Housing Authority of the City of Pittsburgh

PROJECT MANUAL

Bedford Hope Center Improvements, AMP-02

IFB for Contract No. 600-16-18

GENERAL CONSTRUCTION

ELECTRICAL CONSTRUCTION

MECHANICAL CONSTRUCTION

Bids Due
May 17, 2018
3:00 pm

Procurement Dept. 100 Ross St.
2nd FL. Suite 200
Pittsburgh, PA 15219

Attn:
Mr. Kim Detrick, Director of Procurement

CONSULTANT: Gerard Associates Architects

Issued: April 16, 2018

Caster D. Binion
Executive Director

Housing Authority of the City of Pittsburgh

Point of Contact: Kim.Detrick@hacp.org
or 412-456-5116 Opt 1

Housing Authority of the City of Pittsburgh

Procurement Department
100 Ross Street, Suite 200
Pittsburgh, PA 15219
Phone: (412) 456-5116
Fax: (412) 456-5007
www.hacp.org

NOTICE TO PROSPECTIVE BIDDERS

April 16, 2018

INVITATION FOR BIDS (IFB)

Bedford Hope Center Improvements, AMP-02

The HOUSING AUTHORITY OF THE CITY OF PITTSBURGH will receive separate sealed bids for Bedford Hope Center Improvements, AMP-02 ; for the following contracts:

GENERAL CONSTRUCTION
ELECTRICAL CONSTRUCTION
MECHANICAL CONSTRUCTION

The estimated values of the project per contract noted above are in the following ranges:

GENERAL CONSTRUCTION	$ 285,500.00	$ 418,000.00
ELECTRICAL CONSTRUCTION	$ 176,500.00	$ 258,000.00
MECHANICAL CONSTRUCTION	$ 170,000.00	$ 248,500.00

Bid documents will be available on **April 16, 2018** . A Pre-Bid Conference will be held on **April 25, 2018** at **12:00 pm** , at Bedford Hope Center, 2305 Bedford Avenue, Pittsburgh, PA 15219.

A site visit of the property will be conducted thereafter. Bidders shall be prepared to review all aspects of the site necessary to prepare a bid. The last day for submission of written questions will be **May 1, 2018** **until** **2:00 pm** *Bids will be received at the HACP Procurement Department, 100 Ross Street – Suite 200 (2nd Floor), Pittsburgh, PA, 15219* ***until*** **3:00 pm** ***on*** **May 17, 2018** *, at which time and place all bids will be publicly opened and read aloud.*

The work must be substantially complete within 150 calendar days of the Notice to Proceed.

Point of contact for the Housing Authority is Mr. Kim Detrick at (412) 456-5116 Opt 1.

TO VIEW AND OBTAIN DOCUMENTS

Bid Documents, including the Bid Forms, Project Manual, and Drawings, may be obtained from the Business Opportunities Section of the HACP website, www.hacp.org. Prospective Bidders may register as a vendor on the website and download the documents free of charge. Electronic versions of the Bid Documents may also be obtained in person, Monday through Friday 8:30 a.m. to 4:30 p.m. at the Housing Authority of the City of Pittsburgh's Procurement Department, located at 100 Ross Street, Suite 200, Pittsburgh, PA 15219.

AWARD OF CONTRACT (S):

It is the intention of the Authority to award a contract to the lowest responsive and responsible bidder.

All bids shall remain open for the period specified in the IFB, which in no case shall be less than sixty (60) calendar days from the bid opening.

All bids of $10,000 or more must be accompanied by a negotiable bid guarantee that shall not be less than 5% of the amount of the bid. No bid guarantee is required for bids under $10,000. In accordance with 2 CFR 200.318(h) formerly 24 CFR Section 85.36(b)(8), the Authority is permitted to make awards only to responsible bidders possessing the ability to perform successfully under the terms and conditions of the proposed contract. Prior to award of any contract, the Authority shall conduct a pre-contract survey. Consideration will be given to such matters as bidder integrity, compliance with public policy, record of past performance, and financial and technical resources.

All bids must include a completed and signed Form of Agreement (Form 00500) as part of the bid. If the bid is successful and approved by HACP Board of Commissioners (if applicable), HACP will also sign the Form of Agreement thus creating a binding contract.

The successful bidder will be required to furnish an assurance of completion (performance and payment bond) each equal to 100% of the contract price.

The Authority reserves the right to reject any or all bids or to waive any informality in the bidding.

EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS:

The Contractor will be required to comply with all applicable Equal Employment Opportunity requirements for Federally-Assisted Construction Contracts. The Contractor must insure that employees and applicants for employment are not discriminated against because of race, color, religion, sexual preference, handicap or national origin.

A. Section 3 Participation

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 and with HUD's regulations set forth at 24 CFR Part 135 ("Section 3"). The purpose of Section 3 is to ensure that employment and other economic opportunities generated by HUD assistance shall be directed to low and very low-income persons, particularly persons who are recipients of HUD assistance for housing.

> Please describe ways the Bidder will assist HACP to comply with HUD's Section 3 requirements for hiring HACP residents and/or local disadvantaged individuals and businesses by reviewing the Section 3 Clause and by completing **Document 00433 – Section 3 Form.**

Section 3 of the Housing and Urban Development Act of 1968, as amended (12 U.S.C. 1701, et seq.) (the "Act") requires the Housing Authority of the City of Pittsburgh to ensure that employment and other economic and business opportunities generated by financial assistance from the Department of Housing and Urban Development ("HUD"), to the greatest extent feasible, are directed to public housing residents and other low income persons, particularly recipients of government housing assistance, and business concerns that provide economic opportunities to low and very low income persons.

To comply with the Act HACP requires its contractors to provide equal employment opportunity to all employees and applicants for employment without regard to race, color, religion, sex, national origin, disability, veteran's or marital status, or economic status and to take affirmative action to ensure that both job applicants and existing employees are given fair and equal treatment.

The goal of this policy is to obtain a reasonable level of success in the recruitment, employment, and utilization of HACP residents and other eligible persons and/or businesses by contractors working on contracts partially or wholly funded with HUD monies. HACP shall examine and consider a contractor's potential for success in providing employment and business opportunities to those covered under Section 3 prior to acting on any proposed contract award. In response to any RFP, RFQ or IFB HACP will require submission of the Section 3 Opportunities Plan and roster of current employees, and certification that the bidder will comply with the requirements of Section 3 either by hiring Section 3 employees to directly perform under the contract or by committing a dollar amount to HACP's Section 3 program in an amount consistent with the chart below. Below are the HACP Section 3 Guidelines as listed in the HACP Section 3 Program Manual:

RESIDENT HIRING REQUIREMENTS / RESIDENT HIRING SCALE

TOTAL LABOR DOLLARS USE TOTAL CONTRACT AMOUNT FOR SERVICE CONTRACTS	**RESIDENT LABOR AS A % OF TOTAL LABOR** **A.** DOLLARS
Labor dollars $25,000 but less than $100,000	10% of the labor dollars
$100,000, but less than $200,000	9% of the labor dollars
At least $200,000, but less than $300,000	8% of the labor dollars
At least $300,000, but less than $400,000	7% of the labor dollars
At least $400,000, but less than $500,000	6% of the labor dollars
At least $500,000, but less than $1 million	5% of the labor dollars
At least $1 million, but less than $2 million	4% of the labor dollars
At least $2 million, but less than $4 million	3% of the labor dollars
At least $4 million, but less than $7 million	2% of the labor dollars
$7 million or more	½ to 1 % of the labor dollars

***A copy of HACP's Section 3 Program Manual is available for download at www.hacp.org*

A copy of HUD's Section 3 requirement is provided herein. If you have any questions regarding the Section 3 Requirements or would like to discuss goals and planning for Section 3 Requirements please contact Mr. Lloyd Wilson, Section 3 Coordinator, by e-mail at lloyd.wilson@hacp.org or by contacting him at the Housing Authority of the City of Pittsburgh, Resident Employment Program located at the Bedford Hope Center, 2305 Bedford Ave, Pittsburgh PA 15219, telephone (412) 395-3950, ext. 1048. Proposals must demonstrate how the Offeror intends to meet or exceed the Authority's Section 3 requirements. Proposals submitted without a Section 3 plan may be deemed nonresponsive. Also, please complete **Section 3 Opportunities Plan** and include with your proposal.

Any bid or proposal received from a contractor that does not contain a Section 3 Opportunities Plan or certification and back-up documentation acceptable to HACP shall be deemed non-responsive by HACP.

B. MBE/WBE Participation Plan

HACP MBE and WBE Goals. It is the policy of HACP to ensure that Minority Business Enterprises (MBEs) and Women-owned Businesses (WBEs) are provided maximum opportunity to participate in contracts let by HACP. In accordance with Executive Order 11625, HACP has established a minimum threshold of eighteen percent (18%) of the total dollar amount for MBE utilization in this contract. HACP has established a seven percent (7%) minimum threshold for participation of WBEs, and, HACP strongly encourages and affirmatively promotes the use of MBEs and WBEs in all HACP contracts. For these purposes, an MBE is defined as "any legal entity other than a joint venture, organized to engage in commercial transactions, that is at least fifty-one percent (51%) owned and controlled by one or more minority persons." Also, a minority person is defined as a member of a socially or economically disadvantaged minority group, which includes African-Americans, Hispanic-Americans, Native-Americans, and Asian-Americans. A WBE/MBE is defined as "any legal entity other than a joint venture, organized to engage in commercial transactions, that is at least fifty-one percent (51%) owned and controlled by a female.

Bids or proposals submitted in response to this solicitation MUST include an MBE/WBE participation plan which, at a minimum demonstrates "Best Efforts" have been taken to achieve compliance with MBE/WBE goals. HACP's Procurement Policy defines "Best Efforts" in compliance with MBE/WBE goals to mean that the contractor must certify and document with its bid or proposal that it has contacted in writing at least ten (10) certified MBE and ten (10) certified WBE subcontractors to participate in the proposed contract with or lesser number if the contractor provides documentation that ten (10) certified MBE/WBE contractors could not be identified. Each contractor shall certify as to same under penalty of perjury and shall submit the back-up documentation with its bid or proposal. Any bid or proposal received from a contractor that does not contain such certification and back-up documentation acceptable to HACP may be deemed non-responsive by HACP.

If you have any questions regarding the HACP MBE/WBE goals please contact Mr. Anthony Mannella, MBE/WBE Compliance Specialist, by e-mail at anthony.mannella@hacp.org or by contacting him at the Procurement Department, Housing Authority of the City of Pittsburgh, 100 Ross Street, Suite 200 Pittsburgh PA 15219, telephone (412) 456-5116 opt.1. Bids or proposals must demonstrate how the Offeror intends to meet or exceed these goals.

The Authority's Minority and Woman Business (MBE/WBE) participation goals are as follows:

-- MBE Goal: 18%
-- WBE Goal: 7%

Additionally, please be advised that participation credit will be applied in accordance with the following classifications, as follows:

-- Broker:	10% of contract face value
-- Supplier:	60% of contract face value
-- Bona Fide Contractor:	100% of contract face value
-- All Professional Service Firms:	100% of contract face value

Vendor definitions for the above classifications are to be referenced in either the respective vendor MBE/WBE certifications or as defined in 49 CFR Part 26.

Please describe ways the Bidder will utilize MBE/WBE businesses to meet the goals above by completing **Document 00434** – **MBE/WBE Solicitation & Commitment Record**.

Caster D. Binion
Executive Director
Housing Authority of the City of Pittsburgh

Housing Authority of the City of Pittsburgh

Development & Modernization
100 Ross Street, Suite 200
Pittsburgh, PA 15219
(412) 456-5020
www.hacp.org

SPECIAL PROVISIONS

NOTICE TO ALL PROSPECTIVE BIDDERS

Bedford Hope Center Improvements, AMP-02

CONTRACT NO. 600-16-18

Each successful bidder(s) shall be required to comply with the following special provisions:

A. Required Documents/Information

After bid opening and determination of the responsive and responsible bidder, but prior to Notice to Proceed each successful bidder for this project shall provide the following documents/information to HACP within ten (10) business days of receiving written notice thereof:

(1) Insurance
(2) Payment and Performance Bonds
(3) Construction Schedule
(4) Submittal Log and Corresponding Submittals

Please accept these special provisions by completing the information requested below:

Signature of Authorized Officer: _____ Date: _____

Name of Contractor: _____

Address: _____

Telephone Number: _____

Bedford Hope Center Improvements, AMP-02

IFB CONTRACT NO. 600-16-18

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH
DEVELOPMENT & MODERNIZATION DEPARTMENT
100 Ross Street, Suite 200
Pittsburgh, PA 15219
Phone: (412) 456-5020
Fax: (412) 456-5591

Issued: April 16, 2018

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

Bedford Hope Center Improvements, AMP-02

HACP Contract No. 600-16-18

PROJECT MANUAL
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	Document 00433	Section 3 Opportunities Plan
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	Document 00435	Bidder Manpower
	Document 00436	Previous Related Experience
	HUD 5369-A	Representations, Certifications and Other Statements of Bidders
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HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

Bedford Hope Center Improvements, AMP-02

HACP CONTRACT NO. 600-16-18

INVITATION FOR BIDS
LIST OF DOCUMENTS

The HOUSING AUTHORITY OF THE CITY OF PITTSBURGH will receive separate sealed bids for Bedford Hope Center Improvements, AMP-02, for the following contracts:

GENERAL CONSTRUCTION
ELECTRICAL CONSTRUCTION
MECHANICAL CONSTRUCTION

A complete **Invitation for Bids (IFB)** consists of the following documents:

THE PROJECT MANUAL, **dated** April 16, 2018 consisting of:

Bidding Requirements, Contract Forms, Conditions of the Contract, Wage Determination, and the Specifications.

THE PROJECT DRAWINGS, as prepared by **Gerard Associates Architects**, **dated** **March 16, 2018**.

THE BID PACKAGE, **dated** April 16, 2018 consisting of a single three-ring binder containing:

Blank bid document forms to be completed by the bidder;

Divider tabs to separate the original bid documents from the copies;

A pre-printed, pre-addressed envelope in which to deliver the bid.

