ensure metal-to-metal contact.

D. Lugs, HTAPs, grounding strips, and busbars shall be UL Listed and made of premium quality tin-plated electrolytic copper that provides low electrical resistance while inhibiting corrosion.

E. In MDF/IDF telecommunication rooms mount an electrostatic discharge (ESD) port kit, PANDUIT part number RGESD-1 (or OTS approved equal) directly to each side of the vertical mounting rail (of the center most rack) using thread-forming screws to form a bond to the rack. Mount at approximately 48 inches from the floor. Place the Electric Static Discharge (ESD) protection identification stickers directly above the ESD ports.

F. Provide an equipment grounding conductor from the Telecommunications Grounding Busbar (TGB) to each MDF/IDF rack grounding bar and ladder tray.

G. The communications grounding system shall adhere to the recommendations of the ANSI/TIA-942 and J-STD-607-A standards, and shall be installed in accordance with best industry practice.
H. The ground/earth system must be designed for high reliability. There the grounding/earthing system shall meet the following criteria:

1. Antioxidant shall be used when making bonding connections in the field.
2. The Telecommunications Grounding Busbar (TGB) in each telecommunications space shall be grounded (earthed) to the Telecommunications Main Grounding Busbar (TMGB) located at the electrical service entrance. The gauge of the connecting ground cable, known as the Telecommunications Bonding Backbone (TBB) shall follow J-STD-607-A and referenced in the table appendix for sizing the Telecommunications bonding Backbone (TBB).
3. The Telecommunications Main Grounding Busbar (TMGB) shall be bonded to the electrical service grounding according to the BICSI TDMM rev. 10 and J-STD-607-A. Verify all requirements in NEC (including all updates and addendum) as they may supersede the BICSI requirements. Where telecommunications spaces have only one rack, the jumper cables must be connected directly to the Telecommunications Grounding Busbar (TGB).
4. Route the TBB to each TGB in straight pathways. The TBB shall be a continuous conductor. The TBB shall be bonded to the equipment ground bar in the IG Computer Panel to the TGB in the MDF and IDF’s. Note: This will be the same IG Computer Panel providing IG circuits to that MDF/IDF.
5. In the event of more than one TBB, the contractor will bond them together at the TBD on the top floor with a Grounding Equalizer (GE). Reference the J-STD-607-A standards for sizing TBB’s for the GE.
6. Building steel and metallic water piping must be bonded to the grounding system for safety, however neither may be utilized as the TBB.
7. Equipment racks shall be bonded to the grounding system in accordance with ANSI/TIA EAI-942.
8. To maintain continuity throughout each equipment rack where bonding to the grounding system paint or insulators must be ground away to expose bare, unpainted, and uncoated metal to insure metal to metal contact.
9. Paint piercing grounding washers and hardware shall be used where rack sections join together. Paint piercing hardware will be used on both sides when and where the hardware passes through the rack.
10. Any metallic components that part of the data equipment (equipment, racks, ladder racks, enclosures, cable runway, etc.) must be bonded to the grounding systems.
11. In retrofit applications where equipment is installed, grind away paint and insulators in such a way to avoid disruption of installed equipment and data cabling.

I. Each of the Communications surge protection devices shall be grounded in accordance with manufacturers recommendations as presented in product installation instructions to the TGB.

3.04 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. Common Ground Bonding with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

C. Ground Rods: Drive rods until tops are 2 inches (50 mm) 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.

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 so vibration is not transmitted to rigidly mounted equipment.
   3. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.

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, using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
   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. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet (18 m) apart.
3.05 CLEANING – NOT APPLICABLE

3.06 CONTRACTOR STARTUP AND REPORTING

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. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells and at individual ground rods. Make tests at ground rods before any conductors are connected.
   a. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
   b. Perform tests by fall-of-potential method according to IEEE 81.

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

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

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

END OF SECTION
PART 1 - GENERAL

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

1.02 SUMMARY
A. This Section includes the following:
   1. Hangers and supports for electrical equipment and systems.
   2. Construction requirements for concrete bases.

1.03 DEFINITIONS
A. EMT: Electrical metallic tubing.
B. IMC: Intermediate metal conduit.
C. RMC: Rigid metal conduit.

1.04 PERFORMANCE REQUIREMENTS
A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
C. 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 5 times the applied force.

1.05 SUBMITTALS
A. Product Data: For the following:
   1. Steel slotted support systems.
1.06 QUALITY ASSURANCE

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

B. Comply with NFPA 70.

1.07 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

PART 2 - PRODUCTS

2.01 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. Thomas & Betts Corporation.
   e. Unistrut; Tyco International, Ltd.
   f. Or Equal.

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. Channel Dimensions: Selected for applicable load criteria.

5. Fittings and Accessories: Products of channel and angle manufacturer and designed for use with those items.

6. Fitting and Accessory Materials: Same as channels and angles, except metal items may be stainless steel.

7. Rated Strength: Selected to suit applicable load criteria.

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

C. Conduit and Cable Support Devices: Steel and malleable-iron 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.
      5) Or Equal.

2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials 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.
      6) Or Equal.

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.


2.02 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.
PART 3 - EXECUTION

3.01 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 its Table 1 lists maximum spacings 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 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 single-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.

3.02 SUPPORT INSTALLATION

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

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

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

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
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.

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

3.03 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.

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

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

3.04 CONCRETE BASES

A. Construct concrete bases 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. Coordinate dimensions of supported equipment with manufacturers’ drawings.

B. Use 3000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 033000 "Cast-in-Place Concrete"

C. Anchor equipment to concrete base.

3.05 PAINTING

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

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

B. Touchup: Comply with requirements in Division 09 painting Sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

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

END OF SECTION
PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

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

1.03 DEFINITIONS

A. EMT: Electrical metallic tubing.
B. EPDM: Ethylene-propylene-diene terpolymer rubber.
C. FMC: Flexible metal conduit.
D. IMC: Intermediate metal conduit.
E. LFMC: Liquidtight flexible metal conduit.
F. NBR: Acrylonitrile-butadiene rubber.

1.04 SUBMITTALS

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

B. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.

1. Custom enclosures and cabinets.
2. For handholes and boxes for underground wiring, including the following:
   a. Duct entry provisions, including locations and duct sizes.
   b. Frame and cover design.
   c. Grounding details.
   d. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.
   e. Joint details.
C. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
   1. Structural members in the paths of conduit groups with common supports.
   2. HVAC and plumbing items and architectural features in the paths of conduit groups with common supports.

D. Source quality-control test reports.

1.05 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

2.01 METAL CONDUIT AND TUBING

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Allied Tube & Conduit; a Tyco International Ltd. Co.
   2. Anamet Electrical, Inc.; Anaconda Metal Hose.
   3. Electri-Flex Co.
   4. Manhattan/CDT/Cole-Flex.
   5. Maverick Tube Corporation.
   7. Wheatland Tube Company.
   8. Or Equal.

B. Rigid Steel Conduit: ANSI C80.1.

C. IMC: ANSI C80.6.

D. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit
   1. Comply with NEMA RN 1.
   2. Coating Thickness: 0.040 inch minimum.

E. EMT: ANSI C80.3.

F. FMC: Zinc-coated steel

G. LFMC: Flexible steel conduit with PVC jacket.
H. 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. Fittings for EMT: Steel or die-cast compression type.
   2. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch with overlapping sleeves protecting threaded joints.

I. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.02 SURFACE RACEWAYS

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

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

      a. Thomas & Betts Corporation.
      c. Wiremold Company (The); Electrical Sales Division.
      d. Or Equal.

2.03 BOXES, ENCLOSURES, AND CABINETS

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

   1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
   2. EGS/Appleton Electric.
   7. RACO; a Hubbell Company.
   12. Or Equal.

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

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

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

F. 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

3.01 RACEWAY APPLICATION

A. Comply with the following indoor applications, unless otherwise indicated:
   1. Exposed, Not Subject to Physical Damage: EMT
   2. Exposed, Not Subject to Severe Physical Damage: IMC
   3. Exposed and Subject to Severe Physical Damage: Rigid steel conduit Includes raceways in the following locations:
      a. Trash Room.
      b. Mechanical rooms.
      c. Boiler rooms.
   4. Concealed in Ceilings and Interior Walls and Partitions: EMT
   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. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel in damp or wet locations.

