REQUEST FOR BIDS

Specifications and Contract Documents
For
DHW Replacement at Highland View Apartments,
300 Highland Ave,
Palisades Park, NJ 07650

For Bid Information
Erick Martinez, Purchasing Agent
Phone: (201) 892-4313
martinez@habcnj.org

LAN Associates
445 Godwin Avenue
Midland Park, NJ 07432
(201) 447-6400

JUNE 25, 2021

REQUEST FOR BIDS

The Housing Authority of Bergen County, in compliance with N.J.S.A. 19:44A-20.4 et seq., N.J.S.A 10:5-31& N.J.A.C. 17-27 et seq. is seeking Sealed Rebids for:

DHW REPLACEMENT

AT HIGHLAND VIEW APARTMENTS,
300 Highland Avenue, Palisades Park, NJ 07650

Request for rebids may be obtained on our website www.habcnj.org.

The bid opening will be held REMOTELY at 9:30 a.m. (prevailing time) on Wednesday, July 14, 2021, in the Conference Room of the Housing Authority of Bergen County, One Bergen County Plaza, Floor 2, Hackensack, New Jersey 07601 at which time they will be opened and publicly read via Zoom as detailed below. LATE BIDS WILL NOT BE ACCEPTED. PHOTOCOPIES OR FACSIMILES OF THE BID DOCUMENTS WILL NOT BE ACCEPTED IN LIEU OF THE ORIGINALS.

During the COVID-19 pandemic, all bid packets will ONLY be available electronically on "VendorRegistry". Vendors can register on the following link:

https://vrapp.vendorregistry.com/Vendor/Register/Index/bergen-county-housing-authority-nj-vendor-registration

Once registered, a vendor will be able to download and open any requests for bids on the following link:

https://vrapp.vendorregistry.com/Bids/View/BidsList?BuyerId=ae35e3d1-5079- 4fe0-9688-0d6422c5d4bf

All documents must be completed as required, and vendor must submit their bids electronically no later than the date and time outlined in the bid documents.

Additionally, pursuant to N.J.S.A. 40A: 11-23 a hard copy of each bid must also be mailed:

1) on original forms, as made available electronically, in a sealed envelope no later than the date and time outlined in the bid documents.
2) addressed and mailed to the HABC Purchasing Department as noted below
3) bearing the name and address of the bidder on the outside
4) clearly marked "BID" with the name of the item(s) being bid

Housing Authority of Bergen County,
Purchasing Department
One Bergen County Plaza, Floor 2,
Hackensack, NJ 07601

It should be noted that electronic bid submissions will be kept locked and will only be made accessible to the Authority on the prescribed bid opening date and time herein noted. Additionally, all hard copies mailed to the above address shall be kept sealed and will be received and publicly opened via teleconferencing on the date and time specified below in the conference room of the Housing Authority of Bergen County, One Bergen County Plaza, Floor 2, Hackensack, New Jersey 07601. This bid opening can be attended by logging into Zoom in the following manner:

Join Zoom Meeting:
Time: Wednesday, July 14, 2021, at 9:30 AM Eastern Time (US and Canada)
https://us04web.zoom.us/j/9927769002?pwd=bjJYUjhBamQySFdyQURYVVRiZjBDdz09
Meeting ID: 992 776 9002
Password: HABC0828

The Housing Authority of Bergen County reserves the right to reject any or all bids or to waive any informalities contained therein. No bid shall be withdrawn for a period of sixty (60) days subsequent to the bid's due date without the consent of the Housing Authority of Bergen County.

Lynn Bartlett
Executive Director
Housing Authority of Bergen County

By: Vincent Bufis, Q.P.A.
Director of Operations

HABC **CONTENTS OF BID PACKAGE** *Form PD002* (Revised 11.13.2014)	**HOUSING AUTHORITY OF BERGEN COUNTY** **INVITATION TO BID**	**BID NUMBER:**		**HABC 2021.07.14.01**
	Direct Questions concerning this Bid to: ERICK MARTINEZ, PURCHASING AGENT PHONE: ***201-892-4313*** MARTINEZ@HABCNJ.ORG	DESCRIPTION OF SERVICES **DHW Replacement at Highland View Apartments**		
		CONTRACT TERM **90 Days**	BEGINNING **08/01/2021**	ENDING **10/30/2021**
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CONTENTS OF BID PACKAGE

#		NAME OF DOCUMENT
1	X	PUBLIC ADVERTISEMENT FOR INVITATION FOR BID (FROM THE RECORD, JULY 2, 2021) MADE A PART OF THESE BID DOCUMENTS
2	X	SUBMISSION CHECKLIST
3	X	SPECIFICATIONS HABC 2021.07.14.02 DATED JUNE 25, 2021, AS PREPARED BY THE HOUSING AUTHORITY OF BERGEN COUNTY
4	X	BID FORM(S)
5	X	BIDDER'S AFFIDAVIT
6	X	AFFIDAVIT OF NON-DEFAULT
7	X	NON-COLLUSION AFFIDAVIT (MUST BE NOTARIZED)
8	X	STOCKHOLDER DISCLOSURE CERTIFICATION
9	X	AFFIRMATIVE ACTION AFFIDAVIT AND REGULATIONS (MUST BE NOTARIZED)
10	X	AFFIDAVIT FOR MINORITY BUSINESS ENTERPRISE (MUST BE NOTARIZED)
11	X	GENERAL CONTRACTOR AND SUBCONTRACTOR QUALIFICATION QUESTIONNAIRE (2 PAGE NARRATIVE INSTRUCTIONS)
12	X	GENERAL CONTRACTOR QUALIFICATION QUESTIONNAIRE
13	X	SUB-CONTRACTOR QUALIFICATION QUESTIONNAIRE **FOR EACH SUB-CONTRACTOR TO BE USED**
14	X	REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS TO BIDDERS (Form HUD 5369-A)
15	X	HOLIDAY SCHEDULE
16		INTENTIONALLY LEFT BLANK
17		INSTRUCTIONS TO BIDDERS FOR CONTRACTS FOR PUBLIC HOUSING PROGRAMS (Form HUD 5369)
18		STANDARD TERMS AND CONDITIONS
19		INTENTIOANLLY LEFT BLANK
20		INTENTIONALLY LEFT BLANK
21	X	STATEMENT OF COMPLIANCE WITH HUD DETERMINED PREVAILING WAGE RATES IN EFFECT ON BID OPENING DATE
22	X	PUBLIC WORKS CONTRACTOR REGISTRATION ACT CERTIFICATE (TO BE SUBMITTED BY CONTRACTOR AND EACH SUB-CONTRACTOR USED)
23	X	REFERENCES ATTACHMENT
24	X	CONTRACTOR & SUB-CONTRACTOR QUALIFICATIONS AND LICENSING REQUIREMENTS
25	X	NEW JERSEY BUSINESS REGISTRATION CERTIFICATE (TO BE SUBMITTED BY CONTRACTOR AND EACH SUB-CONTRACTOR USED)
26		INTENTIONALLY LEFT BLANK
27		HUD DETERMINED PREVAILING WAGE RATES
28		INTENTIONALLY LEFT BLANK
29	X	ACKNOWLEDGEMENT OF RECEIPT OF ADDENDA
30	X	CONFLICT OF INTEREST & POLITICAL CONTRIBUTION DISCLOSURE FORM
31	X	SECTION 3 REQUIREMENTS AND CERTIFICATION OF CONFORMITY
32	X	W-9 FORM SAMPLE (REQUEST FOR TAXPAYER IDENTIFICATION NUMBER AND CERTIFICATION)
33	X	DISCLOSURE OF INVESTMENT ACTIVITIES IN IRAN
34	X	DLG FEDERAL DEBARMENT MODEL FORM
35	X	TECHNICAL SPECIFICATIONS PREPARED BY LAN ASSOCIATES

BIDDERS PLEASE NOTE: ALL ITEMS PRECEDED BY AN "X" MUST BE RETURNED IN YOUR BID PACKAGE.
FAILURE TO INCLUDE ANY OF THESE ITEMS MAY DISQUALIFY YOU AS A BIDDER

PRE-BID MEETING: NONE SCHEDULED

BID OPENING DATE: 9:30 AM ON WEDNESDAY, JULY 14, 2021

DEADLINE FOR QUESTIONS AND CLARIFICATIONS: 10:00 AM ON FRIDAY, JULY 9, 2021

BID DOCUMENT SUBMISSION CHECKLIST ***Form PD003*** (Revised 11.13.2014)	**HOUSING AUTHORITY OF BERGEN COUNTY** **INVITATION TO BID** ***Direct Questions concerning this RFP/Bid to:*** ERICK MARTINEZ, PURCHASING AGENT PHONE: ***201-892-4313*** MARTINEZ@HABCNJ.ORG	**BID NUMBER:**	**HABC 2021.07.14.01**
		DESCRIPTION OF SERVICES	
		DHW Replacement at Highland View Apartments	
		CONTRACT TERM **90 Days**	BEGINNING **8/01/2021** / ENDING **10/30/2021**

BID DOCUMENT SUBMISSION CHECKLIST ---Page 1

Failure to submit the following documents is a mandatory cause for the bid to be rejected (N.J.S.A. 40A:11-23.2)

	DOCUMENT NAME REQUIRED WITH SUBMISSION OF BID	INITIAL EACH ITEM SUBMITTED BIDDER	HABC
X	STOCKHOLDER DISCLOSURE CERTIFICATION, PURSUANT TO N.J.S.A. 52:25-24.2 (P.L. 1977, c33)		
X	A LISTING OF ALL SUB-CONTRACTORS AS REQUIRED BY N.J.S.A. 11-16, INCLUDING SUB-CONTRACTOR QUALIFICATION QUESTIONNAIRE (8 PAGE) FOR EACH SUB-CONTRACTOR USED		
X	ACKNOWLEDGEMENT OF RECEIPT OF ADDENDA (AS APPLICABLE) OF ANY NOTICE, REVISION OR ADDENDA TO AN ADVERTISEMENT, SPECIFICATION OR BID DOCUMENT		

Failure to submit the following documents may be cause for the bid to be rejected (N.J.S.A. 40A:11-23.1b)

	DOCUMENT NAME REQUIRED WITH SUBMISSION OF BID	INITIAL EACH ITEM SUBMITTED BIDDER	HABC
X	BID PROPOSAL FORM(S)		
X	BID GUARENTEE (DEPOSIT IN THE FORM OF A CERTIFIED CHECK, CASHIER'S CHECK OR BID BOND)		
X	CERTIFICATE FROM A SURETY COMPANY		
X	NON-COLLUSION AFFIDAVIT		
X	BIDDER'S AFFIDAVIT		
X	AFFIDAVIT OF NON-DEFAULT		
X	AFFIRMATIVE ACTION AFFIDAVIT AND REGULATIONS		
X	AFFIDAVIT FOR AFFIRMATIVE ACTION PLAN		
X	AFFIDAVIT FOR MINORITY BUSINESS ENTERPRISE		
X	GENERAL CONTRACTOR QUALIFICATION QUESTIONNAIRE		
X	REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS TO BIDDERS		
X	STATEMENT OF COMPLIANCE WITH HUD DETERMINED PREVAILING WAGE RATES		
X	REFERENCES ATTACHMENT		
X	CONTRACTOR & SUB-CONTRACTOR QUALIFICATIONS, LICENSING REQUIREMENTS, INCLUDING PUBLIC WORKS CONTRACTOR REGISTRATION CERTIFICATE		
X	BUSINESS REGISTRATION CERTIFICATE, PURSUANT TO P.L. 2004, c57 (MUST BE SUBMITTED FOR THE CONTRACTOR AND EACH SUB-CONTRACTOR USED)		
X	CONFLICT OF INTEREST & POLITICAL CONTRIBUTION DISCLOSURE CERTIFICATION		
X	W-9 FORM (REQUEST FOR TAXPAYER IDENTIFICATION NUMBER & CERTIFICATION)		
X	SECTION 3 REQUIREMENTS & CERTIFICATION OF CONFORMITY		
X	DISCLOSURE OF INVESTMENT ACTIVITIES IN IRAN		
	See Specs for additional Documents that may be required.		

BID DOCUMENT SUBMISSION CHECKLIST --- Page 2

TO BE COMPLETED BY RESPONDENT	
Please Type or Print in Ink	
Firm Name and Address: _____ _____ _____	**Federal Taxpayer ID Number** **Telephone Number (24 hour #)**
E-Mail Address	**Fax Number**
Signature of the Respondent attests that the Respondent has read, understands and agrees to all terms, conditions, plans and specifications set forth in this Invitation for Bid, including all addenda	
ORIGINAL Signature of Respondent _____	**PRINT/ TYPE NAME & TITLE** **DATE**

INFORMATION TO BIDDERS

CONTRACT PERIOD

The Contract will be for **90 CALENDAR DAYS beginning on August 1, 2021 and expiring on October 30, 2021.** The Housing Authority of Bergen County reserves the right at its sole discretion, to extend the contract for an additional 12 months beyond the original contract period. The contractor must agree to the extension.

INTENT

The purpose of this solicitation is to provide the Housing Authority of Bergen County with ***DHW Replacement at Highland View Apartments***

CONDITIONS

It is the obligation of the Bidder/Contractor to make his/her own investigation of all Building conditions prior to submitting their bid.

QUOTATIONS AND BIDS

The Housing Authority of Bergen County is exempt from any local, state or federal sales use or excise tax. The Authority will not pay service charges such as interest or late fees.

GENERAL INSTRUCTIONS TO BIDDERS

1. PREQUALIFICATION OF BIDDERS

Prequalification of bidders will not be required but when requested the bidder shall furnish satisfactory evidence

of sufficient experience, financial ability, plant and equipment to perform the work.

2. SUBMISSION OF BIDS

A. Sealed bids shall be received in accordance with the public advertisement, as required by law; a copy of said notice is being attached hereto and made a part of these specifications.

Each bid is to be submitted on the bid forms attached, in a sealed envelope addressed to:

Housing Authority of Bergen County,
Purchasing Department
One Bergen County Plaza, Floor 2,
Hackensack, NJ, 07601

and bearing the name and address of the bidder on the outside, and clearly marked "BID" with the name of the item(s) being bid. Bid submitted on forms other than herewith provided will be rejected.

A. It is the bidder's responsibility to see that bids are presented to the Authority's Purchasing Department on the hour and at the place designated (at the address shown above). Bids will not be accepted after the designated time and date.

B. The Housing Authority of Bergen County reserves the right to postpone the date for presentation and opening of bids and will give written notice of any such postponement to each prospective bidder as required by law.

3. BID GUARANTEE, CONCENT OF SURETY AND PERFORMANCE BOND

1. BID BOND

- Each bid must be accompanied by the Certified Check of the bidder or by a Cashier's Check, or by a Bid Bond, duly executed by the bidder as principal, having surety thereon, a surety company approved by the Authority, in an amount not less than ten percent (10%) of the amount of the base bid submitted, said 10% not to exceed $20,000.00 pursuant to N.J.S.A. 40A:11-21, payable to the Housing Authority of Bergen County. Only **originals** will be accepted.

2. CONSENT OF SURETY

- In addition, the bid must also be accompanied by a Certificate (Consent of Surety) from a Surety Company stating that it will provide said bidder with a Performance Bond in the full amount of the bid.

Per N.J.S.A. 40A:11-24(a), All bid security, except the security of the three apparent lowest responsible bidders, shall be returned, unless otherwise requested by the bidder, within ten (10) days after the opening of bids, **Sundays and holidays excepted**, and the bids of such bidders shall be considered as withdrawn. Within three (3) days, **Sundays and holidays excepted**, after the awarding and signing of the contract, and the approval of the contractor's performance bond, the bid security of the remaining unsuccessful bidders shall be returned to them.

4. QUOTATIONS AND BIDS

1. The Housing Authority of Bergen County is exempt from any local, state or federal sales, use or excise tax.
2. Bids must be signed in ink by the bidder; all quotations shall be made with a typewriter or pen and ink. Any quotation showing any erasure alteration must be initialed by the bidder in ink. Unit prices and totals are to be inserted in spaces provided.

3. Failure to sign all documents and provide all information in the bid may result in the bid being rejected.
4. After award of the contract and without invalidating the contract, the Housing Authority of Bergen County may order extra items or make changes by altering, adding to or deducting from the items, with the contract sum being adjusted accordingly. Materials and workmanship for additional items shall conform to that in the original specification. No extra items or changes shall be made unless in pursuance of a written order from the Purchasing Agent, and no claim for an addition or credit to the contract sum shall be valid unless so ordered.
5. The Housing Authority of Bergen County shall at its sole discretion and option, request a three-price quote for any item in this contract, for the purpose of determining the reasonableness of the price proposal.
6. The Housing Authority of Bergen County may at its sole discretion and option, request a price proposal for any items not part of the scope of work and this contract, and shall procure the services of the vendor who submits the best and most advantageous price proposal to the Authority.
7. Insert prices for furnishing all of the services described. Prices shall be net including all transportation charges fully prepaid by the contractor F.O.B. destination as designated by the Housing Authority of Bergen County. No additional charges will be allowed for any transportation costs resulting from partial shipments made at vendor's convenience when a single shipment is ordered.
8. Carelessness in quoting prices or in preparation of the bid will not relieve the bidder from performance of the services required by these bid documents.
9. The inability of any bidder to quote on all items listed in this solicitation will not preclude consideration of his/her bid.
10. Bidders shall submit net prices with all discounts taken into consideration and total lump sum for all items they are eligible or interested in bidding upon. Prices quoted shall be net with all discounts deducted and subject only to cash discounts for prompt payment of invoice.
11. In accordance with advertisement, bids will be received for the performance of the project, the designation of which is stated in the advertisement. Bids are requested on the items stated in the bid form for the project. The prices bid shall cover all costs of any nature, incident to and growing out of the work. In explanation but not in limitation thereof, these costs shall include the cost of all work, labor, material, equipment, transportation, travel time, and all else necessary to perform and complete the project in the manner and within the time required, all incidental expenses in connection therewith, all cost on account of loss by damage or destruction of the project and any additional expenses, for unforeseen difficulties encountered, for settlement of damages, and for replacement of defective work and materials, conditions, limitations or provisos attached by the bidder to the bid may be cause for rejection.
12. When an error is made in calculating the total bid amounts, the line item unit bid price will govern. No price escalation will be permitted after quote has been submitted.
13. No bidder will be allowed to offer more than one price on the items requested even though he may feel that he has two or more types that will meet specifications. Bidders must determine for themselves which to offer. If said bidder should submit more than one price on said item in same bid, all prices for that item may be rejected at the discretion of the Housing Authority of Bergen County.
14. Any bidder may withdraw his/her bid at any time before the time set for receipt of bids. No bid may be withdrawn in the 60-day period after the bids are received.
15. All forms shall be completed and attached to the bid.
16. Before submitting his/her bid, the bidder shall be familiar with the plans, specifications and other documents that will form parts of the contract, shall have investigated in detail the site of the project and shall have made such examination thereof as may be necessary to satisfy him/herself in regards to the character and amount of work involved. He/she shall have satisfied him/herself also that he can secure the necessary labor and equipment, and that the materials he proposes to use will comply with the requirements therefore and can be obtained by him/her in the quantities and at the time required.

5. CHANGE ORDERS

The quantities of equipment, services and supplies as required by these specifications are based on current needs and estimated projections. If requirements change and funds become available, the Housing Authority of Bergen County reserves the right to issue change orders increasing or decreasing the estimated quantities as stated. This

right will not expire during the life of the contract.

6. INTERPRETATION AND ADDENDA

The bidder understands and agrees that its bid is submitted on the basis of the specifications prepared by the Authority. The bidder accepts the obligation to become familiar with these specifications.

Bidders are expected to examine the specifications and related documents with care and observe all their requirements. Ambiguities, errors or omissions noted by bidders should be promptly reported in writing to the Contracting Officer of the Authority. In the event the bidder fails to notify the Authority of such ambiguities, errors or omissions, the bidder shall be bound by the bid.

A) No oral interpretation shall be made to any bidder as to the meaning of any of the contract documents or be effective to modify any of the provisions of the specifications and contract documents.
B) Each and every request for an interpretation shall be e-mailed to Erick Martinez at martinez@habcnj.org.
C) Any interpretations of these bid specifications and any supplemental instructions will be in the form of a written addendum which will be forwarded to all prospective bidders on record by Certified Mail not later than five (5) working days prior to the date fixed for the opening of bids. Failure of any bidder to receive addenda shall not relieve the bidder from any obligation under its bid submitted.
D) All addenda issued prior to date of receipt of bids shall become part of the contract documents and included in bid prices.
E) Bidders are required to complete, when appropriate, the form acknowledging receipt of changes to bid documents.
F) The Housing Authority of Bergen County's interpretation of the meaning and intent of these bid documents and the contract shall be final and conclusive.
G) In case of any discrepancy between any of these items, the one with more specific language takes precedence over any with general language, and the one that is more stringent takes precedence over the one that is less stringent.

7. BRAND NAMES, STANDARDS OF QUALITY, PATENTS

a) Only manufactured and farm products of the United States, wherever available, shall be used on this contract in accordance with prevailing statutes.
b) Brand names and or descriptions used in this bid are to acquaint bidders with the type of commodity desired and will be used as a standard by which alternate or competitive materials offered will be judged. Competitive items must be equal to the standard described and the materials offered are to be fully explained by the bidder on a separate sheet and submitted with the bid form. Vendor's literature will not suffice in explaining exceptions to these specifications. In the absence of any changes by the bidder, it will be presumed and required that materials as described in the bid be delivered.
c) The Housing Authority of Bergen County reserves the right to evaluate the equivalency of the product, which, in its deliberations, meets the intentions of the Housing Authority of Bergen County.
d) The contractor shall hold and save harmless the Housing Authority of Bergen County, its officers, agents, servants and employees from any liability of any nature and kind for or on account of the use of any copyrighted or un-copyrighted composition, secret process, patented or unpatented invention or article furnished or used in the performance of this contract.
e) Wherever practical and economical to the Housing Authority of Bergen County, it is desired that recycled or recyclable products be used. Please indicate when recycled products are being offered.

8. AWARD OF BID

a) The Housing Authority of Bergen County reserves the right to accept or reject any or all bids, to waive identified irregularities and technicalities, and to award in whole or in part to the lowest responsible bidder, if it is in the best interest of the Housing Authority of Bergen County to do so. Without limiting the generality of the foregoing, any bid which is incomplete, obscure or irregular may be rejected; any

bid having erasures or corrections in the price sheet may be rejected; any bid in which unit prices are omitted, or in which unit/total prices are unbalanced, may be rejected; any bid accompanied by any insufficient or irregular certified check, cashier's check or bid bond may be rejected.

b) The Housing Authority of Bergen County further reserves the right to award each item separately to the lowest responsible bidder meeting specifications or to make an award based on the total bid to the bidder whose total sum is the low bid meeting the specifications, whichever in the Authority's opinion is in its' best interest. Without limiting the generality of the foregoing, the Housing Authority of Bergen County reserves the right to award a contract based on either option that may be described in the bid or based on any combination thereof. **The Authority also reserves the right to reject the bid of any respondent who has previously failed to perform properly, or to complete on time any contract work of a similar nature or who is not in a position to perform the contract.**

c) The Housing Authority of Bergen County reserves the right to award equal or tie bids at their discretion to any one of the tie bidders.

d) The Housing Authority of Bergen County reserves the right to award multiple contracts, both to the lowest responsive and responsible bidder as the Primary contractor and to the second lowest responsive and responsible bidder as the Secondary contractor. In the event of the inability or failure of the primary contractor to respond to a request for emergency service within the specified time, the secondary contractor will be notified of the request for service.

e) Should the bidder, to whom the contract is awarded, fail to enter into a contract, the Housing Authority of Bergen County may then, at its option, accept the bid of the next lowest responsible bidder.

f) **The effective period of this contract will be for a period of 90 DAYS <u>unless otherwise noted in the specifications.</u>** Continuation of the terms of this contract beyond the fiscal year is contingent on availability of sufficient funds in the following year's budget. In the event of unavailability of such funds, the Authority reserves the right to cancel the contract. The Authority, at its sole discretion shall have the option to extend the contract for one (1) additional year upon expiration of the original contract term. Such contract extension must first be agreed to in writing by both the Authority and the contractor.

g) government entities are not private business/consumer clients; therefore, separate company agreements are not honored. Terms of the specifications/bid package prevail unless otherwise noted by the vendor as exceptions.

9. <u>NEW JERSEY PREVAILING WAGE ACT (P.L. 1963 C. 150 AS AMENDED)</u>

Pursuant to N.J.S.A. 34:11-56.25 et seq., contractors on projects for public work shall adhere to all requirements of the New Jersey Prevailing Wage Act. The contractor shall be required to submit a certified payroll record to the owner within ten (10) days of the payment of the wages. The contractor is also responsible for obtaining and submitting all subcontractors' certified payroll records within the aforementioned time period. The contractor shall submit said certified payrolls in the form set forth in N.J.A.C. 12:50-6.1(c). additional information is available at: **www.state.nj.us/labor/lsse/lspubcon.html**

10. <u>NON-COLUSION AFFIDAVIT</u>

The Non-Collusion Affidavit, which is part of these specifications, shall be properly executed and submitted intact with the bid.

11. <u>NON-DISCRIMINATION</u>

There shall be no discrimination against any employee engaged in the work required to produce the commodities covered by any contract resulting from this bid, or against any applicant to such employment because of race, creed, color, national origin or ancestry, sexual or affectional preference or handicap. This provision shall include, but not be limited to the following: employment upgrading, demotion, transfer, recruitment or recruitment advertisement, layoff or termination, rates of pay or other forms of compensation, and selection of training, including apprenticeship. The contractor shall insert a similar provision in all subcontractors for services to be covered by any contract resulting from this bid.

12. REQUIRED AFFIRMATIVE ACTION EVIDENCE

NO FIRM MAY BE ISSUED A CONTRACT UNLESS IT COMPLIED WITH THE AFFIRMATIVE ACTION REGULATIONS OF P.L. 1975, C. 127, AS AMENDED FROM TIME TO TIME, AND THE AMERICANS WITH DISABILITIES ACT.

a) Procurement, Professional and Service Contract

All successful vendors must submit within seven days of the notice of intent to award or the signing of the contract one of the following:

1) A photocopy of their Federal Letter of Affirmative Action Plan Approval, or
2) A photocopy of their Certificate of Employee Information Report, or
3) A competed Affirmative Action Employee Information Report (AA302 – Available upon request)

b) Construction Contracts

All successful contractors must submit within three days of the signing of the contract an Initial Project Manning Report (AA201 – available upon request) for any contract award that meets or exceeds the bidding threshold.

13. WORKER AND COMMUNITY RIGHT TO KNOW

The manufacturer or supplier of a substance or mixture shall supply the Chemical Abstracts Service number of all the components of the mixture or substance and the chemical name to the Housing Authority of Bergen County to assure that every container bears a proper label 315 "Worker and Community Right to Know Act", subsection b, section 14. Further, all applicable Material Safety Data Sheets (MSDS) a.k.a. hazardous substance fact sheet, must be furnished to the Housing Authority of Bergen County.

14. STATEMENT OF CORPORATE OWNERSHIP DISCLOSURE

In accordance with N.J.S.A. 52:25-24.2, no corporation, partnership, limited partnership, limited liability corporation, limited liability partnership, Subchapter S corporation or sole proprietorship, shall be awarded a contract, unless prior to the receipt of the bid or accompanying the bid of the corporation, partnership, limited partnership, limited liability corporation, limited liability partnership, subchapter S corporation or sole proprietorship, there is submitted to the Authority a statement setting forth the names and addresses of all stockholders who own 10% or more of the stock, of any class or of all individual partners who own 10% or greater interest in the corporation or partnership, the stockholders holding 10% or more of that corporation's stock, or the individual partners owning 10% or greater interest in that partnership, as the case may be, shall also be listed. The disclosure shall be continued until names and addresses of every non-corporate stockholder and individual partner, exceeding the 10% ownership criteria established in this act has been listed. This form shall be signed and submitted with the bid/proposal whether or not a stockholder or partner owns less than 10% of the business submitting the bid. Failure to comply requires mandatory rejection of the bid proposal.

15. ACQUISTION, MERGER, SALE AND/OR TRANSFER OF BUSINESS, ETC.

It is understood by all parties that if, during the life of the contract, the contractor disposes of his/her business concern by acquisition, merger, sale and/or transfer or by any means convey his/her interest(s) to another party, all obligations are transferred to that new party. In this event, the new owner(s) will be required to submit, when required, a performance bond in the amount of the open balance of the contract.

16. INSURANCE REQUIREMENTS

a) The Bidder/Contractor must secure and maintain the following coverage during the term of this contract

(unless an exception is provided herein):

INSURANCE COVERAGE REQUIREMENTS

1. **Commercial General Liability**
   Insurance naming the Housing Authority of Bergen and its Agents as an additional insured, with limits of not less than:

General Aggregate:	$2,000,000
Products/Completed Operations Aggregate:	$1,000,000
Personal Injury:	$1,000,000
Each Occurrence:	$1,000,000

2. **Automobile Liability**
   Insurance with limits of not less than $1,000,000 for bodily injury and property damage, in combined or equivalent split limits, for each single accident. Insurance shall cover liability arising out of Contractor's use of autos pursuant to this Contract, including owned, leased, hired, and/or non-owned autos as each may be applicable.

3. **Workers Compensation and Employers' Liability**
   Insurance or qualified self-insurance satisfying statutory requirements, which includes Employers' Liability coverage with limits of not less than $1,000,000 per accident. If applicable to Contractor's operations, coverage also shall be arranged to satisfy the requirements of any federal workers or workmen's compensation law or any federal occupational disease law.

4. **Professional Liability/Errors and Omissions**
   Insurance covering Contractor's liability arising from or related to this Contract, with limits of not less than $1,000,000 per claim and $2,000,000 aggregate. Further, Contractor understands and agrees it shall maintain such coverage for a period of not less than three (3) years following this Agreement expiration, termination or cancellation.

b) Within 48 hours of the Award Resolution, the Bidder/Contractor shall provide the Housing Authority of Bergen County with a Certificate of Insurance evidencing that said insurance is and will be in effect during the term of the contract and naming the Board of Commissioners of the Housing Authority of Bergen County as an Additional Insured.

c) Each certificate of Insurance shall contain a statement that the policy applies to all operations of the project which are undertaken by the insured during the performance of this contract. In addition, each Certificate of Insurance shall contain the following information of statements:
   1) Name and address of insured.
   2) A statement that the Board of Commissioners of the Housing Authority of Bergen County is an Additional Insured under each policy listed.
   3) The number and description of each policy in force on the date of the Certificate.
   4) The expiration date of each policy shown as well as the amount of the coverage for each policy.
   5) A statement showing the method of cancellation. If cancellation may be effected by the giving of notice to the insured and the Board of Commissioners of the Housing Authority of Bergen County by the insurer, the policy and Certificate must provide that cancellation shall not be effective until ten (10) days after receipt of such notice by the said Board of Commissioners.

d) During the term of the contract, it shall be the responsibility of the Bidder/Contractor to provide the Housing Authority of Bergen County with additional Certificates of Insurance in compliance with the above showing current coverage when any insurance policy for the above-listed coverage expires.

e) Submission of proof of the required insurance coverage in the form of a Certificate or Certificates of Insurance is a condition precedent to contract award. After receipt of a sufficient performance bond and other submissions required by these bid specifications, the bid will be accepted and a purchase order will be forwarded to the successful bidder.

f) The contractor shall maintain sufficient Insurance to protect against all claims under Workers Compensation, General Liability and automobile and shall be subject to approval for adequacy of

protection and certificates of such insurance shall be provided to the Housing Authority of Bergen County when required. In all cases where a Certificate of Insurance is required, the Housing Authority of Bergen County is to be named as an additional insured.

17. ALTERNATE DISPUTE RESOLUTION

Pursuant to N.J.S.A. 40A:11-50, all construction disputes must contain provisions for alternate dispute procedures (hereinafter "ADR") for resolving disputes that may arise under construction contracts. Since the contract between the parties relates to construction within the Housing Authority of Bergen County buildings, the following ADR procedures are hereby adopted:

a) The parties shall attempt to resolve all disputes pursuant to this contract by good faith negotiations. If a dispute is unable to be resolved through verbal agreement, either party may reduce the dispute to writing, which the parties shall then attempt to resolve within five (5) business days. If the parties are unable to resolve within five (5) business days, then either party may seek the appointment of a mediator by notifying the other party, in writing, of such a request.
b) Upon a demand for mediation, the parties shall attempt to agree upon a mediator. If the parties are unable to agree upon a mediator, then the Housing Authority of Bergen County shall obtain a list of retired Supreme Court Justices and Supreme Court Judges who have agreed to make themselves available for this purpose. When the list is produced, the parties shall review the list and indicate the judges that they want struck. The list with the struck judge shall be exchanged and the most senior judge remaining on the list shall be contracted. If that judge accepts the appointment as mediator, the mediation shall be conducted within ten (10) business days. If the judge does not accept the appointment, the parties shall then go to the next senior judge on the list until a mediator is reached.
c) If all judges are struck or if the parties are unable to obtain a judge from the list, the parties will then review the list again to strike up to five (5) judges, after which the most senior name on the list will be selected as the mediator.
d) If the parties are unable to select a mediator through this mechanism, then a list shall be presented to the Assignment Judge in Bergen County, New Jersey, for him/her to select a mediator from the list, after giving the parties opportunity to strike up to five (5) judges per party, provided that the number of judges on the list presented to the Assignment Judge shall consist of not less than fifty percent (50%) of the original list when it was provided to the parties. In any case where the striking of five (5) judges per party shall result in more than fifty percent (50%) of the judges being struck, the number of strikes per party shall be reduced equally until such time as there are at least fifty percent (50%) of the judges available.
e) The cost of the mediation shall be apportioned equally among the parties, with each party responsible for its own mediation costs. Mediation shall be non-binding, unless the parties agree otherwise.
f) All proceedings in the mediation shall be confidential. The mediator shall not be required to follow any specific rules of procedure, shall be allowed to meet ex parte with any party, and the mediator may not be called to testify in any future proceedings or to reveal any discussions that occurred during the course of the mediation.

g) If any additional parties are subcontracted, then the subcontractors with those parties must require them to agree to the mediation proposal. In addition, the parties must agree that if there is a dispute between any other parties with respect to the construction project, then the parties must, if requested by the other party and the mediator, participate in that mediation.
h) Notwithstanding the procedures set forth in this agreement mediation, should there be a mediation required by the Housing Authority of Bergen County, pursuant to any contract relating to the construction project, the contractor agrees, if requested, to participate in that mediation in accordance with the procedures set forth above.
i) The method of alternate dispute resolution described in this Section 18 is not intended to waive or in any way alter the right of the Housing Authority of Bergen County to a jury trial on all issues post mediation. Furthermore, notwithstanding anything to the contrary contained in any contract to which these "General Instructions to Bidders" may be appended, it is the intention of the Housing Authority of Bergen County, which intention is acknowledged by the bidder/contractor, to preserve its right to a trial by jury on all issues in dispute.

18. PAYMENT

Payment will be made after a properly executed Housing Authority of Bergen County voucher has been received and formally approved on the bills list by the Board of Commissioners of the Housing Authority of Bergen County at its subsequent regular meeting. The voucher will be certified correct by the department head who received the goods or services.

The contractor must submit invoices to the Authority within ten (10) days of completion of task or service call. Supporting documentation must be submitted evidencing that work or goods for which payment is sought has been satisfactorily completed or delivered. Invoices must reference the tasks and fixed prices for each task completed, as well as a breakdown for labor hours and material costs. **Copies of supplier invoices for material used for the work completed must be attached with each invoice.** All invoices must be approved by the Authority Board of Commissioners before payment will be authorized.

From time to time, the Authority staff shall monitor the hours of work submitted and the work accomplished by contractor to confirm conformance to the requirements of the contract.

19. GUARANTEE

A one-year guarantee on parts and labor shall be provided in the amount for each item, in addition to any manufacturer warranty/guarantee.

20. PURCHASE FROM STATE CONTRACT OR OTHER PUBLIC ENTITIES

The Housing Authority of Bergen County reserves the right to purchase, during the term of any contract to be awarded, any of the specified materials and/or services through the New Jersey Cooperative Purchasing Agreement ("State Contract") or any public entity, if it is in the Housing Authority of Bergen County's best interest to do so.

21. GOVERNING LAW, STATE AND FUNDING

This contract shall be governed by and construed in accordance with the laws of the State of New Jersey (N.J.S.A. 40A:11-et seq. and N.J.A.C. 5:34-1 et seq.) and the Uniform Commercial Code (UCC). All contracts are subject to the availability and appropriation of funds annually.

22. USE OF SUBCONTRACTORS

Bidders that propose using one or more subcontractors must submit a certificate with their bids listing each subcontractor named in the bid for the category. The certificate must set forth the scope of work for which the subcontractor has submitted a price quote and which the bidder has agreed to award to each subcontractor, should the bidder be awarded the contract.

23. THE PUBLIC WORKS CONTRACTOR REGISTRATION ACT

No contractor can bid on or engage in any contract for public work unless the contractor is registered with the Department of Labor. A copy of the registration certificate must be submitted with the bid submission.