ADDENDA will be issued as required.

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

IDENTIFICATION OF OWNER

The Owner of this project is the Housing Authority of the City of Pittsburgh, a body corporate and politic and created pursuant to the "Housing Authorities Law," an Act passed by the 1937 session of the Legislature of the Commonwealth of Pennsylvania, P.L. 955, approved May 28, 1937, hereinafter variously called the "Housing Authority of the City of Pittsburgh" (HACP), "The Authority," the "Local Housing Authority" (LHA), the "Public Housing Authority" (PHA), or the "Public Housing Authority/Indian Housing Authority" (PHA/IHA).

Caster D. Binion
Executive Director
Housing Authority of the City of Pittsburgh

James D. Harris, Esquire
General Counsel
Housing Authority of the City of Pittsburgh

Kim Detrick
Director of Procurement
Housing Authority of the City of Pittsburgh

U.S. Department of Housing and Urban Development
Office of Public and Indian Housing

Instructions to Bidders for Contracts Public and Indian Housing Programs

Instructions to Bidders for Contracts

Public and Indian Housing Programs

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1. Bid Preparation and Submission

(a) Bidders are expected to examine the specifications, drawings, all instructions, and, if applicable, the construction site (see also the contract clause entitled **Site Investigation and Conditions Affecting the Work** of the *General Conditions of the Contract for Construction*). Failure to do so will be at the bidders' risk.

(b) All bids must be submitted on the forms provided by the Public Housing Agency/Indian Housing Authority (PHA/IHA). Bidders shall furnish all the information required by the solicitation. Bids must be signed and the bidder's name typed or printed on the bid sheet and each continuation sheet which requires the entry of information by the bidder. Erasures or other changes must be initialed by the person signing the bid. Bids signed by an agent shall be accompanied by evidence of that agent's authority. (Bidders should retain a copy of their bid for their records.)

(c) Bidders must submit as part of their bid a completed form HUD-5369-A, "Representations, Certifications, and Other Statements of Bidders."

(d) All bid documents shall be sealed in an envelope which shall be clearly marked with the words "Bid Documents," the Invitation for Bids (IFB) number, any project or other identifying number, the bidder's name, and the date and time for receipt of bids.

(e) If this solicitation requires bidding on all items, failure to do so will disqualify the bid. If bidding on all items is not required, bidders should insert the words "No Bid" in the space provided for any item on which no price is submitted.

(f) Unless expressly authorized elsewhere in this solicitation, alternate bids will not be considered.

(g) Unless expressly authorized elsewhere in this solicitation, bids submitted by telegraph or facsimile (fax) machines will not be considered.

(h) If the proposed contract is for a Mutual Help project (as described in 24 CFR Part 905, Subpart E) that involves Mutual Help contributions of work, material, or equipment, supplemental information regarding the bid advertisement is provided as an attachment to this solicitation.

2. Explanations and Interpretations to Prospective Bidders

(a) Any prospective bidder desiring an explanation or interpretation of the solicitation, specifications, drawings, etc., must request it at least 7 days before the scheduled time for bid opening. Requests may be oral or written. Oral requests must be confirmed in writing. The only oral clarifications that will be provided will be those clearly related to solicitation procedures, i.e., not substantive technical information. No other oral explanation or interpretation will be provided. Any information given a prospective bidder concerning this solicitation will be furnished promptly to all other prospective bidders as a written amendment to the solicitation, if that information is necessary in submitting bids, or if the lack of it would be prejudicial to other prospective bidders.

(b) Any information obtained by, or provided to, a bidder other than by formal amendment to the solicitation shall not constitute a change to the solicitation.

3. Amendments to Invitations for Bids

(a) If this solicitation is amended, then all terms and conditions which are not modified remain unchanged.

(b) Bidders shall acknowledge receipt of any amendment to this solicitation (1) by signing and returning the amendment, (2) by identifying the amendment number and date on the bid form, or (3) by letter, telegram, or facsimile, if those methods are authorized in the solicitation. The PHA/IHA must receive acknowledgement by the time and at the place specified for receipt of bids. Bids which fail to acknowledge the bidder's receipt of any amendment will result in the rejection of the bid if the amendment(s) contained information which substantively changed the PHA's/IHA's requirements.

(c) Amendments will be on file in the offices of the PHA/IHA and the Architect at least 7 days before bid opening.

4. Responsibility of Prospective Contractor

(a) The PHA/IHA will award contracts only to responsible prospective contractors who have the ability to perform successfully under the terms and conditions of the proposed contract. In determining the responsibility of a bidder, the PHA/IHA will consider such matters as the bidder's:

(1) Integrity;

(2) Compliance with public policy;

(3) Record of past performance; and

(4) Financial and technical resources (including construction and technical equipment).

(b) Before a bid is considered for award, the bidder may be requested by the PHA/IHA to submit a statement or other documentation regarding any of the items in paragraph (a) above. Failure by the bidder to provide such additional information shall render the bidder nonresponsible and ineligible for award.

5. Late Submissions, Modifications, and Withdrawal of Bids

(a) Any bid received at the place designated in the solicitation after the exact time specified for receipt will not be considered unless it is received before award is made and it:

(1) Was sent by registered or certified mail not later than the fifth calendar day before the date specified for receipt of offers (e.g., an offer submitted in response to a solicitation requiring receipt of offers by the 20th of the month must have been mailed by the 15th);

(2) Was sent by mail, or if authorized by the solicitation, was sent by telegram or via facsimile, and it is determined by the PHA/IHA that the late receipt was due solely to mishandling by the PHA/IHA after receipt at the PHA/IHA; or

(3) Was sent by U.S. Postal Service Express Mail Next Day Service - Post Office to Addressee, not later than 5:00 p.m. at the place of mailing two working days prior to the date specified for receipt of proposals. The term "working days" excludes weekends and observed holidays.

(b) Any modification or withdrawal of a bid is subject to the same conditions as in paragraph (a) of this provision.

(c) The only acceptable evidence to establish the date of mailing of a late bid, modification, or withdrawal sent either by registered or certified mail is the U.S. or Canadian Postal Service postmark both on the envelope or wrapper and on the original receipt from the U.S. or Canadian Postal Service. Both postmarks must show a legible date or the bid, modification, or withdrawal shall be processed as if mailed late. "Postmark" means a printed, stamped, or otherwise placed impression (exclusive of a postage meter machine impression) that is readily identifiable without further action as having been supplied and affixed by employees of the U.S. or Canadian Postal Service on the date of mailing. Therefore, bidders should request the postal clerk to place a hand cancellation bull's-eye postmark on both the receipt and the envelope or wrapper.

(d) The only acceptable evidence to establish the time of receipt at the PHA/IHA is the time/date stamp of PHA/IHA on the proposal wrapper or other documentary evidence of receipt maintained by the PHA/IHA.

(e) The only acceptable evidence to establish the date of mailing of a late bid, modification, or withdrawal sent by Express Mail Next Day Service-Post Office to Addressee is the date entered by the post office receiving clerk on the "Express Mail Next Day Service-Post Office to Addressee" label and the postmark on both the envelope or wrapper and on the original receipt from the U.S. Postal Service. "Postmark" has the same meaning as defined in paragraph (c) of this provision, excluding postmarks of the Canadian Postal Service. Therefore, bidders should request the postal clerk to place a legible hand cancellation bull's eye postmark on both the receipt and Failure by a bidder to acknowledge receipt of the envelope or wrapper.

(f) Notwithstanding paragraph (a) of this provision, a late modification of an otherwise successful bid that makes its terms more favorable to the PHA/IHA will be considered at any time it is received and may be accepted.

(g) Bids may be withdrawn by written notice, or if authorized by this solicitation, by telegram (including mailgram) or facsimile machine transmission received at any time before the exact time set for opening of bids; provided that written confirmation of telegraphic or facsimile withdrawals over the signature of the bidder is mailed and postmarked prior to the specified bid opening time. A bid may be withdrawn in person by a bidder or its authorized representative if, before the exact time set for opening of bids, the identity of the person requesting withdrawal is established and the person signs a receipt for the bid.

6. Bid Opening

All bids received by the date and time of receipt specified in the solicitation will be publicly opened and read. The time and place of opening will be as specified in the solicitation. Bidders and other interested persons may be present.

7. Service of Protest

(a) Definitions. As used in this provision:

"Interested party" means an actual or prospective bidder whose direct economic interest would be affected by the award of the contract.

"Protest" means a written objection by an interested party to this solicitation or to a proposed or actual award of a contract pursuant to this solicitation.

(b) Protests shall be served on the Contracting Officer by obtaining written and dated acknowledgement from —

Contracting Officer
Legal Department
Housing Authority of the City of Pittsburgh
200 Ross Street, 7th Floor
Pittsburgh, PA 15219

[Contracting Officer designate the official or location where a protest may be served on the Contracting Officer]

(c) All protests shall be resolved in accordance with the PHA's/IHA's protest policy and procedures, copies of which are maintained at the PHA/IHA.

8. Contract Award

(a) The PHA/IHA will evaluate bids in response to this solicitation without discussions and will award a contract to the responsible bidder whose bid, conforming to the solicitation, will be most advantageous to the PHA/IHA considering only price and any price-related factors specified in the solicitation.

(b) If the apparent low bid received in response to this solicitation exceeds the PHA's/IHA's available funding for the proposed contract work, the PHA/IHA may either accept separately priced items (see 8(e) below) or use the following procedure to determine contract award. The PHA/IHA shall apply in turn to each bid (proceeding in order from the apparent low bid to the high bid) each of the separately priced bid deductible items, if any, in their priority order set forth in this solicitation. If upon the application of the first deductible item to all initial bids, a new low bid is within the PHA's/IHA's available funding, then award shall be made to that bidder. If no bid is within the available funding amount, then the PHA/IHA shall apply the second deductible item. The PHA/IHA shall continue this process until an evaluated low bid, if any, is within the PHA's/IHA's available funding. If upon the application of all deductibles, no bid is within the PHA's/IHA's available funding, or if the solicitation does not request separately priced deductibles, the PHA/IHA shall follow its written policy and procedures in making any award under this solicitation.

(c) In the case of tie low bids, award shall be made in accordance with the PHA's/IHA's written policy and procedures.

(d) The PHA/IHA may reject any and all bids, accept other than the lowest bid (e.g., the apparent low bid is unreasonably low), and waive informalities or minor irregularities in bids received, in accordance with the PHA's/IHA's written policy and procedures.

(e) Unless precluded elsewhere in the solicitation, the PHA/IHA may accept any item or combination of items bid.

(f) The PHA/IHA may reject any bid as nonresponsive if it is materially unbalanced as to the prices for the various items of work to be performed. A bid is materially unbalanced when it is based on prices significantly less than cost for some work and prices which are significantly overstated for other work.

(g) A written award shall be furnished to the successful bidder within the period for acceptance specified in the bid and shall result in a binding contract without further action by either party.

9. Bid Guarantee (applicable to construction and equipment contracts exceeding $25,000)

All bids must be accompanied by a negotiable bid guarantee which shall not be less than five percent (5%) of the amount of the bid. The bid guarantee may be a certified check, bank draft, U.S. Government Bonds at par value, or a bid bond secured by a surety company acceptable to the U.S. Government and authorized to do business in the state where the work is to be performed. In the case where the work under the contract will be performed on an Indian reservation area, the bid guarantee may also be an irrevocable Letter of Credit (see provision 10, Assurance of Completion, below). Certified checks and bank drafts must be made payable to the order of the PHA/IHA. The bid guarantee shall insure the execution of the contract and the furnishing of a method of assurance of completion by the successful bidder as required by the solicitation. Failure to submit a bid guarantee with the bid shall result in the rejection of the bid. Bid guarantees submitted by unsuccessful bidders will be returned as soon as practicable after bid opening.

10. Assurance of Completion

(a) Unless otherwise provided in State law, the successful bidder shall furnish an assurance of completion prior to the execution of any contract under this solicitation. This assurance may be [Contracting Officer check applicable items] —

[X] (1) a performance and payment bond in a penal sum of 100 percent of the contract price; or, as may be required or permitted by State law;

[ ] (2) separate performance and payment bonds, each for 50 percent or more of the contract price;

[ ] (3) a 20 percent cash escrow;

[ ] (4) a 25 percent irrevocable letter of credit; or,

[ ] (5) an irrevocable letter of credit for 10 percent of the total contract price with a monitoring and disbursements agreement with the IHA (applicable only to contracts awarded by an IHA under the Indian Housing Program).

(b) Bonds must be obtained from guarantee or surety companies acceptable to the U.S. Government and authorized to do business in the state where the work is to be performed. Individual sureties will not be considered. U.S. Treasury Circular Number 570, published annually in the Federal Register, lists companies approved to act as sureties on bonds securing Government contracts, the maximum underwriting limits on each contract bonded, and the States in which the company is licensed to do business. Use of companies listed in this circular is mandatory. Copies of the circular may be downloaded on the U.S. Department of Treasury website **http://www.fms.treas.gov/c570/index.html**, or ordered for a minimum fee by contacting the Government Printing Office at (202) 512-2168.

(c) Each bond shall clearly state the rate of premium and the total amount of premium charged. The current power of attorney for the person who signs for the surety company must be attached to the bond. The effective date of the power of attorney shall not precede the date of the bond. The effective date of the bond shall be on or after the execution date of the contract.

(d) Failure by the successful bidder to obtain the required assurance of completion within the time specified, or within such extended period as the PHA/IHA may grant based upon reasons determined adequate by the PHA/IHA, shall render the bidder ineligible for award. The PHA/IHA may then either award the contract to the next lowest responsible bidder or solicit new bids. The PHA/IHA may retain the ineligible bidder's bid guarantee.

11. Preconstruction Conference (applicable to construction contracts)

After award of a contract under this solicitation and prior to the start of work, the successful bidder will be required to attend a preconstruction conference with representatives of the PHA/IHA and its architect/engineer, and other interested parties convened by the PHA/IHA. The conference will serve to acquaint the participants with the general plan of the construction operation and all other requirements of the contract (e.g., Equal Employment Opportunity, Labor Standards). The PHA/IHA will provide the successful bidder with the date, time, and place of the conference.