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

C. 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.
   2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with that material. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer.

D. Do not install aluminum conduits in contact with concrete.
3.02 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. Set screw type fittings are not allowed.

C. 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.

D. Complete raceway installation before starting conductor installation.

E. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."

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

G. 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.

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

I. 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.

J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

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

L. 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.

M. Raceways for Optical Fiber and Communications Cable: Install raceways, metallic and nonmetallic, rigid and flexible, 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.
N. 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.

O. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for recessed and semirecessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors. Use LFMC in damp or wet locations.

P. 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.

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

R. Air-Barrier Penetrations: All penetrations in both exterior walls, and common walls between units, must be sealed continuously to prevent air from infiltrating through membranes of roof/floor/wall ceiling assemblies. This air barrier will be comprised of through-penetration firestop materials such as sealants, caulks, foams, and putties. Air-Barrier/Firestopping materials to be used to install roof/floor/wall/ceiling assembly air-barrier penetrations are specified in Division 07 Section "Penetration Firestopping." The air-barrier penetration material is required for both fire rated and non-fire rated exterior and common wall assemblies.

1. All penetrations must be air-sealed for all raceway, conduit, fittings, boxes, enclosures, and cabinet penetrations.

3.03 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

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. Rectangular Sleeve Minimum Metal Thickness:

1. For sleeve cross-section rectangle perimeter less than 50 inches and no side greater than 16 inches (400 mm), thickness shall be 0.052 inch.
2. For sleeve cross-section rectangle perimeter equal to, or greater than, 50 inches and 1 or more sides equal to, or greater than, 16 inches thickness shall be 0.138 inch.
E. 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.

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

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

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

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

J. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway, using joint sealant appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.

K. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway penetrations. Install sleeves and seal with firestop materials. Comply with Division 07 Section "Penetration Firestopping."

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

M. Aboveground, Exterior-Wall Penetrations: Seal penetrations using 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.

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

3.04 SLEEVE-SEAL INSTALLATION

A. Install to seal underground, exterior wall penetrations.

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

3.05 FIRESTOPPING

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

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION
SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
   1. Identification for raceways.
   2. Identification of power and control cables.
   3. Identification for conductors.
   4. Warning labels and signs.
   5. Instruction signs.
   7. Miscellaneous identification products.

1.03 SUBMITTALS

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

B. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.04 QUALITY ASSURANCE

A. Comply with ANSI A13.1.

B. Comply with NFPA 70.


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.
1.05 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer’s wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.01 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. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch with stamped legend, punched for use with self-locking cable tie fastener.

D. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
   1. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

E. 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.

F. 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.

2.02 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape 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. 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.

D. 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.

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

F. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
   1. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.03 FLOOR MARKING TAPE

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

2.04 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.

2.05 WARNING LABELS AND SIGNS


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.

2.06 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.
2.07  EQUIPMENT IDENTIFICATION LABELS

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

B. 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.


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

2.08  CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self extinguishing, one piece, self locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).

B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self extinguishing, one piece, self locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
3. Temperature Range: Minus 40 to plus 185 deg F.

2.09  MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.
PART 3 - EXECUTION

3.01 INSTALLATION

A. Verify identity of each item before installing identification products.

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

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

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

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

F. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.

G. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:
   1. Outdoors: UV-stabilized nylon.
   2. In Spaces Handling Environmental Air: Plenum rated.

H. 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.

I. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

3.02 IDENTIFICATION SCHEDULE

A. VOLTAGE WIRING with 3-inch-high black letters on 20-inch centers. Stop stripes at legends. Apply to the following finished surfaces:
   1. Floor surface directly above conduits running beneath and within 12 inches of a floor that is in contact with earth or is framed above unexcavated space.
   2. Wall surfaces directly external to raceways concealed within wall.
   3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.

B. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30A, and 120V to ground: Identify with self-adhesive vinyl tape applied in bands. Install labels at 30-foot maximum intervals.
C. 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:

2. Power.
3. UPS.
4. Fire Alarm.

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


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.

F. 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.

G. 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.

H. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels

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.

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

K. 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: Self-adhesive, 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 or melamine label
   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.

2. Equipment to Be Labeled:
   a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be engraved, laminated acrylic or melamine label.
   b. Access doors and panels for concealed electrical items.
   c. Switchboards.
   d. Emergency system boxes and enclosures.
   e. Enclosed switches.
   f. Enclosed circuit breakers.
   g. Enclosed controllers.
   h. Variable-speed controllers.
   i. Push-button stations.
   j. Power transfer equipment.
   k. Contactors.
   l. Remote-controlled switches, dimmer modules, and control devices.
   m. Monitoring and control equipment.
   n. UPS equipment.

END OF SECTION
PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following individually mounted, enclosed switches and circuit breakers rated 600V AC and less:

1. Fusible switches.
2. Nonfusible switches.
3. Enclosed circuit breakers and switch.
4. Enclosures.

1.03 DEFINITIONS

A. GD: General duty.
B. GFCI: Ground-fault circuit interrupter.
C. HD: Heavy duty.
D. RMS: Root mean square.
E. SPDT: Single pole, double throw.

1.04 REFERENCES

A. International Electrical Testing Association

1. NETA, ATS – 1999; Electrical Testing Specifications for Electrical Power Distribution Equipment and Systems

B. National Electrical Manufacturers Association

1. NEMA 250-97: Enclosures for Electrical equipment (1000V Maximum)
2. NEMA 1-99: Molded Case Circuit Breakers and Molded Case Switches
3. NEMA FU 1-86: Low Voltage Cartridge Fuses
4. NEMA KS 1-01: Enclosed and Miscellaneous Distribution Equipment Switches (600Volts Maximum)
5. NEMA PB 1.1-96: General Instructions for proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less
6. NEMA PB 2.1-96: General Instructions for proper Installation, Operation and Maintenance of Deadfront Distribution Switchboards Rated 600 Volts or Less

C. Underwriters Laboratories

1. UL 486A: Wire connectors and soldering lugs for use with copper conductors
2. UL 98: Enclosed and Dead-Front Switches.
3. UL 489: Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
4. UL 977: Fused Power Circuit Devices
5. UL 1053: Ground Fault Sensing and Relaying Equipment

1.05 SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
4. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
5. Time current curves.
7. Coordination charts, tables and related data.

B. Shop Drawings: Wiring Diagrams detailing power, signal, and control wiring and differentiating between manufacturer-installed and field-installed wiring.

C. Manufacturer's field service report.

D. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Sections “Closeout Procedures” and “Operation and Maintenance Data,” include the following:

1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
2. Time-current curves, including selectable ranges for each type of circuit breaker.
1.06 CLOSEOUT

A. Field quality-control test reports including the following:
   1. Test procedures used.
   2. Test results that comply with requirements.

B. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.07 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in the Local Electrical Code by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with the Local Electrical Code.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

1.08 DELIVERY, STORAGE AND HANDLING

A. Store enclosed switches and circuit breakers indoors in clean and dry space with uniform temperature to prevent condensation. Protect enclosed switches and circuit breakers from exposure to dirt, fumes, water, corrosive substances, and physical damage.

B. If stored in areas subject to weather, cover enclosed switches and circuit breakers to protect them from weather, dirt, dust, corrosive substances, and physical damage. Remove loose packing and flammable materials. Install electric heating of sufficient wattage to prevent condensation.

C. Deliver in factory shipping cartons.

D. Handle enclosed switches and circuit breakers to avoid damage.

1.09 COMPATIBILITY

A. All protective devices in new assemblies shall be of the same manufacturer except for special applications of proprietary types to maximize single-source responsibility.

B. Protective devices added to existing assemblies shall have compatible interrupting ratings with the existing assembly and shall be of the original manufacturer. If not available, modify or extend the assembly to accept compatible protective devices of same manufacturer as supplied in new assemblies.
1.010  PROJECT CONDITIONS

A.  Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:

1.  Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
2.  Altitude: Not exceeding 6600 feet.

1.011  COORDINATION

A.  Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.012  EXTRA MATERIALS

A.  Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.  Spares: For the following:
   a.  Potential Transformer Fuses: Three of each type installed.
   b.  Control-Power Fuses: Three of each type installed.
   c.  Fuses and Fusible Devices for Fused Circuit Breakers: Three of each type installed.
   d.  Fuses for Fusible Switches: Three of each type installed.