NOTE: All labor costs and wages to be paid to employees for all Public Housing Buildings MUST be Prevailing Wage Rates for each job classification used. Those buildings which do not require prevailing wage rates to be

paid will be clearly identified. The 2021 New Jersey Prevailing Wage Rates for Bergen County may be downloaded from the following site: http://lwd.dol.state.nj.us/labor/forms_pdfs

24. BUSINESS REGISTRATION OF PUBLIC CONTRACTORS ACT

a) No vendor/contractors can bid or engage in any contract with the Authority unless the vendor/contractor is registered with the State and provides proof of that registration to the contracting agency before the contracting agency may enter into a contract with vendor/contractor.

b) Procedures for Construction Contracts (As may be applicable)

1) These procedures shall be used for all construction contracts. For consistency, "construction" shall mean, exclusive of the value of work, "public work" as defined in the "Prevailing Wage Act" N.J.S.A. 34:11-56.26:

i. "Public Work" means construction, reconstruction, demolition, alteration, or repair work, or maintenance work, including painting and decorating, done under contract and paid for in whole or in part out of the funds of a public body, except work performed under the rehabilitation program.

ii. "Maintenance Work" means the repair of existing facilities when the size, type or extend of such facilities is not thereby changed or increased.

2) In response to a request for bids for construction work, a contractor must include proof of its own business registration and proofs of business registration of those subcontractors required to be listed in the contractor's submission (i.e., "named subcontractors"). The proof of business registration shall be provided at the time the bid is officially received and opened by the contracting agency.

3) "New Jersey Business Registration Requirements"

i. The contractor shall provide written notice to its subcontractors and suppliers of the responsibility to submit proof of business registration to the contract. The requirement of proof of business registration extends down through all levels (tiers) of the project.

ii. Before final payment of the contract is made by the contracting agency, the contractor shall submit an accurate list of the proof of business registration of each subcontractor or supplier used in the fulfillment of the contract, or shall attest that no subcontractors were used.

iii. For the term of the contract, the contractor and each of its affiliates and a subcontractor and each of its affiliates [N.J.S.A. 52:32-44 (g)(3)] shall collect and remit to the Director, New Jersey Division of Taxation, the use tax due pursuant to the Sales and Use Tax Act on all sales of tangible personal property delivered into this State, regardless of whether the tangible personal property is intended for a contract with a contracting agency.

iv. A business organization that fails to provide a copy of a business registration as required pursuant to section 1 of P.L. 2001, c. 134 9C.52:32-44 et. Al.) or subsection e. or f. of section 92 of P.L. 1977, c. 110 (C.5:12-92), or that provides false business registration information under the requirements of either of those sections, shall be liable for a penalty of $ 25.00 for each day of violation, not to exceed $ 50,000.00 for each business registration copy not properly provided under a contract with a contracting agency.

25. FAIR HOUSING AND EQUAL OPPORTUNITY EMPLOYMENT

Section 3 Clause

The work to be performed under this contract is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (section 3). The purpose of section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered under section 3, shall, to the greatest extend feasible, be directed to low-and very-low income persons, particularly persons who are recipients of HUD assistance for housing.

The parties to this contract agree to comply with HUD's regulations in 24 CFR part 135, which implement section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with the part 135 regulations.

The contractor agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work shall begin.

The contractor agrees to include this section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 135. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR part 135.

The contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the contractor is selected but before the contract is executed, and (2) with persons other than those to whom the regulations of 24CFR part 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR part 135.

Noncompliance with HUD's regulations in 24 CFR part 135 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD assisted contracts.

With respect to work performed in connection with section 3 covered Indian Housing Assistance, section 7 (b) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450.e) also applies to the work to be performed under this contract. Section 7(b) requires that to the greatest extent feasible (i) preference and opportunities for training and employment shall be given to Indians, and (ii) preference in the award of contracts and subcontracts shall be given to Indian organizations and Indian-owned Economic Enterprises. Parties to this contract that are subject to the provisions of section 3 and section 7(b) agree to comply with section 3 to the maximum extent feasible, but not in derogations of compliance with section 7(b).

Section 3 residents are:

- Public Housing residents
- Low and very-low income persons who live in the metropolitan or non-metropolitan county where a HUD-assisted project for housing or community development is located
- Low income is defined as 80% or below the median income of that area
- Very low income is defined as 50% or below the median income of that area
- A section 3 business is one that is at least 51% or more owned by Section 3 residents
- Whose permanent, full-time employees include persons, at least 30% of whom are currently Section 3 residents, or within three years of the date of first employment with the business concern where Section 3 residents
- That provides evidence of a commitment to subcontract in excess of 25% of the dollar award of all subcontracts to be awarded to a Section 3 business concern

<u>How can a business find Section 3 residents to work for them?</u>

Businesses can recruit in the neighborhood and public housing developments to inform residents about available

training and job opportunities. Distributing flyers, posting signs, placing ads, and contacting resident organizations and local community development and employment agencies to locate potential workers are effective ways of acquiring jobs.

Are recipients, contractors and subcontractors required to provide long-term employment opportunities, and not simply seasonal or temporary employment?

Recipients are required, to the greatest extent feasible, to provide all types of employment opportunities to low and very low-income persons, including seasonal and temporary employment, as well as long-term jobs. After a Section 3 employee has been employed for 3 years, the employee may no longer be counted as a Section 3 employee to meet the 30% requirement. This requires the recipients to continue hiring Section 3 residents when employment opportunities are available.

Will HUD require compliance?

Yes. HUD receives annual reports from recipients, monitors performance of contractors and investigates complaints. HUD examines employment and contract records for evidence of actions taken to train and employ Section 3 residents and to award contracts to Section 3 businesses.

PROPOSAL FORM

The undersigned hereby declare(s) that _____ has carefully examined the site, Drawings and Specifications for the construction of the proposed project knows as **"DHW Replacement at Highland View Apartments",** for which receipt of bids has been advertised, and having examined the Special and General Instructions, Drawings, and Specifications on file in the office of the Housing Authority of Bergen County, as well as the site of work, will contract to do all of the work and furnish all the materials, tools and equipment mentioned in said Instructions, and Specifications in the manner prescribed therein at the unit prices specified for the various items below and for the resulting lump sum given below.

The undersigned agrees to save the Housing Authority of Bergen County agents, consultants or representatives harmless with respect to any claim or claims of liability which may be incurred by reason or in connection with the performance of said work.

It is understood that a certain amount of money will be available for the work proposed and that the actual work to be performed and the materials to be furnished may be increased or decreased to bring the cost of the work within the amount available.

In addition, the quantities as set forth below and as shown on the construction drawings may be approximately estimations of the actual quantity to be used, and the Housing Authority of Bergen County reserves the right to increase or decrease at the unit price set forth in the bid proposal sheets to the extent set forth in specifications and as provided by law.

It is further understood that the prices herein bid and the lump sum stated below are to remain firm for a period of (60) days from date in accordance with RS 40:A 11-24 until awarded.

This bid proposal is accompanied by bid security either in the form of certified check on the _____ bank of_____ in the amount of _____(_____) Dollars, or in a Bid Bond in the amount of _____(_____) Dollars guaranteed by the undersigned as Bidder and _____ as Surety. This proposal is also accompanied by a Consent of Surety for Performance Bond and Labor Material Payment Bond in accordance with the conditions named in the foregoing Information to Bidders.

The undersigned Bidder hereby agrees that if this Proposal shall be accepted by the Owner and the undersigned shall fail to execute and deliver the Contract and Contract Bonds in accordance with the Terms of this Proposal, and with the requirements of the foregoing Information to Bidders, then the undersigned shall be deemed to have abandoned the Contract, and thereupon the Proposal and its acceptance shall be null and void and (1) if a certified check is herewith submitted as bid security, the amount of the said check accompanying this proposal shall be due and payable thereunder to the Housing Authority of Bergen County as liquidated damages; otherwise, the said certified check or amount thereof, shall be returned to the undersigned, or (2) if the Bid Bond is herewith submitted as bid security, the amount specified in the Bid Bond shall be due and payable thereunder to the Housing Authority of Bergen County as liquidated damages in accordance with said Bid Bond, otherwise the Bid Bond shall become null and void.

The undersigned Bidder acknowledges the receipt of the following Addenda:

Addenda No.	**Dated**
_____	_____
_____	_____
_____	_____

All the various phases of work enumerated in the specifications with their individual jobs and overhead, whether specifically mentioned, included by implication or appurtenant thereto, are to be performed by the contractor under one of the items listed in the proposal.

Payment for work performed will be in accordance with the proposal subject to changes provided for in the Construction Contract.

The full names and residences of all persons and parties interested in this proposal as principals are as follows below. Note: For each person, give first and last names in full. Record each member of the co-partnership; in case of a corporation, give the

names of the President, Secretary, Treasurer, Manager, and Directors, and state the place of incorporation.

This proposal is hereby respectfully submitted by:

_____
(Bidder's Signature)

_____
(Bidder's Business Address)

_____

Dated this _____day of _____ 2021

IF PROPOSAL IS SUBMITTED BY A CORPORATION, AFFIX CORPORATE SEAL HERE

PROPOSAL SUBMISSION FORM (1 of 2)

Required Material

#	MATERIAL	RATE	TOTAL
		TOTAL MATERIALS	

Required Labor

HOURS	LABOR	RATE	TOTAL
		TOTAL LABOR	

Miscellaneous

#	ITEM	TOTAL
	TOTAL MISCELLANEOUS	

Totals

Materials Total	
Labor Total	
Miscellaneous Total	
TOTAL $	

BASE BID (Amount in Words)

$_____

PROPOSAL SUBMISSION FORM (2 of 2)

_____ DATE

_____ COMPANY

_____ PRINCIPAL

_____ SIGNATURE

_____ TELEPHONE

_____ EMAIL

_____ FEDERAL TAX ID #

CONTRACTOR & SUBCONTRACTOR QUALIFICATIONS & LICENSING REQUIREMENTS

Project: **DHW Replacement at Highland View Apartments**

Please include a copy of your permit, certificate or license with your price quote for those items listed below pertaining to this project **for the contractor and for each subcontractor** you will be using. **Failure to include proof of your qualifications with your price quote, may be cause for disqualification. All certificates must be current.**

- New Jersey State Business Registration Certificate, pursuant to P.L. 204, c.57.
- Certificate of Employee Information Report, pursuant to NJAC 17:27-1.1 et seq.
- Public Works Contractor Registration Certificate, pursuant to NJSA 34:11-56.48 et seq.
- Notice of Classification and Rating, (DPMC & DPMC 701) pursuant to NJSA 52:35-1
- Sales Tax Certificate Of Authority, pursuant to NJSA 54:32B-1 et seq.
- Master Plumber License
- Other (specify)_____

Form **W-9**
(Rev. October 2018)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

► Go to *www.irs.gov/FormW9* for instructions and the latest information.

Give Form to the requester. Do not send to the IRS.

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.

2 Business name/disregarded entity name, if different from above

Print or type. See Specific Instructions on page 3.

3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only **one** of the following seven boxes.

☐ Individual/sole proprietor or single-member LLC ☐ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate

☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ►

Note: Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is **not** disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that is disregarded from the owner should check the appropriate box for the tax classification of its owner.

☐ Other (see instructions) ►

4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):

Exempt payee code (if any)

Exemption from FATCA reporting code (if any)

(Applies to accounts maintained outside the U.S.)

5 Address (number, street, and apt. or suite no.) See instructions.

Requester's name and address (optional)

6 City, state, and ZIP code

7 List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN*, later.

Note: If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Social security number

___ - ___ - ____

or

Employer identification number

__ - _____

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

Sign Here Signature of U.S. person ► Date ►

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to *www.irs.gov/FormW9*.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid)
- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding, *later.*

Cat. No. 10231X Form **W-9** (Rev. 10-2018)

SAMPLE W-9 FORM

Revised Contract Language for BRC Compliance

Goods and Services Contracts (including purchase orders)

** Construction Contracts (including public works related purchase orders)*

N.J.S.A. 52:32-44 imposes the following requirements on contractors and all subcontractors that **knowingly** provide goods or perform services for a contractor fulfilling this contract: 1) the contractor shall provide written notice to its subcontractors to submit proof of business registration to the contractor; 2) prior to receipt of final payment from a contracting agency, a contractor must submit to the contracting agency an accurate list of all subcontractors or attest that none was used; 3) during the term of this contract, the contractor and its affiliates shall collect and remit, and shall notify all subcontractors and their affiliates that they must collect and remit to the Director, New Jersey Division of Taxation, the use tax due pursuant to the Sales and Use Tax Act, (N.J.S.A. 54:32B-1 et seq.) on all sales of tangible personal property delivered into this State.

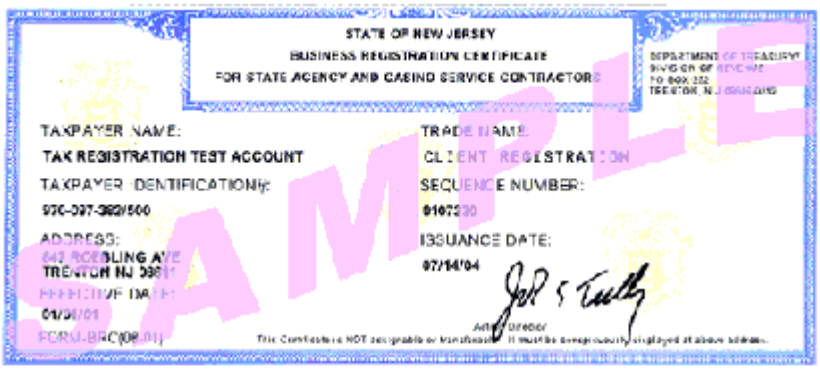
A contractor, subcontractor or supplier who fails to provide proof of business registration or provides false business registration information shall be liable to a penalty of $25 for each day of violation, not to exceed $50,000 for each business registration not properly provided or maintained under a contract with a contracting agency. Information on the law and its requirements is available by calling (609) 292-9292.

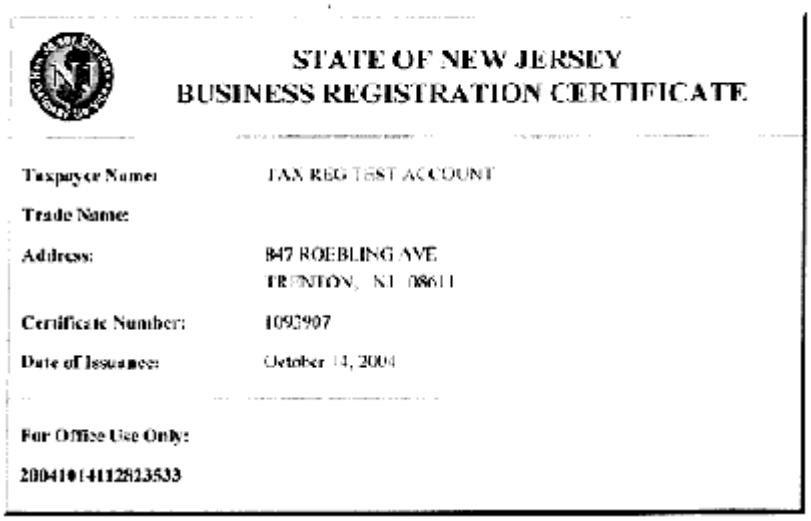
Construction Contracts (including public works related purchase orders)

N.J.S.A. 52:32-44 imposes the following requirements on contractors and all subcontractors that **knowingly** provide goods or perform services for a contractor fulfilling this contract:

1) the contractor shall provide written notice to its subcontractors and suppliers to submit proof of business registration to the contractor;
2) subcontractors through all tiers of a project must provide written notice to their subcontractors and suppliers to submit proof of business registration and subcontractors shall collect such proofs of business registration and maintain them on file;
3) prior to receipt of final payment from a contracting agency, a contractor must submit to the contacting agency an accurate list of all subcontractors and suppliers or attest that none was used; and,
4) during the term of this contract, the contractor and its affiliates shall collect and remit, and shall notify all subcontractors and their affiliates that they must collect and remit, to the Director, New Jersey Division of Taxation, the use tax due pursuant to the Sales and Use Tax Act, (N.J.S.A. 54:32B-1 et seq.) on all sales of tangible personal property delivered into this State.

A contractor, subcontractor or supplier who fails to provide proof of business registration or provides false business registration information shall be liable to a penalty of $25 for each day of violation, not to exceed $50,000 for each business registration copy not properly provided or maintained under a contract with a contracting agency. Information on the law and its requirements are available by calling (609) 292-9292.





THESE ARE SAMPLES OF THE ONLY ACCEPTABLE BUSINESS REGISTRATION CERTIFICATES

FAILURE TO POCESS A NEW JERSEY BUSINESS REGISTRATION CERTIFICATE IS CAUSE FOR REJECTION OF YOUR BID REGARDLESS OF THE FACT THAT A COPY MAY ALREADY BE ON FILE WITH THE HOUSING AUTHORITY OF BERGEN COUNTY

AFFIDAVIT OF NON-DEFAULT

The undersigned, being duly sworn pursuant to law, deposes and says that, as the party making the foregoing Bid; I certify as follows:

1. That all the statements made by me are true, complete and correct to the best of my knowledge and belief and are made in good faith.

2. That for the past ten years from the date of this certification, and except as shown by me on the attachment, I have not experienced defaults or noncompliance under any contract for the U.S. Department of Housing and Urban Development, or any other governmental agency with which I have contracts.

3. To the best of my knowledge there are no unresolved findings raised as a result of HUD audits, management reviews or any other Governmental investigations concerning me or work under any of my contracts.

4. There has not been a suspension or termination of payments under any HUD contract in which I have had a beneficial interest attributable to my fault or negligence.

5. I have not been convicted of a felony and am not presently, to my knowledge, the subject of a complaint or indictment charging a felony.

6. I have not been suspended, debarred or otherwise restricted by any Department or Agency of the Federal Government or of any State Government or the Housing Authority of Bergen County from doing business with such Department or Agency.

7. I have not defaulted on an obligation covered by a bond and have not been the subject of a claim under any fidelity bond.

8. All the names of the parties, known to me to be principals in this contract, in which I propose to participate, are included on resumes submitted with this bid.

9. To my knowledge I have not been found by HUD or the State of New Jersey to be in noncompliance with any applicable civil rights laws.

10. I am not a Member of Congress or a Resident Commissioner nor otherwise prohibited or limited by law from contracting with the Government of the United States of America.

11. I am not an officer or employee or commissioner of the Housing Authority of Bergen County who is prohibited or limited by law from contracting with HABC.

12. For a period of five years prior to the date of this certification, and except as shown by me on the attachment, I have not been suspended, or otherwise disqualified by the U.S. Department of Housing and Urban Development, or any other governmental agency with which I have contracted, from doing business with any governmental agency.

13. Statements above (if any) to which I cannot certify have been deleted by striking through the words with a pen. I have initialed each deletion (if any) and have attached a true and accurate signed statement (if applicable) to explain the fact and circumstances which I think helps to qualify me as a responsible principal for participation in this project.

Firm Name: _____

Name: _____

Title: _____

Signature: _____

MUST BE NOTARIZED

State of _____)
) ss
County of_____)

Subscribed and sworn to before me, this _____ day of _____, 202_____

_____ My Commission Expires: _____, 202_____
Notary Public Signature

(Affix Notary Public Seal)

BIDDER'S AFFIDAVIT

Name of Bidder: _____ being duly sworn, deposes and says that he resides at:

_____,
(Address)
that he is the _____ who signed the above Bid, that he was
(Title)
duly authorized to sign and that the Bid is the true offer of the Bidder, that the seal attached is the seal of the Bidder and that all the declarations and statements contained in the Bid are true to the best of his/her knowledge and belief.

_____
(Signature of Bidder & Seal)

MUST BE NOTARIZED

State of _____)
) ss
County of_____)

Subscribed and sworn to before me, this _____ day of _____, 202_____

_____ My Commission Expires: _____, 202_____
Notary Public Signature

(Affix Notary Public Seal)

NON-COLLUSION AFFIDAVIT

I, _____, of the City/Town of _____
(name of affiant) (name of municipality)

in the County of _____, and the State of _____

of full age, being duly sworn pursuant to law on my oath depose and say that:

I am the _____ of the firm of _____
(title or position) (name of firm)
the bidder making this proposal for the above named project, and that I executed the said Proposal with full authority to do so; that said bidder has not, directly or indirectly, entered into an agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with the above named project; and that all statements contained in said Proposal and in this affidavit are true and correct, and made with full knowledge that the Housing Authority relies upon the truth of the statements contained in said Proposal and in the statements contained in this affidavit in awarding the contract for the said project.

I fully warrant that no person or selling agency has been employed or retained to solicit or secure such contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, except bona fide employees or bona fide established commercial or selling agencies maintained by:

_____
Company Name

_____
*Signature

_____
Title

_____
Date

*FAILURE TO SIGN THIS AFFIDAVIT BY THE PRESIDENT, VICE PRESIDENT OR DULY AUTHORIZED COMPANY OFFICIAL WILL RESULT IN REJECTION OF THIS PROPOSAL/ BID.

MUST BE NOTARIZED

State of _____)
) ss
County of_____)

Subscribed and sworn to before me, this _____ day of _____, 202_____

_____ My Commission Expires: _____, 202_____
Notary Public Signature

(Affix Notary Public Seal)

STOCKHOLDER DISCLOSURE CERTIFICATION

This Statement MUST Be Included with Bid Submission

Name of Business: _____

☐ I certify that the list below contains the names and home addresses of all stockholders holding 10% or more of the issued and outstanding stock of the undersigned.

OR

☐ I certify that no one stockholder owns 10% or more of the issued and outstanding stock of the undersigned.

If a corporation owns all or part of the stock of the corporation or partnership submitting the bid, then the statement shall include a list of the stockholders who own 10% or more of the stock of any class of that corporation. If no one owns 10% or more stock, attest to that.

Check the box that represents the type of business organization:

☐ Partnership	☐ Corporation	☐ Sole Proprietorship
☐ Limited Partnership	☐ Limited Liability Corporation	☐ Limited Liability Partnership
☐ Subchapter S Corporation		

Sign and notarize the form and complete the stockholder list below.

Stockholders:

Name: _____ Name: _____

Address: _____ Address: _____

_____ _____

Name: _____ Name: _____

Address: _____ Address: _____

_____ _____

Name: _____ Name: _____

Address: _____ Address: _____

_____ _____

☐ **Check box if attachments are being used to complete this section.**

MUST BE NOTARIZED

State of _____) County of_____)

Subscribed and sworn to before me, this _____ day of _____, 202_____

_____ My Commission Expires: _____, 202_____

Notary Public Signature

(Affix Notary Public Seal)

AFFIDAVIT FOR AFFIRMATIVE ACTION PLAN

_____ being first duly sworn deposes and says
(Individual's Name)

THAT he/she is the _____ of the _____
(partner or officer) (firm name)

and the party making a certain proposal or bid dated _____ 2021 for work in connection with the bid for:

_____
(Indicate Job Name)

located in_____ New Jersey that such proposal or bid is submitted with full knowledge and understanding of the Affirmative Action Plan (AAP) requirements contained herein; that in submitting such proposal or bid, the bidder acknowledges that he or she must and will fulfill these requirements and that all statements in said proposal or bid are true.

SIGNATURE OF: Bidder, if the bidder is an individual;
Officer, if the bidder is a Corporation;
Partner, if the bidder is a Partnership/

_____
(Signature of Contractor)

MUST BE NOTARIZED

State of _____)
) ss
County of_____)

Subscribed and sworn to before me, this _____ day of _____, 202_____

_____ My Commission Expires: _____, 202_____
Notary Public Signature

(Affix Notary Public Seal)

AFFIRMATIVE ACTION AFFIDAVIT

(to be completed by firms with less than 50 employees)

I, _____, of the (City, Town, Borough) of _____

in the County of _____ State of _____, of full age being duly sworn pursuant to law on my oath depose and say that:

PART 1 - I am (President, Partner, Owner) of the firm of_____,
(name of firm)
a bidder making a proposal upon the above named project.

2. _____ does not have 50 employees or more
(name of firm)
inclusive of all officers and employees of every type.
3. I am familiar with the affirmative action requirements of P.L. 1975 c. 127 and rules and regulations issued by the Treasurer, State of New Jersey, pursuant thereto.
4. _____ has complied with all the affirmative action
(name of firm)
requirements of the State of New Jersey, including those required by P.L. 1975 c. 127 and the rules and regulations issued by the Treasurer, State of New Jersey, pursuant thereto.
5. I am aware that if_____ does not comply with P.L. 1975 c. 127 and rules and regulations issued pursuant thereto, that no monies will be paid by the Housing Authority of Bergen County until an affirmative action plan is approved. I am also aware that the contract may be terminated and
_____may be debarred from all public contracts for a
(name of firm)
period of up to five (5) years.
6. In the event my workforce increases to 50 employees, I must contact the State Affirmative Action Office and complete an Employee Information Report.

_____
Signature President, Vice-President or
Authorized Representative.

_____
Name and Title

MUST BE NOTARIZED

State of _____)
) ss
County of_____)

Subscribed and sworn to before me, this _____ day of _____, 202_____

_____ My Commission Expires: _____, 202_____
Notary Public Signature

(Affix Notary Public Seal)

AFFIRMATIVE ACTION REGULATIONS

(To be completed by firms with fifty (50) or more employees

BIDDER STATES HE HAS FIFTY (50) OR MORE EMPLOYEES: CHECK ONE

YES_____ **NO**_____

COMPANY NAME: _____

NAME: _____

SIGNATURE: _____

TITLE: _____

A. CONTRACTORS WITH 50 OR MORE EMPLOYEES NOTE:

Within seven (7) days after receipt of the notification of intent to award the contract or receipt of the contract, whichever is sooner, a procurement contractor with 50 or more employees should present one of the following to the County of Bergen and Housing Authority of Bergen County.

1. Appropriate evidence that the contractor is operating under an existing federally approved or sanctioned affirmative action program;

OR

2. A Certificate of Employee Information Report Approval issued in accordance with Article 4 of the Regulations promulgated by the Treasurer pursuant to P.L. 1975, c127;

OR

3. If the bidder cannot present "1" or "2" and the bidder has never applied for "2", the bidder is required to submit to the State Affirmative Action Office (a copy to accompany this bid proposal) a completed Employee Information Report (Form AA302). This form may be obtained at State Affirmative Action Office.

A contractor's bid must be rejected as non-responsive if a contractor fails to submit either "1", "2", or "3" listed above in A, within the time specified after the Housing Authority submits the contract to the contractor for signing.

B. CONTRACTORS WITH LESS THAN 50 EMPLOYEES NOTE:

Bidders with less than 50 employees who are negotiating for a contract, as a precondition to entering into a valid and binding procurement or service contract with the Housing Authority of Bergen County, prior to recommendation of contract award is submitted to the Commissioners of the Housing Authority must complete the following affidavit in accordance with P.L. 1975C.1

AFFIDAVIT FOR MINORITY BUSINESS ENTERPRISES

_____ being first duly sworn depose and says:
(Individual's Name)

That he/she is _____ of the _____, the party
(Partner or Officer) (Firm Name)

making a certain proposal or bid dated_____, 2021, for work in

connection with the _____ located in) _____
(indicate job name) (Indicate Town

New Jersey that such proposal or bid is submitted with full knowledge and understanding of the Minority Business Enterprise (MBE) requirements contained herein; that in submitting such proposal or bid, the bidder acknowledges that he/she must and will fulfill these requirements and that all statements in said proposal or bid are true.

SIGNATURE OF: Bidder, if the bidder is an individual;
Officer, if the bidder is a Corporation;
Partner, if the bidder is a Partnership

_____
(Signature of Contractor)

MUST BE NOTARIZED

State of _____)
) ss
County of_____)

Subscribed and sworn to before me, this _____ day of _____, 202_____

_____ My Commission Expires: _____, 202_____
Notary Public Signature

(Affix Notary Public Seal)

STAMEMENT OF COMPLIANCE

WAGE RATES

This is to certify that all persons employed by the undersigned will be paid full weekly wages earned, less permissible deduction for income taxes, social security, etc., and that no rebates have or will be made either directly or indirectly to the undersigned from the full weekly wages earned by any person in its employ, and further that all employees will be paid as defined in Regulations, Part 3 (29 CFR Part 3) issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948, 63 Stat. 108, 72 Stat. 967, 40 U.S.C. 276C), as described on said payroll; that said payroll is correct and complete; that the wage rates, as set forth in the General Wage Determinations issued under HUD Determined Wage Rates and Related Acts, U.S. Department of Labor, Employment Standards Administration, Wage and Hour Division, (unless otherwise specified), contained in said payroll for laborers, and mechanics, are not less than those applicable to such laborers and mechanics pursuant to the contract under which such work was performed; and that the classifications set forth for each laborer or mechanic conforms with the work he performed.

SIGNATURE: _____

TITLE: _____

MUST BE NOTARIZED

State of _____)
) ss
County of_____)

Subscribed and sworn to before me, this _____ day of _____, 202_____

_____ My Commission Expires: _____, 202_____
Notary Public Signature

(Affix Notary Public Seal)

Acknowledgment of Receipt of Addenda

Please note that this Form must be returned with your bid regardless if you received an addenda or not. Failure to return this Form with your bid is a non-curable fatal flaw which shall cause your bid to be rejected

The undersigned respondent hereby acknowledges receipt of the following Addenda, (if any)

ADDENDA NUMBER	DATE OF ADDENDA	DATE ADDENDA RECEIVED BY CONTRACTOR

☐ **No addenda issued**

Signed: _____ Title: _____

Printed Name: _____ Date: _____

Company: _____

INSURANCE REQUIREMENT AND ACKNOWLEDGMENT FORM

And

HOLD HARMLESS / INDEMNIFICATION AGREEMENT

Respondents Certificate of Professional Liability coverage shall be filed with the Authority's Office upon award of contract by the Authority.

Acknowledgment of Insurance Requirement:

_____ _____
(Signature) (Date)

_____
(Printed Name and Title)

INDEMNITY: To the maximum extent permitted by law, the firm/ contractor shall defend, indemnify and hold the Housing Authority of Bergen County and its commissioners, officers, agents and employees harmless from and against all claims, actions, judgments, damages and costs, including reasonable attorneys' fees and all other costs of defense to which the Housing Authority of Bergen County or its commissioners, officers, agents or employees may be subjected, or which they may suffer, that are caused by, or arise out of, any act, error or omission of the firm/ contractor, their subcontractors, affiliates, or anyone retained by or employed by the firm/ contractor in connection with the project/ service or from their failure to comply with any of the provisions of their contracts or of the law. This indemnity shall not apply to the extent of the Housing Authority's or its commissioners, officers, agents or employees' negligence. The firm/ contractor agrees, that it will not implead the Housing Authority or its commissioners, officers, agents or employees into any such claim or action.

MANDATORY EQUAL EMPLOYMENT OPPORTUNITY LANGUAGE
N.J.S.A. 10:5-31 et seq. (P.L.1975, c.127)
N.J.A.C. 17:27-1.1 et seq.
CONSTRUCTION CONTRACTS

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

The contractor or subcontractor, where applicable, will not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Except with respect to affectional or sexual orientation and gender identity or expression, the contractor will ensure that equal employment opportunity is afforded to such applicants in recruitment and employment, and that employees are treated during employment, without regard to their age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Such equal employment opportunity shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Public Agency Compliance Officer setting forth provisions of this nondiscrimination clause.
The contractor or subcontractor, where applicable will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex.

The contractor or subcontractor will send to each labor union, with which it has a collective bar-gaining agreement, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the contractor's commitments under this act and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

The contractor or subcontractor, where applicable, agrees to comply with any regulations promulgated by the Treasurer, pursuant to N.J.S.A. 10:5-31 et seq., as amended and supplemented from time to time and the Americans with Disabilities Act.

When hiring or scheduling workers in each construction trade, the contractor or subcontractor agrees to make good faith efforts to employ minority and women workers in each construction trade consistent with the targeted employment goal prescribed by N.J.A.C. l7:27-7.2; provided, however, that the Dept. of LWD, Construction EEO Monitoring Program, may, in its discretion, exempt a contractor or subcontractor from compliance with the good faith procedures pre-scribed by the following provisions, A, B, and C, as long as the Dept. of LWD, Construction EEO Monitoring Program is satisfied that the contractor or subcontractor is employing workers provided by a union which provides evidence, in accordance with standards prescribed by the Dept. of LWD, Construction EEO Monitoring Program, that its percentage of active “card carrying” members who are minority and women workers is equal to or greater than the targeted employment goal established in accordance with N.J.A.C. 17:27-7.2. The contractor or subcon-tractor agrees that a good faith effort shall include compliance with the following procedures:

(A) If the contractor or subcontractor has a referral agreement or arrangement with a union for a construction trade, the contractor or subcontractor shall, within three business days of the contract award, seek assurances from the union that it will cooperate with the contractor or sub-contractor as it fulfills its affirmative action obligations under this contract and in accordance with the rules promulgated by the Treasurer pursuant to

N.J.S.A. 10:5-31 et. seq., as supplemented and amended from time to time and the Americans with Disabilities Act. If the contractor or subcontractor is unable to obtain said assurances from the construction trade union at least five business days prior to the commencement of construction work, the contractor or sub-contractor agrees to afford equal employment opportunities minority and women workers directly, consistent with this chapter. If the contractor's or subcontractor's prior experience with a construction trade union, regardless of whether the union has provided said assurances, indicates a significant possibility that the trade union will not refer sufficient minority and women workers consistent with affording equal employment opportunities as specified in this chapter, the contractor or subcontractor agrees to be prepared to provide such opportunities to minority and women workers directly, consistent with this chapter, by complying with the hiring or scheduling procedures prescribed under (B) below; and the contractor or subcontractor further agrees to take said action immediately if it determines that the union is not referring minority and women workers consistent with the equal employment opportunity goals set forth in this chapter.

(B) If good faith efforts to meet targeted employment goals have not or cannot be met for each construction trade by adhering to the procedures of (A) above, or if the contractor does not have a referral agreement or arrangement with a union for a construction trade, the contractor or subcontractor agrees to take the following actions:

(l) To notify the public agency compliance officer, the Dept. of LWD, Construction EEO Monitoring Program, and minority and women referral organizations listed by the Division pursuant to N.J.A.C. 17:27-5.3, of its workforce needs, and request referral of minority and women workers;

(2) To notify any minority and women workers who have been listed with it as awaiting available vacancies;

(3) Prior to commencement of work, to request that the local construction trade union refer minority and women workers to fill job openings, provided the contractor or subcontractor has a referral agreement or arrangement with a union for he construction trade;

(4) To leave standing requests for additional referral to minority and women workers with the local construction trade union, provided the contractor or subcontractor has a referral agreement or arrangement with a union for the construction trade, the State Training and Employment Service and other approved referral sources in the area;

(5) If it is necessary to lay off some of the workers in a given trade on the construction site, layoffs shall be conducted in compliance with the equal employment opportunity and non-discrimination standards set forth in this regulation, as well as with applicable Federal and State court decisions;
(6) To adhere to the following procedure when minority and women workers apply or are referred to the contractor or subcontractor:

(i) The contactor or subcontractor shall interview the referred minority or women worker.

(ii) If said individuals have never previously received any document or certification signifying a level of qualification lower than that required in order to perform the work of the construction trade, the contractor or subcontractor shall in good faith determine the qualifications of such individuals. The contractor or subcontractor shall hire or schedule those individuals who satisfy appropriate qualification standards in conformity with the equal employment opportunity and non-discrimination principles set forth in this chapter. However, a contractor or subcontractor shall determine that the individual at least possesses the requisite skills, and experience recognized by a union, apprentice program or a referral agency, provided the referral agency is acceptable to the Dept. of LWD, Construction EEO Monitoring Program. If necessary, the

contractor or subcontractor shall hire or schedule minority and women workers who qualify as trainees pursuant to these rules. All of the requirements, however, are limited by the provisions of (C) below.

(iii) The name of any interested women or minority individual shall be maintained on a waiting list and shall be considered for employment as described in (i) above, whenever vacancies occur. At the request of the Dept. of LWD, Construction EEO Monitoring Program, the contractor or subcontractor shall provide evidence of its good faith efforts to employ women and minorities from the list to fill vacancies.

(iv) If, for any reason, said contractor or subcontractor determines that a minority individual or a woman is not qualified or if the individual qualifies as an advanced trainee or apprentice, the contractor or subcontractor shall inform the individual in writing of the reasons for the determination, maintain a copy of the determination in its files, and send a copy to the public agency compliance officer and to the Dept. of LWD, Construction EEO Monitoring Program.

(7) To keep a complete and accurate record of all requests made for the referral of workers in any trade covered by the contract, on forms made available by the Dept. of LWD, Construction EEO Monitoring Program and submitted promptly to the Dept. of LWD, Construction EEO Monitoring Program upon request.

(C) The contractor or subcontractor agrees that nothing contained in (B) above shall preclude the contractor or subcontractor from complying with the union hiring hall or apprentice-ship policies in any applicable collective bargaining agreement or union hiring hall arrangement, and, where required by custom or agreement, it shall send journeymen and trainees to the union for referral, or to the apprenticeship program for admission, pursuant to such agreement or arrangement. However, where the practices of a union or apprenticeship program will result in the exclusion of minorities and women or the failure to refer minorities and women consistent with the targeted county employment goal, the contractor or subcontractor shall consider for employment persons referred pursuant to (B) above without regard to such agreement or arrangement; provided further, however, that the contractor or subcontractor shall not be re-quired to employ women and minority advanced trainees and trainees in numbers which result in the employment of advanced trainees and trainees as a percentage of the total workforce for the construction trade, which percentage significantly exceeds the apprentice to journey worker ratio specified in the applicable collective bargaining agreement, or in the absence of a collective bargaining agreement, exceeds the ratio established by practice in the area for said construction trade. Also, the contractor or subcontractor agrees that, in implementing the procedures of (B) above, it shall, where applicable, employ minority and women workers residing within the geographical jurisdiction of the union.