12. Indian Preference Requirements (applicable only if this solicitation is for a contract to be performed on a project for an Indian Housing Authority)

(a) HUD has determined that the contract awarded under this solicitation is subject to the requirements of section 7(b) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450e(b)). Section 7(b) requires that any contract or subcontract entered into for the benefit of Indians shall require that, to the greatest extent feasible

(1) Preferences and opportunities for training and employment (other than core crew positions; see paragraph (h) below) in connection with the administration of such contracts or subcontracts be given to qualified "Indians." The Act defines "Indians" to mean persons who are members of an Indian tribe and defines "Indian tribe" to mean any Indian tribe, band, nation, or other organized group or community, including any Alaska Native village or regional or village corporation as defined in or established pursuant to the Alaska Native Claims Settlement Act, which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians; and,

(2) Preference in the award of contracts or subcontracts in connection with the administration of contracts be given to Indian organizations and to Indian-owned economic enterprises, as defined in section 3 of the Indian Financing Act of 1974 (25 U.S.C. 1452). That Act defines "economic enterprise" to mean any Indian-owned commercial, industrial, or business activity established or organized for the purpose of profit, except that the Indian ownership must constitute not less than 51 percent of the enterprise; "Indian organization" to mean the governing body of any Indian tribe or entity established or recognized by such governing body; "Indian" to mean any person who is a member of any tribe, band, group, pueblo, or community which is recognized by the Federal Government as eligible for services from the Bureau of Indian Affairs and any "Native" as defined in the Alaska Native Claims Settlement Act; and Indian "tribe" to mean any Indian tribe, band, group, pueblo, or community including Native villages and Native groups (including

corporations organized by Kenai, Juneau, Sitka, and Kodiak) as defined in the Alaska Native Claims Settlement Act, which is recognized by the Federal Government as eligible for services from the Bureau of Indian Affairs.

(b) (1) The successful Contractor under this solicitation shall comply with the requirements of this provision in awarding all subcontracts under the contract and in providing training and employment opportunities.

(2) A finding by the IHA that the contractor, either (i) awarded a subcontract without using the procedure required by the IHA, (ii) falsely represented that subcontracts would be awarded to Indian enterprises or organizations; or, (iii) failed to comply with the contractor's employment and training preference bid statement shall be grounds for termination of the contract or for the assessment of penalties or other remedies.

(c) If specified elsewhere in this solicitation, the IHA may restrict the solicitation to qualified Indian-owned enterprises and Indian organizations. If two or more (or a greater number as specified elsewhere in the solicitation) qualified Indian-owned enterprises or organizations submit responsive bids, award shall be made to the qualified enterprise or organization with the lowest responsive bid. If fewer than the minimum required number of qualified Indian-owned enterprises or organizations submit responsive bids, the IHA shall reject all bids and readvertise the solicitation in accordance with paragraph (d) below.

(d) If the IHA prefers not to restrict the solicitation as described in paragraph (c) above, or if after having restricted a solicitation an insufficient number of qualified Indian enterprises or organizations submit bids, the IHA may advertise for bids from non-Indian as well as Indian-owned enterprises and Indian organizations. Award shall be made to the qualified Indian enterprise or organization with the lowest responsive bid if that bid is -

(1) Within the maximum HUD-approved budget amount established for the specific project or activity for which bids are being solicited; and

(2) No more than the percentage specified in 24 CFR 905.175(c) higher than the total bid price of the lowest responsive bid from any qualified bidder. If no responsive bid by a qualified Indian-owned economic enterprise or organization is within the stated range of the total bid price of the lowest responsive bid from any qualified enterprise, award shall be made to the bidder with the lowest bid.

(e) Bidders seeking to qualify for preference in contracting or subcontracting shall submit proof of Indian ownership with their bids. Proof of Indian ownership shall include but not be limited to:

(1) Certification by a tribe or other evidence that the bidder is an Indian. The IHA shall accept the certification of a tribe that an individual is a member.

(2) Evidence such as stock ownership, structure, management, control, financing and salary or profit sharing arrangements of the enterprise.

(f) (1) All bidders must submit with their bids a statement describing how they will provide Indian preference in the award of subcontracts. The specific requirements of that statement and the factors to used by the IHA in determining the statement's adequacy are included as an attachment to this solicitation. Any bid that fails to include the required statement shall be rejected as nonresponsive. The IHA may require that comparable statements be provided by subcontractors to the successful Contractor, and may require the Contractor to reject any bid or proposal by a subcontractor that fails to include the statement.

(2) Bidders and prospective subcontractors shall submit a certification (supported by credible evidence) to the IHA in any instance where the bidder or subcontractor believes it is infeasible to provide Indian preference in subcontracting. The acceptance or rejection by the IHA of the certification shall be final. Rejection shall disqualify the bid from further consideration.

(g) All bidders must submit with their bids a statement detailing their employment and training opportunities and their plans to provide preference to Indians in implementing the contract; and the number or percentage of Indians anticipated to be employed and trained. Comparable statements from all proposed subcontractors must be submitted. The criteria to be used by the IHA in determining the statement(s)'s adequacy are included as an attachment to this solicitation. Any bid that fails to include the required statement(s), or that includes a statement that does not meet minimum standards required by the IHA shall be rejected as nonresponsive.

(h) Core crew employees. A core crew employee is an individual who is a bona fide employee of the contractor at the time the bid is submitted; or an individual who was not employed by the bidder at the time the bid was submitted, but who is regularly employed by the bidder in a supervisory or other key skilled position when work is available. Bidders shall submit with their bids a list of all core crew employees.

(i) Preference in contracting, subcontracting, employment, and training shall apply not only on-site, on the reservation, or within the IHA's jurisdiction, but also to contracts with firms that operate outside these areas (e.g., employment in modular or manufactured housing construction facilities).

(j) Bidders should contact the IHA to determine if any additional local preference requirements are applicable to this solicitation.

(k) The IHA [ ] does [X] does not [Contracting Officer check applicable box] maintain lists of Indian-owned economic enterprises and Indian organizations by specialty (e.g., plumbing, electrical, foundations), which are available to bidders to assist them in meeting their responsibility to provide preference in connection with the administration of contracts and subcontracts.

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

Bedford Hope Center Improvements, AMP-02

HACP CONTRACT NO. 600-16-18

NOTICE OF PRE-BID CONFERENCE

A Pre-Bid Conference will be held on April 25, 2018

- A Pre-Bid Conference will be held on April 25, 2018 **at** 12:00 pm, at the Bedford Hope Center, 2305 Bedford Avenue, Pittsburgh, PA 15219. A site visit of the property will be conducted thereafter. Bidders shall be prepared to review all aspects of the site necessary to prepare a bid.

- Representatives of the Authority, the engineer and other interested parties will be in attendance.

All bidders are urged to attend.

- Bidders are responsible for examining the construction site. (Refer to "Instructions to Bidders for Contracts," Document HUD 5369, Clause 1, "Bid Preparation and Submission.") Notwithstanding the above, lack of attendance will not be a basis for rejecting a bid.

- Bidders are urged to examine the drawings and specifications prior to the Pre-Bid Conference.

- Nothing at the Pre-Bid Conference will change the terms of the IFB unless a subsequent Addendum is issued. (Refer to "Instructions to Bidders for Contracts," Document HUD 5369, Clause 2, "Explanations and Interpretations to Prospective Bidders.")

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

Bedford Hope Center Improvements, AMP-02

HACP CONTRACT NO. 600-16-18

PROJECT SCHEDULE

NO LATER THAN	
April 16, 2018	Invitation for Bids issued
April 25, 2018 12:00 pm	Pre-Bid Conference (Followed by Site Visit)
May 1, 2018 2:00 pm	Last day to submit written questions
May 17, 2018 3:00 pm	Bids due
June 29, 2018 (estimated)	Notice of Award
July 26, 2018 (estimated)	Execution of Contracts
July 27, 2018 (estimated)	Pre-Construction Conference
August 7, 2018 (estimated)	Construction Start
150 calendar days from effective date of Notice to Proceed	All work required under this contract shall be complete

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

Bedford Hope Center Improvements, AMP-02

HACP CONTRACT NO. 600-16-18

SCOPE OF WORK FOR GENERAL CONSTRUCTION

The Contract for General Construction shall consist of the following component parts:

1. THE AGREEMENT
(Bound in the Project Manual)

THE BID	Document 00310 - Scope of Work for General Construction Document 00311 - Form of Bid for General Construction
THE FORM OF AGREEMENT	Document 00500 - Form of Agreement Document 00590 - Contracting Officer Certification
CONDITIONS OF THE CONTRACT	Document HUD - 5370 General Conditions HACP Document - Supplemental General Conditions Document 00830 - Wage Determination Schedule

2. PRIMARY SPECIFICATIONS FOR THE GENERAL CONSTRUCTION CONTRACT
(Bound in the Project Manual)

All Work contained in the Primary Specifications listed below is the Work of the Contractor for this General Construction Contract unless specifically indicated otherwise.

Any Reference in the Primary Specifications to the "Contractor," the "Prime Contractor," or the "General Contractor" shall be interpreted as meaning the Contractor for this General Construction Contract.

The General Contractor shall coordinate the schedule and activities of work performed by this and all other Prime Contracts, as identified by (G)-General, (P)-Plumbing, (H)-HVAC, and (E)-Electrical.

It is the contractual responsibility of the Contractor for General Construction to familiarize himself with the work of the other prime contractors so that the Project as a whole can proceed in an orderly fashion. Failure to familiarize work by other trades would not be an excuse for corrective measures at no cost to the City of Pittsburgh Housing Authority.

For example, the General Contractor shall coordinate installation of general construction work with the requirements of the Plumbing, Mechanical, and Electrical Contractors.

Reference Standard for Incidental Work: Incidental work, as used in this paragraph, is work which is not a basic part of other Prime Contracts but which is required by reference.

For example, the General Contractor is required by his Primary Specifications to install and repair all general work. In the event that the Plumbing Contractor disturbs the general work, the patching, repair shall be done and follow the same Specification requirements of the appropriate Specification Section by the Plumbing Contractor even if that specification section may not be part of the Plumbing Contractor's Primary Specification. The same applies to all trades where incidental work occurs.

TECHNICAL SPECIFICATIONS MAY BE FOUND AT PART FOUR
OF THE PROJECT MANUAL

PLEASE ALSO REFER TO DRAWINGS

3. PRIMARY DRAWINGS FOR THE GENERAL CONSTRUCTION CONTRACT
(Contained in the set of Project Drawings issued simultaneously with this Project Manual)

All Work contained in the Primary Drawings listed below is the Work of this Contractor unless specifically indicated otherwise.

Any Reference to the "Contractor," the "Prime Contractor," or the "General Contractor" shall be interpreted as meaning the Contractor for this General Construction Contract.

The Primary Drawings for this contract consist of all Gerard Associates Architects construction documents drawings, **dated** March 16, 2018 and specifications contained in this project manual.

In case of drawing conflict with specifications, it is understood that the specification shall supersede the drawings.

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

Bedford Hope Center Improvements, AMP-02

HACP Contract No. 600-16-18

FORM OF BID

GENERAL CONSTRUCTION

Contract No.: 600-16-18

TO: HOUSING AUTHORITY
CITY OF PITTSBURGH
(Hereinafter called the "Authority")
100 Ross Street, Suite 200
Pittsburgh, PA 15219

BIDDER: _____
(Bidder Name)
_____
(Business Address)
_____

_____
(Telephone)

1. The undersigned Bidder, having visited the site, having become familiar with local conditions affecting the cost of the work**, including all City of Pittsburgh current code requirements**, and having become familiar with the Invitation for Bids (the IFB) issued by the Authority, which consists of the following:

   - Project Manual, dated April 16, 2018 containing Bidding Requirements, Contract Forms, Conditions of the Contract, and Specifications
   - Project Drawings, dated March 16, 2018
   - Addenda (if any) as enumerated in this Form of Bid

   hereby proposes to provide all supervision, technical personnel, labor, materials, machinery, tools, appurtenances, equipment and services required to construct and complete the General Construction Work as described in Document 00310 "Scope of Work for General Construction" and as indicated in the Drawings and Specifications, for the following Firm Fixed Price:

   _____Dollars ($ _____)
   (Insert Bid Price in words) *(Insert Bid Price in Figures)*

2. Bid security **[ ] is [ ] is not** submitted with this bid.
   (Check one)

   Bid Security is in amount of:

   _____% of the bid OR _____ Dollars ($_____)

Bid Security is in the form of:

[ ]	Certified Check	[ ]	Bank Draft
[ ]	U.S. Govt. Bond	[ ]	Bid Bond (Document 00410)

3. The Bidder hereby acknowledges receipt of the following Addenda, if any, as issued by the Authority:

Total number of Addenda _____ (if none, so state)

Addendum No. _____dated _____	Addendum No. _____ dated _____
Addendum No. _____ dated _____	Addendum No. _____ dated _____
Addendum No. _____ dated _____	Addendum No. _____ dated _____
Addendum No. _____ dated _____	Addendum No. _____ dated _____
Addendum No. _____ dated _____	Addendum No. _____ dated _____
Addendum No. _____ dated _____	Addendum No. _____ dated _____

4. The Bidder attaches hereto the Special Provisions (Document 00021);

5. The Bidder attaches hereto the Statement of Bidder's Qualifications (Document 00420);

6. The Bidder attaches hereto the Section 3 Opportunities Plan (Document 00433), MBE/WBE Solicitation and Commitment Record (Document 00434), Bidder Manpower Plan (Document 00435), and Previous Related Experience (Document 00436);

7. The Bidder attaches hereto the Bidder's Representations, Certifications and Other Statements of Bidders (Document HUD 5369-A), Previous Participation Certificate (Document HUD-2530);

8. The Bidder attaches hereto the Bidder's Special Provisions – Notice to All Prospective Bidders (Document 00437), Non-Collusion Affidavit (Document 00485);

9. The Bidder attaches hereto the completed Form of Agreement (Document 00500);

10. The Bidder attaches hereto the Supplemental General Conditions (HACP Document).

PROPRIETORSHIP SIGNATURE PAGE SHEET - FB-I

(To be used when the Bidder is an individual doing business as a Sole Proprietorship.)