2.  Spare Indicating Lights: Three of each type installed.

PART 2 - PRODUCTS

2.01  MANUFACTURERS

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

1.  Eaton Corporation; Cutler-Hammer Products.
4.  Square D/Group Schneider.
5.  Or Equal.
2.02 FUSIBLE AND NONFUSIBLE SWITCHES

A. Fusible Switch, 600 or 1200 A and Smaller: NEMA KS 1, Type HD, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

B. Nonfusible Switch, 600 or 1200 A and Smaller: NEMA KS 1, Type HD, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

C. 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; and labeled for copper and aluminum neutral conductors.
3. Auxiliary Contact Kit: Auxiliary set of contacts arranged to open before switch blades open.

2.03 FUSED POWER CIRCUIT DEVICES – NOT APPLICABLE

2.04 ENCLOSED CIRCUIT BREAKERS AND SWITCHES

A. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.

3. Electronic Trip Unit Circuit Breakers: RMS sensing; field-replaceable rating plug; with 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 I²t response.
4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
5. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker; trip activation on fuse opening or on opening of fuse compartment door.
7. Molded-Case Switch: Molded-case circuit breaker without trip units.
2.05 ENCLOSURES

A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.
   1. Outdoor Locations: NEMA 250, Type 3R.
   3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 CONCRETE BASES – NOT APPLICABLE

3.03 INSTALLATION

A. Comply with applicable portions of NECA 1, NEMA PB 1.1, and NEMA PB 2.1 for installation of enclosed switches and circuit breakers.

B. Mount individual wall-mounting switches and circuit breakers with tops at uniform height, unless otherwise indicated. Anchor floor-mounting switches to concrete base. Support enclosures independent from stud partitions.

C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components. Provide quantities of the circuit protective devices accessories in locations necessary for the effective general operations of the facility.

3.04 IDENTIFICATION

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

B. Enclosure Nameplates: Label each enclosure with engraved metal or laminated-plastic nameplate as specified in Division 26 Section "Identification for Electrical Systems."
3.05 CONTROL WIRING INSTALLATION

A. Install wiring between OCPDs and control/indication devices as specified in Division 26 Sections "Low-Voltage Electrical Power Conductors and Cables" and "Control-Voltage Electrical Power Cables."

3.06 ADJUSTING

A. Set field-adjustable switches and circuit-breaker trip ranges.
B. Adjust operating mechanisms for free mechanical movement.

3.07 DEMONSTRATION

A. Training: Arrange and pay for the services of factory-authorized service representative to demonstrate OCPDs and train Owner's maintenance personnel.
B. Conduct a minimum of one half day of training in operation and maintenance as specified in the “Closeout Procedures” and “Demonstration and Training” Section of these specifications. Include both classroom training and hands on equipment operation and maintenance procedures.
C. Schedule training with at least seven days' advance notification.

3.08 CLEANING

A. On completion of installation, vacuum dirt and debris from interiors; do not use compressed air to assist in cleaning.
B. Inspect exposed surfaces and repair damaged finishes.

3.09 CONTRACTOR STARTUP AND REPORTING

A. It is contractor’s responsibility to hire third party independent testing agency to perform the following test. A factory-authorized service representative must be present to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
B. Prepare for acceptance testing as follows:

1. Inspect mechanical and electrical connections.
2. Verify switch and relay type and labeling verification.
3. Verify rating of installed fuses.
4. Inspect proper installation of type, size, quantity, and arrangement of mounting or anchorage devices complying with manufacturer's certification.
C. Engage third party independent Electrical Testing Agency to perform the following field tests and inspections and prepare test reports:
1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.5 for switches. 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.

3.010 COMMISSIONING AND DEMONSTRATION – NOT APPLICABLE

END OF SECTION
PART 1 - GENERAL

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

1.02 SUMMARY
A. This Section includes packaged engine-generator sets for emergency power supply with the following features:
   1. Diesel engine.
   2. Radiator.
   3. Exhaust silencer muffler, exhaust piping and fittings.
   4. Batteries and charger.
   5. Remote annunciator.
   6. Outdoor enclosure.
B. Related Sections include the following:
   1. Division 26 Section "Transfer Switches" for transfer switches including sensors and relays to initiate automatic-starting and stopping signals for engine-generator sets.

1.03 DEFINITIONS
A. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

1.04 SUBMITTALS
A. Product Data: For each type of packaged engine generator indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. In addition, include the following:
   1. Thermal damage curve for generator.
   2. Time-current characteristic curves for generator protective device.
   3. U.S EPA new Source Performance Standards, 40 CFR part 60 subpart IIII for CI engines. The manufacturer must certify the generator meets the requirements and provide appropriate documents.
B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Dimensioned outline plan and elevation drawings of engine-generator set and other components specified.
2. Design Calculations: Signed and sealed by a qualified professional engineer. Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
3. Vibration Isolation Base Details: Signed and sealed by a qualified professional engineer. Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include base weights.

C. Qualification Data: For installer and manufacturer.

D. Source quality-control test reports.

1. Certified summary of prototype-unit test report.
2. Certified Test Reports: For components and accessories that are equivalent, but not identical, to those tested on prototype unit.
4. Report of factory test on units to be shipped for this Project, showing evidence of compliance with specified requirements.
6. Report of exhaust emissions showing compliance with applicable regulations.

E. Operation and Maintenance Data: For packaged engine generators to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.

F. Sample warranty.

1.05 CLOSEOUT

A. Field quality-control test reports.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer’s authorized representative who is trained and approved for installation of units required for this Project.

1. Maintenance Proximity: Not more than four hours’ normal travel time from Installer’s place of business to Project site.
2. Engineering Responsibility: Preparation of data for vibration isolators and seismic restraints of engine skid mounts, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Manufacturer Qualifications: A qualified manufacturer. Maintain, within 100 miles of Project site, a service center capable of providing training, parts, and emergency maintenance repairs.

C. Source Limitations: Obtain packaged generator sets and auxiliary components through one source from a single manufacturer.

D. 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.

E. Comply with Chicago Electrical Code.

F. Comply with ASME B15.1.

G. Comply with NFPA 37.

H. Comply with NFPA 70.

I. Comply with NFPA 99.

J. Comply with NFPA 110 requirements for Level 1 emergency power supply system.

K. Comply with UL 2200.

L. Engine Exhaust Emissions: Comply with applicable state and local government requirements.

M. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by generator set including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.

1.07 PROJECT CONDITIONS

A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:

1. Notify Architect and Owner no fewer than two days in advance of proposed interruption of electrical service.

2. Do not proceed with interruption of electrical service without Owner’s written permission.
B. Environmental Conditions: Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:

1. Ambient Temperature: Minus 15 to plus 40 deg C.
2. Relative Humidity: 0 to 95 percent.
3. Altitude: Sea level to 1000 feet.

1.08 COORDINATION

A. Coordinate size and location of concrete bases for package engine generators on grade. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Field locations: Verify locations of engine generator set assembly prior to rough-in.

1.09 WARRANTY

A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period. The warranty must include all parts and labor to perform repair or replacement.

1. Warranty Period: 5 years from date of Substantial Completion.

1.10 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include quarterly exercising to check for proper starting, load transfer, and running under load. Include routine preventive maintenance as recommended by manufacturer and adjusting as required for proper operation. Provide parts and supplies same as those used in the manufacture and installation of original equipment.

1.11 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: One for every 10 of each type and rating, but no fewer than one of each.
2. Indicator Lamps: Two for every six of each type used, but no fewer than two of each.
3. Filters: One set each of lubricating oil, fuel, and combustion-air filters.
2.01 MANUFACTURERS

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:

1. Onan/Cummins Power Generation
2. Caterpillar; Engine Div.
3. Kohler Co.; Generator Division.
4. Or Equal.

2.02 ENGINE-GENERATOR SET

A. Factory-assembled and -tested, engine-generator set.

B. Mounting Frame: Maintain alignment of mounted components without depending on concrete foundation; and have lifting attachments.

1. Rigging Diagram: Inscribed on metal plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and generator-set center of gravity.