After notification of award, but prior to signing a construction contract, the contractor shall submit to the public agency compliance officer and the Dept. of LWD, Construction EEO Monitoring Program an initial project workforce report (Form AA-201) electronically provided to the public agency by the Dept. of LWD, Construction EEO Monitoring Program, through its web-site, for distribution to and completion by the contractor, in accordance with N.J.A.C. 17:27-7. The contractor also agrees to submit a copy of the Monthly Project Workforce Report once a month thereafter for the duration of this contract to the Dept. of LWD, Construction EEO Monitoring Program, and to the public agency compliance officer.

The contractor agrees to cooperate with the public agency in the payment of budgeted funds, as is necessary, for on-the-job and/or off-the job programs for outreach and training of minorities and women.

(D) The contractor and its subcontractors shall furnish such reports or other documents to the Dept. of LWD, Construction EEO Monitoring Program as may be requested by the Dept. of LWD, Construction EEO

Monitoring Program from time to time in order to carry out the purposes of these regulations, and public agencies shall furnish such information as may be re-quested by the Dept. of LWD, Construction EEO Monitoring Program for conducting a compliance investigation pursuant to N.J.A.C. 17:27-1.1 et seq.

STATEMENT OF COMPLIANCE

This is to certify that all persons employed by the undersigned will be paid full weekly wages earned, less permissible deductions for income taxes, social security, etc., and that no rebates have been or will be made either directly or indirectly to the undersigned from the full weekly wages earned by any person in its employ.

SIGNATURE: _____

PRINT NAME: _____

TITLE: _____

DATE: _____

DISCLOSURE OF INVESTMENT ACTIVITIES IN IRAN

Bid/Proposal Number: _____ Bidder/Vendor: _____

Pursuant to Public Law 2012, c. 25, any person or entity that submits a bid or proposal or otherwise proposes to enter into or renew a contract must complete the certification below to attest, under penalty of perjury, that the person or entity, or one of the person or entity's parents, subsidiaries, or affiliates, is not identified on a list created and maintained by the New Jersey Department of the Treasury as a person or entity engaging in investment activities in Iran. If the Director finds a person or entity to be in violation of the principles which are the subject of this law, s/he shall take action as may be appropriate and provided by law, rule or contract, including but not limited to, imposing sanctions, seeking compliance, recovering damages, declaring the party in default and seeking debarment or suspension of the person or entity.

I certify, pursuant to Public Law 2012, c. 25, that the person or entity listed above for which I am authorized to submit a proposal:

□ is not providing goods or services of $20,000,000 or more in the energy sector of Iran, including a person or entity that provides oil or liquefied natural gas tankers, or products used to construct or maintain pipelines used to transport oil or liquefied natural gas, for the energy sector of Iran, **AND**

□ is not a financial institution that extends $20,000,000 or more in credit to another person or entity, for 45 days or more, if that person or entity will use the credit to provide goods or services in the energy sector in Iran.

In the event that a person or entity is unable to make the above certification because it or one of its parents, subsidiaries, or affiliates has engaged in the above-referenced activities, a detailed, accurate and precise description of the activities must be provided in part 2 below to the Housing Authority of Bergen County under penalty of perjury. Failure to provide such will result in the proposal being rendered as non-responsive and appropriate penalties, fines and/or sanctions will be assessed as provided by law.

PART 2: PLEASE PROVIDE FURTHER INFORMATION RELATED TO INVESTMENT ACTIVITIES IN IRAN

You must provide a detailed, accurate and precise description of the activities of the proposer, or one of its parents, subsidiaries or affiliates, engaging in the investment activities in Iran outlined above by completing the boxes below.

Name: _____ Relationship to Proposer: _____

Description of Activities: _____

_____

Duration of Engagement: _____ Anticipated Cessation Date: _____

Proposer Contact Name: _____ Contact Phone Number: _____

Certification: I, being duly sworn upon my oath, hereby represent and state that the foregoing information and any attachments thereto to the best of my knowledge are true and complete. I attest that I am authorized to execute this certification on behalf of the above-referenced person or entity. I acknowledge that the State of New Jersey is relying on the information contained herein and thereby acknowledge that I am under a continuing obligation from the date of this certification through the completion of any contracts with the State to notify the State in writing of any changes to the answers of information contained herein. I acknowledge that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification, and if I do so, I recognize that I am subject to criminal prosecution under the law and that it will also constitute a material breach of my agreement(s) with the State of New Jersey and that the State at its option may declare any contract(s) resulting from this certification void and unenforceable.

Full Name (Print): _____ Signature: _____

Title: _____ Date: _____

GENERAL CONTRACTOR
QUALIFICATION QUESTIONNAIRE

BID FOR: _____

NAME OF BIDDER: _____

ADDRESS: _____

_____

REQUIREMENTS FOR SUBMITTED PROPOSALS, IF QUALIFIED

1. Each proposal must be accompanied by a Certificate of a Surety Company qualified to do business in the State of New Jersey, who shall at the time of submitting such bid/proposal, qualify as to its or their responsibility for the full amount of such bid/proposal; and he/she will post a Performance Bond and Labor and Material Payment Bond for the full amount of the contract pursuant to law if he/she is the successful bidder. Also accompanying each said bid/proposal there must be a Certified Check or Bid Bond in an amount of not less than ten (10% percent of the bid amount not to exceed $ 20,000.00.

Notice to Contractors:
The undersigned agrees to execute and deliver the contract in the prescribed form and furnish the required Performance and Labor and Material Payment Bonds within fifteen (15) days after the contract is presented to him/her for signature.

2. **It shall be necessary for the bidder to present evidence that it is the General Contractor and that it has been in business for at least five (5) years in this particular field and can submit a suitable record/evidence of such experience in satisfactorily completing similar projects in size, magnitude and scope, to the scope of work which is required to be performed in this contract. The contractor must have completed at least three (3) projects as described above within the last three (3) years. (Use the References Attachment). In addition to the above, the bidder shall submit evidence that it has the necessary equipment to carry out this type of operation.**

Pursuant to P.L. 204, c.57. each contractor must also include with their bid documents, copies of all required qualifications, licenses and certificates. Additionally, each contractor must include a copy of their current Public Works Contractor Registration Act Certificate, pursuant to NJSA 34:11-56.48 et. seq.

a. How many years have you been engaged in the work required under this contract under your present firm or trade name? _____ years.

b. What equipment do you own that is available and intended to be used on this project? Provide a description as to the quantity, size, type and capacity of this equipment, along with its present condition.

_____
_____
_____

c. What equipment do you intend to purchase or lease for us on this project, should the contract be awarded to you? Provide a description of the quantity, size, type, and capacity of the equipment you intent to lease or purchase.

_____
_____
_____

d. How many years has your organization been in business performing the work required under this contract?
_____ years.

e. If a corporation, answer the following:
1. Date of incorporation _____
2. State of incorporation _____
3. President's name _____
4. Vice President's name _____

f. If individual or partnership, answer the following:
1. Date of organization _____
2. Name and address of all partners (state whether general or limited partnership
_____
_____

g. We normally perform _____% of the work with our own forces. General character of work performed by our company.
_____

h. Have you ever failed to complete any work awarded to you?
_____Yes _____No
If so, state circumstances.
_____
_____

i. Has any other officer or partner of your organization ever been an officer or a partner of some other organization that failed to complete a contract?
_____Yes _____No
If so, state the name of the individual, other organization and reason therefor.
_____
_____

j. Has any officer or partner of your organization ever failed to complete a contract handled in his own name?
_____Yes _____No
If yes, state name of individual, name of owner and reason therefor.
_____
_____

k. Are there any liens, of any character, filed against your company at this time?
_____Yes _____No
If yes, specify the nature and amount of lien.
_____
_____

l. In what manner have you inspected the proposed project? Explain in detail.
_____
_____

m. The work, if awarded to you, will have the personal supervision of whom?

_____ _____
Contact Name Contact Phone

_____
Contact Email

n. Do you intent to subcontract any portion of the work? _____. If so, state which portion(s) is/are to be subcontracted.

_____
_____
_____
_____

General Contractor must have each subcontractor complete a Subcontractor Qualification Questionnaire. (See bid packet). **Pursuant to P.L. 204, c.57. each subcontractor must include with their bid documents all copies of their qualifications, licenses and certificates, as required. Additionally, each subcontractor must submit a copy of their current Public Works Contractor Registration Act Certificate, pursuant to NJSA 34:11-56.48 et. seq**.

o. Have you made contracts or received firm offers for all materials within price use in preparing your proposal?
_____Yes _____No

Do not give names of dealers or manufacturers.

p. Give three (3) trade references: (Provide company name, contact, phone number and email.)

_____
_____
_____

q. Give three (3) bank references: (Provide bank name, contact, phone number and email.)

_____
_____
_____

This form must be submitted by each bidder as part of formal bid documents. If information contained herein does not meet specification requirements, the bid may be rejected by the Authority.

_____

JOB NAME & LOCATION	DESIGN ARCHITECT/ENGINEER & PHONE # / EMAIL	DATE JOB COMPLETED

CONTRACTS COMPLETED IN THE LAST FIVE YEARS

List the more important contracts completed by you under your current company name in the last five (5) years, stating approximate gross cost for each, and the month and year of completion, or whether you are low bidder pending formal award of contract.

OWNER	LOCATION	DESCRIPTION	DATE OF CONTRACT START	GROSS AMOUNT OF CONTRACT	DATE OF CONTRACT COMPLETION

Give full information about all of your contracts, whether private or government contracts, whether prime or sub-contracts; whether in process or awarded by not yet begun; or whether you are low bidder pending formal award of contract.

Location	Description	Adjusted Contract Amount	Amount Completed and Billed	Additional Earned Since Last Estimate	Balance to be Completed	Estimated Date of Completion

SUB- CONTRACTOR
QUALIFICATION QUESTIONNAIRE

NOTE: If you are not using any sub-contractors, you MUST write N/A on this questionnaire and return it with your bid

BID FOR: _____

NAME OF BIDDER: _____

ADDRESS: _____

_____

REQUIREMENTS FOR SUBMITTED PROPOSALS, IF QUALIFIED

1. Each proposal must be accompanied by a Certificate of a Surety Company qualified to do business in the State of New Jersey, who shall at the time of submitting such bid/proposal, qualify as to its or their responsibility for the full amount of such bid/proposal; and he/she will post a Performance Bond and Labor and Material Payment Bond for the full amount of the contract pursuant to law if he/she is the successful bidder. Also accompanying each said bid/proposal there must be a Certified Check or Bid Bond in an amount of not less than ten (10% percent of the bid amount not to exceed $ 20,000.00.

Notice to Sub-Contractors:
The undersigned agrees to execute and deliver the contract in the prescribed form and furnish the required Performance and Labor and Material Payment Bonds within fifteen (15) days after the contract is presented to him/her for signature.

2. **It shall be necessary for the bidder to present evidence that it is the General Contractor and that it has been in business for at least five (5) years, in this particular field, and can submit a suitable record/evidence of such experience in satisfactorily completing similar projects in size, magnitude and scope, to the scope of work which is required to be performed in this contract. The contractor must have completed at least three (3) projects as described above within the last three (3) years. (Use the References Attachment). In addition to the above, the bidder shall submit evidence that it has the necessary equipment to carry out this type of operation.**

Pursuant to P.L. 204, c.57. each contractor must also include with their bid documents, copies of all required qualifications, licenses and certificates. Additionally, each contractor must include a copy of their current Public Works Contractor Registration Act Certificate, pursuant to NJSA 34:11-56.48 et. seq.

a. How many years have you been engaged in the work required under this contract under your present firm or trade name? _____ years.

b. What equipment do you own that is available and intended to be used on this project? Provide a description as to the quantity, size, type and capacity of this equipment, along with its present condition.
_____
_____
_____

c. What equipment do you intend to purchase or lease for us on this project, should the contract be awarded to you? Provide a description of the quantity, size, type, and capacity of the equipment you intent to lease or purchase.
_____
_____

d. How many years has your organization been in business performing the work required under this contract?
_____ years.

e. If a corporation, answer the following:
1. Date of incorporation _____
2. State of incorporation _____
3. President's name _____
4. Vice President's name _____

f. If individual or partnership, answer the following:
1. Date of organization _____
2. Name and address of all partners (state whether general or limited partnership
_____
_____

g. We normally perform _____% of the work with our own forces. General character of work performed by our company.
_____

h. Have you ever failed to complete any work awarded to you?
_____Yes _____No
If so, state circumstances.
_____
_____

i. Has any other officer or partner of your organization ever been an officer or a partner of some other organization that failed to complete a contract?
_____Yes _____No
If so, state the name of the individual, other organization and reason therefor.
_____
_____

j. Has any officer or partner of your organization ever failed to complete a contract handled in his own name?
_____Yes _____No
If yes, state name of individual, name of owner and reason therefor.
_____
_____

k. Are there any liens, of any character, filed against your company at this time?
_____Yes _____No
If yes, specify the nature and amount of lien.
_____
_____

l. In what manner have you inspected the proposed project? Explain in detail.
_____
_____

m. The work, if awarded to you, will have the personal supervision of whom?
_____ _____
Contact Name Contact Phone
_____

Contact Email

n. Do you intent to subcontract any portion of the work? _____. If so, state which portion(s) is/are to be subcontracted.

_____
_____
_____
_____

General Contractor must have each subcontractor complete a Subcontractor Qualification Questionnaire. (See bid packet). **Pursuant to P.L. 204, c.57. each subcontractor must include with their bid documents all copies of their qualifications, licenses and certificates, as required. Additionally, each subcontractor must submit a copy of their current Public Works Contractor Registration Act Certificate, pursuant to NJSA 34:11-56.48 et. seq**.

o. Have you made contracts or received firm offers for all materials within price use in preparing your proposal?
_____Yes _____No

Do not give names of dealers or manufacturers.

p. Give three (3) trade references: (Provide company name, contact, phone number and email.)

_____
_____
_____

q. Give three (3) bank references: (Provide bank name, contact, phone number and email.)

_____
_____
_____

SIGNATURE PAGE

Dated at: _____, this _____ day of _____, 2021
Town where completed day month

Name of Organization: _____

By: _____
Print Name of Person

Signature: _____

Title of Person Signing: _____

STATE OF: _____

COUNTY OF: _____

_____, being duly sworn, deposes and says that
Name of Person

he/she is _____ of _____
Title Name of Organization

and that the answers to the foregoing questions and all statements therein contained are true and correct.

Sworn to before me this _____

Day of _____, 2021

_____
Notary Public Signature/ Stamp/ Seal

My commission expires: _____

PUBLIC & INDIAN HOUSING
ANNUAL SECTION 3 SUMMARY REPORTING REQUIREMENTS
***TECHNICAL ASSISTANCE ON FORM HUD-60002**

Applicability of Section 3 to Public and Indian Housing Programs

Section 3 of the Housing and Urban Development Act of 1968 [12 U.S.C. 1701u and 24 CFR Part 135] represents HUD's policy for providing preference to low- and very low-income residents of the community where the funds are spent (regardless of race or gender), and the businesses that substantially employ these persons for new employment, training, and contracting opportunities created from the usage of covered HUD funds.

The requirements of Section 3 apply to **all Public Housing Authorities (PHAs)** regardless of size or number of units [Section 8-Only Housing Authorities are exempt]. The requirements also apply to **all contractors** that receive awards from PHAs, regardless of the dollar amount of the contract.

Section 3 applies to the following types of Public and Indian Housing assistance:

- Public Housing Operating subsidies
- Public Housing Capital Funds for Development and Modernization;
- Hope VI Revitalization Grants;
- Resident Opportunities and Self-Sufficiency (ROSS) Grants;
- Family Self-Sufficiency (FSS) Grants;
- Lead Hazard Control Grants; and
- Economic Stimulus Funding

Recipient Responsibilities Pursuant to Section 3

Each PHA (and their contractors, subcontractors, or sub-recipients) are required to comply with the requirements of Section 3 for ***new*** employment, training, or contracting opportunities resulting from the expenditure of covered funding. This responsibility includes:

1. Implementing procedures to notify Section 3 residents and business concerns
2. Notifying potential contractors working on Section 3 covered projects of their responsibilities; about training, employment, and contracting opportunities generated by Section 3 covered assistance;
3. Incorporating the Section 3 Clause into all covered solicitations and contracts [see 24 CFR Part 135.38];
4. Facilitating the training and employment of Section 3 residents and the award of contracts to Section 3 business concerns;
5. Assisting and actively cooperating with the Department in making contractors and subcontractors comply;
6. Refraining from entering into contracts with contractors that are in violation of Section 3 regulations;
7. Documenting actions taken to comply with Section 3; and
8. Submitting Section 3 Annual Summary Reports (form HUD-60002) in accordance with 24 CFR Part 135.90.

Section 3 Summary Reports (Form HUD-60002)

Annually, each PHA is required to submit form HUD-60002 to HUD's Economic Opportunity Division in Washington, DC. Pursuant to 24 CFR 135.90, form HUD-60002 is due at one of the following intervals:
1) Where the program providing Section 3 covered funding requires the submission of an annual performance report (e.g., CAPERs report, etc.), form HUD-60002 shall be submitted at the time that the annual report is due;
2) If the program providing the Section 3 covered funding does not require an annual report, form HUD-60002 shall be submitted by January 10th of each year; or
3) Form HUD-60002 shall be submitted within 10 days of project completion (e.g., if the project is completed prior to January 10th).

Determining What Should Be Reported on Form HUD-60002

Section 3 Annual Summary Reports are intended to measure each PHA's efforts to comply with the statutory and regulatory requirements of Section 3 in its own operations **AND** those of contractors, subcontractors, and sub-recipients.

Accordingly, each submission of form HUD-60002 should indicate the following:

- The total dollar amount of HUD funding that was received by the PHA during the specified reporting period.
- The total number of new employees that were hired by the PHA or its contractors, subcontractors, and sub-recipients.
- The amount of new employees that were hired by the PHA or its contractors, subcontractors, and sub-recipients, that met the definition of a Section 3 resident.
- The total number of man hours worked on covered projects (optional).
- The aggregate number of hours worked by Section 3 residents on covered projects (optional).
- The total number of Section 3 residents that participated in training opportunities that were made available by the PHA, its contractors, sub-recipients, or other local community resource agencies.
- The total dollar amount of construction and/or non-construction contracts (or subcontracts) that were awarded with HUD funding received by the PHA.
- The dollar amount of the PHA's construction or non-construction contracts (or subcontracts) that were awarded to Section 3 business concerns.
- Detailed narrative descriptions of the specific actions that were taken by the PHA, covered contractors, subcontractors, sub-recipients, or others to comply with the requirements of Section 3 and/or meet the minimum numerical goals for employment and contracting opportunities.

****PHAs must submit a separate form HUD-60002 for each type of covered financial assistance (*e.g.,* separate reports must be submitted for Operating Subsidies and Capital funding).**

Important Notes for Submitting HUD-60002

• Use the online Section 3 Summary Reporting System at: **www.hud.gov/section3** to ensure that your report is received by the appropriate HUD office in a timely manner.

• The "reporting period" option in the online Section 3 Summary Reporting System (box #7) lists quarters but the Section 3 reporting is an annual requirement. Accordingly, recipients should select **Quarter 4** to document the total amount of covered activities that took place during the entire year.
• PHAs should follow the same 12-month reporting period (i.e., fiscal, program, or calendar year) that is used for other HUD reports. If the PHA does not have other HUD reporting requirements, the Section 3 reporting period will follow the 12-month calendar year.

• Section 3 reports document compliance during the previous year (or reporting period). For instance, reports submitted on January 10, 2009, document the PHA's efforts to comply with Section 3 during 2008.
• If the PHA (or its contractors, subcontractors and sub-recipients) did not hire any new employees during the reporting period, and/or if no construction or non-construction contracts were awarded, the PHA must state this in Part III of form HUD-60002 and certify that this information is true and accurate by penalty of law.

Form HUD-60002 and Section 3 Compliance Determinations

Absent evidence to the contrary, the Department considers PHAs to be in compliance with Section 3 if they meet the minimum numerical goals set forth at 24 CFR Part 135.30[iii]
a. 30 percent of the aggregate number of new hires shall be Section 3 residents;
b. 10 percent of the total dollar amount of all covered construction contracts shall be awarded to Section 3 business concerns; and
c. 3 percent of the total dollar amount of all covered non-construction contracts shall be awarded to Section 3 business concerns.

PHAs that fail to meet the numerical goals above bear the burden of demonstrating why it was not possible. Such justifications should describe the efforts that were taken, barriers encountered, and other relevant information that will enable the Department to make a compliance determination.
** Recipients that submit Section 3 reports containing **all zeros**, without a sufficient explanation to justify their submission, are in **noncompliance** with the requirements of Section 3.

Failure to comply with the requirements of Section 3 may result in sanctions, including: debarment, suspension, or limited denial of participation in HUD programs pursuant to 24 CFR Part 24. PHAs that are subject to annual A-133 Audits may also receive an audit finding for failure to submit form HUD- 60002 to HUD.

Where Are Reports Submitted

Form HUD-60002 must be submitted to HUD's Economic Opportunity Division, in Washington, DC. Recipients are strongly encouraged to submit form HUD-60002 online at: **www.hud.gov/section3**. Recipients can also download a hard copy of form-HUD 60002 from the website listed above. Hard copies shall be submitted via fax or mail to:

U.S. Department of Housing and Urban Development
Attn: Economic Opportunity Division
451 Seventh Street, SW
Room 5235
Washington, DC 20410
202-708-1286 (fax)

Additional Section 3 Guidance and Technical Assistance

The Economic Opportunity Division is committed to providing PHAs guidance and technical assistance for compliance with the requirements of Section 3.

For additional information, please visit the Section 3 website at: **www.hud.gov/section3**. This webpage provides the following tools and information:

- Section 3 Statute—12 U.S.C. 1701u
- Section 3 Regulation—24 CFR Part 135
- Frequently Asked Questions
- Section 3 Model Programs
- Guidance on Section 3 and Economic Stimulus Funding
- Guidance on Section 3 and the Neighborhood Stimulus Program (NSP)
- Sample Section 3 Certification Forms (residents and business concerns)
- Link to HUD's Local Income Eligibility Calculator
- Link to Section 3 Annual Reporting System(form HUD-60002)
- Downloadable Forms
- Contact Information for Economic Opportunity Division staff
- Email inquiries on Section 3 can be sent to **section3@hud.gov**

Section 3 residents are defined as: 1) residents of public housing; or 2) individuals that reside in the metropolitan area or nonmetropolitan county in which the Section 3 covered assistance is expended and meet the definition of a low- or very low income person as defined by HUD).

Section 3 business concerns are defined as one of the following: 1) businesses that are 51 percent or more owned by Section 3 residents; 2) businesses whose permanent, full-time employees include persons, at least 30 percent of whom are current Section 3 residents or were Section 3 residents within 3 years of the date of first employment with the business concern; or 3) businesses that provide evidence of a commitment to subcontract in excess of 25 percent of the dollar award of all subcontracts to be awarded to business concerns that meet the qualifications set forth in the two previous categories.

See language at 24 CFR Part 135.30(d)

SAMPLE SECTION 3 BUSINESS CERTIFICATION

Name of Business: _____

Address of Business: _____

Contact Person: _____ Title: _____

Telephone: _____

The bidder certifies that it is a Section 3 Business Concern based on:

_____ Status as a Section 3 resident-owned enterprise (at least 51% owned by Section 3 residents:

- Provide copy of resident lease, evidence of participation in a public assistance program, or signed certification of Section 3 resident
- Provide documentation of business ownership, such as copy of articles of incorporation, partnership agreement, list of owners/stockholders and percentage ownership of each, organization chart with names and titles

_____ At least 30% of permanent, full-time employees are currently Section 3 Residents or were Section 3 residents within the past 3 years:

- Provide complete list of all permanent, full-time employees
- Provide list of employees claiming Section 3 status
- Provide documentation of Section 3 status for all applicable employees such as PHA residential lease or signed certification of Section 3 resident

_____ Commitment to subcontract 25% of the dollar awarded to qualified Section 3 business (only applicable to prime contractors:

- Provide list of subcontracted Section 3 business(es) and subcontract amount
- Provide documentation of Section 3 status for applicable businesses

I certify that the information provided here is true and correct and understand that any falsification of any information provided could subject me to disqualification and punishment under the law.

_____ _____

Authorized Name and Signature Date

_____ _____

Witness Name and Signature Date

Standard Terms and Conditions

1. STANDARD TERMS AND CONDITIONS APPLICABLE TO THE CONTRACT-

Unless the bidder/offeror is specifically instructed otherwise in the Request for Proposals (RFP), or Sealed Bid (Bid) the following terms and conditions shall apply to all contracts or purchase agreements made with the Housing Authority of Bergen County (Authority). These terms are in addition to the terms and conditions set forth in the RFP or Bid and should be read in conjunction with same unless the RFP or Bid specifically indicates otherwise. In the event that the bidder/offeror would like to present terms and conditions that are in conflict with either these terms and conditions or those set forth in the RFP or Bid, the bidder/offeror must present those conflicts during the question and answer period for the Authority to consider. Any conflicting terms and conditions that the Authority is willing to accept will be reflected in an addendum to the RFP or Bid. The Authority's terms and conditions shall prevail over any conflicts set forth in a bidder/offeror's proposal that were not submitted through the question and answer process and approved by the Authority. Nothing in these terms and conditions shall prohibit the Purchasing Agent (Agent) and/or Contracting Officer (Officer) from amending a contract when the Agent/Officer determines it is in the best interests of the Authority.

2. STATE LAW REQUIRING MANDATORY COMPLIANCE BY ALL CONTRACTORS -

The statutes, laws or codes cited herein are available for review in the Local Public Contracts Laws.

2.1 BUSINESS REGISTRATION – Pursuant to N.J.S.A. 52:32-44, the Authority is prohibited from entering into a contract with an entity unless the bidder and each subcontractor named in the proposal have a valid Business Registration Certificate on file with the Division of Revenue.

The contractor and any subcontractor providing goods or performing services under the contract, and each of their affiliates, shall, during the term of the contract, collect and remit to the Director of the Division of Taxation in the Department of the Treasury the use tax due pursuant to the "Sales and Use Tax Act, P.L. 1966, c. 30 (http://www.state.nj.us/treasury/revenue/busregcert.shtml. N.J.S.A. 54:32B-1 et seq.) on all their sales of tangible personal property delivered into the Authority. Any questions in this regard can be directed to the Division of Revenue at (609) 292-1730. Form NJ-REG can be filed online at http://www.state.nj.us/treasury/revenue/busregcert.shtml.

2.2 ANTI-DISCRIMINATION -
All parties to any contract with the Authority agree not to discriminate in employment and agree to abide by all anti-discrimination laws including those contained within N.J.S.A. 10:2-1 through N.J.S.A. 10:2-4, N.J.S.A. l0:5-1 et seq. and N.J.S.A. l0:5-31 through 10:5-38, and all rules and regulations issued thereunder are hereby incorporated by reference.

2.3 PREVAILING WAGE ACT -
The New Jersey Prevailing Wage Act, N.J.S.A. 34: 11-56.26 et seq. is hereby made part of every contract entered into on behalf of the Housing Authority of Bergen County through the Purchasing Department, except those contracts which are not within the contemplation of the Act. The bidder's signature on [this proposal] is his guarantee that neither he nor any subcontractors he might employ to perform the work covered by [this proposal] has been suspended or debarred by the Commissioner, Department of Labor for violation of the provisions of the Prevailing Wage Act and/or the Public Works Contractor Registration Acts; the bidder's signature on the proposal is also his guarantee that he and any subcontractors he might employ to perform the work covered by [this proposal] shall comply with the provisions of the Prevailing Wage and Public Works Contractor Registration Acts, where required.

2.4 AMERICANS WITH DISABILITIES ACT -
The contractor must comply with all provisions of the Americans with Disabilities Act (ADA), P.L 101-336, in accordance with 42 U.S.C. 12101, et. seq.

2.5 PAY TO PLAY PROHIBITIONS –
Pursuant to N.J.S.A. 19:44A-20.13 et seq (L.2005, c. 51), and specifically, N.J.S.A. 19:44A-20.21, it shall be a breach of the terms of the contract for the business entity to:
a. make or solicit a contribution in violation of the statute;
b. knowingly conceal or misrepresent a contribution given or received;
c. make or solicit contributions through intermediaries for the purpose of concealing or misrepresenting the source of the contribution;
d. make or solicit any contribution on the condition or with the agreement that it will be contributed to a campaign committee or any candidate of holder of the public office of Governor, or to any State or county party committee;
e. engage or employ a lobbyist or consultant with the intent or understanding that such lobbyist or consultant would make or solicit any contribution, which if made or solicited by the business entity itself would subject that entity to the restrictions of the Legislation;

f. fund contributions made by third parties, including consultants, attorneys, family members, and employees;
g. engage in any exchange of contributions to circumvent the intent of the Legislation; or
h. directly or indirectly through or by any other person or means, do any act which would subject that entity to the restrictions of the Legislation.

2.6 POLITICAL CONTRIBUTION DISCLOSURE –
The contractor is advised of its responsibility to file an annual disclosure statement on political contributions with the New Jersey Election Law Enforcement Commission (ELEC), pursuant to N.J.S.A.19:44A-20.27 (L. 2005, c. 271, §3 as amended) if in a calendar year the contractor receives one or more contracts valued at $50,000.00 or more. It is the contractor's responsibility to determine if filing is necessary. Failure to file can result in the imposition of penalties by ELEC. Additional information about this requirement is available from ELEC by calling 1(888) 313-3532 or on the internet at: http://www.elec.state.nj.us/.

2.7 STANDARDS PROHIBITING CONFLICTS OF INTEREST -
The following prohibitions on contractor activities shall apply to all contracts or purchase agreements made with the Housing Authority of Bergen County.
a. No vendor shall pay, offer to pay, or agree to pay, either directly or indirectly, any fee, commission, compensation, gift, gratuity, or other thing of value of any kind to any Authority officer or employee or special Authority officer or employee, as defined by N.J.S.A. 52:13D-13b. and e., or any other agency with which such vendor transacts or offers or proposes to transact business, or to any member of the immediate family, as defined by N.J.S.A. 52:13D-13i., of any such officer or employee, or partnership, firm or corporation with which they are employed or associated, or in which such officer or employee has an interest within the meaning of N.J.S.A. 52: 13D-13g.
b. The solicitation of any fee, commission, compensation, gift, gratuity or other thing of value by any Authority officer or employee or special Authority officer or employee from any Authority vendor shall be reported in writing forthwith by the vendor to the Attorney General and the Executive Commission on Ethical Standards.
c. No vendor may, directly or indirectly, undertake any private business, commercial or entrepreneurial relationship with, whether or not pursuant to employment, contract or other agreement, express or implied, or sell any interest in such vendor to, any Authority officer or employee or special Authority officer or employee having any duties or responsibilities in connection with the purchase, acquisition or sale of any property or services by or to any Authority agency or any instrumentality thereof, or with any person, firm or entity with which he is employed or associated or in which he has an interest within the meaning of N.J.S.A. 52: 130-13g. Any relationships subject to this provision shall be reported in writing forthwith to the Executive Commission on Ethical Standards, which may grant a waiver of this restriction upon application of the Authority officer or employee or special Authority officer or employee upon a finding that the present or proposed relationship does not present the potential, actuality or appearance of a conflict of interest.
d. No vendor shall influence, or attempt to influence or cause to be influenced, any Authority officer or employee or special Authority officer or employee in his official capacity in any manner which might tend to impair the objectivity or independence of judgment of said officer or employee.
e. No vendor shall cause or influence, or attempt to cause or influence, any Authority officer or employee or special Authority officer or employee to use, or attempt to use, his official position to secure unwarranted privileges or advantages for the vendor or any other person.
f. The provisions cited above in paragraphs 2.8a through 2.8e shall not be construed to prohibit a Authority officer or employee or Special Authority officer or employee from receiving gifts from or contracting with vendors under the same terms and conditions as are offered or made available to members of the general public subject to any guidelines the Executive Commission on Ethical Standards may promulgate under paragraph 3c of Executive Order No. 189.

2.8 COMPLIANCE - LAWS -
The contractor must comply with all local, State and Federal laws, rules and regulations applicable to this contract and to the goods delivered and/or services performed hereunder.

2.9 COMPLIANCE - STATE LAWS -
It is agreed and understood that any contracts and/or orders placed as a result of [this proposal] shall be governed and construed and the rights and obligations of the parties hereto shall be determined in accordance with the laws of the STATE OF NEW JERSEY.

3. STATE LAW REQUIRING MANDATORY COMPLIANCE BY CONTRACTORS UNDER CIRCUMSTANCES SET FORTH IN LAW OR BASED ON THE TYPE OF CONTRACT

3.1 COMPLIANCE - CODES –
The contractor must comply with NJUCC and the latest NEC70, B.O.C.A. Basic Building code, OSHA and all applicable codes for this requirement. The contractor shall be responsible for securing and paying all necessary permits, where applicable.

3.2 PUBLIC WORKS CONTRACTOR REGISTRATION ACT -
The New Jersey Public Works Contractor Registration Act requires all contractors, subcontractors and lower tier subcontractor(s) who engage in any contract for public work as defined in N.J.S.A. 34:11-56.26 be first registered with the New Jersey Department

of Labor and Workforce Development. Any questions regarding the registration process should be directed to the Division of Wage and Hour Compliance at (609) 292-9464.

3.3 PUBLIC WORKS CONTRACT - ADDITIONAL AFFIRMATIVE ACTION REQUIREMENTS -
N.J.S.A. 10:5-33 and N.J.A.C. 17:27-3.5 require that during the performance of this contract, the contractor must agree as follows:
a) The contractor or subcontractor, where applicable, will not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Except with respect to affectional or sexual orientation and gender identity or expression, the contractor will take affirmative action to ensure that such applicants are recruited and employed, and that employees are treated during employment, without regard to their age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause;
b) The contractor or subcontractor, where applicable will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex;
c) The contractor or subcontractor where applicable, will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the contractor's commitments under this act and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
N.J.A.C. 17:27-3.7 requires all contractors and subcontractors, if any, to further agree as follows:
1. The contractor or subcontractor agrees to make good faith efforts to meet targeted county employment goals established in accordance with N.J.A.C. 17:27-5.2.
2. The contractor or subcontractor agrees to inform in writing its appropriate recruitment agencies including, but not limited to, employment agencies, placement bureaus, colleges, universities, and labor unions, that it does not discriminate on the basis of age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex, and that it will discontinue the use of any recruitment agency which engages in direct or indirect discriminatory practices.
3. The contractor or subcontractor agrees to revise any of its testing procedures, if necessary, to assure that all personnel testing conforms with the principles of job-related testing, as established by the statutes and court decisions of the State of New Jersey and as established by applicable Federal law and applicable Federal court decisions.
4. In conforming with the targeted employment goals, the contractor or subcontractor agrees to review all procedures relating to transfer, upgrading, downgrading and layoff to ensure that all such actions are taken without regard to age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex, consistent with the statutes and court decisions of the State of New Jersey, and applicable Federal law and applicable Federal court decisions.

3.4 **BUILDING SERVICE** –
Pursuant to N.J.S.A. 34:11-56.58 et seq., in any contract for building services, as defined in N.J.S.A. 34:11-56.59, the employees of the contractor or subcontractors shall be paid prevailing wage for building services rates, as defined in N.J.S.A. 34:11.56.59. The prevailing wage shall be adjusted annually during the term of the contract.

3.5 THE WORKER AND COMMUNITY RIGHT TO KNOW ACT -
The provisions of N.J.S.A. 34:5A-l et seq. which require the labeling of all containers of hazardous substances are applicable to this contract. Therefore, all goods offered for purchase to the Authority must be labeled by the contractor in compliance with the provisions of the statute.

3.6 BUY AMERICAN –
Pursuant to N.J.S.A. 52:32-1, if manufactured items or farm products will be provided under this contract to be used in a public work, they shall be manufactured or produced in the United States and the contractor shall be required to so certify.

4. INDEMNIFICATION AND INSURANCE

4.1 INDEMNIFICATION -
The contractor's liability to the Authority and its employees in third party suits shall be as follows:
(a) Indemnification for Third Party Claims - The contractor shall assume all risk of and responsibility for, and agrees to indemnify, defend, and save harmless the Authority and its employees from and against any and all claims, demands, suits, actions, recoveries, judgments and costs and expenses in connection therewith which shall arise from or result directly or indirectly from the work and/or materials supplied under this contract, including liability of any nature or kind for or on account of the use of any

copyrighted or un-copyrighted composition, secret process, patented or unpatented invention, article or appliance furnished or used in the performance of this contract.
(b) The contractor's indemnification and liability under subsection (a) is not limited by, but is in addition to the insurance obligations contained in Section 4.2 of these Terms and Conditions.
(c) In the event of a patent and copyright claim or suit, the contractor, at its option, may: (1) procure for the Authority the legal right to continue the use of the product; (2) replace or modify the product to provide a non-infringing product that is the functional equivalent; or (3) refund the purchase price less a reasonable allowance for use that is agreed to by both parties.