THE BIDDER CERTIFIES THAT THE BIDDER IS:

[ ] An individual doing business in his/her own name
[ ] An individual doing business under a fictitious or assumed name
(Complete Proprietorship Fictitious Name Disclosure below)

SIGNED, SEALED AND DELIVERED

this _____ day of _____ 20 _____.

	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Witness		*Principal*	
{		{	
	_____ *(Signature and Date)*		_____ *(Signature and Date)*

PROPRIETORSHIP FICTITIOUS NAME DISCLOSURE

(To be used when the Bidder is an individual doing business under a fictitious or assumed name.)

_____ is an individual trading under a fictitious or
(Proprietor's Name)

assumed name of _____ and **[ ] has [ ] has not** registered under
(Fictitious or Assumed Name Used as Bidder's Name) *(Check one)*

the Fictitious Names Act of Pennsylvania, namely the Act of May 24, 1945,P.L.967, as amended, 54 P.S.sec.281.1 et seq.

	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Witness		*Principal*	
{		{	
	_____ *(Signature and Date)*		_____ *(Signature and Date)*

PARTNERSHIP SIGNATURE PAGE SHEET - FB-P-1

(To be used when the Bidder is an individual doing business as a Partnership.)

THE BIDDER CERTIFIES THAT THE BIDDER IS:

[ ] A General Partnership (Attach completed Sheet FB-P-3)
- [ ] Doing business under Partnership Name
- [ ] Doing business under a fictitious or assumed name
  (Complete Partnership Fictitious Name Disclosure Sheet FB-P-2)

[ ] A Limited Partnership (Attach completed Sheet FB-P-3)
- [ ] Doing business under Partnership Name
- [ ] Doing business under a fictitious or assumed name
  (Complete Partnership Fictitious Name Disclosure Sheet FB-P-2)

SIGNED, SEALED AND DELIVERED

this _____ day of _____ 20 _____.

	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Witness		*Partner **	
{		{	
	_____ *(Signature and Date)*		_____ *(Signature and Date)*
	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Witness		*Partner **	
{		{	
	_____ *(Signature and Date)*		_____ *(Signature and Date)*

* If the Bidder is a partnership, the Bid and Contract must be signed in the name of the partnership by at least two general partners, and the names and addresses of all the partners must be listed on the certificate on Sheet FB-P-3.

PARTNERSHIP FICTITIOUS NAME DISCLOSURE

SHEET FB-P-2

(To be used when the Bidder is a partnership doing business under a fictitious or assumed name.)

_____ is a partnership trading under a fictitious or
(Partnership's Name)

assumed name of _____ and **[ ] has [ ] has not** registered under
(Fictitious or Assumed Name Used as Bidder's Name) *(Check one)*

the Fictitious Names Act of Pennsylvania, namely the Act of May 24, 1945,P.L.967, as amended, 54 P.S.sec.281.1 et seq.

	_____		_____
	(Printed or Typed Name)		*(Printed or Typed Name)*
Witness		*Partner**	
{		{	
	_____		_____
	(Signature and Date)		*(Signature and Date)*

PARTNERSHIP CERTIFICATE SHEET FB-P-3

(To be used when the Bidder is a partnership.)

I, as partner of _____,
(Name of Partnership)
certify that the following are the names and addresses of all the partners of said partnership.

Name: _____	Name: _____
Address: _____	Address: _____
City: _____	City: _____
Name: _____	Name: _____
Address: _____	Address: _____
City: _____	City: _____
Name: _____	Name: _____
Address: _____	Address: _____
City: _____	City: _____
Name: _____	Name: _____
Address: _____	Address: _____
City: _____	City: _____

(Use additional sheets as required.)

	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Witness {		*Partner** {	
	_____ *(Signature and Date)*		_____ *(Signature and Date)*

CORPORATION SIGNATURE PAGE SHEET FB-C-1

(To be used when the bidder is a corporation.)

THE BIDDER CERTIFIES THAT THE BIDDER IS:

[ ] A corporation doing business in its own name
[ ] A corporation doing business under a fictitious or assumed name
(Complete Corporation Fictitious Name Disclosure FB-C-2)

SIGNED, SEALED AND DELIVERED

this _____ day of _____ 20 _____.

(CORPORATE SEAL)

_____
(Corporate Name)

_____ _____
(Printed or Typed Name) *(Printed or Typed Name)*

Witness *President*
{ *V.P.*** {

_____ _____
(Signature and Date) *(Signature and Date)*

_____ _____
(Corporate Title) *(Corporate Title)*

** If the bidder is a corporation, the Bid and the Contract must be executed in the Corporation's correct corporate name by its President or Vice President and attested to by its Secretary or Assistant Secretary or Treasurer or Assistant Treasurer, and the Certification of Corporate Principal (Doc. 00625) must be executed by the Secretary or Assistant Secretary.

CORPORATION FICTITIOUS NAME DISCLOSURE SHEET FB-C-2

(To be used when the Bidder is a corporation doing business under a fictitious or assumed name.)

_____ is a corporation trading under a fictitious or
(Corporation's Name)

assumed name of _____ and **[ ] has [ ] has not** registered under
(Fictitious or Assumed Name Used as Bidder's Name) *(Check one)*

the Fictitious Names Act of Pennsylvania, namely the Act of May 24, 1945,P.L.967, as amended, 54 P.S.sec.281.1 et seq.

	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Witness		*President*	
{		*V.P. *****	{	
	_____ *(Signature and Date)*		_____ *(Signature and Date)*

** If the bidder is a corporation, the Bid and the Contract must be executed in the Corporation's correct corporate name by its President or Vice President and attested to by its Secretary or Assistant Secretary or Treasurer or Assistant Treasurer, and the Certification of Corporate Principal (Doc. 00625) must be executed by the Secretary or Assistant Secretary.

CORPORATION CERTIFICATE SHEET FB-C-3

(To be used when the bidder is a corporation)

_____ is a corporation organized and existing
(Corporate name used as Bidder name)

under the laws of the state of _____ with its principal place of business at:

_____,_____,_____
(Street Address) *(City)* *(State)*

and, if a non-Pennsylvania corporation **[ ] has [ ] has not** *(check one)* been granted a certificate of authority to do business in Pennsylvania as required by the Pennsylvania Business Corporation Law, approved May 5, 1933, P.L. 364, as amended, 15 P.S. sec.2005 et seq.

I, _____, certify that I am the **[ ] Secretary [ ] Assistant Secretary** of the
(check one)
Corporation named a Bidder herein; that _____ who signed

this Bid on behalf of the Corporation was then _____ of said Corporation that
(President/V.P.) **

I know his signature and his signature thereto is genuine; and that said Bid was duly signed, sealed and attested in behalf of said Corporation by authority of its governing body.

(CORPORATE SEAL)

_____
(Signature and Date)

** If the bidder is a corporation, the Bid and the Contract must be executed in the Corporation's correct corporate name by its President or Vice President and its Secretary or Assistant Secretary or Treasurer or Assistant Treasurer, and the above Certificate must be executed by the Secretary or Assistant Secretary

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

Bedford Hope Center Improvements, AMP-02

HACP CONTRACT NO. 600-16-18

SCOPE OF WORK FOR
ELECTRICAL CONSTRUCTION

The Contract for Electrical Construction shall consist of the following component parts:

1. THE AGREEMENT
(Bound in the Project Manual)

THE BID	Document 00320 - Scope of Work for Electrical Construction Document 00321 - Form of Bid for Electrical Construction
THE FORM OF AGREEMENT	Document 00500 - Form of Agreement Document 00590 - Contracting Officer Certification
CONDITIONS OF THE CONTRACT	Document HUD - 5370 General Conditions HACP Document - Supplemental General Conditions Document 00830 - Wage Determination Schedule

2. PRIMARY SPECIFICATIONS FOR THE ELECTRICAL CONSTRUCTION CONTRACT
(Bound in the Project Manual)

All Work contained in the Primary Specifications listed below is the Work of the Contractor for this Electrical Construction Contract unless specifically indicated otherwise.

Any Reference in the Primary Specifications to the "Contractor," the "Prime Contractor," or the "Electrical Contractor" shall be interpreted as meaning the Contractor for this Electrical Construction Contract.

The Electrical Contractor shall coordinate the schedule and activities of work performed under this contract with that of those contracts identified as (G)-General, (P)-Plumbing, and (H)-HVAC.

It is the contractual responsibility of the Contractor for Electrical Construction to familiarize himself with the work of the other prime contractors so that the Project as a whole can proceed in an orderly fashion. Failure to familiarize work by other trades would not be an excuse for corrective measures at no cost to the City of Pittsburgh Housing Authority.

For example, the Electrical Contractor shall coordinate installation of electrical construction work with the requirements of the Plumbing, Mechanical, and General Contractors.

Reference Standard for Incidental Work: Incidental work, as used in this paragraph, is work which is not a basic part of other Prime Contracts but which is required by reference.

For example, the General Contractor is required by his Primary Specifications to install and repair all general work. In the event that the Plumbing Contractor disturbs the general work, the patching, repair shall be done and follow the same Specification requirements of the appropriate Specification Section by the Plumbing Contractor even if that specification section may not be part of the Plumbing Contractor's Primary Specification. The same applies to all trades where incidental work occurs.

TECHNICAL SPECIFICATIONS MAY BE FOUND AT PART FOUR
OF THE PROJECT MANUAL

PLEASE ALSO REFER TO DRAWINGS

3. PRIMARY DRAWINGS FOR THE ELECTRICAL CONSTRUCTION CONTRACT
(Contained in the set of Project Drawings issued simultaneously with this Project Manual)

All Work contained in the Primary Drawings listed below is the Work of this Contractor unless specifically indicated otherwise.

Any Reference to the "Contractor," the "Prime Contractor," or the "Electrical Contractor" shall be interpreted as meaning the Contractor for this Electrical Construction Contract.

The Primary Drawings for this contract consist of all Gerard Associates Architects construction documents drawings, **dated** March 16, 2018 and specifications contained in this project manual.

In case of drawing conflict with specifications, it is understood that the specification shall supersede the drawings.

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

Bedford Hope Center Improvements, AMP-02

HACP Contract No. 600-16-18

FORM OF BID

ELECTRICAL CONSTRUCTION

Contract No.: 600-16-18

TO: HOUSING AUTHORITY
CITY OF PITTSBURGH
(Hereinafter called the "Authority")
100 Ross Street, Suite 200
Pittsburgh, PA 15219

BIDDER: _____
(Bidder Name)
_____
(Business Address)
_____

_____
(Telephone)

1. The undersigned Bidder, having visited the site, having become familiar with local conditions affecting the cost of the work**, including all City of Pittsburgh current code requirements**, and having become familiar with the Invitation for Bids (the IFB) issued by the Authority, which consists of the following:

   - Project Manual, dated April 16, 2018 containing Bidding Requirements, Contract Forms, Conditions of the Contract, and Specifications
   - Project Drawings, dated March 16, 2018
   - Addenda (if any) as enumerated in this Form of Bid

   hereby proposes to provide all supervision, technical personnel, labor, materials, machinery, tools, appurtenances, equipment and services required to construct and complete the Electrical Construction Work as described in Document 00320 "Scope of Work for Electrical Construction" and as indicated in the Drawings and Specifications, for the following Firm Fixed Price:

   _____Dollars ($ _____)
   (Insert Bid Price in words) *(Insert Bid Price in Figures)*

2. Bid security **[ ] is [ ] is not** submitted with this bid.
   (Check one)

   Bid Security is in amount of:

   _____% of the bid OR _____ Dollars ($_____)

Bid Security is in the form of:

[ ]	Certified Check	[ ]	Bank Draft
[ ]	U.S. Govt. Bond	[ ]	Bid Bond (Document 00410)

3. The Bidder hereby acknowledges receipt of the following Addenda, if any, as issued by the Authority:

Total number of Addenda _____ (if none, so state)

Addendum No. _____dated _____	Addendum No. _____ dated _____
Addendum No. _____ dated _____	Addendum No. _____ dated _____
Addendum No. _____ dated _____	Addendum No. _____ dated _____
Addendum No. _____ dated _____	Addendum No. _____ dated _____
Addendum No. _____ dated _____	Addendum No. _____ dated _____
Addendum No. _____ dated _____	Addendum No. _____ dated _____

4. The Bidder attaches hereto the Special Provisions (Document 00021);

5. The Bidder attaches hereto the Statement of Bidder's Qualifications (Document 00420);

6. The Bidder attaches hereto the Section 3 Opportunities Plan (Document 00433), MBE/WBE Solicitation and Commitment Record (Document 00434), Bidder Manpower Plan (Document 00435), and Previous Related Experience (Document 00436);

7. The Bidder attaches hereto the Bidder's Representations, Certifications and Other Statements of Bidders (Document HUD 5369-A), Previous Participation Certificate (Document HUD-2530);

8. The Bidder attaches hereto the Bidder's Special Provisions – Notice to All Prospective Bidders (Document 00437), Non-Collusion Affidavit (Document 00485);

9. The Bidder attaches hereto the completed Form of Agreement (Document 00500);

10. The Bidder attaches hereto the Supplemental General Conditions (HACP Document).

PROPRIETORSHIP SIGNATURE PAGE

SHEET - FB-I

(To be used when the Bidder is an individual doing business as a Sole Proprietorship.)

THE BIDDER CERTIFIES THAT THE BIDDER IS:

[ ] An individual doing business in his/her own name
[ ] An individual doing business under a fictitious or assumed name
(Complete Proprietorship Fictitious Name Disclosure below)

SIGNED, SEALED AND DELIVERED

this _____ day of _____ 20 _____.