C. Capacities and Characteristics:

1. Power Output Ratings: 125kW and 60kW.
2. Output Connections: 120/208V, Three-phase, four wire.
3. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component.

D. Generator-Set Performance:

1. Steady-State Voltage Operational Bandwidth: 3 percent of rated output voltage from no load to full load.
2. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three seconds.
3. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency from no load to full load.
4. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
5. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.
6. Output Waveform: At no load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for single harmonics. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
7. Sustained Short-Circuit Current: For a 3-phase, bolted short circuit at system output terminals, system shall supply a minimum of 250 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to generator system components.

8. Start Time: Comply with NFPA 110, Type 10, system requirements.

2.03 ENGINE

A. Fuel: Diesel.

B. Rated Engine Speed: 1800 rpm.

C. Maximum Piston Speed for Four-Cycle Engines: 2250 fpm.

D. Lubrication System: The following items are mounted on engine or skid:

1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.
3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.

E. Engine Fuel System:

3. Relief-Bypass Valve: Automatically regulates pressure in fuel line and returns excess fuel to source.
4. Minimum 12 hour rated sub base tank.

F. Coolant Jacket Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity. Thermal circulation type water heater with integral thermostatic control, sized to maintain engine jacket water at 90 degree F and suitable for operation on 24 volt AC. Provide installed isolation valves.

G. Fuel Tank: Comply with UL 142, freestanding, factory-fabricated fuel tank assembly, with integral, float-controlled transfer pump and the following features:

1. Containment: Integral rupture basin with a capacity of 150 percent of nominal capacity of tank.
   a. Leak Detector: Locate in rupture basin and connect to provide audible and visual alarm in the event of day-tank leak.
2. Tank Capacity: As recommended by engine manufacturer for an uninterrupted period of 12 hours’ operation at 100 percent of rated power output of engine generator system without being refilled.
3. Pump Capacity: Exceeds maximum flow of fuel drawn by engine-mounted fuel supply pump at 110 percent of rated capacity, including fuel returned from engine.

4. Low-Level Alarm Sensor: Liquid-level device operates alarm contacts at 25 percent of normal fuel level.

5. High-Level Alarm Sensor: Liquid-level device operates alarm and redundant fuel shutoff contacts at midpoint between overflow level and 100 percent of normal fuel level.

6. Piping Connections: Factory-installed fuel supply and return lines from tank to engine; local fuel fill, vent line, overflow line; and tank drain line with shutoff valve.

7. Redundant High-Level Fuel Shutoff: Actuated by high-level alarm sensor in day tank to operate a separate motor-control device that disconnects day-tank pump motor. Sensor shall signal solenoid valve, located in fuel suction line between fuel storage tank and day tank, to close. Both actions shall remain in shutoff state until manually reset. Shutoff action shall initiate an alarm signal to control panel but shall not shut down engine generator.

H. Governor: Adjustable isochronous, with speed sensing to maintain isochronous engine speed.

I. Engine accessories: lube oil filter, intake air filter, lube oil cooler, gear-driven water pump. Provide unit mounted instruments including service meter, water temperature gauge and lube oil pressure gauge on engine/generator control panel.

J. Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine-generator-set mounting frame and integral engine-driven coolant pump.

1. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.

2. Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.

3. Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with gage glass and petcock.

4. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.

   
a. Rating: 50-psig maximum working pressure with coolant at 180 deg F, and noncollapsible under vacuum.
   
b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.

K. Muffler/Silencer: Critical type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.

1. Minimum sound attenuation of 25 dB at 500 Hz.
2. Sound level measured at a distance of 10 feet from exhaust discharge after installation is complete shall be 74 dBA or less.

L. **Air-Intake Filter**: Heavy-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.

M. **Starting System**: 24-V electric, with negative ground.

1. **Components**: Sized so they will not be damaged during a full engine-cranking cycle with ambient temperature at maximum specified in Part 1 "Project Conditions" Article.
2. **Cranking Motor**: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
3. **Cranking Cycle**: As required by the Chicago Building Code for emergency generator.
4. **Battery**: Adequate capacity within ambient temperature range specified in Part 1 "Project Conditions" Article to provide specified cranking cycle at least twice without recharging.
5. **Battery Cable**: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
6. **Battery Compartment**: Factory fabricated of metal with acid-resistant finish and thermal insulation. Thermostatically controlled heater shall be arranged to maintain battery above 10 deg C regardless of external ambient temperature within range specified in Part 1 "Project Conditions" Article. Include accessories required to support and fasten batteries in place.
7. **Battery-Charging Alternator**: Factory mounted on engine with solid-state voltage regulation and 35-A minimum continuous rating.
8. **Battery Charger**: Current-limiting, automatic-equalizing and float-charging type. Unit shall comply with UL 1236 and include the following features:
   a. **Operation**: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
   b. **Automatic Temperature Compensation**: Adjust float and equalize voltages for variations in ambient temperature from minus 40 deg C to plus 60 deg C to prevent overcharging at high temperatures and undercharging at low temperatures.
   c. **Automatic Voltage Regulation**: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
   d. **Ammeter and Voltmeter**: Flush mounted in door. Meters shall indicate charging rates.
   e. **Safety Functions**: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.
   f. **Enclosure and Mounting**: NEMA 250, Type 1, wall-mounted cabinet.
2.04 CONTROL AND MONITORING

A. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate transfer switches initiate starting and stopping of generator set. When mode-selector switch is switched to the on position, generator set starts. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms. Operation of a remote emergency-stop switch also shuts down generator set.

B. Manual Starting System Sequence of Operation: Switching on-off switch on the generator control panel to the on position starts generator set. The off position of same switch initiates generator set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms. Operation of a remote emergency-stop switch also shuts down generator set.

C. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the generator set. Mounting method shall isolate the control panel from generator-set vibration.

D. Indicating and Protective Devices and Controls: As required by the local building code.

E. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator, unless otherwise indicated.

F. Common Remote Audible Alarm: Comply with NFPA 110 requirements for Level 1 systems. Include necessary contacts and terminals in control and monitoring panel.

1. Overcrank shutdown.
2. Low oil pressure.
3. Low oil pressure (Pre-alarm).
4. Oil pressure sensor failure.
5. Coolant low-temperature.
6. Coolant high-temperature.
7. High oil temperature.
8. Excessive engine temperature (Pre-alarm).
10. Low coolant level.
11. Over speed.
13. 80% load indicator (warning).
14. Voltage variation more than 5%.
15. Low natural gas pressure (Leakage).
16. Battery-charger malfunction alarm.
17. Battery low-voltage alarm.

G. Remote Alarm Annunciator: Comply with NFPA 99. An LED labeled with proper alarm conditions shall identify each alarm event and a common audible signal shall sound for
each alarm condition. Silencing switch in face of panel shall silence signal without altering visual indication. Connect so that after an alarm is silenced, clearing of initiating condition will reactivate alarm until silencing switch is reset. Cabinet and faceplate are surface- or flush-mounting type to suit mounting conditions indicated.

H. Provide devices and controls to monitor the following functions:
1. Voltage
2. Current
3. Frequency
4. Running time
5. Oil pressure
6. Water temperature
7. Generator voltage adjusting rheostat
8. Ammeter-voltmeter, phase-selector switch(es)

I. Engine status monitoring. The following information shall be available from a status panel on the generator set control panel:
1. Engine oil pressure
2. Engine coolant temperature
3. Engine oil temperature
4. Engine speed
5. Non-resettable Number of hours of operation
6. Number of start attempts
7. Battery voltage