4.2 INSURANCE -
The contractor shall secure and maintain in force for the term of the contract insurance as provided herein. All required insurance shall be provided by insurance companies with A.M. Best & Company. The contractor shall provide the Authority with current certificates of insurance for all coverage's and renewals thereof, and the certificates shall reflect that the insurance policies shall not be canceled for any reason except after sixty (60) days written notice to the Authority. Certificates of renewals shall be provided within thirty (30) days of the expiration of the insurance. The contractor shall not begin to provide services or goods to the Authority until evidence of the required insurance is provided. The certificates of insurance shall indicate the contract number or purchase order number and title of the contract in the Description of Operations box and shall list the Housing Authority of Bergen County, One Bergen County Plaza, Floor 2, Hackensack, New Jersey 07601 in the Certificate Holder box. The certificates and any notice of cancelation shall be emailed to the Authority at:

martinez@habcnj.org

The insurance to be provided by the contractor shall be as follows:

a. General Aggregate for Commercial General Liability shall be in the minimum limit of $2,000,000. Occurrence Form Comprehensive General Liability Insurance or its equivalent: The minimum limit of liability shall be $1,000,000 per occurrence as a combined single limit for bodily injury and property damage. The above required Comprehensive General Liability Insurance policy or its equivalent shall name the Authority, its officers, and employees as "Additional Insured's" and include the blanket additional insured endorsement or its equivalent. The coverage to be provided under these policies shall be at least as broad as that provided by the standard basic, un-amended, and unendorsed Comprehensive General Liability Insurance occurrence coverage forms or its equivalent currently in use in the State of New Jersey, which shall not be circumscribed by any endorsement limiting the breadth of coverage.

b. Automobile Liability Insurance: Insurance with limits of not less than $1,000,000 for bodily injury and property damage, in combined or equivalent split limits, for each single accident. Insurance shall cover liability arising out of Contractor's use of autos pursuant to this Contract, including owned, leased, hired, and/or non-owned autos as each may be applicable. The Authority must be named as an "Additional Insured" and a blanket additional insured endorsement or its equivalent must be provided when the services being procured involve vehicle use on the Authority's behalf or on Authority controlled property.

c. Worker's Compensation Insurance and Employers' liability: Insurance or qualified self-insurance satisfying statutory requirements, which includes Employers' Liability coverage with limits of not less than $1,000,000 per accident. If applicable to Contractor's operations, coverage also shall be arranged to satisfy the requirements of any federal workers or workmen's compensation law or any federal occupational disease law.

d. This $1 million amount may have been raised by the RFP when deemed necessary by the Agent/Officer.

e. Professional Liability/Errors & Omissions: Insurance covering Contractor's liability arising or related to this Contract, with limits of not less than $1,000,000 per claim and $2,000,000 aggregate.

f. In the case of a contract entered into pursuant to N.J.S.A. 52:32-17, et. seq., (small business set asides) the minimum amount of insurance coverage in subsections a., b., and c. above may have been lowered in the RFP for certain commodities when deemed in the best interests of the Authority by the Agent/Officer.

g. Further, Contractor understands and agrees it shall maintain such coverage for a period of not less than three (3) years following this Agreement Expiration, termination or cancellation.

5. TERMS GOVERNING ALL CONTRACTS

5.1 CONTRACTOR IS INDEPENDENT CONTRACTOR –
The contractor's status shall be that of any independent contractor and not as an employee of the Authority.

5.2 CONTRACT AMOUNT -
The estimated amount of the contract(s), when stated on the RFP or Bid Form, shall not be construed as either the maximum or minimum amount which the Authority shall be obliged to order as the result of the RFP or Bid, or any contract entered into as a result of the RFP or Bid.

5.3 CONTRACT TERM AND EXTENSION OPTION -
If, in the opinion of the Agent/Officer, it is in the best interest of the Authority to extend a contract, the contractor shall be so notified of the Agent/Officer's Intent at least thirty (30) days prior to the expiration date of the existing contract. The contractor shall have fifteen (15) calendar days to respond to the Agent/Officer's request to extend the term and period of performance of the contract. If the contractor agrees to the extension, all terms and conditions including pricing of the original contract shall apply unless more favorable terms for the Authority have been negotiated.

5.4 AUTHORITY'S OPTION TO INCREASE OR REDUCE SCOPE OF WORK –
The Authority has the option, in its sole discretion, to increase or reduce the scope of work for any deliverable, task or subtask called for under this contract. In such an event, the Agent/Officer shall provide to the contractor advance written notice of the change in scope of work and what the Agent/Officer believes should be the corresponding adjusted contract price. Within five (5) business days of receipt of such written notice, if either is applicable:
a. If the contractor does not agree with the Agent/Officer's proposed adjusted contract price, the contractor shall submit to the Agent/Officer any additional information that the contractor believes impacts the adjusted contract price with a request that the Agent/Officer reconsider the proposed adjusted contract price. The parties shall negotiate the adjusted contract price. If the parties are unable to agree on an adjusted contract price, the Agent/Officer shall make a prompt decision taking all such information into account, and shall notify the contractor of the final adjusted contract price.
(b) If the contractor has undertaken any work effort toward a deliverable, task or subtask that is being changed or eliminated such that it would not be compensated under the adjusted contract, the contractor shall be compensated for such work effort according to the applicable portions of its price schedule and the contractor shall submit to the Agent/Officer an itemization of the work effort already completed by deliverable, task or subtask within the scope of work, and any additional information the Agent/Officer may request. The Agent/Officer shall make a prompt decision taking all such information into account, and shall notify the contractor of the compensation to be paid for such work effort.

5.5 CHANGE IN LAW–
Whenever a change in applicable law or regulation affects the scope of work, the Agent/Officer shall provide written notice to the contractor of the change and the Agent/Officer's determination as to the corresponding adjusted change in the scope of work and corresponding adjusted contract price. Within five (5) business days of receipt of such written notice, if either is applicable:
(a) If the contractor does not agree with the adjusted contract price, the contractor shall submit to the Agent/Officer any additional information that the contractor believes impacts the adjusted contract price with a request that the Agent/Officer reconsider the adjusted contract price. The Agent/Officer shall make a prompt decision taking all such information into account, and shall notify the contractor of the final adjusted contract price.
(b) If the contractor has undertaken any work effort toward a deliverable, task or subtask that is being changed or eliminated such that it would not be compensated under the adjusted contract, the contractor shall be compensated for such work effort according to the applicable portions of its price schedule and the contractor shall submit to the Agent/Officer an itemization of the work effort already completed by deliverable, task or subtask within the scope of work, and any additional information the Agent/Officer may request. The Agent/Officer shall make a prompt decision taking all such information into account, and shall notify the contractor of the compensation to be paid for such work effort.

5.6 SUSPENSION OF WORK -
The Authority may, for valid reason, issue a stop order directing the contractor to suspend work under the contract for a specific time. The contractor shall be paid for goods ordered, goods delivered, or services requested and performed until the effective date of the stop order. The contractor shall resume work upon the date specified in the stop order, or upon such other date as the Authority may thereafter direct in writing. The period of suspension shall be deemed added to the contractor's approved schedule of performance. The Agent/Officer shall make an equitable adjustment, if any is required, to the contract price. The contractor shall provide whatever information that Agent/Officer may require related to the equitable adjustment.

5.7 TERMINATION OF CONTRACT
a. For Convenience
Notwithstanding any provision or language in this contract to the contrary, the Agent/Officer may terminate this contract at any time, in whole or in part, for the convenience of the Authority, upon no less than thirty (30) days written notice to the contractor.
b. For Cause
1. Where a contractor fails to perform or comply with a contract or a portion thereof, and/or fails to comply with the complaints procedure in N.J.A.C. 17: 12-4.2 et seq., the Agent/Officer may terminate the contract, in whole or in part, upon ten (10) day notice to the contractor with an opportunity to respond.
2. Where in the reasonable opinion of the Agent/Officer, a contractor continues to perform a contract poorly as demonstrated by e.g., formal complaints, late delivery, poor performance of service, short-shipping, so that the Agent/Officer is required to use the

complaints procedure in N.J.A.C. 17:12-4.2 et seq., and there has been a failure on the part of the contractor to make progress towards ameliorating the issue(s) or problem(s) set forth in the complaint, the Agent/Officer may terminate the contract, in whole or in part, upon ten (10) day notice to the contractor with an opportunity to respond.
c. In cases of emergency the Agent/Officer may shorten the time periods of notification and may dispense with an opportunity to respond.
d. In the event of termination under this section, the contractor shall be compensated for work performed in accordance with the contract, up to the date of termination. Such compensation may be subject to adjustments.

5.8 SUBCONTRACTING OR ASSIGNMENT
a. Subcontracting: The contractor may not subcontract other than as identified in the contractor's proposal without the prior written consent of the Agent/Officer. Such consent, if granted in part, shall not relieve the contractor of any of his responsibilities under the contract, nor shall it create privity of contract between the Authority and any subcontractor. If the contractor uses a subcontractor to fulfill any of its obligations, the contractor shall be responsible for the subcontractor's: (a) performance; (b) compliance with all of the terms and conditions of the contract; and (c) compliance with the requirements of all applicable laws.
b. Assignment: The contractor may not assign its responsibilities under the contract, in whole or in part, without the prior written consent of the Agent/Officer.

5.9 NO CONTRACTUAL RELATIONSHIP BETWEEN SUBCONTRACTORS AND THE AUTHORITY -
Nothing contained in any of the contract documents, including the RFP or Bid and vendor's bid or proposal shall be construed as creating any contractual relationship between any subcontractor and the Authority.

5.10 MERGERS, ACQUISITIONS -
If, during the term of this contract, the contractor shall merge with or be acquired by another firm, the contractor shall give notice to the Agent/Officer as soon as practicable and in no event longer than thirty (30) days after said merger or acquisition. The contractor shall provide such documents as may be requested by the Agent/Officer, which may include but need not be limited to the following: corporate resolutions prepared by the awarded contractor and new entity ratifying acceptance of the original contract, terms, conditions and prices; updated information including ownership disclosure and Federal Employer Identification Number. The documents must be submitted within thirty (30) days of the request. Failure to do so may result in termination of the contract for cause.
If, at any time during the term of the contract, the contractor's partnership, limited liability company, limited liability partnership, professional corporation, or corporation shall dissolve, the Agent/Officer must be so notified. All responsible parties of the dissolved business entity must submit to the Agent/Officer in writing, the names of the parties proposed to perform the contract, and the names of the parties to whom payment should be made. No payment shall be made until all parties to the dissolved business entity submit the required documents to the Agent/Officer.

5.11 PERFORMANCE GUARANTEE OF CONTRACTOR -
The contractor hereby certifies that:
a. The equipment offered is standard new equipment, and is the manufacturer's latest model in production, with parts regularly used for the type of equipment offered; that such parts are all in production and not likely to be discontinued; and that no attachment or part has been substituted or applied contrary to manufacturer's recommendations and standard practice.
b. All equipment supplied to the Authority and operated by electrical current is UL listed where applicable.
c. All new machines are to be guaranteed as fully operational for the period stated in the contract from time of written acceptance by the Authority. The contractor shall render prompt service without charge, regardless of geographic location.
d. Sufficient quantities of parts necessary for proper service to equipment shall be maintained at distribution points and service headquarters.
e. Trained mechanics are regularly employed to make necessary repairs to equipment in the territory from which the service request might emanate within a 48-hour period or within the time accepted as industry practice.
f. During the warranty period the contractor shall replace immediately any material which is rejected for failure to meet the requirements of the contract.
g. All services rendered to the State shall be performed in strict and full accordance with the specifications stated in the contract. The contract shall not be considered complete until final approval by the Authority is rendered.

5.12 DELIVERY REQUIREMENTS-
a. Deliveries shall be made at such time and in such quantities as ordered in strict accordance with conditions contained in the contract.
b. The contractor shall be responsible for the delivery of material in first class condition to the Authority or the purchaser under this contract and in accordance with good commercial practice.
c. Items delivered must be strictly in accordance with the contract.
d. In the event delivery of goods or services is not made within the number of days stipulated or under the schedule defined in the contract, the Authority shall be authorized to obtain the material or service from any available source, the difference in price, if any, to be paid by the contractor.

5.13 CONTRACT AMENDMENT –

Except as provided herein, the contract may only be amended by written agreement of the Authority and the contractor.

5.14 MAINTENANCE OF RECORDS -
The contractor shall maintain records for products and/or services delivered against the contract for a period of five (5) years from the date of final payment unless otherwise specified in the RFP or Bid. Such records shall be made available to the Authority for audit and review.

5.14 ASSIGNMENT OF ANTITRUST CLAIM(S) -
The contractor recognizes that in actual economic practice, overcharges resulting from antitrust violations are in fact usually borne by the ultimate purchaser. Therefore, and as consideration for executing this contract, the contractor, acting herein by and through its duly authorized agent, hereby conveys, sells, assigns, and transfers to the Housing Authority of Bergen County, for itself and on behalf of its subdivisions and public agencies, all right, title and interest to all claims and causes of action it may now or hereafter acquire under the antitrust laws of the United States or the State of New Jersey, relating to the particular goods and services purchased or acquired by the Authority or any of its subdivisions or public agencies pursuant to this contract.
In connection with this assignment, the following are the express obligations of the contractor:
a. It shall take no action that will in any way diminish the value of the rights conveyed or assigned hereunder.
b. It shall advise the Attorney General of New Jersey:
1. in advance of its intention to commence any action on its own behalf regarding any such claim or cause(s) of action;
2. immediately upon becoming aware of the fact that an action has been commenced on its behalf by some other person(s) of the pendency of such action.
c. It shall notify the defendants in any antitrust suit of the within assignment at the earliest practicable opportunity after the contractor has initiated an action on its own behalf or becomes aware that such an action has been filed on its behalf by another person. A copy of such notice shall be sent to the Attorney General of New Jersey.
d. It is understood and agreed that in the event any payment under any such claim or cause of action is made to the contractor, it shall promptly pay over to the Authority the allotted share thereof, if any, assigned to the Authority hereunder.

6. TERMS RELATING TO PRICE AND PAYMENT

6.1 PRICE FLUCTUATION DURING CONTRACT -
Unless otherwise agreed to in writing by the Authority, all prices quoted shall be firm through issuance of contract or purchase order and shall not be subject to increase during the period of the contract.
In the event of a manufacturer's or contractor's price decrease during the contract period, the Authority shall receive the full benefit of such price reduction on any undelivered purchase order and on any subsequent order placed during the contract period. The Agent/Officer must be notified, in writing, of any price reduction within five (5) days of the effective date.
Failure to report price reductions may result in cancellation of contract for cause, pursuant to provision 5.7(b)1.

6.2 TAX CHARGES -
The Housing Authority of Bergen county is exempt from State sales or use taxes and Federal excise taxes. Therefore, price quotations must not include such taxes. The Authority's Federal Excise Tax Exemption number is 22-182-8802.

6.3 PAYMENT TO VENDORS -
a. The Authority is authorized to order and the contractor is authorized to ship only those items covered by the contract resulting from the RFP or Bid. If a review of orders placed by the Authority reveals that goods and/or services other than that covered by the contract have been ordered and delivered, such delivery shall be a violation of the terms of the contract and may be considered by the Agent/Officer as a basis to terminate the contract and/or not award the contractor a subsequent contract. The Agent/Officer may take such steps as are necessary to have the items returned by the agency, regardless of the time between the date of delivery and discovery of the violation. In such event, the contractor shall reimburse the Authority the full purchase price.
b. The contractor must submit invoices to the using agency with supporting documentation evidencing that work or goods for which payment is sought has been satisfactorily completed or delivered. For commodity contracts, the invoice, together with the original Bill of Lading, express receipt and other related papers must be sent to the Authority or using agency on the date of each delivery. For contracts featuring services, invoices must reference the tasks or subtasks detailed in the Scope of Work section of the RFP or Bid and must be in strict accordance with the firm, fixed prices submitted for each task or subtask on the RFP or Bid pricing sheets. When applicable, invoices should reference the appropriate RFP or Bid price sheet line number from the contractor's bid proposal. All invoices must be approved by the Authority or using agency before payment will be authorized.
c. In all time and materials contracts, the Authority or designee shall monitor and approve the hours of work and the work accomplished by contractor and shall document both the work and the approval. Payment shall not be made without such documentation. A form of timekeeping record should be adapted that is appropriate for the Scope of Work being performed.

6.4 NEW JERSEY PROMPT PAYMENT ACT -
The New Jersey Prompt Payment Act, N.J.S.A. 52:32-32 et seq., requires the Authority to pay for goods and services within sixty (60) days of the Authority's receipt of a properly executed Payment Voucher or within sixty (60) days of receipt and acceptance of goods and services, whichever is later. Properly executed performance security, when required, must be received by the Authority

prior to processing any payments for goods and services accepted by the Authority. Cash discounts and other payment terms included as part of the original agreement are not affected by the Prompt Payment Act.

6.6 AVAILABILITY OF FUNDS –

The Authority's obligation to make payment under this contract is contingent upon the availability of appropriated funds and receipt of revenues from which payment for contract purposes can be made. No legal liability on the part of the Authority for payment of any money shall arise unless and until funds are appropriated each fiscal year to the using agency by the Authority and made available through receipt of revenues.

CONFLICT OF INTEREST
and
POLITICAL CONTRIBUTION DISCLOSURE CERTIFICATION

The bidder certified that to the best of its knowledge and belief and except as otherwise disclosed, he or she does not have any organizational conflict of interest which is defined as a situation in which the nature of work to be performed under this proposed contract and the bidder's organizational, financial, contractual, or other interests may, without some restriction on future activities:

a. result in an unfair competitive advantage to the bidder; or
b. impair the bidder's objectivity in performing the contract work

In the absence of any actual or apparent conflict, I certify to the best of my knowledge and belief, no actual or apparent conflict of interest exists with regard to my possible performance of this procurement.

By the submission of this bid, the bidder certifies that to the best of its knowledge and belief, neither it, nor any person or firm which has an interest in the bidder's firm, nor any of the bidder's subcontractors, is ineligible to:

1) be awarded contracts by any agency of the United States Government, HUD, or the State of New Jersey, or
2) participate in HUD programs pursuant to 24 CFR Part 24.

This certification above is a material representation of fact upon which reliance was placed when making award. If it is later determined that the bidder knowingly rendered an erroneous certification, the contract may be terminated for default, and the bidder may be debarred or suspended from participation in HUD programs and other Federal contract programs.

_____

Signature of Person Authorized to sign for contractor

_____

Print Name

_____

Date

C. 271 POLITICAL CONTRIBUTION DISCLOSURE FORM

Contractor Instructions

Business entities (contractors) receiving contracts from a public agency that are NOT awarded pursuant to a "fair and open" process (defined at N.J.S.A. 19:44A-20.7) are subject to the provisions of P.L. 2005, c. 271, s.2 (N.J.S.A. 19:44A-20.26). This law provides that 10 days prior to the award of such a contract, the contractor shall disclose contributions to:

- any State, county, or municipal committee of a political party
- any legislative leadership committee*
- any continuing political committee (a.k.a., political action committee)
- any candidate committee of a candidate for, or holder of an elective office:
    - of the public entity awarding the contract
    - of that county in which that public entity is located
    - of another public entity within that county
    - or of a legislative district in which that public entity is located or, when the public entity is a county, of any legislative district which includes all or part of the county

The disclosure must list reportable contributions to any of the committees that exceed $300 per election cycle that were made during the 12 months prior to award of the contract. See N.J.S.A. 19:44A-8 and 19:44A-16 for more details on reportable contributions.

N.J.S.A. 19:44A-20.26 itemizes the parties from whom contributions must be disclosed when a business entity is not a natural person. This includes the following:

- individuals with an "interest" ownership or control of more than 10% of the profits or assets of a business entity or 10% of the stock in the case of a business entity that is a corporation for profit
- all principals, partners, officers, or directors of the business entity or their spouses
- any subsidiaries directly or indirectly controlled by the business entity
- IRS code Section 527 New Jersey based organizations, directly or indirectly controlled by the business entity and filing as continuing political committees, (PACs)

When the business entity is a natural person, "a contributions by that person's spouse or child, residing therewith, shall be deemed to be a contribution by the business entity". [N.J.S.A. 19:44A-20.26 (b)] The contributor must be listed on the disclosure.

Any business entity that fails to comply with the disclosure provisions shall be subject to a fine imposed by ELEC in an amount to be determined by the Commission which may be based upon the amount that the business entity failed to report.

The enclosed list of agencies is provided to assist the contractor in identifying those public agencies whose elected official and/or candidate campaign committees are affected by the disclosure requirement. It is the contractor's responsibility to identify the specific committees to which contributions may have been made and need to be disclosed. The disclosed information may exceed the minimum requirement.

The enclosed form, a content-consistent facsimile, or an electronic data file containing the required details (along with a signed cover sheet) may be used as the contractor's submission and is disclosable to the public under the Open Public Records Act.

The contractor must also complete the attached Stockholder Disclosure Certification. This will assist the agency in meeting its obligations under the law. **NOTE: This section does not apply to Board of Education contracts)**

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* N.J.S.A. 19:44a-3(S): "The term "legislative leadership committee" means a committee established, authorized to be established, or designated by the President of the Senate, the Minority Leader of the Senate, the Speaker of the General Assembly or the Minority Leader of the General Assembly pursuant to section 16 of P.L. 1933, c65 (C.1944A-10.1) for the purpose of receiving contributions and making expenditures.

C. 271 POLITICAL CONTRIBUTION DISCLOSURE FORM

Required Pursuant to N.J.S.A. 19:44A-20.26

This form or its permitted facsimile must be submitted to the local unit no later than 10 days prior to the award of the contract.

Part I - Vendor Information

Vendor Name:		
Address:		
City:	State:	Zip:

The undersigned being authorized to certify, hereby certifies that the submission provided herein represents compliance with the provisions of N.J.S.A. 19:44a-20.26 and as represented by the Instructions accompanying this form.

_____	_____	_____
Signature	Printed Name	Title

Part II - Contribution Disclosure

Disclosure requirement: Pursuant to N.J.S.A. 19:44A-20.26 this disclosure must include all reportable political contributions (more than $300 per election cycle) over the 12 months prior to submission to the committees of the government entities listed on the form provided by the local unit.

☐ Check here if disclosure is provided in electronic form.

Contributor Name	Recipient Name	Date	Dollar Amount
			$
			$
			$
			$
			$
			$
			$
			$
			$
			$
			$
			$
			$
			$

☐ Check here if the information is continued on subsequent page(s)

List of Agencies with Elected Officials Required for Political Contribution Disclosure

N.J.S.A. 19:44A-20.26

County Name:

State: Governor, and Legislative Leadership Committees

Legislative District #s: State Senator and two members of the General Assembly per district

County:

- ☐ Commissioners
- ☐ County Executive
- ☐ County Clerk
- ☐ Surrogate
- ☐ Sheriff

Municipalities: Mayor and members of governing body, regardless of title

STANDARD BID DOCUMENT REFERENCE	
Name of Form:	**FEDERAL NON-DEBARMENT CERTIFICATION**
Statutory Reference:	N.J.S.A. 52:32-44.1 (P.L. 2019, c.406)
Description:	Meets statutory criteria for certification of non-debarment by a federal government agency.

Summary of the Certification Requirements under N.J.S.A. 52:32-44.1

Pursuant to state law any natural person, company, firm, association, corporation, or other entity prohibited, or "debarred," from contracting with the federal government agencies, shall also be prohibited from contracting for public work in the state of New Jersey. This prohibition also extends to any affiliate organization(s) held by or subject to the control of an entity of that prohibited person or entity.

Prior to awarding a contract for public work a local units must obtain written certification from the contracting person or entity through the form below, attesting to their non-debarment from contracting with federal government agencies. Contracting units are reminded that they must fill-in the boilerplate information in the certification sections of Parts II through IV regarding their name and type of contracting unit before using the form.

CERTIFICATION OF NON-DEBARMENT
FOR FEDERAL GOVERNMENT CONTRACTS
N.J.S.A. 52:32-44.1 (P.L. 2019, c.406)

This certification shall be completed, certified to, and submitted to the contracting unit prior to contract award, except for emergency contracts where submission is required prior to payment.

PART I: VENDOR INFORMATION	
Individual or Organization Name	
Address of Individual or Organization	
DUNS Code (if applicable)	
CAGE Code (if applicable)	
Check the box that represents the type of business organization:	

☐Sole Proprietorship (skip Parts III and IV) ☐Non-Profit Corporation (skip Parts III and IV)

☐For-Profit Corporation (any type) ☐Limited Liability Company (LLC) ☐Partnership

☐Limited Partnership ☐Limited Liability Partnership (LLP)

☐Other (be specific): _____

PART II – CERTIFICATION OF NON-DEBARMENT: Individual or Organization			
I hereby certify that the **individual or organization listed above in Part I** is not debarred by the federal government from contracting with a federal agency. I further acknowledge: that I am authorized to execute this certification on behalf of the above-named organization; that the ***<name of contracting unit>*** is relying on the information contained herein and that I am under a continuing obligation from the date of this certification through the date of contract award by ***<type of contracting unit>*** to notify the ***<type of contracting unit>*** in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification, and if I do so, I am subject to criminal prosecution under the law and that it will constitute a material breach of my agreement(s) with the ***<type of contracting unit>***, permitting the ***<type of contracting unit>*** to declare any contract(s) resulting from this certification void and unenforceable.			
Full Name (Print):		Title:	
Signature:		Date:	

PART III – CERTIFICATION OF NON-DEBARMENT: Individual or Entity Owning Greater than 50 Percent of Organization	
Section A (Check the Box that applies)	
☐	Below is the name and address of the stockholder in the corporation who owns more than 50 percent of its voting stock, or of the partner in the partnership who owns more than 50 percent interest therein, or of the member of the limited liability company owning more than 50 percent interest therein, as the case may be.
Name of Individual or Organization	
Home Address (for Individual) or Business Address	
OR	
☐	No one stockholder in the corporation owns more than 50 percent of its voting stock, or no partner in the partnership owns more than 50 percent interest therein, or no member in the limited liability company owns more than 50 percent interest therein, as the case may be.
Section B (Skip if no Business entity is listed in Section A above)	
☐	Below is the name and address of the stockholder in the corporation who owns more than 50 percent of the voting stock of the organization's parent entity, or of the partner in the partnership who owns more than 50 percent interest in the organization's parent entity, or of the member of the limited liability company owning more than 50 percent interest in organization's parent entity, as the case may be.
Stockholder/Partner/Member Owning Greater Than 50 Percent of Parent Entity	
Home Address (for Individual) or Business Address	
OR	
☐	No one stockholder in the parent entity corporation owns more than 50 percent of its voting stock, no partner in the parent entity partnership owns more than 50 percent interest therein, or no member in the parent entity limited liability company owns more than 50 percent interest therein, as the case may be.
Section C – Part III Certification	

I hereby certify that no individual or organization that is debarred by the federal government from contracting with a federal agency owns greater than 50 percent of the **Organization listed above in Part I** or, if applicable, owns greater than 50 percent of a parent entity of **<name of organization>**. I further acknowledge: that I am authorized to execute this certification on behalf of the above-named organization; that the ***<name of contracting unit>*** is relying on the information contained herein and that I am under a continuing obligation from the date of this certification through the date of contract award ***<type of contracting unit>*** to notify the ***<type of contracting unit>*** in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification, and if I do so, I am subject to criminal prosecution under the law and that it will constitute a material breach of my agreement(s) with the ***<type of contracting unit>***, permitting the ***<type of contracting unit>*** to declare any contract(s) resulting from this certification void and unenforceable.

Full Name (Print):		Title:	
Signature:		Date:	

Part IV – CERTIFICATION OF NON-DEBARMENT: Contractor – Controlled Entities	
Section A	
☐	Below is the name and address of the corporation(s) in which the **Organization listed in Part I** owns more than 50 percent of voting stock, or of the partnership(s) in which the **Organization listed in Part I** owns more than 50 percent interest therein, or of the limited liability company or companies in which the **Organization listed above in Part I** owns more than 50 percent interest therein, as the case may be.
Name of Business Entity	**Business Address**
Add additional sheets if necessary	
OR	
☐	The **Organization listed above in Part I** does not own greater than 50 percent of the voting stock in any corporation and does not own greater than 50 percent interest in any partnership or any limited liability company.

Section B (skip if no business entities are listed in Section A of Part IV)	
☐	Below are the names and addresses of any entities in which an entity listed in Part III A owns greater than 50 percent of the voting stock (corporation) or

	owns greater than 50 percent interest (partnership or limited liability company).

Name of Business Entity Controlled by Entity Listed in Section A of Part IV	**Business Address**

Add additional Sheets if necessary

OR

☐	No entity listed in Part III A owns greater than 50 percent of the voting stock in any corporation or owns greater than 50 percent interest in any partnership or limited liability company.

Section C – Part IV Certification

I hereby certify that the **Organization listed above in Part I** does not own greater than 50 percent of any entity that that is debarred by the federal government from contracting with a federal agency and, if applicable, does not own greater than 50 percent of any entity that in turns owns greater than 50 percent of any entity debarred by the federal government from contracting with a federal agency. I further acknowledge: that I am authorized to execute this certification on behalf of the above-named organization; that the ***<name of contracting unit>*** is relying on the information contained herein and that I am under a continuing obligation from the date of this certification through the date of contract award by ***<type of contracting unit>*** to notify the ***<type of contracting unit>*** in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification, and if I do so, I am subject to criminal prosecution under the law and that it will constitute a material breach of my agreement(s) with the ***<type of contracting unit>***, permitting the ***<type of contracting unit>*** to declare any contract(s) resulting from this certification void and unenforceable.

Full Name (Print):		Title:	
Signature:		Date:	

USERS SHOULD CREATE THEIR OWN FORM, OR DOWNLOAD FROM
WWW.NJ.GOV/DCA/LGS/P2P A COUNTY-BASED CUSTOMIZABLE FORM

HOUSING AUTHORITY OF BERGEN COUNTY

2021 HOLIDAY SCHEDULE

JANUARY 18TH	MONDAY	MARTIN LUTHER KING'S BIRTHDAY
FEBRUARY 15TH	MONDAY	PRESIDENT'S DAY
APRIL 2nd	FRIDAY	GOOD FRIDAY
MAY 31st	MONDAY	MEMORIAL DAY*
JUNE 18th	FRIDAY	JUNETEENTH (Observed)
JULY 5th	MONDAY	INDEPENDENCE DAY* (Observed)
SEPTEMBER 6TH	MONDAY	LABOR DAY*
OCTOBER 11TH	MONDAY	COLUMBUS DAY
NOVEMBER 2nd	TUESDAY	ELECTION DAY
NOVEMBER 11TH	THURSDAY	VETERAN'S DAY
NOVEMBER 25TH	THURSDAY	THANKSGIVING DAY*
NOVEMBER 26TH	FRIDAY	DAY AFTER THANKSGIVING DAY
DECEMBER 24TH	FRIDAY	CHRISTMAS DAY* (Observed)
DECEMBER 31st	FRIDAY	NEW YEAR'S DAY* (Observed)

*The business day preceding this holiday is a half day. The Main Office will be open from 8:00am to 12:00pm.

SECTION 033000 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Formwork for cast-in-place concrete with shoring and bracing
2. Formwork accessories
3. Form stripping
4. Reinforcing steel for cast-place-concrete
5. Cast-in-place concrete including the following:
   a. Foundations and footings
   b. Foundation walls
   c. Floor slabs
   d. Retaining Walls
   e. Equipment pads and bases
   f. Steel pan stairs
   g. Exterior stairs
6. Concrete curing.

1.2 REFERENCES

A. General:

1. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the work. Where differences exist between codes and standards, the one affording the greatest protection shall apply.

B. American Concrete Institute (ACI):

1.	ACI 117	Specification for Tolerances for Concrete Construction
2.	ACI 211.1	Proportioning Concrete Mixtures
3.	ACI 301	Specifications for Structural Concrete
4.	ACI 303.1	Specification for Cast-in-Place Architectural Concrete
5.	ACI 305	Hot Weather Concreting
6.	ACI 306	Specifications for Cold Weather Concreting
7.	ACI 308	Specifications for Curing Concrete
8.	ACI 309	Consolidation of Concrete
9.	ACI 318	Building Code Requirements for Structural Concrete

1.3 SUBMITTALS

A. Product Data: Provide data for proprietary materials, including admixtures curing materials, and finish materials.

B. Submit Placement Shop Drawings, showing location of construction joints. Clearly indicate the construction joints in different locations that those shown in the drawings.

C. Samples: As requested by testing laboratory.

D. Mix design for each concrete mix.

E. Include compression test data used to establish mix proportions.

SPECIFICATION TABLE OF CONTENTS

LIST OF DRAWINGS

(24" x 36" Not Bound in Specifications)

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C. Samples: As requested by testing laboratory.

D. Mix design for each concrete mix.

E. Include compression test data used to establish mix proportions.

F. Submit certification that the facilities of the ready-mix plant comply with the requirements of ASTM C94.

G. Material Certificates.

1. Cementitious materials, including supplemental cementitous material.
2. Aggregates, including gradation and combined gradation.
3. Admixtures. Where more than one admixture is proposed, include statement from admixture manufacturer indicating that admixtures proposed for use are compatible, such that desirable effects of each admixture will be realized.

H. Submit ticket to Testing Laboratory for each batch of concrete delivered.

1. Mix identification.
2. Weights of cementitious materials, aggregates, water and admixtures, and aggregate size.

1.4 QUALITY ASSURANCE

A. Standards: Comply with provisions of ACI 301, except where more stringent requirements are indicated. Evaluation and acceptance of concrete structures will be in accordance with ACI 301.

B. Concrete Mix Design: Submit proposed mix designs and test data before concrete operations begin. Identify for each mix submitted the method by which proportions have been selected. Each mix shall be identified as it will appear on batch tickets delivered to project site.

1. For mix designs based on field experience, include individual strength test results, standard deviation, and required average compressive strength calculations.
2. For mix designs based on trial mixtures, include trial mix proportions, test results, and graphical analysis and show required average compressive strength.
3. Indicate quantity of each ingredient per cubic yard of concrete.
4. Indicate type and quantity of admixtures proposed or required.

C. Certificates of Compliance: Acceptability of the following materials will be based upon documentation furnished by the manufacturer identifying each batch of material and certifying compliance with the requirements specified:

1. Portland cement.
2. Fly ash.
3. Chemical admixtures.

D. Certified Laboratory Test Reports: Before delivery of materials submit certified copies of the reports of the tests required in referenced standards or otherwise specified here. The testing shall have been performed by an independent laboratory within one year of submittal of test reports for approval. Test reports on a previously tested material shall be accompanied by certificates from the manufacturer certifying that the previously tested material is of the same type, quality, manufacture and make as that proposed for use in the project. Certified test reports are required for the following:

1. Portland Cement.
2. Aggregates.
3. Admixtures.

E. Survey anchor bolts for placement and alignment prior to casting concrete.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver reinforcement to project site bundled and tagged with metal tags, indicating bar size, lengths, and other data corresponding to information shown on placement drawings.

B. Store concrete reinforcement materials at the site to prevent damage and accumulation of dirt or rust.

C. Store cementitious materials in a dry, weathertight location. Maintain accurate records of shipment and use.

D. Store aggregates to permit free drainage and to avoid contamination with deleterious matter or other aggregates. When stockpiled on ground, discard bottom 6 inches of pile.

1.6 PROJECT CONDITIONS

A. Cold-Weather Concreting: Comply fully with the recommendations of ACI 306.

1. Well in advance of proposed concreting operations, advise the engineer of planned protective measures including but not limited to heating of materials, heated enclosures, and insulating blankets.

B. Hot-Weather Concreting: Comply fully with the recommendations of ACI 305.

1. Well in advance of proposed concreting operations, advise the engineer of planned protective measures including but not limited to cooling of materials before or during mixing, placement during evening to dawn hours, fogging during finishing and curing, shading, and windbreaks.

PART 2 - PRODUCTS

2.1 FORMWORK

A. Facing Materials:

1. Unexposed finish concrete: Any standard form materials that produce structurally sound concrete.
2. Exposed finish concrete: Materials selected to offer optimum smooth, stain-free final appearance and minimum number of joints. Provide materials with sufficient strength to resist hydrostatic head without bow or deflection in excess of allowable tolerances.

B. Formwork Accessories:

1. Foam coating: Foam release agent that will not adversely affect concrete surfaces or prevent subsequent application of concrete coatings.
2. Metal ties: Commercially manufactured types; cone snap ties, taper removable bolt, or other type which will leave no metal closer than 1-1/2 inches from surface of concrete when forms are removed, leaving not more than a 1-inch-diameter hole in concrete surface.
3. Fillets: Wood or plastic fillets for chamfered corners, in maximum lengths possible.

2.2 REINFORCING MATERIALS

A. Reinforcing Bars: Provide deformed bars complying with ASTM A615, Grade 60, except where otherwise indicated.

B. Reinforcing Bar Mats: ASTM A184.

C. Welded Wire Fabric: ASTM A1064, cold-drawn steel, plain.

D. Reinforcing Accessories:

1. Tie wire: Black annealed type, 16-1/2 gage or heavier.
2. Supports: Bar supports conforming to specifications of CRSI "Manual of Standard Practice."
   a. Class 1 (plastic protected) where legs of wire bar supports contact forms.
   b. Precast concrete blocks of strength equal to or greater than specified strength of concrete or Class 3 supports equipped with sand plates, where concrete will be cast against earth. Concrete masonry units will not be accepted.