	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Witness		*Principal*	
{		{	
	_____ *(Signature and Date)*		_____ *(Signature and Date)*

PROPRIETORSHIP FICTITIOUS NAME DISCLOSURE

(To be used when the Bidder is an individual doing business under a fictitious or assumed name.)

_____ is an individual trading under a fictitious or
(Proprietor's Name)

assumed name of _____ and **[ ] has [ ] has not** registered under
(Fictitious or Assumed Name Used as Bidder's Name) *(Check one)*

the Fictitious Names Act of Pennsylvania, namely the Act of May 24, 1945,P.L.967, as amended, 54 P.S.sec.281.1 et seq.

	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Witness		*Principal*	
{		{	
	_____ *(Signature and Date)*		_____ *(Signature and Date)*

PARTNERSHIP SIGNATURE PAGE SHEET - FB-P-1

(To be used when the Bidder is an individual doing business as a Partnership.)

THE BIDDER CERTIFIES THAT THE BIDDER IS:

[ ] A General Partnership (Attach completed Sheet FB-P-3)
- [ ] Doing business under Partnership Name
- [ ] Doing business under a fictitious or assumed name
  (Complete Partnership Fictitious Name Disclosure Sheet FB-P-2)

[ ] A Limited Partnership (Attach completed Sheet FB-P-3)
- [ ] Doing business under Partnership Name
- [ ] Doing business under a fictitious or assumed name
  (Complete Partnership Fictitious Name Disclosure Sheet FB-P-2)

SIGNED, SEALED AND DELIVERED

this _____ day of _____ 20 _____.

	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Witness		*Partner **	
{		{	
	_____ *(Signature and Date)*		_____ *(Signature and Date)*
	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Witness		*Partner **	
{		{	
	_____ *(Signature and Date)*		_____ *(Signature and Date)*

* If the Bidder is a partnership, the Bid and Contract must be signed in the name of the partnership by at least two general partners, and the names and addresses of all the partners must be listed on the certificate on Sheet FB-P-3.

PARTNERSHIP FICTITIOUS NAME DISCLOSURE

SHEET FB-P-2

(To be used when the Bidder is a partnership doing business under a fictitious or assumed name.)

_____ is a partnership trading under a fictitious or
(Partnership's Name)

assumed name of _____ and **[ ] has [ ] has not** registered under
(Fictitious or Assumed Name Used as Bidder's Name) *(Check one)*

the Fictitious Names Act of Pennsylvania, namely the Act of May 24, 1945,P.L.967, as amended, 54 P.S.sec.281.1 et seq.

	_____		_____
	(Printed or Typed Name)		*(Printed or Typed Name)*
Witness		*Partner**	
{		{	
	_____		_____
	(Signature and Date)		*(Signature and Date)*

PARTNERSHIP CERTIFICATE SHEET FB-P-3

(To be used when the Bidder is a partnership.)

I, as partner of _____,
(Name of Partnership)
certify that the following are the names and addresses of all the partners of said partnership.

Name: _____ Name: _____

Address: _____ Address: _____

City: _____ City: _____

Name: _____ Name: _____

Address: _____ Address: _____

City: _____ City: _____

Name: _____ Name: _____

Address: _____ Address: _____

City: _____ City: _____

Name: _____ Name: _____

Address: _____ Address: _____

City: _____ City: _____

(Use additional sheets as required.)

_____ _____
(Printed or Typed Name) *(Printed or Typed Name)*

Witness *Partner**

{ {

_____ _____
(Signature and Date) *(Signature and Date)*

CORPORATION SIGNATURE PAGE SHEET FB-C-1

(To be used when the bidder is a corporation.)

THE BIDDER CERTIFIES THAT THE BIDDER IS:

[ ] A corporation doing business in its own name
[ ] A corporation doing business under a fictitious or assumed name
(Complete Corporation Fictitious Name Disclosure FB-C-2)

SIGNED, SEALED AND DELIVERED

this _____ day of _____ 20 _____.

(CORPORATE SEAL)

_____
(Corporate Name)

_____ _____
(Printed or Typed Name) *(Printed or Typed Name)*

Witness *President*
{ *V.P.*** {

_____ _____
(Signature and Date) *(Signature and Date)*

_____ _____
(Corporate Title) *(Corporate Title)*

** If the bidder is a corporation, the Bid and the Contract must be executed in the Corporation's correct corporate name by its President or Vice President and attested to by its Secretary or Assistant Secretary or Treasurer or Assistant Treasurer, and the Certification of Corporate Principal (Doc. 00625) must be executed by the Secretary or Assistant Secretary.

CORPORATION FICTITIOUS NAME DISCLOSURE SHEET FB-C-2

(To be used when the Bidder is a corporation doing business under a fictitious or assumed name.)

_____ is a corporation trading under a fictitious or
(Corporation's Name)

assumed name of _____ and **[ ] has [ ] has not** registered under
(Fictitious or Assumed Name Used as Bidder's Name) *(Check one)*

the Fictitious Names Act of Pennsylvania, namely the Act of May 24, 1945,P.L.967, as amended, 54 P.S.sec.281.1 et seq.

	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Witness		*President*	
{		*V.P. *****	{	
	_____ *(Signature and Date)*		_____ *(Signature and Date)*

** If the bidder is a corporation, the Bid and the Contract must be executed in the Corporation's correct corporate name by its President or Vice President and attested to by its Secretary or Assistant Secretary or Treasurer or Assistant Treasurer, and the Certification of Corporate Principal (Doc. 00625) must be executed by the Secretary or Assistant Secretary.

CORPORATION CERTIFICATE SHEET FB-C-3

(To be used when the bidder is a corporation)

_____ is a corporation organized and existing
(Corporate name used as Bidder name)

under the laws of the state of _____ with its principal place of business at:

_____,_____,_____
(Street Address) *(City)* *(State)*

and, if a non-Pennsylvania corporation **[ ] has [ ] has not** *(check one)* been granted a certificate of authority to do business in Pennsylvania as required by the Pennsylvania Business Corporation Law, approved May 5, 1933, P.L. 364, as amended, 15 P.S. sec.2005 et seq.

I, _____, certify that I am the **[ ] Secretary [ ] Assistant Secretary** of the
(check one)
Corporation named a Bidder herein; that _____ who signed

this Bid on behalf of the Corporation was then _____ of said Corporation that
*(President/V.P.) ***

I know his signature and his signature thereto is genuine; and that said Bid was duly signed, sealed and attested in behalf of said Corporation by authority of its governing body.

(CORPORATE SEAL)

_____
(Signature and Date)

** If the bidder is a corporation, the Bid and the Contract must be executed in the Corporation's correct corporate name by its President or Vice President and its Secretary or Assistant Secretary or Treasurer or Assistant Treasurer, and the above Certificate must be executed by the Secretary or Assistant Secretary

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

Bedford Hope Center Improvements, AMP-02

HACP CONTRACT NO. 600-16-18

SCOPE OF WORK FOR PLUMBING CONSTRUCTION

The Contract for Plumbing Construction shall consist of the following component parts:

1. THE AGREEMENT
(Bound in the Project Manual)

THE BID	Document 00330 - Scope of Work for Plumbing Construction Document 00331 - Form of Bid for Plumbing Construction
THE FORM OF AGREEMENT	Document 00500 - Form of Agreement Document 00590 - Contracting Officer Certification
CONDITIONS OF THE CONTRACT	Document HUD - 5370 General Conditions HACP Document - Supplemental General Conditions Document 00830 - Wage Determination Schedule

2. PRIMARY SPECIFICATIONS FOR THE PLUMBING CONSTRUCTION CONTRACT
(Bound in the Project Manual)

All Work contained in the Primary Specifications listed below is the Work of the Contractor for this Plumbing Construction Contract unless specifically indicated otherwise.

Any Reference in the Primary Specifications to the "Contractor," the "Prime Contractor," or the "Plumbing Contractor" shall be interpreted as meaning the Contractor for this Plumbing Construction Contract.

The Plumbing Contractor shall coordinate the schedule and activities of work performed under this contract with that of those contracts identified as (G)-General, (E)-Electrical, and (H)-HVAC.

It is the contractual responsibility of the Contractor for Plumbing Construction to familiarize himself with the work of the other prime contractors so that the Project as a whole can proceed in an orderly fashion. Failure to familiarize work by other trades would not be an excuse for corrective measures at no cost to the City of Pittsburgh Housing Authority.

For example, the Plumbing Contractor shall coordinate installation of plumbing construction work with the requirements of the Electrical, Mechanical, and General Contractors.

Reference Standard for Incidental Work: Incidental work, as used in this paragraph, is work which is not a basic part of other Prime Contracts but which is required by reference.

For example, the General Contractor is required by his Primary Specifications to install and repair all general work. In the event that the Plumbing Contractor disturbs the general work, the patching, repair shall be done and follow the same Specification requirements of the appropriate Specification Section by the Plumbing Contractor even if that specification section may not be part of the Plumbing Contractor's Primary Specification. The same applies to all trades where incidental work occurs.

TECHNICAL SPECIFICATIONS MAY BE FOUND AT PART FOUR
OF THE PROJECT MANUAL

PLEASE ALSO REFER TO DRAWINGS

3. PRIMARY DRAWINGS FOR THE PLUMBING CONSTRUCTION CONTRACT
(Contained in the set of Project Drawings issued simultaneously with this Project Manual)

All Work contained in the Primary Drawings listed below is the Work of this Contractor unless specifically indicated otherwise.

Any Reference to the "Contractor," the "Prime Contractor," or the "Plumbing Contractor" shall be interpreted as meaning the Contractor for this Plumbing Construction Contract.

The Primary Drawings for this contract consist of all Gerard Associates Architects construction documents drawings, **dated** March 16, 2018 and specifications contained in this project manual.

In case of drawing conflict with specifications, it is understood that the specification shall supersede the drawings.

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

Bedford Hope Center Improvements, AMP-02

HACP Contract No. 600-16-18

FORM OF BID

PLUMBING CONSTRUCTION

Contract No.: 600-16-18

TO: HOUSING AUTHORITY
CITY OF PITTSBURGH
(Hereinafter called the "Authority")
100 Ross Street, Suite 200
Pittsburgh, PA 15219

BIDDER: _____
(Bidder Name)
_____
(Business Address)
_____

_____
(Telephone)

1. The undersigned Bidder, having visited the site, having become familiar with local conditions affecting the cost of the work**, including all City of Pittsburgh current code requirements**, and having become familiar with the Invitation for Bids (the IFB) issued by the Authority, which consists of the following:

   - Project Manual, dated April 16, 2018 containing Bidding Requirements, Contract Forms, Conditions of the Contract, and Specifications
   - Project Drawings, dated March 16, 2018
   - Addenda (if any) as enumerated in this Form of Bid

   hereby proposes to provide all supervision, technical personnel, labor, materials, machinery, tools, appurtenances, equipment and services required to construct and complete the Plumbing Construction Work as described in Document 00330 "Scope of Work for Plumbing Construction" and as indicated in the Drawings and Specifications, for the following Firm Fixed Price:

   _____Dollars ($ _____)
   (Insert Bid Price in words) *(Insert Bid Price in Figures)*

2. Bid security **[ ] is [ ] is not** submitted with this bid.
   (Check one)

   Bid Security is in amount of:

   _____% of the bid OR _____ Dollars ($_____)

Bid Security is in the form of:

[ ]	Certified Check	[ ]	Bank Draft
[ ]	U.S. Govt. Bond	[ ]	Bid Bond (Document 00410)

3. The Bidder hereby acknowledges receipt of the following Addenda, if any, as issued by the Authority:

Total number of Addenda _____ (if none, so state)

Addendum No. _____dated _____	Addendum No. _____ dated _____
Addendum No. _____ dated _____	Addendum No. _____ dated _____
Addendum No. _____ dated _____	Addendum No. _____ dated _____
Addendum No. _____ dated _____	Addendum No. _____ dated _____
Addendum No. _____ dated _____	Addendum No. _____ dated _____
Addendum No. _____ dated _____	Addendum No. _____ dated _____

4. The Bidder attaches hereto the Special Provisions (Document 00021);

5. The Bidder attaches hereto the Statement of Bidder's Qualifications (Document 00420);

6. The Bidder attaches hereto the Section 3 Opportunities Plan (Document 00433), MBE/WBE Solicitation and Commitment Record (Document 00434), Bidder Manpower Plan (Document 00435), and Previous Related Experience (Document 00436);

7. The Bidder attaches hereto the Bidder's Representations, Certifications and Other Statements of Bidders (Document HUD 5369-A), Previous Participation Certificate (Document HUD-2530);

8. The Bidder attaches hereto the Bidder's Special Provisions – Notice to All Prospective Bidders (Document 00437), Non-Collusion Affidavit (Document 00485);

9. The Bidder attaches hereto the completed Form of Agreement (Document 00500);

10. The Bidder attaches hereto the Supplemental General Conditions (HACP Document).

PROPRIETORSHIP SIGNATURE PAGE SHEET - FB-I

(To be used when the Bidder is an individual doing business as a Sole Proprietorship.)

THE BIDDER CERTIFIES THAT THE BIDDER IS:

[ ] An individual doing business in his/her own name
[ ] An individual doing business under a fictitious or assumed name
(Complete Proprietorship Fictitious Name Disclosure below)

SIGNED, SEALED AND DELIVERED

this _____ day of _____ 20 _____.

	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Witness		*Principal*	
{		{	
	_____ *(Signature and Date)*		_____ *(Signature and Date)*

PROPRIETORSHIP FICTITIOUS NAME DISCLOSURE

(To be used when the Bidder is an individual doing business under a fictitious or assumed name.)

_____ is an individual trading under a fictitious or
(Proprietor's Name)

assumed name of _____ and **[ ] has [ ] has not** registered under
(Fictitious or Assumed Name Used as Bidder's Name) *(Check one)*

the Fictitious Names Act of Pennsylvania, namely the Act of May 24, 1945,P.L.967, as amended, 54 P.S.sec.281.1 et seq.

	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Witness		*Principal*	
{		{	
	_____ *(Signature and Date)*		_____ *(Signature and Date)*

PARTNERSHIP SIGNATURE PAGE SHEET - FB-P-1

(To be used when the Bidder is an individual doing business as a Partnership.)