J. Remote annunciator panel: Install where existing annunciator panels were used to be located.
1. Flush (or surface) mounted, single membrane front face enclosure with integral test light and alarm acknowledge silence switches. Environmentally sealed, remotely mounted up to 1000 ft away from generator control panel. Designed for operation on 24VDC.
2. Spare lamps shall be provided to allow future addition of other alarm and status functions to the annunciator.
3. Provisions for labeling of the annunciator in a fashion consistent with the specified functions shall be provided.
4. The interconnecting wiring between the annunciator and other system components shall be monitored failure of the interconnection between components shall be displayed in the annunciator panel.
5. Remote annunciator monitoring and alarming points must be connected to Owner's BAS network. Provide network card and communication devices for the connectivity. Coordinate BAS connection with existing BAS manufacturers (Police/Fire HQ – Siemens and Fire Station #2 – Schneider).
6. The annunciator shall include the following audible and visible LED indicators and alarms as required by the Local Building Code:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Audible Alarm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal power to loads</td>
<td>No</td>
</tr>
<tr>
<td>Genset supplying load</td>
<td>No</td>
</tr>
<tr>
<td>Genset running</td>
<td>No</td>
</tr>
<tr>
<td>Not in auto</td>
<td>Yes</td>
</tr>
<tr>
<td>High battery voltage</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Low battery voltage  Yes
Charger AC failure  Yes
Fail to start  Yes
Low engine temperature  Yes
Pre-high engine temperature  Yes
High engine temperature  Yes
Pre-low oil pressure  Yes
Low oil pressure  Yes
Overspeed  Yes
Low coolant level  Yes
Network OK  Yes
(4) Spare points  Configurable

2.05 GENERATOR OVERCURRENT AND FAULT PROTECTION

A. Generator Circuit Breaker: Molded-case, thermal-magnetic type; 100 percent rated; complying with NEMA AB 1 and UL 489.
   1. Tripping Characteristic: Designed specifically for generator protection.
   2. Trip Rating: Matched to generator rating.
   3. Shunt Trip: Connected to trip breaker when generator set is shut down by other protective devices.
   4. Mounting: Adjacent to or integrated with control and monitoring panel.

B. Generator Disconnect Switch: Molded-case type, 100 percent rated.
   1. Rating: Matched to generator output rating.
   2. Shunt Trip: Connected to trip switch when signaled by generator protector or by other protective devices.

C. Ground-Fault Indication: Comply with NFPA 70, "Emergency System" signals for ground-fault. Integrate ground-fault alarm indication with other generator-set alarm indications.

2.06 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

A. Comply with NEMA MG 1.

B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.

C. Electrical Insulation: Class H or Class F.

D. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required.

E. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.

F. Instrument Transformers: Mounted within generator enclosure.
G. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified.
   1. Adjusting rheostat on control and monitoring panel shall provide plus or minus 5 percent adjustment of output-voltage operating band.

H. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.

I. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.

J. Subtransient Reactance: 12 percent, maximum.

2.07 OUTDOOR GENERATOR-SET ENCLOSURE

A. Description: Vandal-resistant, weatherproof steel housing, wind resistant up to 100 mph. Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be removable by one person without tools. Instruments and control shall be mounted within enclosure.

B. Description: Prefabricated or preengineered walk-in enclosure with the following features:
   2. Structural Design and Anchorage: Comply with ASCE 7 for wind loads.
   3. Space Heater: Thermostatically controlled and sized to prevent condensation.
   4. Louvers: Equipped with bird screen and filter arranged to permit air circulation when engine is not running while excluding exterior dust, birds, and rodents.
   6. Ventilation: Louvers equipped with bird screen and filter arranged to permit air circulation while excluding exterior dust, birds, and rodents.
   7. Thermal Insulation: Manufacturer's standard materials and thickness selected in coordination with space heater to maintain winter interior temperature within operating limits required by engine-generator-set components.
   8. Muffler Location: Internal to enclosure.

C. Engine Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 110 percent of rated load for 2 hours with ambient temperature at top of range specified in system service conditions.
   1. Louvers: Fixed-engine, cooling-air inlet and discharge. Storm-proof and drainable louvers prevent entry of rain and snow.
   2. Automatic Dampers: At engine cooling-air inlet and discharge. Dampers shall be closed to reduce enclosure heat loss in cold weather when unit is not operating.

D. Interior Lights with Switch: Factory-wired, vaporproof-type fixtures within housing; arranged to illuminate controls and accessible interior. Arrange for external electrical connection.
1. AC lighting system and connection point for operation when remote source is available.

E. Convenience Outlets: Factory wired, GFCI. Arrange for external electrical connection.

F. Day tank and associated fuel pump system shall be installed within the enclosure.

2.08 VIBRATION ISOLATION DEVICES

A. Elastomeric Isolator Pads: Oil- and water-resistant elastomer or natural rubber, arranged in single or multiple layers, molded with a nonslip pattern and galvanized-steel baseplates of sufficient stiffness for uniform loading over pad area, and factory cut to sizes that match requirements of supported equipment.

3. Number of Layers: Three.

2.09 FINISHES

A. Indoor and Outdoor Enclosures and Components: Manufacturer's standard finish over corrosion-resistant pretreatment and compatible primer.

2.10 SOURCE QUALITY CONTROL

A. Prototype Testing: Factory test engine-generator set using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.


B. Project-Specific Equipment Tests: Before shipment, factory test engine-generator set and other system components and accessories manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:

1. Test components and accessories furnished with installed unit that are not identical to those on tested prototype to demonstrate compatibility and reliability.
2. Full load run.
3. Maximum power.
4. Voltage regulation.
5. Transient and steady-state governing.
7. Safety shutdown.
8. Provide 14 days' advance notice of tests and opportunity for observation of tests by Owner's representative.
9. Report factory test results within 10 days of completion of test.
PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine-generator performance.

B. Examine roughing-in of piping systems and electrical connections. Verify actual locations of connections before packaged engine-generator installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Comply with packaged engine-generator manufacturers’ written installation and alignment instructions and with NFPA 110.

B. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.

C. Install packaged engine generator with elastomeric isolator pads having a minimum deflection of 1 inch on 10-inch-concrete base. Secure sets to anchor bolts installed in concrete bases.

D. Install Schedule 40, black steel piping with welded joints and connect to engine muffler. Install thimble at wall. Piping shall be same diameter as muffler outlet. Flexible connectors and steel piping materials and installation requirements are per manufacturer’s standard

1. Install condensate drain piping to muffler drain outlet full size of drain connection with a shutoff valve, stainless-steel flexible connector, and Schedule 40, black steel pipe with welded joints.

E. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

3.03 CONNECTIONS

A. Piping installation requirements are specified in Division 23 Sections. Drawings indicate general arrangement of piping and specialties.

B. Connect fuel, cooling-system, and exhaust-system piping adjacent to packaged engine generator to allow service and maintenance.

C. Connect engine exhaust pipe to engine with flexible connector.

D. Ground equipment according to Division 26 Section “Grounding and Bonding for Electrical Systems.”
E. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.04 IDENTIFICATION

A. Identify system components according to Division 23 Section "Identification for HVAC duct and Equipment" and Division 26 Section "Identification for Electrical Systems."

3.05 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.

B. Perform tests and inspections and prepare test reports.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Perform tests recommended by manufacturer and each electrical test and visual and mechanical inspection for "AC Generators and for Emergency Systems" specified in NETA Acceptance Testing Specification. Certify compliance with test parameters.

2. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here including, but not limited to, single-step full-load pickup test.

3. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.

   a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
   b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.
   c. Verify acceptance of charge for each element of the battery after discharge.
   d. Verify that measurements are within manufacturer's specifications.

4. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.

5. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine-generator system before and during system operation. Check for air, exhaust, and fluid leaks.

6. Exhaust-System Back-Pressure Test: Use a manometer with a scale exceeding 40-inch wg. Connect to exhaust line close to engine exhaust manifold. Verify that back pressure at full-rated load is within manufacturer's written allowable limits for the engine.
7. Exhaust Emissions Test: Comply with applicable government test criteria.
8. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.
9. Harmonic-Content Tests: Measure harmonic content of output voltage under 25 percent and at 100 percent of rated linear load. Verify that harmonic content is within specified limits.
10. Noise Level Tests: Measure A-weighted level of noise emanating from generator-set installation, including engine exhaust and cooling-air intake and discharge, at four locations on the property line, and compare measured levels with required values.

D. Coordinate tests with tests for transfer switches and run them concurrently.
E. Test instruments shall have been calibrated within the last 12 months, traceable to standards of NIST, and adequate for making positive observation of test results. Make calibration records available for examination on request.
F. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
G. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
H. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
I. Remove and replace malfunctioning units and retest as specified above.
J. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.
K. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.

3.06 DEMONSTRATION

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

END OF SECTION
PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes transfer switches rated 600 V and less, including the following:

1. Automatic transfer switches.
2. Remote annunciation systems.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, weights, operating characteristics, furnished specialties, and accessories.