2.3 CONCRETE MATERIALS

A. Cementitious materials and aggregates for exposed concrete shall be from same source throughout the work.

B. Cementitious Material: An intimate blend of Portland cement and supplemental cementitious material. Cementitious material shall include a maximum of 15 percent fly ash or ground blast furnace slag by weight unless the strength is specified to be achieved in 7 or 14 days. Cementitious material shall comply with ACI 318 Chapter 4 requirements for exposure class S1.

C. Portland Cement: ASTM C150 and as follows:

1. Type I except where other type is specifically permitted or required.
   a. Type I can be replaced by Type III (high early strength) for concrete placed during cold weather.

D. Supplemental Cementitious Materials:

1. Fly Ash: ASTM C618, Class F with the following Modified ASTM requirements:
   a. Loss of Ignition (L.O.I.): maximum 1 percent.
   b. Sulfur Trioxide (SO_3) shall not exceed 3 percent by weight.
2. Ground Blast Furnace Slag: ASTM C989.

E. Aggregates

1. Normal weight concrete: ASTM C33.
   a. Class S3
2. Light weight concrete: ASTM C330.
3. Maximum size of coarse aggregate, whichever is least:
   a. One-fifth narrowest dimension between sides of forms.
   b. Three-fourths of minimum clear distance between reinforcing bars or between bars and side of form.
   c. Columns and piers: Two-thirds of minimum clear distance between bars.

F. Water: Mixing water shall be clean, potable and free from deleterious material.

G. Admixtures - General

1. Admixtures containing more than 0.1 percent chloride ions are not permitted.
2. Where mix contains more than one admixture, all admixtures shall be supplied by one manufacturer. Manufacturer shall certify that admixtures are compatible such that desirable effects of each admixture will be realized.
3. Liquid admixtures shall be considered part of the total water.

H. Water Reducing Admixture: ASTM C494, Type A. Provide in all concrete at necessary dosage to facilitate placement.

I. Mid to High Range Water Reducing Admixture: ASTM C494, Type F; polycarboxylate formulation. Provide in mid-range or high-range dosage as necessary for placement at the maximum water to cement ratio specified.

J. Set Accelerating Admixture: ASTM C494, Type E, non-chloride. Subject to approval of engineer, provide in necessary dosage to accelerate set.

K. Set Retarding Admixture: ASTM C494, Type D. Subject to approval of engineer, provide in necessary dosage to retard set.

L. Fibrous Reinforcement: Polypropylene fibers designed and engineered specifically for secondary reinforcement of concrete.

2.4 ACCESSORIES

A. Curing Compounds: ASTM C309, Type 1 which will not discolor concrete or affect bonding of other finishes applied, and which restricts loss of water to not more than 0.500 grams per square centimeter of surface when tested per ASTM C156, “Test Method for Water Retention by Concrete Curing Materials.”

B. Bonding Compound: Non-redispersible acrylic bonding admixture, ASTM C1059, Type II.

C. Slab Curing Membrane: Membrane conforming to ASTM C171, non-staining.

D. Burlap Sheet: AASHTO M182, class 3 or 4.

E. Vapor Barrier: ASTM D2103, “Polyethylene Film and Sheeting.”

F. Grout: ASTM C1107, Grade B non-shrink, non-metallic, prepackaged grout.

G. Waterstops: Provide waterstops at construction joints and as otherwise indicated, sized and configured to suit joints.

H. Expansion Joint Filler: Nonextruding bituminous type: ASTM D1751.

2.5 CONCRETE MIXES

A. Proportioning of Concrete: Comply with recommendations of ACI 211.1.

B. Required Average Strength: Establish the required average strength of the design mix on the basis of either field experience or trial mixtures as specified in ACI 301, and proportion mixes accordingly. If trial mixture method is used, employ an independent testing agency acceptable to the engineer for preparing and reporting proposed mix design.

C. Specified compressive strength f'(c) at 28 days:

1. Foundations and footings: 4000 psi.
2. Walls, columns, suspended slabs, and beams: 4000 psi.
3. Floor slabs on grade: 4000 psi
4. Concrete fill on metal deck: 4000 psi.
5. Miscellaneous curbs and pads: 4000 psi.

D. Slump: The concrete mix design shall provide for a concrete slump appropriate to the project conditions. The concrete shall be sufficiently fluid to allow for ease of placement and sufficiently stiff to prevent segregation.

E. Fibrous Reinforcement: Where specified or approved, add to mix at rate recommended by manufacturer for specific application.

1. Add to concrete mix in lieu of providing welded wire fabric reinforcement for interior floor slabs, at contractor's option and with prior approval of engineer.

F. Water to Cementitious Material Ratio: Water-to-cementitious-material ratio shall not exceed 0.45 by weight. Weight of water shall include all free moisture, including liquid admixtures.

G. Air-entraining admixture: Use in mixes for exterior exposed concrete unless otherwise specifically indicated. Add at rate to achieve total air content of 6 percent. For concrete not exposed to exterior, add at rate to achieve total air content between 2 percent and 4 percent.

H. Water-reducing admixture: Add as required for placement and workability.

I. Water-reducing and retarding admixture: Add as required in concrete mixes to be placed at ambient temperatures above 90 degrees F.

J. Water-reducing and accelerating admixture: Add as required in concrete mixes to be placed at ambient temperatures below 50 degrees F.

K. High-range water-reducing admixture (superplasticizer): As required for placement and workability.

L. Mix Adjustments: Provided that no additional expense to owner is involved, contractor may submit for approval requirements for adjustment to approved concrete mixes when circumstances such as changed project conditions, weather, or unfavorable test results occur. Include laboratory test data substantiating specified properties with mix adjustment requests.

2.6 CONTROL OF MIX IN THE FIELD

A. Slump: A tolerance of up to 1 inch above approved design mix slump will be permitted for 1 batch in 5 consecutive batches tested. Concrete of lower slump than that specified may be used, provided proper placing and consolidation is obtained.

B. Total Air Content: A tolerance of plus or minus 1 percent of approved design mix air content will be allowed for field measurements.

C. Do not use batches that exceed tolerances.

PART 3- EXECUTION

3.1 FORMWORK ERECTION

A. General: Comply with requirements of ACI 301 for formwork, and as herein specified. The contractor is responsible for design, engineering, and construction of formwork, and for its timely removal.

B. Design: Design and fabricate forms for easy removal, without impact, shock, or damage to concrete surfaces or other portions of the work. Design to support all applied loads until concrete is adequately cured, within allowable tolerances and deflection limits.

C. Construction: Construct and brace formwork to accurately achieve end results required by contract documents, with all elements properly located and free of distortion. Provide for necessary openings, inserts, anchorages, and other features shown or otherwise required.

1. Joints: Minimize form joints and make watertight to prevent leakage of concrete.
   a. Align joints symmetrically at exposed conditions.
2. Chamfers: Provide chamfered edges and corners at exposed locations, unless specifically indicated otherwise on the drawings.
3. Permanent openings: Provide openings to accommodate work of other trades, sized and located accurately. Securely support items built into forms; provide additional bracing at openings and discontinuities in formwork.
4. Temporary openings: Provide temporary openings for cleaning and inspection in most inconspicuous locations at base of forms, closed with tight-fitting panels designed to minimize appearance of joints in finished concrete work.

D. Tolerances for Formed Surfaces: Comply with minimum tolerances established in ACI 117, unless more stringent requirements are indicated on the drawings.

E. Release Agent: Provide either form materials with factory-applied nonabsorptive liner or field-applied form coating. If field-applied coating is employed, thoroughly clean and recondition formwork and reapply coating before each use.

3.2 REINFORCEMENT AND EMBEDDED ITEMS

A. Preparation: Clean reinforcement of loose rust and mill scale, soil, and other materials which adversely affect bond with concrete.

B. Placement: Place reinforcement to achieve not less than minimum concrete coverage as required for protection. Accurately position, support, and secure reinforcement against displacement. Provide Class B tension lap splices complying with ACI 318 unless otherwise indicated. Do not field-bend partially embedded bars unless otherwise indicated or approved.

1. Use approved bar supports and tie wire, as required. Set wire ties to avoid contact with or penetration of exposed concrete surfaces. Tack welding of reinforcing is not permitted.
2. Wire fabric: Install in maximum lengths possible, lapping adjoining pieces not less than one full mesh. Offset end laps to prevent continuous laps in either direction, and splice laps with tie wire.

C. Welding: Welding of reinforcement is not permitted.

D. Installation tolerances for anchor bolts for structural steel columns shall comply with the AISC Code of Standard Practice for Steel Buildings and Bridges.

3.3 JOINT CONSTRUCTION

A. Construction Joints: Locate and install construction joints as indicated on drawings. If construction joints are not indicated, locate in manner which will not impair strength and will have least impact on appearance.

1. Keyways: Provide keyways not less than 1-1/2 inches deep.
2. Reinforcement: Continue reinforcement across and perpendicular to construction joints, unless details specifically indicate otherwise.
3. Waterstops: Provide waterstops as indicated, installing to form continuous, watertight dam, with field joints fabricated in strict accordance with manufacturer's instructions.

B. Expansion Joints: Construct expansion joints where indicated. Install expansion joint filler to full depth of concrete. Recess edge of filler to depth indicated to receive joint sealant and backer rod where necessary.

3.4 PLACING CONCRETE

A. The rate of delivery, haul time, missing time and hopper capacity shall be such that all mixed concrete delivered shall be placed in forms within 90 minutes from the time of the introduction of cement and water into the mixer.

B. No water shall be added after transit mixer leaves the batching.

C. Prepare previously placed concrete by cleaning and applying bonding agent in accordance with manufacturer's instruction.

D. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with epoxy grout.

E. Foundation surfaces against which concrete is to be placed must be free from standing water, mud and debris. Surfaces shall be clean and free from oil, objectionable coatings, and loose or unsound material.

F. Placement in Forms: Limit horizontal layers to depths which can be properly consolidated, but in no event greater than 24 inches.

1. Consolidate concrete by means of mechanical vibrators, inserted vertically in freshly placed concrete in a systematic pattern at close intervals. Penetrate previously placed concrete to ensure that separate concrete layers are knitted together.

2. Vibrate concrete sufficiently to achieve consistent consolidation without segregation of coarse aggregates.

3. Do not use vibrators to move concrete laterally.

G. Cold Weather Placement: Comply with recommendations of ACI 306 when air temperatures are expected to drop below 40 degrees F either during concrete placement operations or before concrete has cured.

1. Do not use frozen or ice-laden materials.
2. Do not place concrete on frozen substrates.

H. Hot Weather Placement: Comply with recommendations of ACI 305 when ambient temperature before, during, or after concrete placement is expected to exceed 90 degrees F or when combinations of high air temperature, low relative humidity, and wind speed are such that the rate of evaporation from freshly poured concrete would otherwise exceed 0.2 pounds per square foot per hour.

1. Do not add water to approved concrete mixes under hot weather conditions.
2. Provide mixing water at lowest feasible temperature and provide adequate protection of poured concrete to reduce rate of evaporation.
3. Use fog nozzle to cool formwork and reinforcing steel immediately prior to placing concrete.

3.5 FINISHING FORMED SURFACES

A. Repairs: Repair surface defects, including tie holes, immediately after removing formwork.

1. Remove honeycombed areas and other defective concrete down to sound concrete, cutting perpendicular to surface or slightly undercutting. Dampen patch location and area immediately surrounding it prior to applying bonding compound or patching mortar.
2. Before bonding compound has dried, apply patching mixture matching original concrete in materials and mix except for omission of coarse aggregate, and using a blend of white and normal Portland cement as necessary to achieve color match. Consolidate thoroughly and strike off slightly higher than surrounding surface.

B. Unexposed Form Finish: Repair tie holes and patch defective areas. Rub down or chip off fins or other raised areas exceeding 1/4 inch height.

C. Exposed Form Finish: Repair and patch defective areas, with fins or other projections completely removed and smoothed.

1. Smooth rubbed finish: Apply to surfaces indicated no later than 24 hours after form removal.
2. Wet concrete surfaces to be finished and rub with abrasive until uniform color and texture are achieved.
3. Do not apply separate grout mixture.

D. Contiguous unformed surfaces: Strike smooth and float to a similar texture tops of walls, horizontal offsets, and other unformed surfaced adjacent to or contiguous with formed surfaces. Continue final finish of formed surfaces across unformed surfaces, unless otherwise specifically indicated.

3.6 CURING AND PROTECTION

A. Working and walking on concrete shall be avoided for at least 24 hours after casting. Protect concrete from sun and rain. Do not permit concrete to become dry during curing period. Concrete shall not be subjected to any loads until concrete is completely cured, and until concrete has attained its 28 day strength and 14 days minimum.

B. Protect concrete during and after curing from damage during subsequent building construction operations.

C. Cover traffic areas with plywood or other suitable means for as long as necessary to protect concrete from damage.

D. Immediately upon completion of finishing operation, the surface of slabs shall be sealed against moisture loss by the application of one of the following methods for 7 days:

1. Apply a curing blanket made of polyetheylene bonded to burlap in accordance with the manufacturer's instructions.
2. Apply waterproof curing paper with edges lapped and sealed with tape. The curing membrane shall be weighted down. Tears and rips in curing membrane shall be repaired immediately during curing period.

E. Specific curing requirements for walls, beams and columns shall include the following:

1. Concrete in forms shall be kept moist until removal.
2. Immediately upon removal of forms, an approved sprayed-on curing compound shall be applied to the concrete surfaces in strict compliance with the manufacturer's recommendations.
3. Curing shall be maintained for 7 days.

3.7 MISCELLANEOUS CONCRETE ITEMS

A. Fill-in: Fill in holes and openings left in concrete structures for passage of work by other trades after such work is in place. Place such fill-in concrete to blend with existing construction, using same mix and curing methods.

B. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Screed, tamp, and finish concrete surfaces as scheduled.

C. Reinforced Masonry: Provide concrete grout for reinforced masonry where indicated on drawings and as scheduled.

3.8 FIELD QUALITY CONTROL

A. Composite Sampling and Making and Curing of Specimens: ASTM C172 and ASTM C31.

1. Take samples at point of discharge.
2. For pumped concrete, perform sampling and testing at the frequencies specified herein at point of delivery to pump, and perform additional sampling and testing at the same frequency at discharge from line. Results obtained at point of delivery shall be used for acceptance of concrete.
3. Take samples and perform tests for concrete before and after field addition of admixtures. Report results of all tests.

B. Slump: ASTM C143. Test first 2 loads delivered for each pour and 1 test per strength test and additional tests if concrete consistency changes.

1. Modify sampling to comply with ASTM C94.

2. For concrete containing superplasticizer added at the job site, perform slump test prior to addition of admixture and after mixing. Report both test results.
3. Visual estimate of slump may be accepted once uniform results are achieved over a minimum of 4 samples. Report all estimated results as such.

C. Air Content of concrete: ASTM C173 or ASTM C231. Test first 2 loads delivered for each pour and one test per strength test performed on air-entrained concrete.

D. Concrete Temperature:

1. Test hourly when air temperature is 40 degrees F or below.
2. Test hourly when air temperature is 90 degrees F or above.
3. Test each time a set of strength test specimens is made.

E. Compressive Strength Tests: ASTM C39.

1. Compression test specimens: Mold and cure one set of 4 standard cylinders for each compressive strength test required.

2. Testing for acceptance of potential strength of as-delivered concrete:
   a. Obtain samples on a statistically sound, random basis.
   b. Provide one test per 50 cubic yards or fraction thereof for each day's pour of each concrete class.
   c. Provide one test per 2500 square feet of slab or wall area or fraction thereof for each day's pour of each concrete class.
   d. When the above testing frequency would provide fewer than 5 strength tests for a given class of concrete during the project, conduct testing from not less than 5 randomly selected batches or from each batch if fewer than 5.
   e. Test one specimen per set at 7 days for information unless an earlier age is required.
   f. Test 2 specimens per set for acceptance of strength potential; test at 28 days unless other age is specified. The test result shall be the average of the two specimens. If one specimen shows evidence of improper sampling, molding, or testing, the test result shall be the result of the remaining specimen; if both show such evidence, discard the test result and inform the engineer.
   g. Retain one specimen from each set for later testing, if required.
   h. Strength potential of as-delivered concrete will be considered acceptable if all of the following criteria are met:
      i. No individual test result falls below specified compressive strength by more than 500 psi.
      ii. Not more than 10 percent of individual test results fall below specified compressive strength.
      iii. Average of any 3 consecutive strength test results equals or exceeds specified compressive strength.
   i. Evaluate construction and curing procedures and implement corrective action when strength results for field-cured specimens area less than 85 percent of test values for companion laboratory-cured specimens.

F. Test Results: Testing agency shall report field and laboratory test results in writing to engineer and contractor within 24 hours of test.

1. Field test results which do not comply with the project specifications shall be immediately reported to project superintendent. Field reports shall include documentation of all such reports and the name of the person results were reported to.
2. Test reports shall contain the following data:

a. Project name, number, and other identification.
b. Name of concrete testing agency.
c. Date and time of sampling.
d. Concrete type and class.
e. Location of concrete batch in the completed work.
f. All information required by respective ASTM Test methods.
g. Concrete mix parameters and tolerances.

3. Nondestructive testing may be used at engineer's option for assistance in determining probable concrete strength at various locations or for selecting areas to be cored, but such tests shall not be the sole basis for acceptance or rejection.

4. The testing agency shall make additional tests of in-place concrete as directed by the engineer when test results indicate that specified strength and other concrete characteristics have not been attained.
   a. Testing agency may conduct tests of cored cylinders complying with ASTM C42, or tests as directed.
   b. Cost of additional testing shall be borne by the contractor when unacceptable concrete has been verified.

END OF SECTION 033000

SECTION 220000 – PLUMBING SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 22, and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

a. Work covered under Plumbing contract.

b. Work under other contracts.

c. Use of premises.

d. Owner's occupancy requirements.

e. Specification formats and conventions.

B. Related Sections include the following:

a. Division 22 Sections.

1.3 WORK COVERED UNDER PLUMBING CONTRACT

A. Provide all labor, materials, tools, machinery, equipment, and services necessary to complete the plumbing work under this contract. All systems and equipment shall be complete in every respect and all items of material, equipment, and labor shall be provided for a fully operational system. Coordinate the work with work of other trades so as to resolve conflicts without impeding job progress. The plumbing work includes the following:

B. PLUMBING:

1. Remove three (3) existing indirect fire water heaters with all appurtenances. Controls, electricals per latest NEC. Etc.

2. Remove two (2) existing gas fired boilers and associated appurtenances. Controls, hydronic components, etc.

3. and Furnish and install two (2) new gas fired, domestic water heaters as indicated on the plans, complete with valves, fittings, hangers, supports, insulation, etc. Connect to existing piping. Coordinate all tie-in connections in field.

4. Furnish and install gas piping to new water heaters as indicated on the drawings. Provide gas shut off valves and gas pressure regulators as called out on plans. All new as piping shall be painted with “yellow” color (1 primer and 2 finish coats).

5. Provide insulation to all domestic water piping (DCW/DHW/DHWR) located in boiler room.

6. Provide proper piping supports, hangers, anchors, etc.

7. Provide proper slope to all piping as per latest Plumbing Code and other applicable codes.

8. Pressure-test all piping for any leakage. Repair all leaks and perform testing until no leaks are found.

9. Provide identification tags with flow arrows for all plumbing piping. Provide valve tags for all valves, and provide a valve chart identifying all valve sizes and locations.

10. Furnish and install all ancillary equipment needed for a complete and proper installation including, but not limited to expansion joints, anchors, hangers, fittings, valves, unions, etc.

11. All cutting, patching and alteration work shall be performed.

12. The contractor shall furnish and install all items required for a complete and functioning plumbing system.

1.4 WORK UNDER OTHER CONTRACTS

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

1.5 USE OF PREMISES

A. General: Each Contractor shall have limited use of premises for construction operations as indicated on Drawings by the Contract limits.

B. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

a. Owner Occupancy: Allow for Owner occupancy of Project site and use by the public.

b. Driveways and Entrances: Keep driveways parking garage, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

1. Schedule deliveries to minimize use of driveways and entrances.

2. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Use of Existing Building: Maintain existing building in a weather tight condition throughout construction period. Repair damage caused by construction operations. Protect building and its occupants during construction period.

1.6 OWNER'S OCCUPANCY REQUIREMENTS

A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits, unless otherwise indicated.

a. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.

b. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

B. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.

a. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied before Owner occupancy.

b. Obtain a Certificate of Occupancy from authorities having jurisdiction before Owner occupancy.

c. Before partial Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed.

1.7 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the CSI/CSC's "MasterFormat" numbering system.

a. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.

b. Division 1: Sections in Division 1 govern the execution of the Work of all Sections in the Specifications.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

a. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.

b. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

1. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

1.8 MISCELLANEOUS PROVISIONS

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 220000

SECTION 220501 – BASIC PLUMBING MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.

2. Transition fittings.

3. Dielectric fittings.

4. Mechanical sleeve seals.

5. Sleeves.

6. Escutcheons.

7. Grout.

8. Mechanical demolition.

9. Equipment installation requirements common to equipment sections.

10. Painting and finishing.

11. Concrete bases.

12. Supports and anchorages.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. The following are industry abbreviations for rubber materials:

1. EPDM: Ethylene-propylene-diene terpolymer rubber.

2. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Transition fittings.

2. Dielectric fittings.

3. Mechanical sleeve seals.

4. Escutcheons.

B. Welding certificates.

1.5 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

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.

C. Electrical Characteristics for Mechanical Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

1.7 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for mechanical installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for mechanical items requiring access that are concealed behind finished surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

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

2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 22 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

F. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.4 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

1. Manufacturers:

a. Eclipse, Inc.
b. Epco Sales, Inc.
c. Watts Industries, Inc.; Water Products Div.
d. Zurn Industries, Inc.; Wilkins Div.
e. Or Approved Equal

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.

1. Manufacturers:

a. Capitol Manufacturing Co.
b. Epco Sales, Inc.
c. Watts Industries, Inc.; Water Products Div.
d. Or Approved Equal

E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

1. Manufacturers:

a. Calpico, Inc.
b. Pipeline Seal and Insulator, Inc.
c. Or Approved Equal

2. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig minimum working pressure where required to suit system pressures.

F. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

1. Manufacturers:

a. Calpico, Inc.
b. Lochinvar Corp.
c. Or Approved Equal

G. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

1. Manufacturers:

a. Perfection Corp.
b. Precision Plumbing Products, Inc.
c. Sioux Chief Manufacturing Co., Inc.
d. Or Approved Equal

2.5 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

1. Manufacturers:

a. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Metraflex Co.
d. Pipeline Seal and Insulator, Inc.
e. Or Approved Equal

2. Sealing Elements: EPDM or NBR interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

3. Pressure Plates: Carbon steel or Stainless steel. Include two for each sealing element.

4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating or Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.6 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

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

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

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

2.7 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece/Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

1. Finish: Polished chrome-plated.

D. One-Piece/Split-Plate, Stamped-Steel Type: With concealed or exposed-rivet hinge, set screw or spring clips, and chrome-plated finish.

E. One-Piece, Floor-Plate Type: Cast-iron floor plate.

F. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.8 GROUT

A. Description: ASTM C 1107, Grade B, non-shrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, non-staining, noncorrosive, nongaseous, and recommended for interior and exterior applications.

2. Design Mix: 5000-psi, 28-day compressive strength.

3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Select system components with pressure rating equal to or greater than system operating pressure.

K. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

1. New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
c. Insulated Piping: One-piece, stamped-steel type with spring clips.
d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
f. Bare Piping at Ceiling Penetrations in Finished Spaces: Cast-brass type with polished chrome-plated finish.
g. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished chrome-plated finish.
h. Bare Piping in Equipment Rooms: One-piece, cast-brass type or One-piece, stamped steel type.
i. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.

L. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

M. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.

3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

a. Steel Pipe Sleeves: For pipes smaller than NPS 6 (DN 150).

b. Steel Sheet Sleeves: For pipes NPS 6 (DN 150) and larger, penetrating gypsum-board partitions.

c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 7 Section "Sheet Metal Flashing and Trim" for flashing.

1) Seal space outside of sleeve fittings with grout.

4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 7 Section "Joint Sealants" for materials and installation.

N. Aboveground, Exterior-Wall Pipe 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.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.

2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.

3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

O. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 7 Section "Through-Penetration Firestop Systems" for materials.

P. Verify final equipment locations for roughing-in.

Q. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.3 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.

2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.

4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.5 PAINTING

A. Painting of mechanical systems, equipment, and components is specified.

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.6 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.

2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.

3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.

4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

5. Install anchor bolts to elevations required for proper attachment to supported equipment.

6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

7. Use 4000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-Place Concrete."

3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES

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

B. Field Welding: Comply with AWS D1.1.

3.8 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor mechanical materials and equipment.

B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.9 GROUTING

A. Mix and install grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout around anchors.

G. Cure placed grout.

END OF SECTION 220501

SECTION 220519 – METERS AND GAGES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Bimetallic-actuated thermometers.
2. Liquid-in-glass thermometers.
3. Thermowells.
4. Dial-type pressure gages.
5. Gage attachments.
6. Test plugs.

B. Related Sections:

1. Section 221116 "Domestic Water Piping" for water meters inside the building.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of meter and gage, from manufacturer.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For meters and gages to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 BIMETALLIC-ACTUATED THERMOMETERS

A. Manufacturers:

1. Palmer Wahl Instruments Inc.

2. H.O. Trerice Co.

3. Weiss Instruments, Inc.

4. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.

5. Or Approved Equal.

B. Standard: ASME B40.200.

C. Case: Liquid-filled and sealed type(s); stainless steel with 5-inch nominal diameter.

D. Dial: Nonreflective aluminum with permanently etched scale markings and scales in deg. F.

E. Connector Type(s): Union joint, adjustable angle or rigid, with unified-inch screw threads.

F. Connector Size: 1/2 inch with ASME B1.1 screw threads.

G. Stem: 0.25 or 0.375 inch in diameter; stainless steel.

H. Window: Plain glass.

I. Ring: Stainless steel.

J. Element: Bimetal coil.

K. Pointer: Dark-colored metal.

L. Accuracy: Plus or minus 1 percent of scale range.

2.2 LIQUID-IN-GLASS THERMOMETERS

A. Manufacturers:

1. Palmer Wahl Instruments Inc.

2. H.O. Trerice Co.

3. Weiss Instruments, Inc.

4. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.

5. Or Approved Equal.

B. Metal-Case, Compact-Style, Liquid-in-Glass Thermometers:

1. Standard: ASME B40.200.
2. Case: Cast aluminum, 6-inch nominal size.
3. Case Form: Back angle or Straight unless otherwise indicated.
4. Tube: Glass with magnifying lens and blue [or red] organic liquid.
5. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg. F.
6. Window: Glass or plastic.
7. Stem: Aluminum or brass and of length to suit installation.
    a. Design for Thermowell Installation: Bare stem.
8. Connector: 3/4 inch, with ASME B1.1 screw threads.
9. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

C. Metal-Case, Industrial-Style, Liquid-in-Glass Thermometers:

1. Standard: ASME B40.200.
2. Case: Cast aluminum, 9-inch (229-mm) nominal size unless otherwise indicated.
3. Case Form: Adjustable angle, Back angle or Straight unless otherwise indicated.
4. Tube: Glass with magnifying lens and blue or red organic liquid.
5. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg. F.
6. Window: Glass.
7. Stem: Aluminum and of length to suit installation.
    a. Design for Thermowell Installation: Bare stem.
8. Connector: 1-1/4 inches, with ASME B1.1 screw threads.
9. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

2.3 THERMOWELLS

A. Thermowells:

1. Standard: ASME B40.200.

2. Description: Pressure-tight, socket-type fitting made for insertion into piping tee fitting.

3. Material for Use with Copper Tubing: [CNR] [or] [CUNI] <Insert material>.

4. Material for Use with Steel Piping: [CRES] [CSA] <Insert material>.

5. Type: Stepped shank unless straight or tapered shank is indicated.

6. External Threads: NPS 1/2, NPS 3/4, or NPS 1, (DN 15, DN 20, or NPS 25,) ASME B1.20.1 pipe threads.

7. Internal Threads: 1/2, 3/4, and 1 inch (13, 19, and 25 mm), with ASME B1.1 screw threads.

8. Bore: Diameter required to match thermometer bulb or stem.

9. Insertion Length: Length required to match thermometer bulb or stem.

10. Lagging Extension: Include on thermowells for insulated piping and tubing.

11. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.

B. Heat-Transfer Medium: Mixture of graphite and glycerin.

2.4 PRESSURE GAGES

A. Manufacturers:

1. Palmer Wahl Instruments Inc.

2. H.O. Trerice Co.

3. Weiss Instruments, Inc.

4. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.

5. Or Approved Equal.

B. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:

1. Standard: ASME B40.100.

2. Case: Sealed Solid-front, pressure relief] type(s); cast aluminum; 4-1/2-inch nominal diameter.

3. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.

4. Pressure Connection: Brass, with [NPS 1/4 (DN 8)] [NPS 1/4 or NPS 1/2 (DN 8 or DN 15)] [NPS 1/2 (DN 15)], ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.

5. Movement: Mechanical, with link to pressure element and connection to pointer.

6. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi.

7. Pointer: Dark-colored metal.

8. Window: Glass.

9. Ring: Stainless steel.

10. Accuracy: Grade A, plus or minus 1 percent of middle half of.

C. Remote-Mounted, Metal-Case, Dial-Type Pressure Gages:

1. Standard: ASME B40.100.

2. Case: Liquid-filled, Sealed type; cast aluminum; 4-1/2-inch nominal diameter with [back] [front] flange and holes for panel mounting.

3. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.

4. Pressure Connection: Brass, with [NPS 1/4 (DN 8)] [NPS 1/4 or NPS 1/2 (DN 8 or DN 15)] [NPS 1/2 (DN 15)], ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.

5. Movement: Mechanical, with link to pressure element and connection to pointer.

6. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi.

7. Pointer: Dark-colored metal.

8. Window: Glass.

9. Ring: Stainless steel.

10. Accuracy: Grade A, plus or minus 1 percent of middle half of.

2.5 GAGE ATTACHMENTS

A. Snubbers: ASME B40.100, brass; with [NPS 1/4 (DN 8)] [NPS 1/4 or NPS 1/2 (DN 8 or DN 15)] [NPS 1/2 (DN 15)], ASME B1.20.1 pipe threads and [piston] [porous-metal]-type surge-dampening device. Include extension for use on insulated piping.

B. Valves: Brass or stainless-steel needle, with [NPS 1/4 (DN 8)] [NPS 1/4 or NPS 1/2 (DN 8 or DN 15)] [NPS 1/2 (DN 15)], ASME B1.20.1 pipe threads.

2.6 TEST PLUGS

A. Description: Test-station fitting made for insertion into piping tee fitting.

B. Body: Brass or stainless steel with core inserts and gasketed and threaded cap. Include extended stem on units to be installed in insulated piping.

C. Thread Size: [NPS 1/4 (DN 8)] [or] [NPS 1/2 (DN 15)], ASME B1.20.1 pipe thread.

D. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F.

E. Core Inserts: Chlorosulfonated polyethylene synthetic and EPDM self-sealing rubber.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install thermowells with socket extending [a minimum of 2 inches into fluid and in vertical position in piping tees.

B. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.

C. Install thermowells with extension on insulated piping.

D. Fill thermowells with heat-transfer medium.

E. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.

F. Install remote-mounted thermometer bulbs in thermowells and install cases on panels; connect cases with tubing and support tubing to prevent kinks. Use minimum tubing length.

G. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.

H. Install remote-mounted pressure gages on panel.

I. Install valve and snubber in piping for each pressure gage for fluids.

J. Install test plugs in piping tees.

K. Install thermometers in the following locations:

1. Inlet and outlet of each water heater.

L. Install pressure gages in the following locations:

1. Suction and discharge of each domestic water pump.

3.2 CONNECTIONS

A. Install meters and gages adjacent to machines and equipment to allow service and maintenance of meters, gages, machines, and equipment.

3.3 ADJUSTING

A. Adjust faces of meters and gages to proper angle for best visibility.

3.4 THERMOMETER SCHEDULE

A. Thermometers at inlet and outlet of each domestic water heater shall be one of the following:

1. Liquid-filled or Sealed, bimetallic-actuated type.

2. Industrial]-style, liquid-in-glass type.

3. Test plug with chlorosulfonated polyethylene synthetic or EPDM self-sealing rubber inserts.

B. Thermometer stems shall be of length to match thermowell insertion length.

3.5 THERMOMETER SCALE-RANGE SCHEDULE

A. Scale Range for Domestic Cold-Water Piping: 0 to 100 deg F.

B. Scale Range for Domestic Hot-Water Piping: 0 to 250 deg F.

C. Pressure gages at inlet and outlet of each water pressure-reducing valve shall be one of the following:

1. Liquid-filled, Sealed, direct-mounted, metal case.

2. Test plug with chlorosulfonated polyethylene synthetic or EPDM self-sealing rubber inserts.

D. Pressure gages at suction and discharge of each domestic water pump shall be one of the following:

1. Liquid-filled, Sealed, direct-mounted, metal case.

2. Test plug with chlorosulfonated polyethylene synthetic or EPDM self-sealing rubber inserts.

3.6 PRESSURE-GAGE SCALE-RANGE SCHEDULE

A. Scale Range for Water Service Piping: 0 to 200 psi.

B. Scale Range for Domestic Water Piping: 0 to 200 psi.

END OF SECTION 220519

SECTION 220523 – PLUMBING VALVES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following general-duty valves (Lead Free Type):

1. Copper-alloy ball valves.
2. Ferrous-alloy ball valves.
3. Bronze check valves.
4. Ferrous-alloy wafer check valves.
5. Spring-loaded, lift-disc check valves.
6. Bronze globe valves.

B. Related Sections include the following:

1. Division 22 Section for valve tags and charts.
2. Division 22 piping Sections for specialty valves applicable to those Sections only.

C. All valves and fittings for potable water system shall be lead-free type in compliance with requirements of NSF/ANSI Standard 61.

1.3 DEFINITIONS

A. The following are standard abbreviations for valves:

1. CWP: Cold working pressure.
2. EPDM: Ethylene-propylene-diene terpolymer rubber.
3. NBR: Acrylonitrile-butadiene rubber.
4. PTFE: Polytetrafluoroethylene plastic.
5. SWP: Steam working pressure.
6. TFE: Tetrafluoroethylene plastic.

1.4 SUBMITTALS

A. Product Data: For each type of valve indicated. Include body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances. Include list indicating valve and its application. Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.

1.5 QUALITY ASSURANCE

A. ASME Compliance: ASME B31.1 for power piping valves and ASME B31.9 for building services piping valves.

1. Exceptions: Domestic hot- and cold-water piping valves unless referenced.

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

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

1.6 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.

2. Protect threads, flange faces, grooves, and weld ends.

3. Set valves closed to prevent rattling.

4. Set ball and plug valves open to minimize exposure of functional surfaces.

5. Block check valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.

2. Store valves indoors and maintain at higher than ambient dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use hand-wheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

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

2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 VALVES, GENERAL

A. Refer to Part 3 "Valve Applications" Article for applications of valves.

B. Bronze/Brass Valves: NPS 2 (DN 50) and smaller with threaded ends, unless otherwise indicated.

C. Ferrous Valves: NPS 2-1/2 (DN 65) and larger with flanged ends, unless otherwise indicated.

D. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

E. Valve Sizes: Same as upstream pipe, unless otherwise indicated.

F. Valve Actuators:

1. Chain wheel: For attachment to valves, of size and mounting height, as indicated in the "Valve Installation" Article in Part 3.

2. Gear Drive: For quarter-turn valves NPS 8 (DN 200) and larger.

3. Hand wheel: For valves other than quarter-turn types.

4. Lever Handle: For quarter-turn valves NPS 6 (DN 150) and smaller, except plug valves.

5. Wrench: For plug valves with square heads. Furnish Owner with 1 wrench for every 10 plug valves, for each size square plug head.

G. Extended Valve Stems: On insulated valves.

H. Valve Flanges: ASME B16.1 for cast-iron valves, ASME B16.5 for steel valves, and ASME B16.24 for bronze valves.

I. Valve Bypass and Drain Connections: MSS SP-45.

2.3 COPPER-ALLOY BALL VALVES

A. Available Manufacturers:

B. Manufacturers:

1. One-Piece, Copper-Alloy Ball Valves:

a. American Valve, Inc.
b. Conbraco Industries, Inc.; Apollo Div.
c. Grinnell Corporation.
d. Kitz Corporation of America.
e. Legend Valve & Fitting, Inc.
f. NIBCO INC.
g. Watts Industries, Inc.; Water Products Div.
h. Or Approved Equal.

C. Copper-Alloy Ball Valves, General: MSS SP-110, full port type.

D. One-Piece, Copper-Alloy Ball Valves: Brass or bronze body with chrome-plated bronze ball, PTFE or TFE seats, full port type.