THE BIDDER CERTIFIES THAT THE BIDDER IS:

[ ] A General Partnership (Attach completed Sheet FB-P-3)
- [ ] Doing business under Partnership Name
- [ ] Doing business under a fictitious or assumed name
  (Complete Partnership Fictitious Name Disclosure Sheet FB-P-2)

[ ] A Limited Partnership (Attach completed Sheet FB-P-3)
- [ ] Doing business under Partnership Name
- [ ] Doing business under a fictitious or assumed name
  (Complete Partnership Fictitious Name Disclosure Sheet FB-P-2)

SIGNED, SEALED AND DELIVERED

this _____ day of _____ 20 _____.

_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*	
Witness		*Partner **	
{		{	
_____ *(Signature and Date)*		_____ *(Signature and Date)*	
_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*	
Witness		*Partner **	
{		{	
_____ *(Signature and Date)*		_____ *(Signature and Date)*	

* If the Bidder is a partnership, the Bid and Contract must be signed in the name of the partnership by at least two general partners, and the names and addresses of all the partners must be listed on the certificate on Sheet FB-P-3.

PARTNERSHIP FICTITIOUS NAME DISCLOSURE

SHEET FB-P-2

(To be used when the Bidder is a partnership doing business under a fictitious or assumed name.)

_____ is a partnership trading under a fictitious or
(Partnership's Name)

assumed name of _____ and **[ ] has [ ] has not** registered under
(Fictitious or Assumed Name Used as Bidder's Name) *(Check one)*

the Fictitious Names Act of Pennsylvania, namely the Act of May 24, 1945,P.L.967, as amended, 54 P.S.sec.281.1 et seq.

_____	_____
(Printed or Typed Name)	*(Printed or Typed Name)*
Witness	*Partner**
{	{
_____	_____
(Signature and Date)	*(Signature and Date)*

PARTNERSHIP CERTIFICATE SHEET FB-P-3

(To be used when the Bidder is a partnership.)

I, as partner of _____,
(Name of Partnership)
certify that the following are the names and addresses of all the partners of said partnership.

Name: _____ Name: _____

Address: _____ Address: _____

City: _____ City: _____

Name: _____ Name: _____

Address: _____ Address: _____

City: _____ City: _____

Name: _____ Name: _____

Address: _____ Address: _____

City: _____ City: _____

Name: _____ Name: _____

Address: _____ Address: _____

City: _____ City: _____

(Use additional sheets as required.)

	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Witness {		*Partner** {	
	_____ *(Signature and Date)*		_____ *(Signature and Date)*

CORPORATION SIGNATURE PAGE SHEET FB-C-1

(To be used when the bidder is a corporation.)

THE BIDDER CERTIFIES THAT THE BIDDER IS:

[ ] A corporation doing business in its own name
[ ] A corporation doing business under a fictitious or assumed name
(Complete Corporation Fictitious Name Disclosure FB-C-2)

SIGNED, SEALED AND DELIVERED

this _____ day of _____ 20 _____.

(CORPORATE SEAL)

_____
(Corporate Name)

_____ _____
(Printed or Typed Name) *(Printed or Typed Name)*

Witness *President*
{ *V.P.*** {

_____ _____
(Signature and Date) *(Signature and Date)*

_____ _____
(Corporate Title) *(Corporate Title)*

** If the bidder is a corporation, the Bid and the Contract must be executed in the Corporation's correct corporate name by its President or Vice President and attested to by its Secretary or Assistant Secretary or Treasurer or Assistant Treasurer, and the Certification of Corporate Principal (Doc. 00625) must be executed by the Secretary or Assistant Secretary.

CORPORATION FICTITIOUS NAME DISCLOSURE SHEET FB-C-2

(To be used when the Bidder is a corporation doing business under a fictitious or assumed name.)

_____ is a corporation trading under a fictitious or
(Corporation's Name)

assumed name of _____ and **[ ] has [ ] has not** registered under
(Fictitious or Assumed Name Used as Bidder's Name) *(Check one)*

the Fictitious Names Act of Pennsylvania, namely the Act of May 24, 1945,P.L.967, as amended, 54 P.S.sec.281.1 et seq.

	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Witness		*President*	
{		*V.P. ***	{
	_____ *(Signature and Date)*		_____ *(Signature and Date)*

** If the bidder is a corporation, the Bid and the Contract must be executed in the Corporation's correct corporate name by its President or Vice President and attested to by its Secretary or Assistant Secretary or Treasurer or Assistant Treasurer, and the Certification of Corporate Principal (Doc. 00625) must be executed by the Secretary or Assistant Secretary.

CORPORATION CERTIFICATE SHEET FB-C-3

(To be used when the bidder is a corporation)

_____ is a corporation organized and existing
(Corporate name used as Bidder name)

under the laws of the state of _____ with its principal place of business at:

_____,_____,_____
(Street Address) *(City)* *(State)*

and, if a non-Pennsylvania corporation **[ ] has [ ] has not** *(check one)* been granted a certificate of authority to do business in Pennsylvania as required by the Pennsylvania Business Corporation Law, approved May 5, 1933, P.L. 364, as amended, 15 P.S. sec.2005 et seq.

I, _____, certify that I am the **[ ] Secretary [ ] Assistant Secretary** of the
(check one)
Corporation named a Bidder herein; that _____ who signed

this Bid on behalf of the Corporation was then _____ of said Corporation that
(President/V.P.) **

I know his signature and his signature thereto is genuine; and that said Bid was duly signed, sealed and attested in behalf of said Corporation by authority of its governing body.

(CORPORATE SEAL)

_____
(Signature and Date)

** If the bidder is a corporation, the Bid and the Contract must be executed in the Corporation's correct corporate name by its President or Vice President and its Secretary or Assistant Secretary or Treasurer or Assistant Treasurer, and the above Certificate must be executed by the Secretary or Assistant Secretary

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

Bedford Hope Center Improvements, AMP-02

HACP CONTRACT NO. 600-16-18

SCOPE OF WORK FOR
MECHANICAL CONSTRUCTION

The Contract for Mechanical Construction shall consist of the following component parts:

1. THE AGREEMENT
(Bound in the Project Manual)

THE BID	Document 00340 - Scope of Work for Mechanical Construction Document 00341 - Form of Bid for Mechanical Construction
THE FORM OF AGREEMENT	Document 00500 - Form of Agreement Document 00590 - Contracting Officer Certification
CONDITIONS OF THE CONTRACT	Document HUD - 5370 General Conditions HACP Document - Supplemental General Conditions Document 00830 - Wage Determination Schedule

2. PRIMARY SPECIFICATIONS FOR THE MECHANICAL CONSTRUCTION CONTRACT
(Bound in the Project Manual)

All Work contained in the Primary Specifications listed below is the Work of the Contractor for this Mechanical Construction Contract unless specifically indicated otherwise.

Any Reference in the Primary Specifications to the "Contractor," the "Prime Contractor," or the "Mechanical Contractor" shall be interpreted as meaning the Contractor for this Mechanical Construction Contract.

The Mechanical Contractor shall coordinate the schedule and activities of work performed under this contract with that of those contracts identified as (G)-General, (E)-Electrical, and (P)-Plumbing.

It is the contractual responsibility of the Contractor for Mechanical Construction to familiarize himself with the work of the other prime contractors so that the Project as a whole can proceed in an orderly fashion. Failure to familiarize work by other trades would not be an excuse for corrective measures at no cost to the City of Pittsburgh Housing Authority.

For example, the Mechanical Contractor shall coordinate installation of mechanical construction work with the requirements of the Electrical, Plumbing, and General Contractors.

Reference Standard for Incidental Work: Incidental work, as used in this paragraph, is work which is not a basic part of other Prime Contracts but which is required by reference.

For example, the General Contractor is required by his Primary Specifications to install and repair all general work. In the event that the Plumbing Contractor disturbs the general work, the patching, repair shall be done and follow the same Specification requirements of the appropriate Specification Section by the Plumbing Contractor even if that specification section may not be part of the Plumbing Contractor's Primary Specification. The same applies to all trades where incidental work occurs.

TECHNICAL SPECIFICATIONS MAY BE FOUND AT PART FOUR
OF THE PROJECT MANUAL

PLEASE ALSO REFER TO DRAWINGS

3. PRIMARY DRAWINGS FOR THE MECHANICAL CONSTRUCTION CONTRACT
(Contained in the set of Project Drawings issued simultaneously with this Project Manual)

All Work contained in the Primary Drawings listed below is the Work of this Contractor unless specifically indicated otherwise.

Any Reference to the "Contractor," the "Prime Contractor," or the "Mechanical Contractor" shall be interpreted as meaning the Contractor for this Mechanical Construction Contract.

The Primary Drawings for this contract consist of all Gerard Associates Architects construction documents drawings, **dated** March 16, 2018 and specifications contained in this project manual.

In case of drawing conflict with specifications, it is understood that the specification shall supersede the drawings.

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

Bedford Hope Center Improvements, AMP-02

HACP Contract No. 600-16-18

FORM OF BID

MECHANICAL CONSTRUCTION

Contract No.: 600-16-18

TO: HOUSING AUTHORITY
CITY OF PITTSBURGH
(Hereinafter called the "Authority")
100 Ross Street, Suite 200
Pittsburgh, PA 15219

BIDDER: _____
(Bidder Name)
_____
(Business Address)
_____

_____
(Telephone)

1. The undersigned Bidder, having visited the site, having become familiar with local conditions affecting the cost of the work**, including all City of Pittsburgh current code requirements**, and having become familiar with the Invitation for Bids (the IFB) issued by the Authority, which consists of the following:

   - Project Manual, dated April 16, 2018 containing Bidding Requirements, Contract Forms, Conditions of the Contract, and Specifications
   - Project Drawings, dated March 16, 2018
   - Addenda (if any) as enumerated in this Form of Bid

   hereby proposes to provide all supervision, technical personnel, labor, materials, machinery, tools, appurtenances, equipment and services required to construct and complete the Mechanical Construction Work as described in Document 00340 "Scope of Work for Mechanical Construction" and as indicated in the Drawings and Specifications, for the following Firm Fixed Price:

   _____Dollars ($ _____)
   (Insert Bid Price in words) *(Insert Bid Price in Figures)*

2. Bid security **[ ] is [ ] is not** submitted with this bid.
   (Check one)

   Bid Security is in amount of:

   _____% of the bid OR _____ Dollars ($_____)

Bid Security is in the form of:

[ ]	Certified Check	[ ]	Bank Draft
[ ]	U.S. Govt. Bond	[ ]	Bid Bond (Document 00410)

3. The Bidder hereby acknowledges receipt of the following Addenda, if any, as issued by the Authority:

Total number of Addenda _____ (if none, so state)

Addendum No. _____dated _____	Addendum No. _____ dated _____
Addendum No. _____ dated _____	Addendum No. _____ dated _____
Addendum No. _____ dated _____	Addendum No. _____ dated _____
Addendum No. _____ dated _____	Addendum No. _____ dated _____
Addendum No. _____ dated _____	Addendum No. _____ dated _____
Addendum No. _____ dated _____	Addendum No. _____ dated _____

4. The Bidder attaches hereto the Special Provisions (Document 00021);

5. The Bidder attaches hereto the Statement of Bidder's Qualifications (Document 00420);

6. The Bidder attaches hereto the Section 3 Opportunities Plan (Document 00433), MBE/WBE Solicitation and Commitment Record (Document 00434), Bidder Manpower Plan (Document 00435), and Previous Related Experience (Document 00436);

7. The Bidder attaches hereto the Bidder's Representations, Certifications and Other Statements of Bidders (Document HUD 5369-A), Previous Participation Certificate (Document HUD-2530);

8. The Bidder attaches hereto the Bidder's Special Provisions – Notice to All Prospective Bidders (Document 00437), Non-Collusion Affidavit (Document 00485);

9. The Bidder attaches hereto the completed Form of Agreement (Document 00500);

10. The Bidder attaches hereto the Supplemental General Conditions (HACP Document).

PROPRIETORSHIP SIGNATURE PAGE

SHEET - FB-I

(To be used when the Bidder is an individual doing business as a Sole Proprietorship.)

THE BIDDER CERTIFIES THAT THE BIDDER IS:

[ ] An individual doing business in his/her own name
[ ] An individual doing business under a fictitious or assumed name
(Complete Proprietorship Fictitious Name Disclosure below)

SIGNED, SEALED AND DELIVERED

this _____ day of _____ 20 _____.

	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Witness		*Principal*	
{		{	
	_____ *(Signature and Date)*		_____ *(Signature and Date)*

PROPRIETORSHIP FICTITIOUS NAME DISCLOSURE

(To be used when the Bidder is an individual doing business under a fictitious or assumed name.)

_____ is an individual trading under a fictitious or
(Proprietor's Name)

assumed name of _____ and **[ ] has [ ] has not** registered under
(Fictitious or Assumed Name Used as Bidder's Name) *(Check one)*

the Fictitious Names Act of Pennsylvania, namely the Act of May 24, 1945,P.L.967, as amended, 54 P.S.sec.281.1 et seq.

	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Witness		*Principal*	
{		{	
	_____ *(Signature and Date)*		_____ *(Signature and Date)*

PARTNERSHIP SIGNATURE PAGE SHEET - FB-P-1

(To be used when the Bidder is an individual doing business as a Partnership.)

THE BIDDER CERTIFIES THAT THE BIDDER IS:

[ ] A General Partnership (Attach completed Sheet FB-P-3)
- [ ] Doing business under Partnership Name
- [ ] Doing business under a fictitious or assumed name
  (Complete Partnership Fictitious Name Disclosure Sheet FB-P-2)

[ ] A Limited Partnership (Attach completed Sheet FB-P-3)
- [ ] Doing business under Partnership Name
- [ ] Doing business under a fictitious or assumed name
  (Complete Partnership Fictitious Name Disclosure Sheet FB-P-2)

SIGNED, SEALED AND DELIVERED

this _____ day of _____ 20 _____.