B. Shop Drawings: Dimensioned plans, elevations, sections, and details showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.

1. Single-Line Diagram: Show connections between transfer switch, bypass/isolation switch, power sources, and load; and show interlocking provisions for each combined Coordinate paragraph below with qualification requirements in Division 01 Section "Quality Requirements" and as supplemented in "Quality Assurance" Article.

C. Qualification Data: For manufacturer.

D. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Features and operating sequences, both automatic and manual.
2. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.04 CLOSEOUT

A. Field quality-control test reports.
1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Maintain a service center capable of providing training, parts, and emergency maintenance repairs within a response period of less than eight hours from time of notification.

B. Source Limitations: Obtain automatic transfer switches and remote annunciator through one source from a single manufacturer.

C. 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.

D. Comply with Chicago Electrical Code.

E. Comply with NEMA ICS 1.

F. Comply with NFPA 70.

G. Comply with NFPA 99.

H. Comply with NFPA 110.

I. Comply with UL 1008 unless requirements of these Specifications are stricter.

1.06 PROJECT CONDITIONS

A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service:

1. Notify Architect and Owner no fewer than two days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without Owner’s written permission.

1.07 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

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

1. Onan/Cummins Power Generation; Industrial Business Group
2. Emerson; ASCO Power Technologies, LP.
3. GE Zenith Controls.
4. Or Equal.

2.02 GENERAL TRANSFER-SWITCH PRODUCT REQUIREMENTS

A. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.

B. Tested Fault-Current Closing and Withstand Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.

1. Where transfer switch includes internal fault-current protection, rating of switch and trip unit combination shall exceed indicated fault-current value at installation location.

C. Solid-State Controls: Repetitive accuracy of all settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.

D. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.41. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.

E. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism, mechanically and electrically interlocked in both directions.

F. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.

1. Limitation: Switches using molded-case switches or circuit breakers or insulated-case circuit-breaker components are not acceptable.
2. Switch Action: Double throw; mechanically held in both directions.
3. Contacts: Silver composition or silver alloy for load-current switching. Conventional automatic transfer-switch units, rated 225 A and higher, shall have separate arcing contacts.

G. Neutral Switching. Where four-pole switches are indicated, provide neutral pole switched simultaneously with phase poles.

H. Neutral Terminal: Solid and fully rated, unless otherwise indicated.

I. Annunciation, Control, and Programming Interface Components: Devices at transfer switches for communicating with remote programming devices, annunciators, or annunciator and control panels shall have communication capability matched with remote device.

J. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, either by color-code or by numbered or lettered wire and cable tape markers.
Color-coding and wire and cable tape markers are specified in Division 26 Section "Identification for Electrical Systems."

1. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.
2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.
3. Control Wiring: Equipped with lugs suitable for connection to terminal strips.

K. Enclosures: General-purpose NEMA 250, Type 1, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

2.03 AUTOMATIC TRANSFER SWITCHES

A. Comply with Level 1 equipment according to NFPA 110.

B. Switching Arrangement: Double-throw type, incapable of pauses or intermediate position stops during normal functioning, unless otherwise indicated.

C. Manual Switch Operation: Under load, with door closed and with either or both sources energized. Transfer time is same as for electrical operation. Control circuit automatically disconnects from electrical operator during manual operation.

D. Digital Communication Interface: Matched to capability of remote annunciator or annunciator and control panel.

E. Automatic Transfer-Switch Features:

1. Undervoltage Sensing for Each Phase of Normal Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage is adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.
2. Adjustable Time Delay: For override of normal-source voltage sensing to delay transfer and engine start signals. Adjustable from zero to six seconds, and factory set for one second.
3. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.
4. Time Delay for Retransfer to Normal Source: Adjustable from 0 to 30 minutes, and factory set for 10 minutes to automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.
5. Test Switch: Simulate normal-source failure.
6. Switch-Position Pilot Lights: Indicate source to which load is connected.

a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."

8. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.

9. Transfer Override Switch: Overrides automatic retransfer control so automatic transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.

10. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.

11. Engine Shutdown Contacts: Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.

12. Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods are adjustable from 10 to 30 minutes. Factory settings are for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:

a. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.

b. Push-button programming control with digital display of settings.

c. Integral battery operation of time switch when normal control power is not available.

2.04 REMOTE ANNUNCIATOR SYSTEM

A. Functional Description: Remote annunciator panel shall annunciate conditions for indicated transfer switches. Annunciation shall include the following:

1. Sources available, as defined by actual pickup and dropout settings of transfer-switch controls.

2. Switch position.

3. Switch in test mode.

4. Failure of communication link.

B. Annunciator Panel: LED-lamp type with audible signal and silencing switch.

1. Indicating Lights: Grouped for each transfer switch monitored.

2. Label each group, indicating transfer switch it monitors, location of switch, and identity of load it serves.

3. Mounting: Flush, modular, steel cabinet, unless otherwise indicated.

4. Lamp Test: Push-to-test or lamp-test switch on front panel.

2.05 SOURCE QUALITY CONTROL

A. Factory test and inspect components, assembled switches, and associated equipment. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay
settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Annunciator and Control Panel Mounting: Flush in wall, unless otherwise indicated.

B. Identify components according to Division 26 Section "Identification for Electrical Systems."

C. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

3.02 CONNECTIONS

A. Wiring to Remote Components: Match type and number of cables and conductors to control and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.

B. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

C. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.03 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform tests and inspections and prepare test reports.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.

C. Perform tests and inspections and prepare test reports.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installation, including connections, and to assist in testing.

2. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.


a. Check for electrical continuity of circuits and for short circuits.
b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
c. Verify that manual transfer warnings are properly placed.
d. Perform manual transfer operation.

5. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.

a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.
b. Simulate loss of phase-to-ground voltage for each phase of normal source.
c. Verify time-delay settings.
d. Verify pickup and dropout voltages by data readout or inspection of control settings.
e. Test bypass/isolation unit functional modes and related automatic transfer-switch operations.
f. Perform contact-resistance test across main contacts and correct values exceeding 500 microhms and values for 1 pole deviating by more than 50 percent from other poles.
g. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.


a. Verify grounding connections and locations and ratings of sensors.

D. Coordinate tests with tests of generator and run them concurrently.

E. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.

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

3.04 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment as specified below.

B. Coordinate this training with that for generator equipment.
<table>
<thead>
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<th>Trade Title</th>
<th>Rg</th>
<th>Type</th>
<th>C</th>
<th>Base</th>
<th>Foreman</th>
<th>M-F</th>
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<th>Su</th>
<th>Hol</th>
<th>H/W</th>
<th>Pension</th>
<th>Vac</th>
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**Legend**
- **Rg Region**
- **Type Trade Type - All, Highway, Building, Floating, Oil & Chip, Rivers**
- **C Class**
- **Base Wage Rate**
- **OT M-F** Unless otherwise noted, OT pay is required for any hour greater than 8 worked each day, Mon through Fri. The number listed is the multiple of the base wage.
- **OT Sa** Overtime pay required for every hour worked on Saturdays
- **OT Su** Overtime pay required for every hour worked on Sundays
- **OT Hol** Overtime pay required for every hour worked on Holidays
- **H/W** Health/Welfare benefit
- **Vac** Vacation
- **Trng** Training
- **Other Ins** Employer hourly cost for any other type(s) of insurance provided for benefit of worker.

**Explanations COOK COUNTY**

The following list is considered as those days for which holiday rates of wages for work performed apply: New Years Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, Christmas Day and Veterans Day in some classifications/counts. Generally, any of these holidays which fall on a Sunday is celebrated on the following Monday. This then makes work performed on that Monday payable at the appropriate overtime rate for holiday pay. Common practice in a given local may alter certain days of celebration. If in doubt, please check with IDOL.

**TRUCK DRIVERS (WEST) - That part of the county West of Barrington Road.**

**EXPLANATION OF CLASSES**

**ASBESTOS - GENERAL** - removal of asbestos material/mold and hazardous materials from any place in a building, including mechanical systems where those mechanical systems are to be removed. This includes the removal of asbestos materials/mold and hazardous materials from ductwork or pipes in a building when the building is to be demolished at the time or at some close future date. **ASBESTOS - MECHANICAL** - removal of asbestos material from mechanical systems, such as pipes, ducts, and boilers, where the mechanical systems are to remain.