2.4 FERROUS-ALLOY BALL VALVES

A. Available Manufacturers:

B. Manufacturers:

1. American Valve, Inc.

2. Conbraco Industries, Inc.; Apollo Div.

3. Cooper Cameron Corp.; Cooper Cameron Valves Div.

4. Flow-Tek, Inc.

5. Hammond Valve.

6. Kitz Corporation of America.

7. KTM Products, Inc.

8. Milwaukee Valve Company.

9. NIBCO INC.

10. Richards Industries; Marwin Ball Valves.

11. Or Approved Equal.

C. Ferrous-Alloy Ball Valves, General: MSS SP-72, with flanged ends, full port.

D. Ferrous-Alloy Ball Valves: Class 150, full port.

2.5 BRONZE CHECK VALVES

A. Available Manufacturers:

B. Manufacturers:

1. Type 1, Bronze, Horizontal Lift Check Valves with Metal Disc:

a. Cincinnati Valve Co.
b. Red-White Valve Corp.
c. Walworth Co.
d. Or Approved Equal.

2. Type 1, Bronze, Vertical Lift Check Valves with Metal Disc:

a. Cincinnati Valve Co.
b. Red-White Valve Corp.
c. NIBCO INC.
d. Or Approved Equal.

3. Type 3, Bronze, Swing Check Valves with Metal Disc:

a. American Valve, Inc.
b. Cincinnati Valve Co.
c. Grinnell Corporation.
d. Hammond Valve.
e. Kitz Corporation of America.
f. Legend Valve & Fitting, Inc.
g. Milwaukee Valve Company.
h. NIBCO INC.
i. Powell, Wm. Co.
j. Red-White Valve Corp.
k. Walworth Co.
l. Watts Industries, Inc.; Water Products Div.
m. Or Approved Equal.

C. Bronze Check Valves, General: MSS SP-80.

D. Type 1, Class 150, Bronze, Horizontal Lift Check Valves: Bronze body with bronze disc and seat.

E. Type 1, Class 150, Bronze, Vertical Lift Check Valves: Bronze body with bronze disc and seat.

F. Type 3, Class 150, Bronze, Swing Check Valves: Bronze body with bronze disc and seat.

2.6 FERROUS-ALLOY WAFER CHECK VALVES

A. Available Manufacturers:

B. Manufacturers:

1. Dual-Plate, Ferrous-Alloy, Wafer-Lug Check Valves:

a. Gulf Valve Co.
b. Valve and Primer Corp.
c. NIBCO INC.
d. Or Approved Equal.

2. Dual-Plate, Ferrous-Alloy, Double-Flanged-Type Check Valves:

a. Gulf Valve Co.
b. Techno Corp.
c. NIBCO INC.
d. Or Approved Equal.

C. Ferrous-Alloy Wafer Check Valves, General: API 594, spring loaded.

D. Dual-Plate, Class 125 or 150, Ferrous-Alloy, Double-Flanged Check Valves: Flanged-end body.

2.7 SPRING-LOADED, LIFT-DISC CHECK VALVES

A. Available Manufacturers:

B. Manufacturers:

1. Type I, Wafer Lift-Disc Check Valves:

a. Mueller Steam Specialty. NIBCO INC.
b. Or Approved Equal.

2. Type II, Compact-Wafer, Lift-Disc Check Valves:

a. Durabla Fluid Technology, Inc.
b. Flomatic Valves.
c. Grinnell Corporation.
d. Metraflex Co.
e. Milwaukee Valve Company.
f. Mueller Steam Specialty.
g. NIBCO INC.
h. Or Approved Equal.

3. Type III, Globe Lift-Disc Check Valves:

a. Durabla Fluid Technology, Inc.
b. GA Industries, Inc.
c. Grinnell Corporation.
d. Metraflex Co.
e. Milwaukee Valve Company.
f. NIBCO INC.
g. Or Approved Equal.

4. Type IV, Threaded Lift-Disc Check Valves:

a. Check-All Valve Mfg. Co.
b. Durabla Fluid Technology, Inc.
c. Grinnell Corporation.

d. Legend Valve & Fitting, Inc.
e. Metraflex Co.
f. Milwaukee Valve Company.
g. Mueller Steam Specialty.
h. NIBCO INC.
i. Watts Industries, Inc.; Water Products Div.
j. Or Approved Equal.

C. Lift-Disc Check Valves, General: FCI 74-1, with spring-loaded bronze or alloy disc and bronze or alloy seat.

D. Type I, Class 125, Wafer Lift-Disc Check Valves: Wafer style with cast-iron shell with diameter matching companion flanges.

E. Type II, Class 125, Compact-Wafer, Lift-Disc Check Valves: Compact-wafer style with cast-iron shell with diameter made to fit within bolt circle.

F. Type III, Class 125, Globe Lift-Disc Check Valves: Globe style with cast-iron shell and flanged ends.

G. Type IV, Class 125, Threaded Lift-Disc Check Valves: Threaded style with bronze shell and threaded ends.

2.8 BRONZE GLOBE VALVES

A. Available Manufacturers:

B. Manufacturers:

1. Type 1, Bronze Globe Valves with Metal Disc:

a. Cincinnati Valve Co.
b. Grinnell Corporation.
c. Hammond Valve.
d. Kitz Corporation of America.
e. Legend Valve & Fitting, Inc.
f. Milwaukee Valve Company.
g. NIBCO INC.
h. Powell, Wm. Co.
i. Red-White Valve Corp.
j. Walworth Co.
k. Or Approved Equal.

2. Type 2, Bronze Globe Valves with Nonmetallic Disc:

a. Cincinnati Valve Co.
b. Grinnell Corporation.
c. Hammond Valve.
d. Kitz Corporation of America.
e. McWane, Inc.; Kennedy Valve Div.
f. Milwaukee Valve Company.
g. NIBCO INC.
h. Powell, Wm. Co.
i. Red-White Valve Corp.

j. Walworth Co.
k. Or Approved Equal.

3. Type 3, Bronze Globe Valves with Renewable Seat and Metal Disc:

a. Cincinnati Valve Co.
b. Grinnell Corporation.
c. Hammond Valve.
d. Milwaukee Valve Company.
e. NIBCO INC.
f. Walworth Co.
g. Or Approved Equal.

C. Bronze Globe Valves, General: MSS SP-80, with ferrous-alloy hand wheel.

D. Type 1, Class 150, Bronze Globe Valves: Bronze body with bronze disc and union-ring bonnet.

E. Type 3, Class 150, Bronze Globe Valves: Bronze body with bronze disc and renewable seat. Include union-ring bonnet.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine piping system for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

B. 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.

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

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

E. 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.

F. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE APPLICATIONS

A. Refer to piping Sections for specific valve applications. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball valves.

2. Throttling Service: Ball or globe valves.

3. Pump Discharge: Spring-loaded, lift-disc check valves.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP class or CWP ratings may be substituted.

C. Heating Water Piping: Use the following types of valves:

1. Ball Valves, NPS 2 (DN 50) and Smaller: One or Two-piece, CWP rating, copper alloy.

2. Ball Valves, NPS 2-1/2 (DN 65) and Larger: Class 150, ferrous alloy.

3. Lift Check Valves, NPS 2 (DN 50) and Smaller: Type 2, Class 150, horizontal / vertical, bronze.

4. Swing Check Valves, NPS 2 (DN 50) and Smaller: Type 4, Class 150, bronze.

5. Swing Check Valves, NPS 2-1/2 (DN 65) and Larger: Type II, Class 125, gray iron.

6. Wafer Check Valves, NPS 2-1/2 (DN 65) and Larger: Single / Dual-plate, wafer-lug/ double-flanged, Class 150, ferrous alloy.

7. Spring-Loaded, Lift-Disc Check Valves, NPS 2 (DN 50) and Smaller: Type IV, Class 150.

8. Spring-Loaded, Lift-Disc Check Valves, NPS 2-1/2 (DN 65) and Larger: Class 125, cast iron.

9. Globe Valves, NPS 2 (DN 50) and Smaller: Type 2, Class 150, bronze.

3.3 VALVE INSTALLATION

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

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 check valves for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level.

2. Dual-Plate Check Valves: In horizontal or vertical position, between flanges.

3. Lift Check Valves: With stem upright and plumb.

3.4 JOINT CONSTRUCTION

A. Refer to Division 22 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

B. Grooved Joints: Assemble joints with keyed coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

C. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

3.5 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

END OF SECTION 220523

SECTION 220529 – HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Fiberglass pipe hangers.
4. Metal framing systems.
5. Fiberglass strut systems.
6. Thermal-hanger shield inserts.
7. Fastener systems.
8. Pipe stands.
9. Equipment supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.

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

3. Design seismic-restraint hangers and supports for piping and equipment.

1.5 SUBMITTALS

A. Product Data: For the following:

1. Steel pipe hangers and supports.

2. Fiberglass pipe hangers.

3. Thermal-hanger shield inserts.

4. Powder-actuated fastener systems.

5. Pipe positioning systems.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following:

1. Trapeze pipe hangers. Include Product Data for components.

2. Metal framing systems. Include Product Data for components.

3. Fiberglass strut systems. Include Product Data for components.

4. Pipe stands. Include Product Data for components.

5. Equipment supports.

6. Welding certificates.

1.6 QUALITY ASSURANCE

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

B. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."

2. AWS D1.2, "Structural Welding Code--Aluminum."

3. AWS D1.3, "Structural Welding Code--Sheet Steel."

4. AWS D1.4, "Structural Welding Code--Reinforcing Steel."

5. ASME Boiler and Pressure Vessel Code: Section IX.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.

2. Galvanized Metallic Coatings: Pre-galvanized or hot dipped.

3. Nonmetallic Coatings: Plastic coating, jacket, or liner.

4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.

5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Copper Pipe Hangers:

1. Manufacturers' catalogs indicate that copper pipe hangers are small, typically NPS 4 (DN 100) or smaller, and types available are limited.

2. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.

3. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 THERMAL-HANGER SHIELD INSERTS

A. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig (688-kPa) or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig (862-kPa) minimum compressive strength and vapor barrier.

B. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig (688-kPa) ASTM C 552, Type II cellular glass with 100-psig (688-kPa) or [ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig (862-kPa) minimum compressive strength.

C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

E. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

2.4 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, [zinc-coated] [stainless-] steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.5 PIPE STANDS

A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.

C. Low-Type, Single-Pipe Stand: One-piece stainless-steel base unit with plastic roller, for roof installation without membrane penetration.

D. High-Type, Single-Pipe Stand:

1. Description: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.

2. Base: Stainless steel.

3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.

4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.

5. Curb-Mounted-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

2.6 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.7 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, non-shrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Non-staining, noncorrosive, and nongaseous.

2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

C. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.

D. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

E. Metal framing system in first paragraph below requires calculating and detailing at each use.

F. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

G. Fiberglass strut system in first paragraph below requires calculating and detailing at each use.

H. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping

I. Fastener System Installation:

1. Verify suitability of fasteners in two subparagraphs below for use in lightweight concrete or concrete slabs less than 4 inches (100 mm) thick.

2. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches (100 mm) thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.

3. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

J. Pipe stand in first paragraph below requires calculating and detailing at each use.

K. Pipe Stand Installation:

1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.

2. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb.

3. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

L. Equipment support in first paragraph below requires calculating and detailing at each use.

M. Equipment Support Installation:

1. Fabricate from welded-structural-steel shapes.

2. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

3. Install lateral bracing with pipe hangers and supports to prevent swaying.

4. Install building attachments within concrete slabs or attach to structural steel.

5. Install additional attachments at concentrated loads, including valves, flanges, and strainers, [NPS 2-1/2 (DN 65)] <Insert size> and larger and at changes in direction of piping.

6. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts

N. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

O. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

P. Insulated Piping:

1. Attach clamps and spacers to piping.

2. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.

3. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.

4. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

5. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated.

6. Fill interior voids with insulation that matches adjoining insulation.

a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.

7. High-compressive-strength inserts may permit use of shorter shields or shields with less arc span. Revise first subparagraph below to suit Project.

8. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.

Q. Shield Dimensions for Pipe: Not less than the following:

1. NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.

2. NPS 4 (DN 100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.

3. NPS 5 and NPS 6 (DN 125 and DN 150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.

S. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches (40 mm).

3.4 PAINTING

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

B. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).

C. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Section 099123 "Interior Painting".

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

3.5 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports, metal trapeze pipe hangers and metal framing systems and attachments for general service applications.

F. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.

G. Use padded hangers for piping that is subject to scratching.

H. Use thermal-hanger shield inserts for insulated piping and tubing.

I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of non-insulated or insulated, stationary pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).

2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F (566 deg C), pipes NPS 4 to NPS 24 (DN 100 to DN 600), requiring up to 4 inches (100 mm) of insulation.

3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36 (DN 20 to DN 900), requiring clamp flexibility and up to 4 inches (100 mm) of insulation.

4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 (DN 15 to DN 600) if little or no insulation is required.

5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4 (DN 15 to DN 100), to allow off-center closure for hanger installation before pipe erection.

6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of non-insulated, stationary pipes NPS 3/4 to NPS 8 (DN 20 to DN 200).

7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of non-insulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).

8. Adjustable Band Hangers (MSS Type 9): For suspension of non-insulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).

9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of non-insulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).

10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of non- insulated, stationary pipes NPS 3/8 to NPS 8 (DN 10 to DN 200).

11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of non-insulated, stationary pipes NPS 3/8 to NPS 3 (DN 10 to DN 80).

12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).

13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.

14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.

15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.

16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 (DN 65 to DN 900) if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.

17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30 (DN 25 to DN 750), from two rods if longitudinal movement caused by expansion and contraction might occur.

18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24 (DN 65 to DN 600), from single rod if horizontal movement caused by expansion and contraction might occur.

19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 (DN 50 to DN 1050) if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.

20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 (DN 50 to DN 600) if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.

21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 (DN 50 to DN 750) if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.

J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24 (DN 24 to DN 600).

2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 (DN 20 to DN 600) if longer ends are required for riser clamps.

K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.

2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.

3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.

4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.

5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F (49 to 232 deg C) piping installations.

L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.

2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.

3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.

4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.

5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.

6. C-Clamps (MSS Type 23): For structural shapes.

7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.

8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.

9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.

10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.

11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.

12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb (340 kg).
    b. Medium (MSS Type 32): 1500 lb (680 kg).
    c. Heavy (MSS Type 33): 3000 lb (1360 kg).

13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.

14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.

15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.

2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.

3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

N. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.

2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches (32 mm).

3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.

4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.

5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.

6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.

7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.

8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:

    a. Horizontal (MSS Type 54): Mounted horizontally.
    b. Vertical (MSS Type 55): Mounted vertically.
    c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

O. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

P. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

Q. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 220529

SECTION 220553 – IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following mechanical identification materials and their installation:

1. Equipment nameplates
2. Equipment markers
3. Equipment signs
4. Access panel and door markers
5. Valve tags
6. Pipe Markers

1.2 SUBMITTALS

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

1.3 QUALITY ASSURANCE

A. ASME Compliance: Comply with ASME A13.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.

PART 2 - PRODUCTS

2.1 EQUIPMENT IDENTIFICATION DEVICES

A. Equipment Nameplates: Metal, with data engraved or stamped, for permanent attachment on equipment.

1. Data:

a. Manufacturer, product name, model number, and serial number.
b. Capacity, operating and power characteristics, and essential data.
c. Labels of tested compliances.

2. Location: Accessible and visible.

3. Fasteners: As required to mount on equipment.

B. Equipment Markers: Engraved, color-coded laminated plastic. Include contact-type, permanent adhesive.

1. Terminology: Match schedules as closely as possible.

2. Data:

a. Name and plan number
b. Equipment service
c. Design capacity
d. Other design parameters such as pressure drop, entering and leaving conditions, and speed

3. Size: 2-1/2 by 4 inches for control devices, dampers, and valves; 4-1/2 by 6 inches for equipment.

C. Equipment Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.

1. Data: Instructions for operation of equipment and for safety procedures.

2. Engraving: Manufacturer's standard letter style, of sizes and with terms to match equipment identification.

3. Thickness: 1/8 inch, unless otherwise indicated.

4. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

D. Access Panel and Door Markers: 1/16-inch thick, engraved laminated plastic, with abbreviated terms and numbers corresponding to identification. Provide 1/8-inch center hole for attachment.

1. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

2.2 PIPING IDENTIFICATION DEVICES

A. Manufactured Pipe Markers, General: Preprinted, color-coded, with lettering indicating service, and showing direction of flow.

1. Colors: Comply with ASME A13.1, unless otherwise indicated.

2. Pipes with OD, Including Insulation, Less Than 6 Inches: Full-band pipe markers extending 360 degrees around pipe at each location.

3. Pipes with OD, Including Insulation, 6 Inches and Larger: Either full-band or strip-type pipe markers at least three times letter height and of length required for label.

4. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.

B. Pre-tensioned Pipe Markers: Pre-coiled semi-rigid plastic formed to cover full circumference of pipe and to attach to pipe without adhesive.

C. Shaped Pipe Markers: Preformed semi-rigid plastic formed to partially cover circumference of pipe and to attach to pipe with mechanical fasteners that do not penetrate insulation vapor barrier.

D. Self-Adhesive Pipe Markers: Plastic with pressure-sensitive, permanent-type, self-adhesive back.

E. Plastic Tape: Continuously printed, vinyl tape at least 3 mils thick with pressure-sensitive, permanent-type, self-adhesive back.

1. Width for Markers on Pipes with OD, Including Insulation, Less Than 6 Inches: 3/4 inch minimum.

2. Width for Markers on Pipes with OD, Including Insulation, 6 Inches or Larger: 1-1/2 inches minimum.

2.3 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers, with numbering scheme. Provide 5/32-inch hole for fastener.

1. Material: 0.032 inch-thick brass/aluminum

2. Valve-Tag Fasteners: Brass wire-link or beaded chain; or S-hook

PART 3 - EXECUTION

3.1 APPLICATIONS, GENERAL

A. Products specified are for applications referenced in other Division 22 Sections. If more than single-type material, device, or label is specified for listed applications, selection is Installer's option.

3.2 EQUIPMENT IDENTIFICATION

A. Install and permanently fasten equipment nameplates on each major item of mechanical equipment that does not have nameplate or has nameplate that is damaged or located where not easily visible. Locate nameplates where accessible and visible. Include nameplates for the following general categories of equipment:

1. Fuel-burning units, including boilers, furnaces, heaters

2. Pumps and similar motor-driven units.

3. Fans.

B. Install equipment markers with permanent adhesive on or near each major item of mechanical equipment. Data required for markers may be included on signs, and markers may be omitted if both are indicated.

1. Letter Size: Minimum 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

2. Data: Distinguish among multiple units, indicate operational requirements, indicate safety and emergency precautions, warn of hazards and improper operations, and identify units.

3. Locate markers where accessible and visible.

   a. Main control and operating valves, including safety devices and hazardous units such as gas outlets.
   b. Meters, gages, thermometers, and similar units.
   c. Fuel-burning units, including boilers, furnaces, heaters.
   d. Pumps and similar motor-driven units.
   e. Fans.

C. Install equipment signs with screws or permanent adhesive on or near each major item of mechanical equipment. Locate signs where accessible and visible.

1. Letter Size: Minimum 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

2. Data: Distinguish among multiple units, indicate operational requirements, indicate safety and emergency precautions, warn of hazards and improper operations, and identify units.

D. Install access panel markers with screws on equipment access panels.

3.3 PIPING IDENTIFICATION

A. Install manufactured pipe markers indicating service on each piping system. Install with flow indication arrows showing direction of flow.

1. Pipes with OD, Including Insulation, Less Than 6 Inches: Pre-tensioned pipe markers. Use size to ensure a tight fit.

2. Pipes with OD, Including Insulation, Less Than 6 Inches: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, at least 3/4 inch wide, lapped at least 1-1/2 inches at both ends of pipe marker, and covering full circumference of pipe.

3. Pipes with OD, Including Insulation, 6 Inches and Larger: Shaped pipe markers. Use size to match pipe and secure with fasteners.

4. Pipes with OD, Including Insulation, 6 Inches and Larger: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, at least 1-1/2 inches wide,

lapped at least 3 inches at both ends of pipe marker, and covering full circumference of pipe.

B. Locate pipe markers and color bands where piping is exposed in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior non-concealed locations as follows:

1. Near each valve and control device.

2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.

3. Near penetrations through walls, floors, ceilings, and non-accessible enclosures.

4. At access doors, manholes, and similar access points that permit view of concealed piping.

5. Near major equipment items and other points of origination and termination.

6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.

7. On piping above removable acoustical ceilings. Omit intermediately spaced markers.

3.4 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; plumbing fixture supply stops; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following:

1. Valve-Tag Size and Shape:

a. Domestic Water: 1-1/2 inches, round/square
b. Gas: 1-1/2 inches, round/square

3.5 ADJUSTING AND CLEANING

A. Relocate mechanical identification materials and devices that have become visually blocked by other work.

B. Clean faces of mechanical identification devices.

END OF SECTION 220553

SECTION 220719 – PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes mechanical insulation for duct, equipment, and pipe, including the following:

1. Insulation Materials:

a. Cellular glass.
b. Mineral fiber.
c. Polystyrene.

2. Fire-rated insulation systems.

3. Adhesives.

4. Mastics.

5. Lagging adhesives.

6. Sealants.

7. Field-applied jackets.

8. Tapes.

9. Securements.

10. Corner angles.

1.3 DEFINITIONS

A. ASJ: All-service jacket.

B. FSK: Foil, scrim, kraft paper.

C. FSP: Foil, scrim, polyethylene.

D. PVDC: Polyvinylidene chloride.

E. SSL: Self-sealing lap.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated, identify thermal conductivity, thickness, and jackets (both factory and field applied, if any).

B. Shop Drawings: Show details for the following:

1. Application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.

2. Attachment and covering of heat tracing inside insulation.

3. Insulation application at pipe expansion joints for each type of insulation.

4. Insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.

5. Removable insulation at piping specialties, equipment connections, and access panels.

6. Application of field-applied jackets.

7. Application at linkages of control devices.

8. Field application for each equipment type.

C. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use. Sample sizes are as follows:

1. Preformed Pipe Insulation Materials: 12 inches long by NPS 2 (DN 50).

2. Sheet Form Insulation Materials: 12 inches square.

3. Jacket Materials for Pipe: 12 inches long by NPS 2 (DN 50).

4. Sheet Jacket Materials: 12 inches square.

5. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

D. Installer Certificates: Signed by Contractor certifying that installers comply with requirements.

E. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

F. Field quality-control inspection reports.

1.5 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per

ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 22 Section "Hangers and Supports."

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.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. 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

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.

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

3. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 INSULATION MATERIALS

A. Refer to Part 3 schedule articles for requirements about where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in Part 2 "Factory-Applied Jackets" Article.

1. Products:

   a. Cell-U-Foam Corporation; Ultra-CUF.
   b. Pittsburgh Corning Corporation; Foamglas Super K.
   c. Or Approved Equal.

2. Block Insulation: ASTM C 552, Type I.

3. Special-Shaped Insulation: ASTM C 552, Type III.

4. Board Insulation: ASTM C 552, Type IV.

5. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.

6. Preformed Pipe Insulation with Factory-Applied [ASJ] [ASJ-SSL]: Comply with ASTM C 552, Type II, Class 2.

7. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.

G. Mineral-Fiber, Preformed Pipe Insulation:

1. Products:

   a. Fibrex Insulations Inc.; Coreplus 1200.
   b. Johns Manville; Micro-Lok.
   c. Knauf Insulation; 1000° Pipe Insulation.
   d. Manson Insulation Inc.; Alley-K.
   e. Owens Corning; Fiberglas Pipe Insulation.
   f. Or Approved Equal.

2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in Part 2 "Factory-Applied Jackets" Article.

H. Mineral-Fiber, Pipe Insulation Wicking System: Preformed pipe insulation complying with ASTM C 547, Type I, Grade A, with absorbent cloth factory applied to the entire inside surface of preformed pipe insulation and extended through the longitudinal joint to outside surface of insulation under insulation jacket. Factory apply a white, polymer, vapor-retarder jacket with self-sealing adhesive tape seam and evaporation holes running continuously along the longitudinal seam, exposing the absorbent cloth.

1. Products:

a. Knauf Insulation; Permawick Pipe Insulation.
b. Owens Corning; VaporWick Pipe Insulation.
c. Or Approved Equal.

I. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied [ASJ] [FSK jacket] complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is 2.5 lb/cu. ft. or more. Thermal conductivity (k-value) at 100 deg F is 0.29 Btu x in./h x sq. ft. x deg F (0.042 W/m x K) or less. Factory-applied jacket requirements are specified in Part 2 "Factory-Applied Jackets" Article.

1. Products:

a. CertainTeed Corp.; CrimpWrap.
b. Johns Manville; MicroFlex.
c. Knauf Insulation; Pipe and Tank Insulation.
d. Manson Insulation Inc.; AK Flex.
e. Owens Corning; Fiberglas Pipe and Tank Insulation.
f. Or Approved Equal.

2.3 FIRE-RATED INSULATION SYSTEMS

A. Fire-Rated Board: Structural-grade, press-molded, xonolite calcium silicate, fireproofing board suitable for operating temperatures up to 1700 deg F. Comply with ASTM C 656, Type II, Grade 6. UL tested and certified to provide a 2-hour fire rating.

1. Products:

a. Johns Manville; Super Firetemp M.
b. Or Approved Equal.

B. Fire-Rated Blanket: High-temperature, flexible, blanket insulation with FSK jacket that is UL tested and certified to provide a 2-hour fire rating.

1. Products:

a. CertainTeed Corp.; FlameChek.
b. Johns Manville; Firetemp Wrap.
c. Nelson Firestop Products; Nelson FSB Flameshield Blanket.

d. Thermal Ceramics; FireMaster Duct Wrap.
e. 3M; Fire Barrier Wrap Products.
f. Unifrax Corporation; FyreWrap.
g. Vesuvius; PYROSCAT FP FASTR Duct Wrap.
h. Or Approved Equal.

2.4 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Calcium Silicate Adhesive: Fibrous, sodium-silicate-based adhesive with a service temperature range of 50 to 800 deg F.

1. Products:

a. Childers Products, Division of ITW; CP-97.
b. Foster Products Corporation, H. B. Fuller Company; 81-27/81-93.
c. Marathon Industries, Inc.; 290.
d. Mon-Eco Industries, Inc.; 22-30.
e. Vimasco Corporation; 760.
f. Or Approved Equal.

C. Cellular-Glass, Phenolic-Foam, Polyisocyanurate, and Polystyrene Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F.

1. Products:

a. Childers Products, Division of ITW; CP-96.
b. Foster Products Corporation, H. B. Fuller Company; 81-33.
c. Or Approved Equal.

D. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Products:

a. Aeroflex USA Inc.; Aeroseal.
b. Armacell LCC; 520 Adhesive.
c. Foster Products Corporation, H. B. Fuller Company; 85-75.
d. RBX Corporation; Rubatex Contact Adhesive.
e. Or Approved Equal.

E. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products:

a. Childers Products, Division of ITW; CP-82.
b. Foster Products Corporation, H. B. Fuller Company; 85-20.
c. ITW TACC, Division of Illinois Tool Works; S-90/80.
d. Marathon Industries, Inc.; 225.
e. Mon-Eco Industries, Inc.; 22-25.
f. Or Approved Equal.

F. Polystyrene Adhesive: Solvent- or water-based, synthetic resin adhesive with a service temperature range of minus 20 to plus 140 deg F.

1. Products:

a. Childers Products, Division of ITW; CP-96.
b. Foster Products Corporation, H. B. Fuller Company; 97-13.
c. Or Approved Equal.

G. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products:

a. Childers Products, Division of ITW; CP-82.
b. Foster Products Corporation, H. B. Fuller Company; 85-20.
c. ITW TACC, Division of Illinois Tool Works; S-90/80.
d. Marathon Industries, Inc.; 225.
e. Mon-Eco Industries, Inc.; 22-25.
f. Or Approved Equal.

H. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products:

a. Dow Chemical Company (The); 739, Dow Silicone.
b. Johns-Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
c. P.I.C. Plastics, Inc.; Welding Adhesive.
d. Red Devil, Inc.; Celulon Ultra Clear.
e. Speedline Corporation; Speedline Vinyl Adhesive.
f. Or Approved Equal.

2.5 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.

B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.

1. Products:

a. Childers Products, Division of ITW; CP-35.
b. Foster Products Corporation, H. B. Fuller Company; 30-90.
c. ITW TACC, Division of Illinois Tool Works; CB-50.
d. Marathon Industries, Inc.; 590.
e. Mon-Eco Industries, Inc.; 55-40.
f. Vimasco Corporation; 749.
g. Or Approved Equal.

2. Water-Vapor Permeance: ASTM E 96, 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, 59 percent by volume and 71 percent by weight.

5. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below ambient services.

1. Products:

a. Childers Products, Division of ITW; CP-30.
b. Foster Products Corporation, H. B. Fuller Company; 30-35.
c. ITW TACC, Division of Illinois Tool Works; CB-25.
d. Marathon Industries, Inc.; 501.
e. Mon-Eco Industries, Inc.; 55-10.
f. Or Approved Equal.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.

3. Service Temperature Range: 0 to 180 deg F

4. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.

5. Color: White.

D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below ambient services.

1. Products:

a. Childers Products, Division of ITW; Encacel.
b. Foster Products Corporation, H. B. Fuller Company; 60-95/60-96.
c. Marathon Industries, Inc.; 570.
d. Mon-Eco Industries, Inc.; 55-70.
e. Or Approved Equal.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.

3. Service Temperature Range: Minus 50 to plus 220 deg F

4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.

5. Color: White.

E. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.

1. Products:

a. Childers Products, Division of ITW; CP-10.
b. Foster Products Corporation, H. B. Fuller Company; 35-00.
c. ITW TACC, Division of Illinois Tool Works; CB-05/15.
d. Marathon Industries, Inc.; 550.
e. Mon-Eco Industries, Inc.; 55-50.
f. Vimasco Corporation; WC-1/WC-5.

g. Or Approved Equal.

2. Water-Vapor Permeance: ASTM F 1249, 3 perms at 0.0625-inch dry film thickness.

3. Service Temperature Range: Minus 20 to plus 200 deg F.

4. Solids Content: 63 percent by volume and 73 percent by weight.

5. Color: White.

2.6 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.

1. Products:

a. Childers Products, Division of ITW; CP-52.
b. Foster Products Corporation, H. B. Fuller Company; 81-42.
c. Marathon Industries, Inc.; 130.
d. Mon-Eco Industries, Inc.; 11-30.
e. Vimasco Corporation; 136.
f. Or Approved Equal.

2. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct, equipment, and pipe insulation.

3. Service Temperature Range: Minus 50 to plus 180 deg F.

4. Color: White.

2.7 SEALANTS

A. Joint Sealants:

1. Joint Sealants for Cellular-Glass, Phenolic-Foam, and Polyisocyanurate Products:

a. Childers Products, Division of ITW; CP-76.
b. Foster Products Corporation, H. B. Fuller Company; 30-45.
c. Marathon Industries, Inc.; 405.
d. Mon-Eco Industries, Inc.; 44-05.
e. Pittsburgh Corning Corporation; Pittseal 444.
f. Vimasco Corporation; 750.
g. Or Approved Equal.

2. Joint Sealants for Polystyrene Products:

a. Childers Products, Division of ITW; CP-70.
b. Foster Products Corporation, H. B. Fuller Company; 30-45/30-46.
c. Marathon Industries, Inc.; 405.
d. Mon-Eco Industries, Inc.; 44-05.

e. Vimasco Corporation; 750.
f. Or Approved Equal.

3. Materials shall be compatible with insulation materials, jackets, and substrates.

4. Permanently flexible, elastomeric sealant.

5. Service Temperature Range: Minus 100 to plus 300 deg F.

6. Color: White or gray.

B. FSK and Metal Jacket Flashing Sealants:

1. Products:

a. Childers Products, Division of ITW; CP-76-8.
b. Foster Products Corporation, H. B. Fuller Company; 95-44.
c. Marathon Industries, Inc.; 405.
d. Mon-Eco Industries, Inc.; 44-05.
e. Vimasco Corporation; 750.
f. Or Approved Equal.

2. Materials shall be compatible with insulation materials, jackets, and substrates.

3. Fire- and water-resistant, flexible, elastomeric sealant.

4. Service Temperature Range: Minus 40 to plus 250 deg F.

5. Color: Aluminum.

C. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Products:

a. Childers Products, Division of ITW; CP-76.
b. Or Approved Equal.

2. Materials shall be compatible with insulation materials, jackets, and substrates.

3. Fire- and water-resistant, flexible, elastomeric sealant.

4. Service Temperature Range: Minus 40 to plus 250 deg F.

5. Color: White.

2.8 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.

C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Products:

    a. Johns Manville; Zeston.
    b. P.I.C. Plastics, Inc.; FG Series.
    c. Proto PVC Corporation; LoSmoke.
    d. Speedline Corporation; SmokeSafe.
    e. Or Approved Equal.

2. Adhesive: As recommended by jacket material manufacturer.

3. Color: White.

4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.

    a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

5. Factory-fabricated tank heads and tank side panels.

D. Metal Jacket:

1. Products:

    a. Childers Products, Division of ITW; Metal Jacketing Systems.
    b. PABCO Metals Corporation; Surefit.
    c. RPR Products, Inc.; Insul-Mate.
    d. Or Approved Equal.

E. PVDC-SSL Jacket: PVDC jacket with a self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip.

2.9 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136 and UL listed.

1. Products:

    a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.
    b. Compac Corp.; 104 and 105.
    c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.
    d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
    e. Or Approved Equal.

2. Width: 3 inches

3. Thickness: 11.5 mils

4. Adhesion: 90 ounces force/inch in width.

5. Elongation: 2 percent.

6. Tensile Strength: 40 lbf/inch in width.

7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136 and UL listed.

1. Products:

a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
b. Compac Corp.; 110 and 111.
c. Ideal Tape Co., Inc., an American Biltrite Company; 491 AWF FSK.
d. Venture Tape; 1525 CW, 1528 CW, and 1528 CW/SQ.
e. Or Approved Equal.

2. Width: 3 inches.

3. Thickness: 6.5 mils.

4. Adhesion: 90 ounces force/inch in width.

5. Elongation: 2 percent.

6. Tensile Strength: 40 lbf/inch in width.

7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive. Suitable for indoor and outdoor applications.

1. Products:

a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0555.
b. Compac Corp.; 130.
c. Ideal Tape Co., Inc., an American Biltrite Company; 370 White PVC tape.
d. Venture Tape; 1506 CW NS.
e. Or Approved Equal.

2. Width: 2 inches.

3. Thickness: 6 mils.

4. Adhesion: 64 ounces force/inch in width.

5. Elongation: 500 percent.

6. Tensile Strength: 18 lbf/inch in width.

D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive and UL listed.

1. Products:

a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
b. Compac Corp.; 120.

c. Ideal Tape Co., Inc., an American Biltrite Company; 488 AWF.
d. Venture Tape; 3520 CW.
e. Or Approved Equal.

2. Width: 2 inches.

3. Thickness: 3.7 mils.

4. Adhesion: 100 ounces force/inch in width.

5. Elongation: 5 percent.

6. Tensile Strength: 34 lbf/inch in width.

2.10 SECUREMENTS

A. Bands:

1. Products:

a. Childers Products; Bands.
b. PABCO Metals Corporation; Bands.
c. RPR Products, Inc.; Bands.
d. Or Approved Equal.

2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304; 0.015 inch thick, 3/4 inch wide with wing or closed seal.

3. Aluminum: ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing or closed seal.

4. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

B. Insulation Pins and Hangers:

1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch diameter shank, length to suit depth of insulation indicated.

a. Products:

1) AGM Industries, Inc.; CWP-1.
2) GEMCO; CD.
3) Midwest Fasteners, Inc.; CD.
4) Nelson Stud Welding; TPA, TPC, and TPS.
5) Or Approved Equal.

2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.

a. Products:

1) AGM Industries, Inc.; CWP-1.
2) GEMCO; Cupped Head Weld Pin.
3) Midwest Fasteners, Inc.; Cupped Head.
4) Nelson Stud Welding; CHP.
5) Or Approved equal

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 requirements:

a. Products:

1) AGM Industries, Inc.; Tactoo Insul-Hangers, Series T.
2) GEMCO; Perforated Base.
3) Midwest Fasteners, Inc.; Spindle.
4) Or Approved Equal

b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
c. Spindle: Aluminum, 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. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch thick, aluminum sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

a. Products:

1) AGM Industries, Inc.; RC-150.
2) GEMCO; R-150.
3) Midwest Fasteners, Inc.; WA-150.
4) Nelson Stud Welding; Speed Clips.
5) Or Approved Equal.

b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

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

D. Wire: 0.062-inch soft-annealed, galvanized steel.

1. Manufacturers:

a. ACS Industries, Inc.
b. C & F Wire.
c. Childers Products.
d. PABCO Metals Corporation.
e. RPR Products, Inc.
f. Or Approved Equal.

2.11 CORNER ANGLES

A. PVC Corner Angles: 30 mils thick, minimum 1 by 1 inch, PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.

B. Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum according to ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105 or 5005; Temper H-14.

C. Stainless-Steel Corner Angles: 0.024 inch thick, minimum 1 by 1 inch, stainless steel according to ASTM A 167 or ASTM A 240/A 240M, Type 304 or 316.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

1. Verify that systems and equipment to be insulated have been tested and are free of defects.

2. Verify that surfaces to be insulated are clean and dry.

3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 COMMON INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

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

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

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

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

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.

2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.

3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.

2. Cover circumferential joints with 3-inch wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.

3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches or 4 inches o.c.

   a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.

5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct and pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above ambient services, do not install insulation to the following:

1. Vibration-control devices.

2. Testing agency labels and stamps.

3. Nameplates and data plates.

4. Manholes.

5. Handholes.

6. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.