	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Witness		*Partner **	
{		{	
	_____ *(Signature and Date)*		_____ *(Signature and Date)*
	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Witness		*Partner **	
{		{	
	_____ *(Signature and Date)*		_____ *(Signature and Date)*

* If the Bidder is a partnership, the Bid and Contract must be signed in the name of the partnership by at least two general partners, and the names and addresses of all the partners must be listed on the certificate on Sheet FB-P-3.

PARTNERSHIP FICTITIOUS NAME DISCLOSURE

SHEET FB-P-2

(To be used when the Bidder is a partnership doing business under a fictitious or assumed name.)

_____ is a partnership trading under a fictitious or
(Partnership's Name)

assumed name of _____ and **[ ] has [ ] has not** registered under
(Fictitious or Assumed Name Used as Bidder's Name) *(Check one)*

the Fictitious Names Act of Pennsylvania, namely the Act of May 24, 1945,P.L.967, as amended, 54 P.S.sec.281.1 et seq.

	_____		_____
	(Printed or Typed Name)		*(Printed or Typed Name)*
Witness		*Partner**	
{		{	
	_____		_____
	(Signature and Date)		*(Signature and Date)*

PARTNERSHIP CERTIFICATE SHEET FB-P-3

(To be used when the Bidder is a partnership.)

I, as partner of _____,
(Name of Partnership)
certify that the following are the names and addresses of all the partners of said partnership.

Name: _____ Name: _____

Address: _____ Address: _____

City: _____ City: _____

Name: _____ Name: _____

Address: _____ Address: _____

City: _____ City: _____

Name: _____ Name: _____

Address: _____ Address: _____

City: _____ City: _____

Name: _____ Name: _____

Address: _____ Address: _____

City: _____ City: _____

(Use additional sheets as required.)

	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Witness {		*Partner** {	
	_____ *(Signature and Date)*		_____ *(Signature and Date)*

CORPORATION SIGNATURE PAGE SHEET FB-C-1

(To be used when the bidder is a corporation.)

THE BIDDER CERTIFIES THAT THE BIDDER IS:

[ ] A corporation doing business in its own name
[ ] A corporation doing business under a fictitious or assumed name
(Complete Corporation Fictitious Name Disclosure FB-C-2)

SIGNED, SEALED AND DELIVERED

this _____ day of _____ 20 _____.

(CORPORATE SEAL)

_____
(Corporate Name)

_____ _____
(Printed or Typed Name) *(Printed or Typed Name)*

Witness *President*
{ *V.P.*** {

_____ _____
(Signature and Date) *(Signature and Date)*

_____ _____
(Corporate Title) *(Corporate Title)*

** If the bidder is a corporation, the Bid and the Contract must be executed in the Corporation's correct corporate name by its President or Vice President and attested to by its Secretary or Assistant Secretary or Treasurer or Assistant Treasurer, and the Certification of Corporate Principal (Doc. 00625) must be executed by the Secretary or Assistant Secretary.

CORPORATION FICTITIOUS NAME DISCLOSURE SHEET FB-C-2

(To be used when the Bidder is a corporation doing business under a fictitious or assumed name.)

_____ is a corporation trading under a fictitious or
(Corporation's Name)

assumed name of _____ and **[ ] has [ ] has not** registered under
(Fictitious or Assumed Name Used as Bidder's Name) *(Check one)*

the Fictitious Names Act of Pennsylvania, namely the Act of May 24, 1945,P.L.967, as amended, 54 P.S.sec.281.1 et seq.

	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Witness		*President*	
{		*V.P. *****	{	
	_____ *(Signature and Date)*		_____ *(Signature and Date)*

** If the bidder is a corporation, the Bid and the Contract must be executed in the Corporation's correct corporate name by its President or Vice President and attested to by its Secretary or Assistant Secretary or Treasurer or Assistant Treasurer, and the Certification of Corporate Principal (Doc. 00625) must be executed by the Secretary or Assistant Secretary.

CORPORATION CERTIFICATE SHEET FB-C-3

(To be used when the bidder is a corporation)

_____ is a corporation organized and existing
(Corporate name used as Bidder name)

under the laws of the state of _____ with its principal place of business at:

_____,_____,_____
(Street Address) *(City)* *(State)*

and, if a non-Pennsylvania corporation **[ ] has [ ] has not** *(check one)* been granted a certificate of authority to do business in Pennsylvania as required by the Pennsylvania Business Corporation Law, approved May 5, 1933, P.L. 364, as amended, 15 P.S. sec.2005 et seq.

I, _____, certify that I am the **[ ] Secretary [ ] Assistant Secretary** of the
(check one)
Corporation named a Bidder herein; that _____ who signed

this Bid on behalf of the Corporation was then _____ of said Corporation that
*(President/V.P.) ***

I know his signature and his signature thereto is genuine; and that said Bid was duly signed, sealed and attested in behalf of said Corporation by authority of its governing body.

(CORPORATE SEAL)

_____
(Signature and Date)

** If the bidder is a corporation, the Bid and the Contract must be executed in the Corporation's correct corporate name by its President or Vice President and its Secretary or Assistant Secretary or Treasurer or Assistant Treasurer, and the above Certificate must be executed by the Secretary or Assistant Secretary

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we,

_____, as Principal, and
(Insert name and address of Bidder exactly as it appears on Form of Bid)

_____, as Sureties, are held and firmly bound unto the Housing Authority of the City of Pittsburgh, its certain attorney, successors, or assigns (the Obligee, hereinafter called the "Authority") in the penal sum of

_____Dollars ($_____)

lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, personal representatives, successors, and assigns, jointly and severally, firmly by these presents:

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas, the Principal simultaneously submits to the Authority the accompanying bid, dated

_____, 20_____ (the "Bid"), for construction of
(Insert date of bid)

_____
(Insert name of project exactly as it appears on Form of Bid)
pursuant to specifications, drawings and other related documents constituting the Invitation for Bids (the "IFB").

NOW, THEREFORE, if the Principal shall not withdraw said bid within the period specified therein after the opening of the same, or, if no period be specified, within sixty (60) days after the said opening, and shall within the period specified therefore, or, if no period be specified within ten (10) days after the prescribed forms are presented to him for signature, enter into a written contract with the Authority in accordance with the bid as accepted, and give bonds with good and sufficient surety or sureties, as may be required for the faithful performance and proper fulfillment of such contract and for the payment of labor and materialmen or in the event of the withdrawal of said bid within the period specified, or the failure to enter into such contract and give such bonds within the time specified, if the Principal shall pay the Authority the difference between the amount specified in said bid and the amount for which the Authority may procure the required work or supplies or both, if the latter amount be in excess of the former, then the above obligation shall be void and of no effect, otherwise to remain in full force and virtue.

SIGNED, SEALED AND DELIVERED IN _____ ORIGINAL COUNTERPARTS

this _____ day of _____ 20_____.

IF THE PRINCIPAL IS AN INDIVIDUAL, SIGN HERE

_____ *(Printed or Typed Name)*	_____ *(Printed or Typed Name)*
Witness	*Principal*
{	{
_____ *(Signature and Date)*	_____ *(Signature and Date)*

SURETY SIGN HERE

(SURETY SEAL)

_____ *(Printed or Typed Name)*	_____ *(Printed or Typed Name)*
Attest	*Surety****
{	{
_____ *(Signature and Date)*	_____ *(Signature and Date)*

*** Power of attorney must be attached to this Bid Bond.

SIGNED, SEALED AND DELIVERED IN _____ ORIGINAL COUNTERPARTS

this _____ day of _____ 20_____.

IF THE PRINCIPAL IS A PARTNERSHIP, SIGN HERE

_____ *(Printed or Typed Name)*	_____ *(Printed or Typed Name)*
Witness {	*Partner** {
_____ *(Signature and Date)*	_____ *(Signature and Date)*
_____ *(Printed or Typed Name)*	_____ *(Printed or Typed Name)*
Witness {	*Partner** {
_____ *(Signature and Date)*	_____ *(Signature and Date)*

* If the Bidder is a partnership, the Bond must be signed in the name of the partnership by at least two general partners, whose names and addresses must be listed on the certificate on page BF-3-P of the Bid.

SURETY SIGN HERE

(SURETY SEAL)

_____ *(Printed or Typed Name)*	_____ *(Printed or Typed Name)*
Attest {	*Surety**** {
_____ *(Signature and Date)*	_____ *(Signature and Date)*

*** Power of attorney must be attached to this Bid Bond.

SIGNED, SEALED AND DELIVERED IN _____ ORIGINAL COUNTERPARTS

this _____ day of _____ 20_____.

IF THE PRINCIPAL IS A CORPORATION, SIGN HERE

(CORPORATE SEAL)

_____
(Corporate Name)

	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Attest {	_____ *(Signature and Date)*	*President* *V.P.*** {	_____ *(Signature and Date)*
	_____ *(Corporate Title)*		_____ *(Corporate Title)*

** If the bidder is a corporation, the Bond must be executed in the Corporation's correct corporate name by its President or Vice President and attested to by its Secretary or Assistant Secretary or Treasurer or Assistant Treasurer, and the Certification of Corporate Principal below must be executed by the Secretary or Assistant Secretary.

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the
[ ] Secretary [ ] Assistant Secretary of the Corporation named a Bidder herein; that
(check one)

_____ who signed this Bid on behalf of the

Corporation was then _____ of said Corporation that I know his signature and his signature thereto is genuine; and that said Bid was duly signed, sealed and attested in behalf of said Corporation by authority of its governing body.

(CORPORATE SEAL)

_____
(Signature and Date)

SURETY SIGN HERE

(SURETY SEAL)

_____ _____
(Printed or Typed Name) *(Printed or Typed Name)*

Attest *Surety****

{ {

_____ _____
(Signature and Date) *(Signature and Date)*

*** Power of attorney must be attached to this Bid Bond.

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

STATEMENT OF BIDDER'S QUALIFICATIONS

Bedford Hope Center Improvements, AMP-02

_____ _____
(Bidder's Name) *(Project Name)*

_____ _____
(Address)

_____ 600-16-18
(HACP Project No.)

Names of not more than two principals to contact:

Name:_____ Name:_____

Title:_____ Title:_____

Telephone:_____ Telephone:_____

AUTHORIZATION:

Excerpt from HUD 7460.8-REV-1 AND 24 CFR 85.36(b)(8) & 24 CFR 905.160(a)(3):

"The evaluation of a contractor's ability to perform a contract is known as determining the contractor's responsibility. Has **shall** make awards only to **responsible** contractors possessing the ability to perform successfully under the terms and conditions of a proposed contract. Consideration **shall** be given to such matters as **contractor integrity, compliance with public policy, record of past performance, and financial and technical resources**.

"The award of a contract to an offeror **shall** not be made solely on the basis of the lowest evaluated price without considering the firm's ability to perform the required work. Some of the specific factors to consider include (1) whether the contractor performed satisfactorily on other HA Contracts, (2) is the contractor suspended or debarred from Federal Contracts, and (3) have other HAs has satisfactory performance from this contractor.

"A pre-award survey may entail an on-site inspection of the offeror's facilities, including a review of financial statements, record keeping, production capacity, or similar factors that impact on the ability to perform the contract.

"Recent unsatisfactory performance regarding either quality or timeliness of delivery is an example of a problem which the Contracting Officer **shall** consider and resolve as to its impact on the current procurement prior to making an affirmative determination of responsibility.

ORGANIZATION

THE BIDDER IS:

[ ] An individual doing business in his/her own name
[ ] An individual doing business under a fictitious or assumed name

[ ] A General Partnership
  [ ] Doing business under Partnership Name
  [ ] Doing business under a fictitious or assumed name

[ ] A Limited Partnership
  [ ] Doing business under Partnership Name
  [ ] Doing business under a fictitious or assumed name

[ ] A corporation doing business in its own name
[ ] A corporation doing business under a fictitious or assumed name

How many years has the bidder been in business as a Contractor? _____

How many years has the bidder been in business under its present business name? _____

Under what other or former names has the bidder operated?

PAST PERFORMANCE

CLAIMS AND SUITS. (If the answer to any of the questions below is yes, please attach explanation.)

[ ] Yes [ ] No Has the Bidder ever failed to complete any work awarded to it?

[ ] Yes [ ] No Are there any judgments, claims, arbitration proceedings or suits pending or outstanding against the bidder or its officers?

[ ] Yes [ ] No Has the bidder filed any law suits or requested arbitration with regard to construction contracts within the last five years?

[ ] Yes [ ] No Within the last five years, has any officer or principal of the bidder ever been an officer or principal of another organization when it failed to complete a construction contract? (If answer is yes, please attach details.)

State average annual amount of construction work performed during the past five years: $_____

State total worth of work in progress and under contract: $_____

On a separate sheet, list major construction projects the bidder has in progress, giving the name of project, owner, architect, contract amount, percent complete and scheduled completion date.

On a separate sheet, list the major projects the bidder has completed in the past five years, giving the name of project, owner, architect, contract amount, date of completion and percentage of the cost of the work performed with your own forces.

FINANCIAL RESOURCES

Financial Statement.

Attach a financial statement (audited if available), including the bidder's latest balance sheet and income statement showing the following items:

Current Assets (e.g. cash, joint venture accounts, accounts receivable, notes receivable, accrued income, deposits, materials inventory and prepaid expenses);
Net Fixed Assets;
Other Assets;
Current Liabilities (e.g. accounts payable, notes payable, accrued expenses, provision for income taxes, advances, accrued salaries and accrued payroll taxes);
Other Liabilities (e.g. capital, capital stock, authorized and outstanding shares par values, earned surplus and retained earnings).

Name and address of firm preparing attached financial statement, and date thereof:

[ ] Yes [ ] No Is the attached financial statement for the identical organization named on page one?

If not, explain the relationship and financial responsibility of the organization whose financial statement is provided (e.g., parent-subsidiary).

[ ] Yes [ ] No Will the organization whose financial statement is attached act as guarantor of the contract for construction?

TECHNICAL RESOURCES

Licensing:
List jurisdictions and trade categories in which the bidder is legally qualified to do business, and indicate registration or license numbers, if applicable.