**CERAMIC TILE FINISHER**

The grouting, cleaning, and polishing of all classes of tile, whether for interior or exterior purposes, all burned, glazed or unglazed products; all composition materials, granite tiles, warning detectable tiles, cement tiles, epoxy composite materials, pavers, glass, mosaics, fiberglass, and all substitute materials, for tile made in tile-like units; all mixtures in tile like form of cement, metals, and other materials that are for and intended for use as a finished floor surface, stair treads, promenade roofs, walls, walls, ceilings, swimming pools, and all other places where tile is to form a finished interior or exterior. The mixing of all setting mortars including but not limited to thin-set mortars, epoxies, wall mud, and any other sand and cement mixtures or adhesives when used in the preparation, installation, repair, or maintenance of tile and/or similar materials. The handling and unloading of all
sand, cement, lime, tile, fixtures, equipment, adhesives, or any other materials to be used in the preparation, installation, repair, or maintenance of tile and/or similar materials. Ceramic Tile Finishers shall fill all joints and voids regardless of method on all tile work, particularly and especially after installation of said tile work. Application of any and all protective coverings to all types of tile installations including, but not be limited to, all soap compounds, paper products, tapes, and all polyethylene coverings, plywood, masonite, cardboard, and any new type of products that may be used to protect tile installations, Blastrac equipment, and all floor scarifying equipment used in preparing floors to receive tile. The clean up and removal of all waste and materials. All demolition of existing tile floors and walls to be re-tiled.

COMMUNICATIONS ELECTRICIAN

Installation, operation, inspection, maintenance, repair and service of radio, television, recording, voice sound vision production and reproduction, telephone and telephone interconnect, facsimile, data apparatus, coaxial, fibre optic and wireless equipment, appliances and systems used for the transmission and reception of signals of any nature, business, domestic, commercial, education, entertainment, and residential purposes, including but not limited to, communication and telephone, electronic and sound equipment, fibre optic and data communication systems, and the performance of any task directly related to such installation or service whether at new or existing sites, such tasks to include the placing of wire and cable and electrical power conduit or other raceway work within the equipment room and pulling wire and/or cable through conduit and the installation of any incidental conduit, such that the employees covered hereby can complete any job in full.

MARBLE FINISHER

Loading and unloading trucks, distribution of all materials (all stone, sand, etc.), stacking of floors with material, performing all rigging for heavy work, the handling of all material that may be needed for the installation of such materials, building of scaffolding, polishing if needed, patching, waxing of material if damaged, pointing up, caulking, grouting and cleaning of marble, holding water on diamond or Carborundum blade or saw for setters cutting, use of tub saw or any other saw needed for preparation of material, drilling of holes for wires that anchor material set by setters, mixing up of molding plaster for installation of material, mixing up thin set for the installation of material, mixing up of sand to cement for the installation of material and such other work as may be required in helping a Marble Setter in the handling of all material in the erection or installation of interior marble, slate, travertine, art marble, serpentine, alberene stone, blue stone, granite and other stones (meaning as to stone any foreign or domestic materials as are specified and used in building interiors and exteriors and customarily known as stone in the trade), carrara, sanionyx, vitrolite and similar opaque glass and the laying of all marble tile, terrazzo tile, slate tile and precast tile, steps, risers treads, base, or any other materials that may be used as substitutes for any of the aforementioned materials and which are used on interior and exterior which are installed in a similar manner.

MATERIAL TESTER I: Hand coring and drilling for testing of materials; field inspection of uncured concrete and asphalt.

MATERIAL TESTER II: Field inspection of welds, structural steel, fireproofing, masonry, soil, facade, reinforcing steel, formwork, cured concrete, and concrete and asphalt batch plants; adjusting proportions of bituminous mixtures.

OPERATING ENGINEER - BUILDING

Class 1. Asphalt Plant; Asphalt Spreader; Autograde; Backhoes with Caisson Attachment; Batch Plant; Benoto (requires Two Engineers); Boiler and Throttle Valve; Caisson Rigs; Central Redi-Mix Plant; Combination Back Hoe Front End-loader Machine; Compressor and Throttle Valve; Concrete Breaker (Truck Mounted); Concrete Conveyor; Concrete Conveyor (Truck Mounted); Concrete Paver Over 27E cu. ft.; Concrete Paver 27E cu. ft. and Under; Concrete Placer; Concrete Placing Boom; Concrete Pump (Truck Mounted); Concrete Tower; Cranes, All; Cranes, Hammerhead; Cranes, (GCI and similar Type); Creter Crane; Spider Crane; Crusher, Stone, etc.; Derricks, All; Derricks, Traveling; Formless Curb and Gutter Machine; Grader; Elevating; Grouting Machines; Heavy Duty Self-Propelled Transporter or Prime Mover; Highlift Shovels or Front Endloader 2-1/4 yd. and over; Hoists, Elevators, outside type rack and pinion and similar machines; Hoists, One, Two and Three Drum; Hoists, Two Tugger One Floor; Hydraulic Backhoes; Hydraulic Boom Trucks; Hydro Vac (and similar equipment); Locomotives, All; Motor Patrol; Lubrication Technician;
Manipulators; Pile Drivers and Skid Rig; Post Hole Digger; Pre-Stress Machine; Pump Cretes Dual Ram; Pump Cretes: Squeeze Cretes-Screw Type Pumps; Gypsum Bulker and Pump; Raised and Blind Hole Drill; Roto Mill Grinder; Scoops - Tractor Drawn; Slip-Form Paver; Straddle Buggies; Operation of Tie Back Machine; Tournapull; Tractor with Boom and Side Boom; Trenching Machines.

Class 2. Boilers; Broom, All Power Propelled; Bulldozers; Concrete Mixer (Two Bag and Over); Conveyor, Portable; Forklift Trucks; Highlift Shovels or Front Endloaders under 2-1/4 yd.; Hoists, Automatic; Hoists, Inside Elevators; Hoists, Sewer Dragging Machine; Hoists, Tugger Single Drum; Laser Screed; Rock Drill (Self-Propelled); Rock Drill (Truck Mounted); Rollers, All; Steam Generators; Tractors, All; Tractor Drawn Vibratory Roller; Winch Trucks with "A" Frame.

Class 3. Air Compressor; Combination Small Equipment Operator; Generators; Heaters, Mechanical; Hoists, Inside Elevators (remodeling or renovation work); Hydraulic Power Units (Pile Driving, Extracting, and Drilling); Pumps, over 3" (1 to 3 not to exceed a total of 300 ft.); Low Boys; Pumps, Well Points; Welding Machines (2 through 5); Winches, 4 Small Electric Drill Winches.

Class 4. Bobcats and/or other Skid Steer Loaders; Oilers; and Brick Forklift.

Class 5. Assistant Craft Foreman.


Class 7. Mechanics; Welders.

OPERATING ENGINEERS - HIGHWAY CONSTRUCTION

Class 1. Asphalt Plant; Asphalt Heater and Planer Combination; Asphalt Heater Scarfire; Asphalt Spreader; Autograder/GOMACO or other similar type machines: ABG Paver; Backhoes with Caisson Attachment; Ballast Regulator; Belt Loader; Caisson Rigs; Car Dumper; Central Redi-Mix Plant; Combination Backhoe Front Endloader Machine, (1 cu. yd. Backhoe Bucket or over or with attachments); Concrete Breaker (Truck Mounted); Concrete Conveyor; Concrete Paver over 27E cu. ft.; Concrete Placer; Concrete Tube Float; Cranes, all attachments; Cranes, Tower Cranes of all types: Creter Crane; Spider Crane; Crusher, Stone, etc.; Derrick, All; Derrick Boats; Derricks, Traveling; Dredges; Elevators, Outside type Rack & Pinion and Similar Machines; Formless Curb and Gutter Machine; Grader, Elevating; Grader, Motor Grader, Motor Patrol, Auto Patrol, Form Grader, Pull Grader, Subgrader; Guard Rail Post Driver Truck Mounted; Hoists, One, Two and Three Drum; Heavy Duty Self-Propelled Transporter or Prime Mover; Hydraulic Backhoes; Backhoes with shear attachments up to 40' of boom reach; Lubrication Technician; Manipulators; Mucking Machine; Pile Drivers and Skid Rig; Pre-Stress Machine; Pump Cretes Dual Ram; Rock Drill - Crawler or Skid Rig; Rock Drill - Truck Mounted; Rock/Track Tamper; Roto Mill Grinder; Slip-Form Paver; Snow Melters; Soil Test Drill Rig (Truck Mounted); Straddle Buggies; Hydraulic Telescoping Form (Tunnel); Operation of Tieback Machine; Tractor Drawn Belt Loader; Tractor Drawn Belt Loader (with attached pusher - two engineers); Tractor with Boom; Tractaire with Attachments; Traffic Barrier Transfer Machine; Trenching; Truck Mounted Concrete Pump with Boom; Raised or Blind Hole Drills (Tunnel Shaft); Underground Boring and/or Mining Machines 5 ft. in diameter and over tunnel, etc; Underground Boring and/or Mining Machines under 5 ft. in diameter; Wheel Excavator; Widener (APSCO).