2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.

3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.

4. Seal jacket to wall flashing with flashing sealant.

B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions. Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.

1. Firestopping and fire-resistive joint sealers are specified in Division 7 Section "Through-Penetration Firestop Systems."

3.5 EQUIPMENT INSULATION INSTALLATION

A. Secure insulation with adhesive and anchor pins and speed washers.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of tank and vessel surfaces.

2. Groove and score insulation materials to fit as closely as possible to equipment, including contours. Bevel insulation edges for cylindrical surfaces for tight joints. Stagger end joints.

3. Protect exposed corners with secured corner angles.

4. Install adhesively attached or self-sticking insulation hangers and speed washers on sides of tanks and vessels as follows:

a. Do not weld anchor pins to ASME-labeled pressure vessels.
b. Select insulation hangers and adhesive that are compatible with service temperature and with substrate.
c. On tanks and vessels, maximum anchor-pin spacing is 3 inches from insulation end joints, and 16 inches o.c. in both directions.
d. Do not overcompress insulation during installation.
e. Cut and miter insulation segments to fit curved sides and domed heads of tanks and vessels.
f. Impale insulation over anchor pins and attach speed washers.
g. 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.

5. Secure each layer of insulation with stainless-steel or aluminum bands. Select band material compatible with insulation materials.

6. Where insulation hangers on equipment and vessels are not permitted or practical and where insulation support rings are not provided, install a girdle network for securing insulation. Stretch prestressed aircraft cable around the diameter of vessel and make taut with clamps, turnbuckles, or breather springs. Place one circumferential girdle around equipment approximately 6 inches from each end. Install wire or cable between two circumferential girdles 12 inches o.c. Install a wire ring around each end and around outer periphery of center openings, and stretch prestressed aircraft cable radially from the wire ring to

nearest circumferential girdle. Install additional circumferential girdles along the body of equipment or tank at a minimum spacing of 48 inches o.c. Use this network for securing insulation with tie wire or bands.

7. Stagger joints between insulation layers at least 3 inches.

8. Install insulation in removable segments on equipment access doors, manholes, handholes, and other elements that require frequent removal for service and inspection.

9. Bevel and seal insulation ends around manholes, handholes, ASME stamps, and nameplates.

10. For equipment with surface temperatures below ambient, apply mastic to open ends, joints, seams, breaks, and punctures in insulation.

3.6 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this Article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.

2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.

3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.

4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.

5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.

6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.

7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.

9. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.

2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.

3. Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.

4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.7 CELLULAR-GLASS INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.

2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.

3. For insulation with factory-applied jackets on above ambient services, secure laps with outward clinched staples at 6 inches o.c.

4. For insulation with factory-applied jackets on below ambient services, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. 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 cellular-glass block insulation of same thickness as pipe insulation.

4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. 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 sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of cellular-glass insulation to valve body.

2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.

3. Install insulation to flanges as specified for flange insulation application.

3.8 MINERAL-FIBER INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.

2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.

3. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.

4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. 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 mineral-fiber blanket insulation.

4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.

2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.

2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.

3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.

4. Install insulation to flanges as specified for flange insulation application.

3.9 FIELD-APPLIED JACKET INSTALLATION

A. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.

2. Install lap or joint strips with same material as jacket.

3. Secure jacket to insulation with manufacturer's recommended adhesive.

4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch wide joint strips at end joints.

5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

B. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.10 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 UL-listed 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. Fire-stop systems are specified in Division 7 Section "Through-Penetration Firestop Systems."

3.11 FINISHES

A. Duct, Equipment, and Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below.

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.12 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Fire-suppression piping.

2. Drainage piping located in crawl spaces.

3. Below-grade piping.

4. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.13 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water:

1. NPS 3 (DN 75) and Smaller: Insulation shall be any of the following:

a. Cellular Glass: 1-1/2 inch thick.

b. Mineral-Fiber Pipe Insulation, Type I: 1-1/2 inch thick.

2. NPS 4 (DN 32) and Larger: Insulation shall be any of the following:

a. Cellular Glass: 2 inches thick.

b. Mineral-Fiber Pipe Insulation, Type I: 2 inches thick.

B. Domestic Hot and Recirculated Hot Water:

1. NPS 3 (DN 75) and Smaller: Insulation shall be[any of] the following:

a. Cellular Glass: 1-1/2 inches thick.

b. Mineral-Fiber Pipe Insulation, Type I: 1-1/2 inch thick.

2. NPS 4 (DN 100) and Larger: Insulation shall be any of the following:

a. Cellular Glass: 2 inches thick.

b. Mineral-Fiber Pipe Insulation, Type I: 2 inch thick.

C. Condensate Drain:

1. Refer to Dwg. P0.01 for insulation requirements.

3.14 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Exposed:

1. Aluminum, Smooth: 0.016 inch thick.

END OF SECTION 220719

SECTION 221116 – DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes domestic water piping inside the building and 5 feet to outside of the building.

B. Related Sections include the following:

1. Division 22 Section "Domestic Water Piping Specialties" for water distribution piping specialties.

1.3 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing domestic water piping systems with 80 psig, unless otherwise indicated.

1.4 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

B. Water Samples: Specified in Part 3 "Cleaning" Article.

C. Field quality-control test reports.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9," for potable domestic water piping and components.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

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

2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PIPING MATERIALS

A. Refer to Part 3 "Pipe and Fitting Applications" Article for applications of pipe, tube, fitting, and joining materials.

B. Transition Couplings for Aboveground Pressure Piping: Coupling or other manufactured fitting the same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.3 COPPER TUBE AND FITTINGS

A. Soft Copper Tube: ASTM B 88, Types K and L (ASTM B 88M, Types A and B), water tube, annealed temper.

1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.

2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends. Furnish Class 300 flanges if required to match piping.

3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

B. Hard Copper Tube: ASTM B 88, Types L and M (ASTM B 88M, Types B and C), water tube, drawn temper.

1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought- copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.

2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends. Furnish Class 300 flanges if required to match piping.

3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

2.4 VALVES

A. General-duty ball valves are specified in Division 22 Section "Plumbing Valves."

B. Backflow preventers, strainers, and drain valves are specified in Division 22 Section "Domestic Water Piping Specialties."

PART 3 - EXECUTION

3.1 PIPE AND FITTING APPLICATIONS

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

B. Flanges may be used on aboveground piping, unless otherwise indicated.

C. Fitting Option: brazed joints may be used on aboveground copper tubing.

D. Under-Building-Slab, Domestic Water Piping on House Side of Water Meter, NPS 4 (DN 100) and Smaller: Soft copper tube, Type K with no fittings.

E. Aboveground Domestic Water Piping: Use the following piping materials for each size range:

1. NPS 1 (DN 25) and Smaller: Hard copper tube, Type L; copper pressure fittings; and soldered joints.

2. NPS 2 (DN 50) and larger: Hard copper tube, Type L; copper pressure fittings; and soldered joints.

3.2 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use ball valves for piping NPS 3 (DN 75) and smaller.

2. Drain Duty: Hose-end drain valves.

B. Install drain valves at low points in horizontal piping, and where required to drain water piping.

1. Install hose-end drain valves at low points in water mains, risers, and branches.

3.3 PIPING INSTALLATION

A. Basic piping installation requirements are specified in Division 22 Section "Basic Plumbing Materials and Methods."

B. Install under-building-slab copper tubing according to CDA's "Copper Tube Handbook."

C. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Sleeves and mechanical sleeve seals are specified in Division 22 Section "Basic Plumbing Materials and Methods."

D. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Wall penetration systems are specified in Division 22 Section "Basic Plumbing Materials and Methods."

E. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.

3.4 JOINT CONSTRUCTION

A. Basic piping joint construction requirements are specified in Division 22 Section "Basic Plumbing Materials and Methods."

B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

3.5 HANGER AND SUPPORT INSTALLATION

A. Seismic-restraint devices are specified in Division 22 Section "Vibration and Seismic Controls."

B. Pipe hanger and support devices are specified in Division 22 Section "Hangers and Supports." Install the following:

1. Vertical Piping: MSS Type 8 or Type 42, clamps.

2. Individual, Straight, Horizontal Piping Runs: According to the following:

   a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
   b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
   c. Longer Than 100 Feet: MSS Type 49, spring cushion rolls, if indicated.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.

4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Install supports according to Division 22 Section "Hangers and Supports."

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced 1 size for double-rod hangers, to a minimum of 3/8 inch.

F. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 (DN 20) and Smaller: 60 inches with 3/8-inch rod.

2. NPS 1 and NPS 1-1/4 (DN 25 and DN 32): 72 inches with 3/8-inch rod.

3. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 96 inches with 3/8-inch rod.

4. NPS 2-1/2 (DN 65): 108 inches with 1/2-inch rod.

5. NPS 3 to NPS 5 (DN 80 to DN 125): 10 feet with 1/2-inch rod.

6. NPS 6 (DN 150): 10 feet with 5/8-inch rod.

G. Install supports for vertical copper tubing every 10 feet.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment and machines to allow service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

3.7 FIELD QUALITY CONTROL

A. Inspect domestic water piping as follows:

1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.

2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

   a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
   b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

3. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

B. Test domestic water piping as follows:

1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.

2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.

3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.

4. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.

5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.

6. Prepare reports for tests and required corrective action.

3.8 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.

2. Open shutoff valves to fully open position.

3. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.

4. Remove and clean strainer screens. Close drain valves and replace drain plugs.

5. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.9 CLEANING

A. Clean and disinfect potable and non-potable domestic water piping as follows:

1. Purge new piping and parts of existing domestic water piping that have been altered, extended, or repaired before using.

2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction or, if methods are not prescribed, procedures described in either AWWA C651 or AWWA C652 or as described below:

a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
b. Fill and isolate system according to either of the following:

1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.

c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

B. Prepare and submit reports of purging and disinfecting activities.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

END OF SECTION 221116

SECTION 221123 – FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes fuel gas piping within the building. Products include the following:

1. Pipe, tube, fittings, and joining materials.
2. Protective pipe and fitting coating.
3. Piping specialties.
4. Specialty valves.
5. Pressure regulators.

1.3 PROJECT CONDITIONS

A. Gas System Pressures: Two pressure ranges. Primary pressure is more than 0.5 psig but not more than 2.0 psig and is reduced to secondary pressure of 0.5 psig or less.

B. Design values of fuel gas supplied for these systems are as follows:

1. Nominal Heating Value: 1000 Btu/cu. ft.
2. Nominal Specific Gravity: 0.6.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Specialty valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
2. Pressure regulators. Include pressure rating, capacity, and settings of selected models.

B. Shop Drawings: For fuel gas piping. Include plans and attachments to other work.

1. Wiring Diagrams: Power, signal, and control wiring.

C. Welding certificates.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For natural gas specialties and accessories to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.

B. Electrical Components and Devices: 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. NFPA Standard: Comply with NFPA 54, "International Fuel Gas Code."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Handling Flammable Liquids: Remove and legally dispose of liquids from drips in existing gas piping. Handle cautiously to avoid spillage and ignition. Notify fuel gas supplier. Handle flammable liquids used by Installer with proper precautions and do not leave on premises from end of one day to beginning of next day.

1.7 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

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

2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.3 PIPES, TUBES, FITTINGS, AND JOINING MATERIALS

A. Steel Pipe: ASTM A 53/A 53M; Type E or S; Grade B; black. Wall thickness of wrought-steel pipe shall comply with ASME B36.10M.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern, with threaded ends according to ASME B1.20.1.

2. Steel Threaded Fittings: ASME B16.11, forged steel with threaded ends according to ASME B1.20.1.

3. Steel Welding Fittings: ASME B16.9, wrought steel or ASME B16.11, forged steel.

4. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends according to ASME B1.20.1.

5. Cast-Iron Flanges and Flanged Fittings: ASME B16.1, Class 125.

6. Joint Compound and Tape: Suitable for natural gas.

7. Steel Flanges and Flanged Fittings: ASME B16.5.

8. Gasket Material: Thickness, material, and type suitable for natural gas.

2.4 PROTECTIVE COATING

A. Furnish pipe and fittings with factory-applied, corrosion-resistant polyethylene coating for use in contact with materials that may corrode the pipe.

2.5 PIPING SPECIALTIES

A. Flexible Connectors: ANSI Z21.24, copper alloy.

B. Quick-Disconnect Devices: ANSI Z21.41, convenience outlets and matching plug connector.

2.6 SPECIALTY VALVES

A. Valves, NPS 2 (DN 50) and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.

B. Valves, NPS 2-1/2 (DN 65) and Larger: Flanged ends according to ASME B16.5 for steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.

C. Appliance Connector Valves: ANSI Z21.15 and CSA International listed.

1. Manufacturers:

a. American Valve Inc.
b. B&K Industries, Inc.
c. Brass Craft Manufacturing Co.

d. Cimberio Valves, S. p. A.
e. Conbraco Industries, Inc.; Apollo Div.
f. E. M. Plastic and Electric Products, Ltd.; Neo Valve Div.
g. JMF Company.
h. Jomar International Ltd.
i. Key Gas Components, Inc.
j. Legend Valve and Fitting, Inc.
k. McDonald, A. Y. Mfg. Co.
l. Mueller Co.; Mueller Gas Products Div.
m. Newman Hattersley Ltd.; Specialty Valves Div.
n. Robert Manufacturing Co.
o. State Metals, Inc.
p. Watts Industries, Inc.; Water Products Div.

D. Gas Stops: Bronze body with AGA stamp, plug type with bronze plug and flat or square head, ball type with chrome-plated brass ball and lever handle, or butterfly valve with stainless-steel disc and fluorocarbon elastomer seal and lever handle; 2-psig minimum pressure rating.

E. Gas Valves, NPS 2 (DN 50) and Smaller: ASME B16.33 and CSA International-listed bronze body and 125-psig pressure rating.

1. Manufacturers:

a. BMI Canada, Inc.
b. Crane Valves.
c. Dungs, Karl, Inc.
d. Flow Control Equipment, Inc.
e. Grinnell Corp.
f. Honeywell International Inc.
g. Jomar International Ltd.
h. KITZ Corporation.
i. Legend Valve and Fitting, Inc.
j. Lyall, R. W. & Co., Inc.
k. McDonald, A. Y. Mfg. Co.
l. Milwaukee Valve Company.
m. Mueller Co.; Mueller Gas Products Div.
n. NIBCO INC.
o. Red-White Valve Corp.
p. Velan Inc.
q. Watts Industries, Inc.; Water Products Div.

2. Tamperproof Feature: Include design for locking.

F. Plug Valves, NPS 2-1/2 (DN 65) and Larger: ASME B16.38 and MSS SP-78 cast-iron, lubricated plug valves, with 125-psig pressure rating.

1. Manufacturers:

a. Flow Control Equipment, Inc.
b. Milliken Valve Co., Inc.
c. Nordstrom Valves, Inc.
d. Olson Technologies, Inc.; Homestead Valve Div.
e. Walworth Co.

2. Tamperproof Feature: Include design for locking.

G. General-Duty Valves, NPS 2-1/2 (DN 65) and Larger: ASME B16.38, cast-iron body, suitable for fuel gas service, with "WOG" indicated on valve body, and 125-psig pressure rating.

1. Gate Valves: MSS SP-70, OS&Y type with solid wedge.

2. Butterfly Valves: MSS SP-67, lug type with lever handle.

H. Automatic Gas Valves: ANSI Z21.21, with electrical/mechanical operator for actuation by appliance automatic shutoff device.

1. Manufacturers:

a. ASCO General Controls.
b. ASCO Power Technologies, LP; Division of Emerson.
c. ASCO Valve Canada, Division of Emerson Electric Canada Limited.
d. Dungs, Karl, Inc.
e. Eaton Corporation; Controls Div.
f. Eclipse Combustion, Inc.
g. GPS Gas Protection Systems Inc.
h. Honeywell International Inc.
i. Johnson Controls.

I. Electrically Operated Gas Valves: UL 429, bronze, aluminum, or cast-iron body solenoid valve; 120-V ac, 60 Hz, Class B, continuous-duty molded coil. Include NEMA ISC 6, Type 4, coil enclosure and electrically opened and closed dual coils. Valve position shall normally be closed.

1. Manufacturers:

a. ASCO General Controls.
b. ASCO Power Technologies, LP; Division of Emerson.
c. Dungs, Karl, Inc.
d. Eclipse Combustion, Inc.
e. Goyen Valve Corp.; Tyco Environmental Systems.
f. Magnatrol Valve Corp.
g. Watts Industries, Inc.

2.7 PRESSURE REGULATORS

A. Description: Single stage and suitable for fuel gas service. Include steel jacket and corrosion-resistant components, elevation compensator, and atmospheric vent.

1. Manufacturers:

a. Service Pressure Regulators:

1) American Meter Company.
2) Fisher Controls International, Inc.; Division of Emerson.
3) Invensys.
4) National Meter Industries, Inc.
5) Richards Industries, Inc.; Jordan Valve Div.

6) Schlumberger Limited; Gas Div.

b. Line Pressure Regulators:

1) American Meter Company.
2) Donkin, Bryan RMG Canada, Ltd.
3) Eclipse Combustion, Inc.
4) Fisher Controls International, Inc.; Division of Emerson.
5) Invensys.
6) Maxitrol Company.
7) National Meter Industries, Inc.
8) Richards Industries, Inc.; Jordan Valve Div.
9) Schlumberger Limited; Gas Div.

c. Appliance Pressure Regulators:

1) Canadian Meter Co., Inc.
2) Eaton Corporation; Controls Div.
3) Harper Wyman Co.
4) Maxitrol Company.
5) SCP, Inc.

2. NPS 2 (DN 50) and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.

3. NPS 2-1/2 (DN 65) and Larger: Flanged ends according to ASME B16.5 for steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.

4. Service Pressure Regulators: ANSI Z21.80. Include 100-psig minimum inlet pressure rating.

5. Line Pressure Regulators: ANSI Z21.80 with 2-psig minimum inlet pressure rating.

6. Line Pressure Regulators: ANSI Z21.80 with 10-psig inlet pressure rating, unless otherwise indicated.

7. Appliance Pressure Regulators: ANSI Z21.18. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.

B. Pressure Regulator Vents: Factory- or field-installed, corrosion-resistant screen in opening if not connected to vent piping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for fuel piping system to verify actual locations of piping connections before equipment installation.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Close equipment shutoff valves before turning off fuel gas to premises or section of piping. Perform leakage test as specified in "Field Quality Control" Article to determine that all equipment is turned off in affected piping section.

3.3 PIPING APPLICATIONS

A. Flanges, unions, transition, and special fittings with pressure ratings same as or higher than system pressure rating may be used in applications below, unless otherwise indicated.

B. Fuel Gas Piping, 2 psig or Less - aboveground or in pipe tunnel:

1. NPS 3/4 to NPS 2 (DN 20 and DN 50) Steel pipe, malleable-iron threaded fittings, and threaded joints.

2. NPS 2-1/2 (DN 65) and Larger: Steel pipe, steel welding fittings, and welded joints.

3.4 VALVE APPLICATIONS

A. Appliance Shutoff Valves for Pressure 0.5 psig or Less: Appliance connector valve or gas stop.

B. Appliance Shutoff Valves for Pressure 0.5 to 2 psig: Gas stop or gas valve.

C. Piping Line Valves, NPS 2 (DN 50) and Smaller: Gas valve.

D. Piping Line Valves, NPS 2-1/2 (DN 65) and Larger: Plug valve or general-duty valve.

3.5 PIPING INSTALLATION

A. Concealed Locations: Except as specified below, install concealed gas piping in airtight conduit constructed of Schedule 40, seamless, black steel pipe with welded joints. Vent conduit to outside and terminate with screened vent cap.

1. In Walls: Gas piping with welded joints and protective wrapping specified in Part 2 "Protective Coating" Article may be installed in masonry walls, subject to approval of authorities having jurisdiction.

B. Drips and Sediment Traps: Install drips at points where condensate may collect. Include outlets of service meters. Locate where readily accessible for cleaning and emptying. Do not install where condensate would be subject to freezing.

1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use minimum-length nipple of 3 pipe diameters, but not less than 3 inches long, and same size as connected pipe. Install with space between bottom of drip and floor for removal of plug or cap.

C. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels, unless indicated to be exposed to view.

D. Install fuel gas piping at uniform grade of 0.1 percent slope upward toward risers.

E. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

F. Connect branch piping from top or side of horizontal piping.

G. Install unions in pipes NPS 2 (DN 50) and smaller, adjacent to each valve, at final connection to each piece of equipment, and elsewhere as indicated. Unions are not required on flanged devices.

H. Install strainer on inlet of each line pressure regulator and automatic and electrically operated valve.

I. Install pressure gage upstream and downstream from each line pressure regulator. Pressure gages are specified in Division 23 Section "Meters and Gages for HVAC Piping."

J. Install flanges on valves, specialties, and equipment having NPS 2-1/2 (DN 65) and larger connections.

K. Install vent piping for gas pressure regulators and gas trains, extend outside building, and vent to atmosphere. Terminate vents with turned-down, reducing-elbow fittings with corrosion-resistant insect screens in large end.

L. Install containment conduits for gas piping below slabs, within building, in gastight conduits extending minimum of 4 inches outside building and vented to atmosphere. Terminate vents with turned-down, reducing-elbow fittings with corrosion-resistant insect screens in large end. Prepare and paint outside of conduits with coal-tar, epoxy-polyamide paint according to SSPC-Paint 16.

3.6 JOINT CONSTRUCTION

A. Use materials suitable for fuel gas.

B. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

3.7 HANGER AND SUPPORT INSTALLATION

A. Pipe hanger and support and equipment support materials and installation requirements are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

B. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 1 (DN 25) and Smaller: Maximum span, 96 inches; minimum rod size, 3/8 inch.

2. NPS 1-1/4 (DN 32): Maximum span, 108 inches; minimum rod size, 3/8 inch.

3. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): Maximum span, 108 inches; minimum rod size, 3/8 inch.

4. NPS 2-1/2 to NPS 3-1/2 (DN 65 to DN 90): Maximum span, 10 feet; minimum rod size, 1/2 inch.

5. NPS 4 (DN 100) and Larger: Maximum span, 10 feet; minimum rod size, 5/8 inch.

3.8 CONNECTIONS

A. Drawings indicate general arrangement of fuel gas piping, fittings, and specialties.

B. Install piping adjacent to appliances to allow service and maintenance.

C. Connect piping to appliances using gas with shutoff valves and unions. Install valve upstream from and within 72 inches of each appliance. Install union downstream from valve.

D. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance using gas.

E. Ground equipment according to Division 26 Section "Grounding and Bonding."

1. Do not use gas pipe as grounding electrode.

F. Connect wiring according to Division 26 Section "Building Wire and Cable."

3.9 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each service meter, pressure regulator, and specialty valve.

1. Text: In addition to name of identified unit, distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

2. Nameplates, pipe identification, and signs are specified in Division 23 Section "Mechanical Identification."

3.10 PAINTING

A. Use materials and procedures in Division 09 Sections.

B. Paint exterior service meters, pressure regulators, and specialty valves.

1. Color: Gray.

C. Paint gas piping.

1. Color: Yellow (1 primer, 2 finish coats).

3.11 FIELD QUALITY CONTROL

A. Test, inspect, and purge piping according to NFPA 54 and requirements of authorities having jurisdiction.

B. Repair leaks and defects with new materials and retest system until satisfactory results are obtained.

C. Verify capacities and pressure ratings of service meters, pressure regulators, valves, and specialties.

D. Verify correct pressure settings for pressure regulators.

E. Verify that specified piping tests are complete.

END OF SECTION 221123

SECTION 223400 – FUEL-FIRED DOMESTIC-WATER HEATER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Commercial, gas-fired domestic-water heaters.

2. Domestic-water heater accessories.

1.3 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Commercial domestic-water heaters shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

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

1.4 ACTION SUBMITTALS

A. Product Data: For each type and size of domestic-water heater indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings:

1. Wiring Diagrams: For power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For fuel-fired, domestic-water heaters, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Product Certificates: For each type of commercial, gas-fired**,** domestic-water heater, from manufacturer.

C. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.

D. Source quality-control reports.

E. Field quality-control reports.

F. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fuel-fired, domestic-water heaters to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

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

B. ASHRAE/IESNA Compliance: Fabricate and label fuel-fired, domestic-water heaters to comply with ASHRAE/IESNA 90.1.

C. ASME Compliance:

1. Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

2. Where ASME-code construction is indicated, fabricate and label commercial, finned-tube, domestic-water heaters to comply with ASME Boiler and Pressure Vessel Code: Section IV.

D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61 Annex G, "Drinking Water System Components - Health Effects."

1.8 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fuel-fired, domestic-water heaters that fail in materials or

workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Structural failures including storage tank and supports.
    b. Faulty operation of controls.
    c. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Periods: From date of Substantial Completion.

    a. Commercial, Gas-Fired, Domestic-Water Heater:

        1) Heater: Five years.
        2) Controls and Other Components: One year(s).

PART 2 - PRODUCTS

2.1 COMMERCIAL GAS-FIRED DOMESTIC-WATER HEATER

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following.

    a. A.O. Smith

    b. LAARS

    c. Lochinvar

2. Domestic Hot Water Heater:

    a. The water heater shall have performance ratings as scheduled on the plans as manufactured by A.O. Smith Corporation, Water Products Company or approved equal.

    b. The heater shall be design certified by an ANSI approved/accredited independent rating laboratory. The boiler shall bear the ASME “H” stamp and shall be National Board registered for 160 PSI working pressure.

    c. (Natural) gas water heater(s) shall be A. O. Smith Cyclone Mxi model # BTH 400 or equal, minimum 95% thermal efficiency, a storage capacity of 119 gallons, an input rating of 399,900 BTUs per hour, a recovery rating of 920 gallons per hour (gph) at 100°F rise and a maximum hydrostatic working pressure of 160 psi.

    d. Heater shall be up flow type having all non-ferrous waterways and employing a copper finned heat exchanger and a tightly wound copper coil combustion chamber.

    e. Heater shall be equipped with an electric gas valve of the step-opening type, an adjustable limit control which will break the electric circuit on temperature rise, intermittent ignition with one (1) second shutdown in the event of pilot flame failure, a gas pressure regulator properly set for the gas to be supplied, and a coil limit

switch for shut off in event of excessive water temperature, a certified draft diverter and a fully illustrated instruction manual.

f. Outer jacket shall be of baked enamel finish.

g. The coil, heat exchanger and burner shall have a ten year limited warranty as outlined in the written warranty.

h. Water heater(s) shall:

Modulating gas burner that automatically adjusts the input based on demand.

Powered anodes that are non sacrificial and maintenance free

Have seamless glass-lined steel tank construction, with glass lining applied to all water-side surfaces after the tank has been assembled and welded.

Meets the thermal efficiency and/or standby loss requirements of the U. S. Department of Energy and current

i. edition of ASHRAE/IES 90.1; 5. Have foam insulation and a CSA Certified and ASME rated T&P relief valve; 6. Have a down-fired power burner designed for

j. precise mixing of air and gas for optimum efficiency, requiring no special calibration on start-up; 7. Be approved for 0″ clearance to combustibles.

k. The control shall be an integrated solid-state temperature and ignition control device with integral diagnostics, graphic user interface, fault history display, and

l. shall have digital temperature readout. No charge connectivety shall be provided allowing for remote viewing and fault notificaion via app.

2.2 DOMESTIC-WATER HEATER ACCESSORIES

A. Comply with requirements for shutoff ball valves specified in Section 220523"Valves."

B. Gas Shutoff Valves: ANSI Z21.15/CSA 9.1-M, manually operated. Furnish for installation in piping.

C. Gas Pressure Regulators: ANSI Z21.18/CSA 6.3, appliance type.

D. Combination Temperature-and-Pressure Relief Valves: Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.

1. Gas-Fired, Domestic-Water Heaters: ANSI Z21.22/CSA 4.4-M.

E. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4-M.

2.3 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect assembled domestic-water heater specified to be ASME-

code construction, according to ASME Boiler and Pressure Vessel Code.

B. Hydrostatically test commercial domestic-water heater to minimum of one and one-half times pressure rating before shipment.

C. Domestic-water heaters will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 DOMESTIC-WATER HEATER INSTALLATION

A. Commercial, Domestic-Water Heater Mounting: Install commercial domestic-water heaters on concrete base.

B. Install domestic-water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping. Comply with requirements for shutoff ball valves specified in Section 220523 "Valves."

C. Install gas-fired, domestic-water heaters according to NFPA 54.

1. Install gas shutoff valves on gas supply piping to gas-fired, domestic-water heaters without shutoff valves.

2. Install gas pressure regulators on gas supplies to gas-fired, domestic-water heaters without gas pressure regulators if gas pressure regulators are required to reduce gas pressure at burner.

D. Install combination temperature and pressure relief valves in water piping for domestic-water heaters without storage. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

E. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for domestic-water heaters that do not have tank drains.

F. Install thermometer on outlet piping of domestic-water heaters. Comply with requirements for thermometers specified in Section 220519 "Meters and Gages for Plumbing Piping."

G. Install piping-type heat traps on inlet and outlet piping of domestic-water heater storage tanks without integral or fitting-type heat traps.

H. Fill domestic-water heaters with water.

3.2 CONNECTIONS

A. Comply with requirements for domestic-water piping specified in Section 221116 "Domestic Water Piping."

B. Drawings indicate general arrangement of piping, fittings, and specialties.

C. Where installing piping adjacent to fuel-fired, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

3.3 IDENTIFICATION

A. Identify system components. Comply with requirements for identification.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

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.

2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.

4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Domestic-water heaters will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain commercial, gas-fired, domestic-water heaters.

END OF SECTION 223400

SECTION 260500 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Electrical equipment coordination and installation.
2. Sleeves for raceways and cables.
3. Sleeve seals.
4. Grout.
5. Common electrical installation requirements.

1.3 SUBMITTALS

A. N/A.

1.4 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.

D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

E. Coordinate with asbestos abatement plans and specifications and with abatement contractor for all work that potentially will disturb asbestos.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 SLEEVES FOR RACEWAYS AND CABLES

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

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

C. Sleeves for Rectangular Openings: Galvanized sheet steel.

1. Minimum Metal Thickness:
   a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
   b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

2.3 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.
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   a. Advance Products & Systems, Inc.
   b. Calpico, Inc.
   c. Metraflex Co.
   d. Pipeline Seal and Insulator, Inc.
   e. Or Approved Equal.
3. 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.
4. Pressure Plates: Plastic. Include two for each sealing element.
5. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.4 GROUT

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

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA, NFPA, and OSHA requirements.

B. All work shall be installed in a neat, workmanlike manner in accordance with ANSI/NECA 1 – 2015.

C. All materials and equipment provided under this contract shall be new (except where otherwise noted) and shall be listed, labeled or certified by a Nationally Recognized Testing Laboratory (NRTL) to meet Underwriters Laboratories, Inc. (UL), standards where test standards have been established. Materials and equipment which are not covered by UL standards will be accepted, providing that materials and equipment are listed, labeled, certified or otherwise determined to meet the safety requirements of a NRTL.

1. A Nationally Recognized Testing Laboratory is a testing laboratory which is recognized and approved by the Secretary of Labor in accordance with OSHA regulations.

D. All materials, products, and equipment being installed which fall into a category covered by the ENERGY STAR program and shall be provide and labeled as such.

E. All equipment of the same type and capacity shall be by the same manufacturer.

F. Where any device or part of equipment is referred to in these specifications in the singular number (e.g., "the switch"), this reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.

G. During construction the contractor shall at all times maintain electrical utilities of the building without interruption. Should it be necessary to interrupt any electrical service or utility, the contractor shall secure permission in writing from the owner’s authorized representative for such Interruption at least ten (10) business days in advance. Any interruption shall be made with minimum amount of inconvenience to the facility and any shut-down time shall have to be on a premium time basis and such time to be included in the contractor's bid. Contractor shall arrange to provide and pay for temporary power source as required by project conditions. Thee costs shall be included in the base bid.

H. Working clearance around equipment shall not be less than that specified in the N.E.C. for all voltages specified.

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

J. 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.

K. 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.

L. The locations of switches, receptacles, lights, motors, etc. outlets shown are approximate. The contractor shall use good judgment in placing the preceding items to eliminate all interference with ducts, piping, etc. The contractor shall check all door swings so that light switches are not located behind doors. Relocate switches as required, with approval from the Design Professional. The Architect/Engineer may direct relocation of outlets before installation, up to five (5) feet from the position indicated on the Drawings, without additional cost.

M. Install equipment 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. Normal maintenance shall not require the removal of protective guards from adjacent equipment. Install equipment as close as practical to the locations shown on the Drawings.

1. Where the University's Chief Electrician determines that the Contractor has installed equipment not conveniently accessible for operations and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the Owner.

2. "Conveniently Accessible" is defined as being capable of being reached without climbing or crawling over or under obstacles such as motors, pumps, belt guards, transformers, racks, piping, ductwork, raceways or similar.

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

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

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

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

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

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

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

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

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

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

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

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

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

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

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

3.3 SLEEVE-SEAL INSTALLATION

A. Install to seal exterior wall penetrations.

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

3.4 FIRESTOPPING

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

END OF SECTION 260500

SECTION 260519 – LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

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

B. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.

C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for, Type THHN-2-THWN-2, and Type XHHW-2.

D. Multiconductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for metal-clad cable, Type MC with ground wire.

E. VFC Cable:

2.2 CONNECTORS AND SPLICES

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

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

2.3 SYSTEM DESCRIPTION

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

B. Comply with NFPA 70.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger, except VFC cable which shall be extra flexible stranded.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Exposed Feeders: Type XHHW-2, single conductors in raceway.

B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Metal-clad cable, Type MC.

C. Exposed Branch Circuits, Including in Crawlspaces: Type THHN-2-THWN-2, single conductors in raceway.

D. Brach Circuits Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Metal-clad cable, Type MC.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

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

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

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

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

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

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

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.7 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

END OF SECTION 260519

SECTION 260526 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes grounding and bonding systems and equipment.

1.3 ACTION SUBMITTALS

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

1.4 QUALITY ASSURANCE

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

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 SYSTEM DESCRIPTION

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

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

2.3 CONDUCTORS

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

2.4 CONNECTORS

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

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.

C. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.5 GROUNDING ELECTRODES

A. Chemical-Enhanced Grounding Electrodes: Copper tube, straight or L-shaped, charged with nonhazardous electrolytic chemical salts.

1. Termination: Factory-attached No. 4/0 AWG bare conductor at least 48 inches (1200 mm) long.
2. Backfill Material: Electrode manufacturers recommended material.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. 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 Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

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

3.3 EQUIPMENT GROUNDING

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

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

C. Metallic Fences: Comply with requirements of IEEE C2.

1. Grounding Conductor: Bare copper, not less than No. 8 AWG.
2. Gates: Shall be bonded to the grounding conductor with a flexible bonding jumper.
3. Barbed Wire: Strands shall be bonded to the grounding conductor.

3.4 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.

END OF SECTION 260526

SECTION 260529 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IMC: Intermediate metal conduit.

C. RMC: Rigid metal conduit.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Steel slotted support systems.

1.5 QUALITY ASSURANCE

A. Comply with NFPA 70.

1.6 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified together with concrete Specifications.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

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

1. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
2. Channel Dimensions: Selected for applicable load criteria.

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

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

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

1. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
2. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
3. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.1 APPLICATION

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

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by 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 (6 mm) 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 using spring friction action for retention in support channel].

D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

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

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

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

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

3.3 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 (0.05 mm).

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

END OF SECTION 260529

SECTION 260533 – RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Surface raceways.
4. Boxes, enclosures, and cabinets.

1.3 DEFINITIONS

A. ARC: Aluminum rigid conduit.

B. GRC: Galvanized rigid steel conduit.

C. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. IMC: Comply with ANSI C80.6 and UL 1242.

C. EMT: Comply with ANSI C80.3 and UL 797.

D. FMC: Comply with UL 1; zinc-coated steel.

E. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

F. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
2. Fittings for EMT:

    a. Material: Steel.
    b. Type: Setscrew or compression.

3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.

G. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

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

2.3 SURFACE RACEWAYS

A. Listing and Labeling: Surface raceways and tele-power poles shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.4 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

C. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

D. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250,Type 3R with continuous-hinge cover with flush latch unless otherwise indicated.

1. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: RNC, Type EPC-40-PVC, unless noted otherwise.
2. Underground Conduit: RNC, Type EPC-40-PVC, direct buried, unless noted otherwise.
3. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R, unless noted otherwise.

B. Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
5. Damp or Wet Locations: IMC.
6. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.

C. Minimum Raceway Size: 3/4-inch (21-mm) trade size.

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

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use setscrew or compression, fittings. Comply with NEMA FB 2.10.
4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

F. Install surface raceways only where indicated on Drawings.

G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F (49 deg C).

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

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

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.

G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

H. Support conduit within 12 inches (300 mm) of enclosures to which attached.

I. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot (3-m) intervals.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum of 2 inches (50 mm) of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
5. Change from ENT to, GRC, before rising above floor.

J. Stub-ups to Above Recessed Ceilings:

1. Use EMT, IMC, or RMC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

K. 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.

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

M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

N. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

O. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

P. Cut conduit perpendicular to the length. For conduits 2-inch (53-mm) trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

Q. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

R. Surface Raceways:

1. Install surface raceway with a minimum 2-inch (50-mm) radius control at bend points.
2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches (1200 mm) and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

S. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

T. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

U. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

V. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F (17 deg C) and that has straight-run length that exceeds 25 feet (7.6 m). Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F (55 deg C) and that has straight-run length that exceeds 100 feet (30 m).
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

    a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.
    b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.
    c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F (70 deg C) temperature change.
    d. Attics: 135 deg F (75 deg C) temperature change.
    e. .

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C)

of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F (0.0115 mm per meter of length of straight run per deg C) of temperature change for metal conduits.

4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

W. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches (1830 mm) of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

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

X. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

Y. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

Z. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

AA. Locate boxes so that cover or plate will not span different building finishes.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 312000 "Earth Moving" for pipe less than 6 inches (150 mm) in nominal diameter.
2. Install backfill as specified in Section 312000 "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 312000 "Earth Moving."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.

a. Couple steel conduits to ducts with adapters designed for this purpose and encase coupling with 3 inches (75 mm) of concrete for a minimum of 12 inches (300 mm) on each side of the coupling.
b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.

6. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.5 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.6 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

SECTION 260544 – SLEEVES AND SLEEVE SEALS FOR ELECTRICAL

RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.

B. Related Requirements:

1. Section 078413 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. LEED Submittals:

1. Product Data for Credit EQ 4.1: For sealants, documentation including printed statement of VOC content.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. Sleeves for Rectangular Openings:

1. Material: Galvanized sheet steel.
2. Minimum Metal Thickness:

a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and with no side larger than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
b. For sleeve cross-section rectangle perimeter 50 inches (1270 mm) or more and one or more sides larger than 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.2 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Comply with NECA 1.

B. Comply with NEMA VE 2 for cable tray and cable penetrations.

C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:

a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.
b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.

2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
3. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.

4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.

D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:

1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

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

F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.

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

3.3 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 260544

SECTION 260553 – IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

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

1.3 ACTION SUBMITTALS

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

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

C. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.4 QUALITY ASSURANCE

A. Comply with ANSI A13.1

B. Comply with NFPA 70.

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

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

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

1.5 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

2.1 POWER RACEWAY IDENTIFICATION MATERIALS

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

B. Colors for Raceways Carrying Circuits at 600 V or Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage and system or service type.

C. Colors for Raceways Carrying Circuits at More Than 600 V:

1. Black letters on an orange field.
2. Legend: "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch-(75-mm-)high letters on 20-inch (500-mm) centers.

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

E. Tape and Stencil for Raceways Carrying Circuits More Than 600 V: 4-inch-(100-mm-)wide black stripes on 10-inch (250-mm) centers diagonally over orange background that extends full length of raceway or duct and is 12 inches (300 mm) wide. Stop stripes at legends.

2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

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

B. Colors for Raceways Carrying Circuits at 600 V and Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage and system or service type.

C. Colors for Raceways Carrying Circuits at More Than 600 V:

1. Black letters on an orange field.
2. Legend: "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch-(75-mm-)high letters on 20-inch (500-mm) centers.

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

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

2.3 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

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

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

2.4 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.

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

2.5 FLOOR MARKING TAPE

A. 2-inch-(50-mm-)wide, 5-mil (0.125-mm) pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.6 UNDERGROUND-LINE WARNING TAPE

A. Tape:

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

B. Color and Printing:

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

C. Tag: Type I:

1. Pigmented polyolefin, bright-colored, [continuous-printed on one side with the inscription of the utility,] compounded for direct-burial service.
2. Thickness: 4 mils (0.1 mm).
3. Weight: 18.5 lb/1000 sq. ft. (9.0 kg/100 sq. m).
4. 3-Inch (75-mm) Tensile According to ASTM D 882: 30 lbf (133.4 N), and 2500 psi (17.2 MPa).

2.7 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

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

C. 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 (915 MM)."

2.8 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. inches (129 sq. cm) and 1/8 inch (3.2 mm) 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.

2.9 EQUIPMENT IDENTIFICATION LABELS

A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

2.10 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).
4. Color: Black except where used for color-coding.

B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, 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).
4. Color: Black.

C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, self-locking.

1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 7000 psi (48.2 MPa).
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).
5. Color: Black.

2.11 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in 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

3.1 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. 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.

G. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches (400 mm) overall.

H. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

A. Concealed Raceways, Duct Banks, More Than 600 V, within Buildings: Tape and stencil 4-inch-(100-mm-)wide black stripes on 10-inch (250-mm) centers over orange background that extends full length of raceway or duct and is 12 inches (300 mm) wide. Stencil legend "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch-(75-mm-)high black letters on 20-inch (500-mm) centers. Stop stripes at legends. Apply to the following finished surfaces:

1. Floor surface directly above conduits running beneath and within 12 inches (300 mm) 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 30 A, and 120 V to ground: Identify with self-adhesive vinyl label. Install labels at 10-foot (3-m) 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:

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

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

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded, feeder, and branch-circuit conductors.

a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
b. Colors for 208/120-V Circuits:

1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.

c. Colors for 480/277-V Circuits:

1) Phase A: Brown.
2) Phase B: Orange.
3) Phase C: Yellow.

d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

E. Power-Circuit Conductor Identification, More than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, usenonmetallic plastic tag holder with adhesive-backed phase tags, and a separate tag with the circuit designation.

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

G. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.

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

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

I. 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.

J. 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.

K. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.

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

    a. Power transfer switches.
    b. Controls with external control power connections.

L. 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.

M. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch-(10-mm-)high letters for emergency instructions at equipment used for power transfer.

N. 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-(13-mm-)high letters on 1-1/2-inch-(38-mm-)high label; where two lines of text are required, use labels 2 inches (50 mm) high.
b. Outdoor Equipment: Engraved, laminated acrylic or melamine label stenciled legend 4 inches (100 mm) high.
c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment to Be Labeled:

a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be self-adhesive, engraved, laminated acrylic or melamine label.
b. Enclosures and electrical cabinets.
c. Access doors and panels for concealed electrical items.
d. Switchgear.
e. Switchboards.
f. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
g. Substations.
h. Emergency system boxes and enclosures.
i. Motor-control centers.
j. Enclosed switches.
k. Enclosed circuit breakers.
l. Enclosed controllers.
m. Variable-speed controllers.
n. Push-button stations.
o. Power transfer equipment.
p. Contactors.
q. Remote-controlled switches, dimmer modules, and control devices.
r. Battery-inverter units.
s. Battery racks.
t. Power-generating units.
u. Monitoring and control equipment.
v. UPS equipment.

END OF SECTION 260553

SECTION 262812 – SAFETY SWITCHES

PART 1 - GENERAL

1.01 SUBMITTALS

A. Product Data: Catalog sheets, specifications and installation instructions.

PART 2 - PRODUCTS

2.01 SAFETY SWITCHES (SINGLE THROW)

A. NEMA 1, 3R, 4 (Stainless Steel), 12: Eaton/ Cutler-Hammer Inc.'s Heavy Duty Series, General Electric Co.'s Heavy Duty Series, Siemens Inc,'s Heavy Duty Series, Square D Co.'s Heavy Duty Series, or approved equal; having:

1. Fuses, or unfused as indicated on drawings.
2. Fused switches equipped with fuseholders to accept only the fuses specified in Section 262813 (UL Class RK-1, RK-5, L).
3. NEMA 1 enclosure unless otherwise indicated on drawing.
4. 240V rating for 120V, 208V, or 240V, circuits.
5. 600V rating for 277V, or 480V circuits.
6. Solid neutral bus when neutral conductor is included with circuit.
7. Ground bus when equipment grounding conductor is included with circuit.
8. Current rating and number of poles as indicated on drawings.

B. NEMA 4X: Crouse-Hinds Co.'s NST, Square D Co.'s Heavy Duty Special Application Safety Switches, or approved equal; having:

1. Fuses, or unfused as indicated on drawings.
2. Fused switches equipped with fuseholders to accept only the fuses specified in Section 262813 (UL Class RK-1, RK-5, L).
3. Molded fiberglass-reinforced polyester NEMA 4X enclosure.
4. 240V rating for 120V, 208V, or 240V, circuits.
5. 600V rating for 277V, or 480V circuits.
6. Solid neutral bus when neutral conductor is included with circuit.
7. Ground bus when equipment grounding conductor is included with circuit.
8. Current rating and number of poles as indicated on drawings.

2.02 NAMEPLATES

A. General: Precision engrave letters and numbers with uniform margins, character size minimum 3/16 inch high.

1. Phenolic: Two color laminated engravers stock, 1/16 inch minimum thickness, machine engraved to expose inner core color (white).
2. Aluminum: Standard aluminum alloy plate stock, minimum .032 inches thick, engraved areas enamel filled or background enameled with natural aluminum engraved characters.
3. Materials for Outdoor Applications: As recommended by nameplate manufacturer to suit environmental conditions.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install switches so that the maximum height above the floor to the center of the operating handle does not exceed 6'-6".

B. Identify each safety switch, indicating purpose or load served:

1. NEMA 1 Enclosures: Rivet or bolt nameplate to the cover.
2. NEMA 12 Enclosures: Rivet or bolt and gasket nameplate to the cover.
3. NEMA 3R, 4, 4X Enclosures: Attach nameplate to the cover using adhesive specifically designed for the purpose, or mount nameplate on wall or other conspicuous location adjacent to switch. Do not penetrate enclosure with fasteners.

C. Paint switches used for the fire protective signaling system with red paint and identify - "FIRE ALARM CIRCUIT CONTROL".

D. Paint switches used for oil burner emergency switch with red paint and identify "OIL BURNER".

END OF SECTION 262812

SECTION 262813 – FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

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

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material, dimensions, descriptions of individual components, and finishes for spare-fuse cabinets. Include the following for each fuse type indicated:

1. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.

    a. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.
    b. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.

2. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
3. Current-limitation curves for fuses with current-limiting characteristics.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017820 "Operation and Maintenance Data," include the following:

1. Ambient temperature adjustment information.
2. Current-limitation curves for fuses with current-limiting characteristics.

1.5 MATERIALS MAINTENANCE SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.

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

C. Comply with NEMA FU 1 for cartridge fuses.

D. Comply with NFPA 70.

E. Comply with UL 248-11 for plug fuses.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Bussman

2. LittleFuse

2.2 CARTRIDGE FUSES

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

2.3 PLUG FUSES

A. Characteristics: UL 248-11, nonrenewable plug fuses; 125-V ac.

2.4 SPARE-FUSE CABINET

A. Characteristics: Wall-mounted steel unit with full-length, recessed piano-hinged door and key-coded cam lock and pull.

1. Size: Adequate for storage of spare fuses specified.
2. Finish: Gray, baked enamel.
3. Identification: "SPARE FUSES" in 1-1/2-inch-(38-mm-)high letters on exterior of door.
4. Fuse Pullers: For each size of fuse, where applicable and available, from fuse manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.

B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.

C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

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

B. Install spare-fuse cabinet(s).

3.3 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION 262813

SECTION 262816 – ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Nonfusible switches.
3. Shunt trip switches.
4. Molded-case circuit breakers (MCCBs).
5. Enclosures.

1.3 DEFINITIONS

A. NC: Normally closed.

B. NO: Normally open.

1.4 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, accessories, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Include evidence of NRTL listing for series rating of installed devices.
5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
6. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Submit on translucent log-log graph paper.

B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: For power, signal, and control wiring.

C. Qualification Data: For qualified testing agency.

D. Field quality-control reports.

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

E. Manufacturer's field service report.

F. 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 Section "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
2. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Submit on translucent log-log graph paper.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.

B. 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.

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

D. Comply with NFPA 70.

1.6 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.

1.7 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Submit drawings showing the location of electrical equipment supplied as part of this specification section that requires work space clearance in accordance with NFPA 70 Article 110 Part II. Work space clearance, including height, shall be indicated on the drawing, indicating where other trades are restricted from locating equipment, ductwork or piping. Locations for equipment furnished under this section may be shown on consolidated drawings submitted under Division 26 Section “BASIC ELECTRICAL REQUIREMENTS.” These drawings

shall be coordinated with the other trades through the General Contractor. Any changes to these drawings during the course of the construction shall be coordinated with all trades through the General Contractor prior to installing the equipment. Changes required by other trades as a result of lack of coordination through the General Contractor shall be borne by the Electrical Contractor.

1.8 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
2. Fuse Pullers: Two for each size and type.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following: Specific fuse types noted on the drawings shall override general requirements of Division 26 section “FUSES.”

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.
5. Or Approved Equal.

B. Type HD, Heavy Duty, Single Throw, 240 and 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
3. Lugs: Mechanical type, suitable for number, size, and conductor material.
4. Service-Rated Switches: Labeled for use as service equipment.

2.2 NONFUSIBLE SWITCHES

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.

4. Square D; a brand of Schneider Electric.
5. Or Approved Equal.

B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.3 SHUNT TRIP SWITCHES

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

1. Cooper Bussmann, Inc.
2. Ferraz Shawmut, Inc.
3. Littelfuse, Inc.
4. Or Approved Equal.

B. General Requirements: Comply with ASME A17.1, UL 50, and UL 98, with 200-kA interrupting and short-circuit current rating when fitted with Class J fuses.

C. Switches: Three-pole, horsepower rated, with integral shunt trip mechanism and Class J fuse block; lockable handle with capability to accept three padlocks; interlocked with cover in closed position.

D. Control Circuit: 120-V ac; obtained from integral control power transformer, with primary and secondary fuses, with a control power transformer of enough capacity to operate shunt trip, connected pilot, and indicating and control devices.

E. Accessories:

1. Oiltight key switch for key-to-test function.
2. Oiltight green ON pilot light.
3. Mechanically interlocked auxiliary contacts that change state when switch is opened and closed.
4. Form C alarm contacts that change state when switch is tripped.
5. Three-pole, double-throw, fire-safety and alarm relay; 24-V dc coil voltage.
6. Three-pole, double-throw, fire-alarm voltage monitoring relay complying with NFPA 72.

2.4 MOLDED-CASE CIRCUIT BREAKERS

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

5. Or Approved Equal.

B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

D. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

E. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:

1. Instantaneous trip.
2. Long- and short-time pickup levels.
3. Long- and short-time time adjustments.
4. Ground-fault pickup level, time delay, and I^2t response.

F. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.

G. Ground-Fault, Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).

H. Ground-Fault, Equipment-Protection (GFEP) Circuit Breakers: With Class B ground-fault protection (30-mA trip).

I. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
4. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered or remote-mounted and powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
5. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
6. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
7. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.

2.5 MOLDED-CASE SWITCHES

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.

4. Square D; a brand of Schneider Electric.
5. Or Approved Equal.

B. General Requirements: MCCB with fixed, high-set instantaneous trip only, and short-circuit withstand rating equal to equivalent breaker frame size interrupting rating.

C. Features and Accessories:

1. Standard frame sizes and number of poles.
2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
3. Ground-Fault Protection: Comply with UL 1053; remote-mounted and powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
4. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
5. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
6. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic switch contacts, "b" contacts operate in reverse of switch contacts.

2.6 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
2. Outdoor Locations: NEMA 250, Type 3R.
3. Kitchen and Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Comply with mounting and anchoring requirements specified in Division 26 Section.

C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

D. Install fuses in fusible devices.

E. Comply with NECA 1.

3.3 IDENTIFICATION

A. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

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.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Perform the following infrared scan tests and inspections and prepare reports:

a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch and circuit breaker. Remove front panels so joints and connections are accessible to portable scanner.

4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as specified in Division 26 Section.

END OF SECTION 262816

SECTION 266000 – ELECTRICAL – GENERAL

CONTENTS

16.1.1 Scope of Work: The scope of work under this section covers the electrical requirements for the mechanical system upgrades and ambient lighting.

1. Electrical subcontractor shall provide electric service to the new equipment as shown on the drawings.

2 All cutting and patching for electrical shall be performed by the Electrical Subcontractor.

3. Electrical subcontractor shall furnish and install a new power supply for new HVAC equipment, as shown on the drawings.

4. Electrical subcontractor shall remove obsolete and abandoned circuits, conduits, and fittings, as applicable.

5. Connect power to new HVAC equipment and all other equipment. Provide all required control wiring, relays, sensors, wiring of new HVAC system, and controls.

6. Provide submittals, shop drawings, and manufacturer's cuts as required.

7. All work to be performed in accordance with latest NEC and provisions & regulations by local authorities having jurisdiction.

8. All new exposed wiring in unfinished spaces such as storage room, mechanical room, etc. shall be in EMT conduits. All new exposed wiring in finished space such as offices, conference rooms, meeting rooms, etc. shall be in wiremold. All new wiring above suspended ceiling shall be EMT raceways. Brach circuits above suspended ceiling shall be type MC cable.

9. Provide all necessary power supplies for all new equipment, including starters, disconnects, and other required electrical devices, except where specified as furnished or factory-installed by the manufacturer.

10. Provide power supplies to all DDC controllers and controls. Coordinate location with the Mechanical Contractor.

16.1.2 General:

1. The entire installation shall be performed in a workman-like manner, left completely connected, and ready to give proper and continuous service.

2. All materials and work in connection with the foregoing items shall be as specified herein or as called for on the contract drawings.

3. In furnishing a proposal, the Contractor confirms agreement to all items and conditions referred to herein and/or indicated on accompanying drawings; no consideration shall be granted for alleged misunderstanding.

16.1.3 Plans and Drawings:

1. The Engineer's drawings, which constitute an integral part of this contract, shall serve as contract drawings. They indicate the general layout of the new & renovated electrical work.

2. Field verification or correction of scale dimensions on plans is directed, since actual locations, distances, and levels are to be governed by local field conditions.

3. Discrepancies shown on different plans or between plans and actual field conditions shall be brought to the attention of the Engineer promptly for resolution.

16.1.4 Standards: All work, equipment, and materials furnished shall conform with the existing rules, requirements, and specifications of the Insurance Rating Organization having jurisdiction, the National Electric Code (NEC), the National Electric Manufacturer's Association (NEMA), the Institute of Electrical and Electronic Engineers (IEEE), the Insulated Power Cable Engineers Association (IPCEA), the American Society of Testing Materials (ASTM), the American National Standards Institute (ANSI), the requirements of the Occupational Safety Hazards Act (OSHA), and all other applicable Federal, State, and local laws and/or ordinances.

All material and equipment shall bear the inspection labels of Underwriters' Laboratories, if the material and equipment is of the class inspected by said laboratories.

Any paragraph of requirements in these specifications, or drawings, deviating from the rules, requirements, and specifications of the above organizations shall be invalid, and their requirements shall hold precedent thereto. The rules, requirements, and specifications as set forth above and any additional work or material necessary for adherence will not be allowed as an extra but shall be included in the bid price. Ignorance of any rule, requirement, or specification shall not be allowed as an excuse for non-conformity. Acceptance by the Engineer does not relieve the Contractor from any expense involved for the correction of any errors which may exist in the drawings submitted or in the satisfactory operation of any equipment.

Acceptance by the Engineer does not relieve the Contractor from the expense involved for the correction of any errors which may exist in the drawings submitted or in the satisfactory operation of any equipment.

16.1.5 Applicable Publications: The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto.

Federal Specifications:

J-C-30A& Am-1	Cable and Wire, Electrical (Power, Fixed Installation)
W-B-811b&Am-2	Busway System, Power, Electrical, 600 Volts
W-F-406B&Int. Am-1 (GSA-FSS)	Fittings for Cable, Power, Electrical and Conduit, Metal, Flexible
L-T-0075 (ARMY-MO)	Tape, Pipe-Coating; Pressure-Sensitive and Laminated
L-T-001512 (GSA-FSS)	Tape, Pressure Sensitive Adhesive, Pipe Wrapping
W-C-375a & Int. Am-4 (GSA-FSS)	Circuit Breaker, Molded Case; Branch Circuit & Service
W-C-538b	Conduit Boxes and Outlet Fittings, Floor, (for Rigid Metal Conduit)
W-C-596D/GEN	Connector, Plug, Receptacle and Cable Outlet, Electrical Power
W-C-1094	Conduit and Fittings; Non-Metallic, Rigid (Plastic)
W-F-406b & Int. Am-1	Fittings for Cable, Power, Electrical and Conduit, Metal Flexible
W-F-408C & Am-1	Fittings for Conduit, Metal, Rigid (Thick Wall and Thin Wall (EMT) Type)
W-J-800c	Junction Box, Extension, Junction and Am-3 Box; Cover, Junction Box (Steel, Cadmium, or Zinc Coated)
W-P-115a & Am-2	Panel, Power Distribution
W-P-455a & Am-4	Plate, Wall Electrical
W-S-610c	Splice Conductor.
W-S-893c & Int. Am-1 (GSA-FSS)	Switch, Toggle, and Mounting Strap, (Interchangeable)
W-S-986E	Switches, Toggle (Toggle & Lock) Flush Mounted (General Specification)
HH-1-510D	Insulation Tape, Electrical Friction
HH-1-553B	Insulation Tape, Electrical, (Rubber, Natural & Synthetic)
HH-1-595B	Insulation Tape, Electrical, and Am-1 Pressure Sensitive Adhesive, Plastic, General Purpose
WW-C-00540c	Conduit, Metal, Rigid: and (GSA-FSS) Coupling, Elbow, and Nipple, and Int. Am-1 Electrical Conduit: Aluminum (GSA-FSS)

WW-C-568A	Conduit, Metal, Rigid: Electrical Thin Wall Type (Electrical Metallic Tubing); Straight Lengths, Elbows and Bends.
WW-C-566b	Conduit, Metal Flexible
WW-C-581d & Am-3	Conduit, Metal, Rigid: and Coupling, Elbow and Nipple, Electrical Conduit: Zinc Coated

16.1.6 National Fire Protection Association (NEMA) Publication:

Latest Edition

16.1.7 National Fire Protection Association (NFPA) Publication:

No. 70 National Electrical Code - Latest Edition

16.1.8 Underwriters' Laboratories, Inc. (UL) Standards:

All equipment to be UL approved.

16.1.9 Materials and Equipment: Materials and equipment shall conform to the respective publications and other requirements specified below. Other materials and equipment shall be as specified elsewhere herein and shall be the products of manufacturers regularly engaged in the manufacturing of such products.

Cable, Flexible: Federal Specification J-C-30.

Metallic Armored Cable: Type ACHH or ACT.

Non-Metallic Sheathed Cable: Type NM or NMC, with ground conductor.

Circuit Breakers:

Low Voltage Power Circuit Breakers: NEMA Standard SG 3.

Molded Case Circuit Breakers: Federal Specification W-C-375.

Conductors, Insulated: Federal Specification J-C-30, types as specified.

Conduit:

Zinc-coated Rigid Steel Conduit: Federal Specification WW-C-581.

Rigid Aluminum: Federal Specification WW-C-540

Connectors, Wire Pressure: Federal Specification W-S-610.

Device Plates: Federal Specification W-P-455.

Fittings, Cable and Conduit: Federal Specifications W-F-406 & W-F-408

Outlets:

Conduit, Cast Metal or Malleable Metal: Federal Specification W-C-586

Outlet Boxes:

Sheet-Steel Outlet Boxes: Federal Specification W-J-800

Panelboards: Dead-front construction, Federal Specification W-P-115

Lighting & Appliance Branch Circuit: Feeder and Distribution Panelboards, Class 1, Type as Specified Hereinafter

Load-Center Panelboards: Type 1, Class 2

Receptacles: Federal Specification W-C-596

Service Equipment: (Federal Specification W-S-865, Type NDD or NDS as indicated), (Federal Specification W-C-375), and Underwriters' Laboratories, Inc., Standard UL 869

Switches:

Enclosed Safety Switches: Federal Specifications W-S-865, Type NDS or NDD as indicated.

Toggle Switches, Multiple Type: Federal Specification W-S-893

Toggle Switches, Multiple Type: Federal Specification W-S-896

Tape:

Friction Tape: Federal Specification HH-1-510.

Plastic Tape: Federal Specification HH-1-595.

Rubber Tape: Federal Specification HH-1-553.

16.1.10 Approval of Materials and Equipment: Approval of materials and equipment shall be based on the manufacturer's published data. The label or listing of the Underwriters' Laboratories, Inc. will be accepted as evidence that the materials or equipment conform to the applicable standards of that agency. In lieu of this listing, the Contractor shall submit a statement from a nationally recognized, adequately equipped testing agency indicating that the items have been tested in accordance with required procedures and that the materials and equipment comply with all contract requirements. A manufacturer's statement indicating complete compliance with the applicable Federal Specification, Military Specification, or standard of the American Society for Testing and Materials (ASTM), National Electrical Manufacturers, or other commercial standard is acceptable.

16.1.11 Shop Drawings: The Contractor shall submit complete manufacturer's data of all equipment, appurtenances and accessories, including the following:

Distribution equipment
Panels
Wiring

Conduit
Disconnect switches and starters
Circuit breakers
Devices
Surface Metal Raceway
Electrical Systems

The Contractor shall submit all manufacturer's data at least one (1) month prior to the installation of the equipment. Equipment installation shall not be permitted until the manufacturer's data has been reviewed by the Engineer.

16.1.12 Working Drawings: The contract drawings are not intended to serve as working or installation drawings. These drawings are for engineering and general arrangement purposes only. The Contractor shall prepare his own working drawings based on the contract drawings.

With submittals, the Contractor shall notify the Engineer of all departures from the contract drawings and specifications; otherwise, acceptance of such submittals will not constitute acceptance of the subject matter thereof only and not of any other structure, material or apparatus shown or indicated.

Materials or equipment shall not be ordered nor shall any work be performed by the Contractor before the materials, equipment, and the working drawings as herein required have been reviewed by the Engineer and the Contractor advised to furnish as submitted or furnish as otherwise noted.

Upon completion of the work and as a condition precedent to obtaining final acceptance of the work, the Contractor shall furnish to the Engineer four (4) complete sets of instructions, technical bulletins, and any other printed matter, such as diagrams, prints, or drawings, containing full information required for the proper operation, maintenance, and repair of the equipment installed and for ordering spare parts.

All conduit 2" or greater in diameter shall be shown in scaled layout, both plan and elevations, to ascertain head clearances and to assure the avoidance of openings and other project components; i.e., doors, access openings, equipment, piping, instrumentation devices, vaults, etc.

16.1.13 Workmanship: All materials and equipment shall be installed in accordance with recommendations of the manufacturer as approved by the Engineer to conform with contract documents. The installation shall be accomplished by workmen skilled in this type of work.

16.1.14 Supporting Devices:

1. Steel Supports:

   a. The contractor shall furnish and install structural steel supports for mounting and installing all electrical, lighting, and equipment furnished under this contract.

   b. Where the weight of equipment exceeds 50 pounds and is supported from walls, ceilings, columns and/or beams, such supporting steel sizes, methods and locations shall be submitted to the engineer for review.

2· Support Fastening and Locations:

a. All equipment fastenings to columns, steel beams, and trusses shall be by beam clamps or welded. No holes shall be drilled in the steel. Where supports or hangers are required for heavy electrical equipment, and where required, additional sections shall be provided for a safe installation.

b. All holes in hung ceilings for support rods, conduits and other equipment shall be made adjacent to bars where possible, to facilitate removal of ceiling panels.

16.1.15 Motor Controls:

1. General:

a. UL listing is required for all factory fabricated assemblies. Individual components' listing is also required.

b. Compliance with UL-508, NEMA-IC-1, and applicable portions of J.I.C. Standards for Industrial Control is required.

c. All equipment furnished shall be of one approved manufacturer, where possible. Acceptable manufacturers are Allen-Bradley, Square D or equal.

2. Construction:

1. All parts subject to wear, arcing damage, or electrical failure shall be easily removable.

2. Overload Protection: Provide melting alloy type for all motors including those with internal protection, of proper size to match the controller. Provide one sensing device per ungrounded motor lead. Exception: windings used only during motor starting and automatically disconnected with the motor is running may be unprotected. Units shall be of "standard", "slow", or "fast" response as required for the type motor and load per the suppliers, recommendations. Size heaters per manufacturer's table supplied with the starter for the actual motor full load current and enclosure indicated on the motor nameplates.

3. Provide auxiliary contacts of type (NO or NC) and rating as required by interlocking and/or automatic control system indicated in Section 23 and/or drawings.

3. Manual Starters:

a. Fractional HP Type: Single phase, toggle operated unless scheduled key operated, full voltage, non-reversing, unless scheduled reversing or 2-speed, with thermal overload device and neon pilot light. Provide H-0-A or Fast-OFF-Slow or FWD-OFF-REV selector switch where scheduled or required by application. Allen-Bradley Bulletin #600, or equal.

b. Integral HP type: polyphase, pushbutton operated with handle guard and lockoff, full voltage non-reversing unless scheduled reversing or 2-speed, with thermal overload device, neon pilot light(s) and auxiliary contacts (where scheduled or required). Allen-Bradley Bulletin #609, or equal.

4. Magnetic Starters:

1. General: Factory fabricated assembly of components listed within a single enclosure. Control circuit transformer with 120V AC secondary winding and fuse and auxiliary devices as shown on elementary diagrams, scheduled and/or as required for function indicated in Electrical Equipment and Control Schedule. Size per NEMA and UL Standards to match motor controlled.

2. Non-Reversing Full Voltage Starting (FVNR): Allen-Bradley Bulletin #706 or equal.

3. Multi-Speed Full Voltage Starting (FVMS): Furnish with overload relay, auxiliary relay, and pilot light for each speed. Allen -Bradley Bulletin #716 or equal.

4. Overload Relay: Polyphase type of proper size to match contactor.

5. Combination Magnetic Starter: Factory assembled of UL listed components within a single enclosure. Handle mechanism permanently connected to switch and installed on body of enclosure with interlock to prevent unauthorized opening on closing of door with switch on, provision for padlocking in off position, clear indication of switch position, and auxiliary switch where indicated on drawings.

   Branch circuit protection: Manually operated quick-make, quick-break over-center, trip free, motor circuit protector with current limiter providing trip indication and single phase protection where required by available fault current. Adjustable trip range at least 3 to 1 with provision for limiting maximum setting per N.E. Code linear calibrated scale, and single adjuster for all poles.

16.1.16 Restoration of Surfaces:

1. Work Included: This Section covers the restoration of existing surfaces and related items that are damaged or disturbed as a result of the Contractor's operations.

2. Contractor's Responsibility:

   a. General:

      1. Except as otherwise specified or shown, grades, and surfaces shall be restored so as to be equal to or better than the original condition which existed at the time they were damaged or disturbed. The Contractor's obligation will not be considered as fulfilled until all restoration work has been approved by the Engineer and by public authorities having jurisdiction.

   b. Conflicting Requirement: If any part of this specification is in conflict with the requirements of a public authority or public utility having jurisdiction over the work described, then the public authority's requirement shall govern.

      However, where this specification exceeds the public authority requirement and is acceptable to the public authority or public utility, then this specification shall govern.

16.1.17 Permits, Fees, and Certification: The cost of procuring all permits, inspection services, fees for temporary and permanent electric services shall be included in the price bid under this specification.

Upon completion of the work, the Contractor shall obtain certificates of inspection and approval from the National Board of Fire Underwriters' or similar inspection organization having jurisdiction and shall deliver same to the Engineer and the Owner.

All material and equipment shall bear the inspection labels of Underwriters' Laboratories, if the material and equipment is of the class inspected by said laboratories.

Any paragraph of requirement in these specifications or drawings, deviating from the rules, requirements and specifications of the above organizations shall be invalid and their requirements shall hold precedent thereto. The Contractor shall be held responsible for adherence to all rules, requirements and specifications as set forth above. Any additional work or material necessary for adherence will not be allowed as an extra, but shall be included in the bid price. Ignorance of any rule, requirement, or specification shall not be allowed as an excuse for non-conformity. Acceptance by the Engineer does not relieve the Contractor from the expense involved for the correction of any errors which may exist in the drawings submitted or in the satisfactory operation of any equipment.

16.1.18 Inspection: The Contractor shall furnish all instruments and a qualified Engineer to properly perform all tests required. Written notice of all tests shall be given the Engineer at least two weeks in advance.

Unless waived in writing by the Engineer, all tests shall be made in the presence of a duly authorized representative of the Engineer. When the presence of such representative is so waived, sworn statements, in duplicate, of the tests made and the results thereof, shall be furnished to the Engineer by the Contractor.

All electrical circuits shall be tested to insure circuit continuity, insulation resistance, proper slicing, and freedom improper grounds.

Necessary adjustments and testing shall be made in cooperation with the respective manufacturers and other contractors when necessary. All tests shall be made in accordance with the latest standards of the ANSI, IPCEA, IEEE and NEMA.

1. Costs: Cost of all test shall be borne by this Contractor and shall be included in the contract price.

2. 600V and Below Equipment: Each panel shall be tested with mains disconnected from the feeder, branches connected, branch circuit breakers closed, all fixtures in place and permanently connected, lamps removed or omitted from the sockets, and all wall switches closed. Feeders shall be tested with the feeders disconnected form the panels. Each individual power circuit shall be tested at the panel with the power equipment connected for proper operation.

   Megohmmeter tests of the insulation resistance of power feeders shall be conducted. The results will be accepted when the megohmmeter shows the insulation resistance to be not less than one megohm per 100 volts at 20°C using a 1000 volt megohmmeter

   The grounding system shall have a resistance to ground of two ohms or less when measured by a megohmmeter or equivalent device.

16.1.19 Operational Tests: The equipment shall be given an operational test to determine that all components including motors, controls, protective and switching devices and auxiliary associated equipment are in operable condition and can function as described and shown on relevant specifications, operating instructions, and drawings.

After completion of work, the Contractor shall thoroughly test the entire electrical system, including electrical work required for instrumentation, control and power, and shall adjust electrical system as required.

The Contractor shall include in his work the providing of necessary factory trained supervision to check over equipment for proper functioning before putting the equipment into operation. This shall include establishing a simulated fault on checking out the coordination of the protective devices.

16.1.20 Documentation Procedures: Signed commitments are required. The transfer of electrical systems to Owner for operation will not proceed until guarantees, warranties, performance certifications, maintenance agreements and similar commitments to be signed by Contractor and other entities have been executed and transmitted to Engineer for placement in the owner's records.

The work of this paragraph is in addition to and does not supersede testing and adjusting specified in other sections of the specifications. The Contractor shall submit to the Engineer, test records, and reports for all testing. Megohmmeter testing (Insulation Resistance Test) of all incoming and outgoing cables, distribution and power panels, motor control centers, etc., shall be done after the cables are in place, and just prior to final termination.

The Contractor shall furnish all test equipment as required.

16.1.21 Closeout Procedures: General coordination is required. Close-out procedures shall be sequenced properly so that work will not be endangered or damaged, and so that every required performance will be fully tested and demonstrated.

System performance test runs are required. Test runs of electrical systems shall be coordinated with test runs of equipment served thereby.

A check of each item in each system shall be made to determine that it is set for proper operation. With Owner's Representative and Engineer present, the Contractor shall operate each system in a test run of appropriate duration to demonstrate compliance with performance requirements. During or following test runs, the Contractor shall make final corrections or where possible, including noise and vibration reductions, elimination of hazards, better response of controls, signals and alarms, and similar system performance improvements. The Contractor shall provide testing or inspection devices requested for Engineer to permit observation of actual system performances and shall demonstrate that controls and items requiring service or maintenance area accessible.

Cleaning and lubrication is required. After final performance test run of each electrical system, the Contractor shall clean system both externally and internally, shall comply with manufacturer’s instructions for lubrication of both power and hand operated equipment, and shall remove excess lubrication, touch up minor damage to factory-painted finishes and other painting specified as electrical work, and shall refinish work where damage is extensive.

General operating instructions are required. In addition, to specific training of Owner's operating personnel, specified in the individual sections, and in addition to preparation of written operating instructions and complied maintenance manuals specified elsewhere in these specifications, the Contractor shall provide general operating instructions for each operational system and equipment item of electrical work, and coordinate instructions with instruction for mechanical work, and other equipment where associated with electrical systems or equipment.

The Contractor shall describe each basic electrical system, and shall explain identification system, displayed diagrams, signals, alarms and audio visual provisions.

The Contractor shall describe interfaces with mechanical equipment, including interlocks, sequencing, startup, shutdown, emergency, safety, system failures, security and similar provisions.

The Contractor shall outline basic maintenance procedures and major equipment turnaround requirements, including adjustments to optimize output and efficiency of electrical systems.

The Contractor shall display and conduct a "thumb-through" explanation of maintenance manuals, record drawings, spare parts inventory, storage of extra materials, meter readings and similar service items.

1. Continued Systems Operations: The Contractor shall coordinate Owner's take over of electrical systems with takeover of mechanical systems, including the provision of skilled electrical operating and maintenance personnel until the time Owner's personnel take over operation of entire mechanical and electrical plant. The Contractor shall respond promptly with continued consultation and services (beyond takeover date) on electrical systems, matching required continued services on associated mechanical systems and equipment until the end of the warranty period.

2. Cleaning: As the work progresses and also before the completion and final acceptance of the work, the Contractor shall remove all rubbish and unused materials resulting from the work and shall leave the structures and grounds in a neat condition satisfactory to the Engineer. Prior to final acceptance, the Contractor shall also remove all temporary structures which he may have erected for his own use.

   The Contractor will be responsible for safeguarding and protecting their own work, materials, tools, and equipment.

16.1.22 Guarantee: The following equipment is to be furnished under this section of the specifications and shall be guaranteed against defective materials, design, and workmanship for a period of two (2) years from the date of acceptance, either for beneficial use or final acceptance, whichever is earlier.

END OF SECTION 266000