Class 2. Batch Plant; Bituminous Mixer; Boiler and Throttle Valve; Bulldozers; Car Loader Trailing Conveyors; Combination Backhoe Front Endloader Machine (Less than 1 cu. yd. Backhoe Bucket or over or with attachments); Compressor and Throttle Valve; Compressor, Common Receiver (3); Concrete Breaker or Hydro Hammer; Concrete Grinding Machine; Concrete Mixer or Paver 7S Series to and including 27 cu. ft.; Concrete Spreader; Concrete Curing Machine, Burlap Machine, Belting Machine and Sealing Machine; Concrete Wheel Saw; Conveyor Muck Cars (Haglund or Similar Type); Drills, All; Finishing Machine - Concrete; Highlift Shovels or Front Endloader; Hoist - Sewer Dragging Machine; Hydraulic Boom Trucks (All Attachments); Hydro-Blaster; Hydro Excavating (excluding hose work); Laser Screed; All Locomotives, Dinky; Off-Road Hauling Units (including articulating) Non Self-Loading Ejection Dump; Pump Cretes: Squeeze Cretes - Screw Type Pumps, Gypsum Bulker and Pump; Roller, Asphalt; Rotary Snow Plows; Rototiller, Seaman, etc., self-propelled; Self-Propelled Compactor; Spreader - Chip - Stone, etc.; Scraper - Single/Twin
Engine/Push and Pull; Scraper - Prime Mover in Tandem (Regardless of Size); Tractors pulling attachments, Sheeps Foot, Disc, Compactor, etc.; Tug Boats.

Class 3. Boilers; Brooms, All Power Propelled; Cement Supply Tender; Compressor, Common Receiver (2); Concrete Mixer (Two Bag and Over); Conveyor, Portable; Farm-Type Tractors Used for Mowing, Seeding, etc; Forklift Trucks; Grouting Machine; Hoists, Automatic; Hoists, All Elevators; Hoists, Tugger Single Drum; Jeep Diggers; Low Boys; Pipe Jacking Machines; Post-Hole Digger, Power Saw, Concrete Power Driven; Pug Mills; Rollers, other than Asphalt; Seed and Straw Blower; Steam Generators; Stump Machine; Winch Trucks with "A" Frame; Work Boats; Tamper-Form-Motor Driven.

Class 4. Air Compressor; Combination - Small Equipment Operator; Directional Boring Machine; Generators; Heaters, Mechanical; Hydraulic Power Unit (Pile Driving, Extracting, or Drilling); Light Plants, All (1 through 5); Pumps, over 3" (1 to 3 not to exceed a total of 300 ft); Pumps, Well Points; Vacuum Trucks (excluding hose work); Welding Machines (2 through 5); Winches, 4 Small Electric Drill Winches.

Class 5. SkidSteer Loader (all); Brick Forklifts; Oilers.

Class 6. Field Mechanics and Field Welders

Class 7. Dowell Machine with Air Compressor; Gradall and machines of like nature.

OPERATING ENGINEER - FLOATING

Class 1. Craft Foreman; Master Mechanic; Diver/Wet Tender; Engineer; Engineer (Hydraulic Dredge).

Class 2. Crane/Backhoe Operator; Boat Operator with towing endorsement; Mechanic/Welder; Assistant Engineer (Hydraulic Dredge); Leverman (Hydraulic Dredge); Diver Tender.

Class 3. Deck Equipment Operator, Machineryman, Maintenance of Crane (over 50 ton capacity) or Backhoe (115,000 lbs. or more); Tug/Launch Operator; Loader/Dozer and like equipment on Barge, Breakwater Wall, Slip/Dock, or Scow, Deck Machinery, etc.

Class 4. Deck Equipment Operator, Machineryman/Fireman (4 Equipment Units or More); Off Road Trucks; Deck Hand, Tug Engineer, Crane Maintenance (50 Ton Capacity and Under) or Backhoe Weighing (115,000 pounds or less); Assistant Tug Operator.

Class 5. Friction or Lattice Boom Cranes.

Class 6. ROV-Pilot, ROV Tender

TERRAZZO FINISHER

The handling of sand, cement, marble chips, and all other materials that may be used by the Mosaic Terrazzo Mechanic, and the mixing, grinding, grouting, cleaning and sealing of all Marble, Mosaic, and Terrazzo work, floors, base, stairs, and wainscoting by hand or machine, and in addition, assisting and aiding Marble, Masonic, and Terrazzo Mechanics.

TRAFFIC SAFETY

Effective November 30, 2018, the description of the traffic safety worker trade in this County is as follows: Work associated with barricades, horses and drums used to reduce lane usage on highway work, the installation and removal of temporary, non-temporary or permanent lane, pavement or roadway markings, and the installation and removal of temporary road signs.

TRUCK DRIVER - BUILDING, HEAVY AND HIGHWAY CONSTRUCTION - EAST & WEST
Class 1. Two or three Axle Trucks. A-frame Truck when used for transportation purposes; Air Compressors and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry-alls; Fork Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors 2-man operation; Pavement Breakers; Pole Trailer, up to 40 feet; Power Mower Tractors; Self-propelled Chip Spreader; Skipman; Slurry Trucks, 2-man operation; Slurry Truck Conveyor Operation, 2 or 3 man; Teamsters; Unskilled Dumpman; and Truck Drivers hauling warning lights, barricades, and portable toilets on the job site.

Class 2. Four axle trucks; Dump Crets and Adgetors under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-mix Plant Hopper Operator, and Winch Trucks, 2 Axles.

Class 3. Five axle trucks; Dump Crets and Adgetors 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers or turnapulls when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, 1-man operation; Pole Trailer, over 40 feet; Pole and Expandable Trailers hauling material over 50 feet long; Slurry trucks, 1-man operation; Winch trucks, 3 axles or more; Mechanic--Truck Welder and Truck Painter.

Class 4. Six axle trucks; Dual-purpose vehicles, such as mounted crane trucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front.

Other Classifications of Work:

For definitions of classifications not otherwise set out, the Department generally has on file such definitions which are available. If a task to be performed is not subject to one of the classifications of pay set out, the Department will upon being contacted state which neighboring county has such a classification and provide such rate, such rate being deemed to exist by reference in this document. If no neighboring county rate applies to the task, the Department shall undertake a special determination, such special determination being then deemed to have existed under this determination. If a project requires these, or any classification not listed, please contact IDOL at 217-782-1710 for wage rates or clarifications.

LANDSCAPING

Landscaping work falls under the existing classifications for laborer, operating engineer and truck driver. The work performed by landscape plantsman and landscape laborer is covered by the existing classification of laborer. The work performed by landscape operators (regardless of equipment used or its size) is covered by the classifications of operating engineer. The work performed by landscape truck drivers (regardless of size of truck driven) is covered by the classifications of truck driver.

MATERIAL TESTER & MATERIAL TESTER/INSPECTOR I AND II

Notwithstanding the difference in the classification title, the classification entitled "Material Tester I" involves the same job duties as the classification entitled "Material Tester/Inspector I". Likewise, the classification entitled "Material Tester II" involves the same job duties as the classification entitled "Material Tester/Inspector II".