Experiences:
List the categories of work that the bidder normally performs with its own forces.

On a separate sheet, list the construction experience and present commitments of the key individuals of the bidder.

REFERENCES

List Trade References (use separate sheet if necessary):

List Bank References (use separate sheet if necessary):

List previous HUD/USDA-FmHA projects and Section 8 Contracts (formerly Schedule A on HUD-2530). Applicable to construction contracts exceeding $50,000. List each principals name, previous project, principal's participation role and interest, and disclose defaults, mortgage relief, assignments and foreclosures. **Note that having a Master Schedule on file with HUD will not meet this requirement.**

Certifications: I (meaning the individual who signs as well as the corporations, partnerships or other parties listed above who certify) hereby apply to HUD or USDA-FmHA, as the case may be, for approval to participate as a principal in the role and project listed above based upon my following previous participation record of this Certification.

I certify 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, including the data contained in Schedule A and Exhibits, signed by me and attached to this form.
Warning: HUD and/or the Authority will prosecute false claims and statements. Conviction may result in criminal and/or civil penalties. (18 U.S.C. 1001, 1012;31 U.S.C. 3729, 3802)

I further certify that:

1. The list of previous HUD/USDA-FmHA projects and Section 8 Contracts contains a listing of every assisted or insured project of HUD, which I have been or am now a principal.

2. For the period beginning 10 years prior to the date of this certification, and except as shown by me on the certification.
   a. No mortgage on a project listed by me has ever been in default, assigned to the Government or foreclosed, nor has mortgage relief by the mortgagee been given;
   b. I have not experienced default or noncompliance under any Conventional Contract or Turnkey Contract of Sale in connection with a public housing project;
   c. To the best of my knowledge, there are no unresolved findings raised as a result of HUD audits, management reviews or other Governmental investigations concerning me or my projects;
   d. There has not been a suspension or termination of payments under any HUD assistance contract in which I have had a legal or beneficial interest;
   e. 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. (A felony is defined as any offense punishable by imprisonment for a term exceeding one year, but does not include any offense classified as a misdemeanor under the laws of a State and punishable by imprisonment of two years or less);
   f. I have not been suspended, debarred or otherwise restricted by any Department or Agency of the Federal Government or of a State Government from doing business with such Department or Agency.

g. I have not defaulted on an obligation covered by a surety or performance bond and have not been the subject of a claim under an employee fidelity bond.

3. All the names of the parties, known to me to be principals in this project(s) in which I propose to participate, are listed above.

4. I am not a HUD/FmHA employee or a member of a HUD/FmHA employee's immediate household as defined in Standards of Ethical Conduct for Employees of the Executive Branch in 5 C.F.R. Part 2635 (57 FR 35006) and HUD's Standard of Conduct in 24 C.F.r. Part O and USDA's Standard of Conduct in 7 C.F.R. Part 9 Subpart B.

5. I am not a Housing Authority of the City of Pittsburgh employee or a member of an Authority employee's immediate family.

6. I am not a principal participant in an assisted or insured project as of this date on which construction has stopped for a period in excess of 20 days or which has been substantially completed for more than 90 days and documents for closing, including final cost certification have not been filed with HUD or FmHA.

7. To my knowledge I have not been found by HUD or FmHA to be in noncompliance with any applicable civil rights law.

8. 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.

9. 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 facts and circumstances which I think helps to qualify me as a responsible principal for participation in this project.

(Signature and Date)

(Typed or Printed Name)

(Title)

(Company Name)

Subscribed and sworn to before me

this_____ day of _____, 20

My Commission expires _____, 20

All section 3 covered contracts shall include the following clause (referred to as the section 3 clause):

A. 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 by section 3, shall, to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.

B. 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.

C. 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.

D. 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.

E. 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 24 CFR part 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR part 135.

F. 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.

G. 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. 450e) 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 derogation of compliance with section 7(b).

Housing Authority City of Pittsburgh

Development and Modernization Department

Bidder's Section 3 Participation Form

A. Bidder's Section 3 Hiring Plan

Job Category	Total Estimated Positions Needed for Project	No. Positions Occupied by Permanent Employees*	Number of Positions Not Occupied	Number of Positions Available for Section 3 Residents
Trade:				
Journeyman				
Helper				
Apprentices				
Trainees				
Laborer				
Others				

*** Please submit a list of current employees to be assigned to this project including Dates of Hire**

B. Bidder's Section 3 Subcontracting Plan

SUB - CONTRACTOR'S NAME**	SUB - CONTRACTORS ADDRESS	PHONE NUMBER	FEDERAL TAX ID NO./ SS#	DESCRIPTION OF WORK	Sub - Contract Amount

**** If the Bidder has not identified a Section 3 subcontractor, please indicate if there will be any Section 3 subcontracting opportunity and describe scope of work**_____

_____
Company Name

_____
Project Name

_____
Project Number

_____
Name and Title of Person Completing this Form

_____
Signature and Date

PLACE HOLDER FOR

ROSTER OF CURRENT EMPLOYEES

Pursuant to Housing Authority of the City of Pittsburgh Section 3 Program Manual, Part I, Section A - Section 3 Policy Statement (in part):

"HACP shall examine and consider a contractor's potential for success in providing employment and business opportunities to those covered under Section 3 prior to acting on any proposed contract award. In response to any RFP, RFQ or IFB HACP will require submission of the Section 3 Opportunities Plan and roster of current employees, and certification that the bidder will comply with the requirements of Section 3."

Section 3 Participation

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. 450e) 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 derogation of compliance with Section 7(b).

RESIDENT HIRING REQUIREMENTS / RESIDENT HIRING SCALE

TOTAL LABOR DOLLARS USE TOTAL CONTRACT AMOUNT FOR SERVICE CONTRACTS	RESIDENT LABOR AS A % OF TOTAL LABOR DOLLARS
Labor dollars $25,000 but less than $100,000	10% of the labor dollars
$100,000, but less than $200,000	9% of the labor dollars
At least $200,000, but less than $300,000	8% of the labor dollars
At least $300,000, but less than $400,000	7% of the labor dollars
At least $400,000, but less than $500,000	6% of the labor dollars
At least $500,000, but less than $1 million	5% of the labor dollars
At least $1 million, but less than $2 million	4% of the labor dollars
At least $2 million, but less than $4 million	3% of the labor dollars
At least $4 million, but less than $7 million	2% of the labor dollars
$7 million or more	½ to 1 % of the labor dollars

A copy of HACP's Section 3 Program Manual is available for download at www.HACP.org.

SECTION 3 OPPORTUNITIES PLAN

Business Opportunities and Employment Training for Housing Authority of the City of Pittsburgh Low Income Public Housing Residents (LIPH) and Area Residents of Low and Very Low Income Status (ARLIS)

PRIME CONTRACTOR'S NAME: _____
SPECIFICATION OR RFP/IFB/RFQ NUMBER: _____
SPECIFICATION OR RFP/IFB/RFQ TITLE: _____

The Contractor hereby agrees to comply with all the provisions of Section 3 as set forth in 24 CFR 135.1 et seq. and the HACP Section 3 Policy and Program requirements. The Contractor hereby submits this document to identify employment opportunities for HACP residents (LIPH) and **Area Residents of Low and Very Low Income Status (ARLIS**) during the term of the contract between the Contractor and the HACP.

The preference of HACP is to ensure that as many HACP residents as possible are employed. In an effort to further that requirement, HACP has created a preference tier structure as outlined in the HACP Section 3 Policy and Program Manual which can be reviewed by visiting the "Vendor Services" section of www.hacp.org. Contractors are required to comply with Section 3 by first considering Tier I – Hiring. If the Contractor cannot meet its Section 3 requirement in Tier I and needs to move to Tier II or Tier III, that Contractor must document this inability to comply with the preference and the need to move to a lower tier. (Such inability **must** be documented for moves within tiers). The Contractor agrees to meet its Section 3 requirement following the Preferential Tier Structure as indicated by the selection below (check one or more tiers below):

[ ] Tier I – HIRING

The Contractor affirms that the jobs identified shall be for meaningful employment that may or may not be related to the scope of services covered under Contract/Purchase Order # _____. The Contractor has committed to employ _____ resident(s) in order to comply with its Section 3 requirements. A prime contractor may satisfy the HACP Resident Hiring Requirements through his/her subcontractors. **Contact the HACP Resident Employment Program for resident referrals at 412-395-3950, Ext 1048.**

When Tier I is selected, the Contractor shall complete the following table as instructed below:

(1) Indicate each job title for all phases of this contract
(2) The number of positions that will be needed in each category
(3) How many of those positions are currently filled
(4) The number currently filled by low and very low-income HACP residents
(5) The number currently filled by City of Pittsburgh neighborhood area residents
(6) How many positions need to be filled

Indicate your requirement for the number of positions you intend to fill with:

(7) Low income HACP Residents (LIPH) and/or
(8) Low and very low income City of Pittsburgh Neighborhood Area Residents (ARLIS)

SECTION 3 OPPORTUNITIES PLAN

Section 3 Labor Utilization Assessment and Plan							
SPEC or RFP TITLE:				SPEC or RFP NUMBER:			
JOB TITLE (1)	NUMBER OF POSITIONS					HIRING REQUIREMENT	
	# NEEDED (2)	CURRENTLY FILLED			TO BE FILLED (6)	LIPH (7)	ARLIS (8)
		TOTAL (3)	LIPH (4)	ARLIS (5)			

LIPH – HACP low income public housing resident
ARLIS - Area Residents of Low/Very Low Income Status – (Area is the Pittsburgh metropolitan area)

In the event the value of Section 3 resident hiring is less than the amount identified in the Resident Hiring Scale, vendors must contribute to the HACP Education Fund an amount not less than the difference between the value of Section 3 hiring and the amount identified in the Resident Hiring Scale, which funds shall be used to provide other economic opportunities.
Therefore, if it is anticipated that any position listed above shall be for less than the full term of the contract period, you must indicate on the lines below, the anticipated term for each position:

_____

_____

SECTION 3 OPPORTUNITIES PLAN

[ ] Tier II – CONTRACTING

The contractor has identified _____ HACP resident-owned business(es) or _____ Section 3 business(es) which is/are 51 percent or more owned by Section 3 residents or 30 percent or more of their permanent full-time workforce are Section 3 residents. This will satisfy the contractor's Section 3 requirement covered under Contract/Purchase Order # _____.

In a one (1) page letter on your firm's letterhead:

1) Indicate the requirements, expressed in terms of percentage, of planned contracting dollars for the use of Section 3 business concerns as subcontractors.

2) A statement of the total dollar amount to be contracted, total dollar amount to be contracted to Section 3 business concerns for building trades, and total dollar amount to be contracted to Section 3 business concerns for other than building trades work (maintenance, repair, modernization, and development).

3) A description of the method used to develop the requirements above and the efforts to be undertaken by the contractor to meet those requirements.

[ ] Tier III - OTHER ECONOMIC OPPORTUNITIES

Firms may provide other economic opportunities to train and employ Section 3 residents or make a direct cash contribution to the HACP Education Fund. HACP has established the following minimum threshold requirements for provision of training or contribution to the HACP fund that provides other economic opportunities:

a) Contractor incurs the cost of providing skilled training for residents in an amount commensurate with the sliding scale set forth in the Resident Hiring Scale; or,

b) Contractor makes a contribution to the HACP Education Fund at Clean Slate E3 to provide assistance to residents to obtain training. The level of contribution would be commensurate with the sliding scale set forth in the Resident Hiring Scale.
Contractor shall provide, in a letter on firm letterhead:

1) Indication of the skilled training to be provided, the number of persons to be trained, the training provider, the cost of training, and the trainee recruitment plan; or,
2) Provide the amount of planned contribution to be made in relation to percentage of the contract labor hours costs. (Contribution checks should be made payable to: Clean Slate E3 Education Fund and mailed to Clean Slate E3, C/O Housing Authority of the City of Pittsburgh, Finance Department, 200 Ross Street, 9th Floor, Pittsburgh, PA 15219.

[ ] Tier IV – No New Hire Opportunity

If awarded this contract, the contractor will be able to fulfill the requirements of the IFB/RFP/RFQ with the existing work force. No new hires will be employed as a result of this award. If this position changes and hiring opportunities become necessary, the HACP Resident Employment Program will be notified.



SECTION 3 OPPORTUNITIES PLAN

By signing below, the Contractor hereby agrees to comply with the selected Section 3 requirements indicated above. To the extent that the completion of this form is contingent upon future information, for example price negotiations, request for specific services, etc., the undersigned hereby affirms and agrees to fully adhere to the spirit and intent of the HACP Section 3 Policy.

Furthermore, the undersigned acknowledges and affirms responsibility for completion and submission of this form as part of the response documentation for this Invitation for Bid or Request for Proposal. Failure to submit this form may jeopardize the responsiveness of your submission.

Company Name:_____

Name:_____

Title:_____

Signature:_____Date:_____

Witness Name:_____

Witness Signature:_____Date:_____

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH
MBE/WBE SOLICITATION AND COMMITMENT RECORD

SOLICITATION AND COMMITMENT STATEMENT
MINORITY (MBE) AND FEMALE (WBE) OWNED BUSINESS ENTERPRISES

BID NUMBER	NAME OF BIDDER	ADDRESS	PHONE

List below All MBE/WBE's that were solicited - whether or not a commitment was obtained -- Copy this form as necessary

_____MBE _____WBE	TYPE OF SUBCONTRACT WORK OR MATERIALS	DATE SOLICITED BY PHONE	DATE SOLICITED BY MAIL	COMMITMENT MADE YES (IF YES, GIVE DATE)	COMMITMENT MADE NO	GIVE REASON(S) IF NO COMMITMENT MADE
COMPANY NAME						
ADDRESS		QUOTE RECEIVED		AMOUNT COMMITTED		
CONTACT PERSON PHONE		YES	NO	DOLLAR AMOUNT $		
				PERCENT OF TOTAL BID %		

_____MBE _____WBE	TYPE OF SUBCONTRACT WORK OR MATERIALS	DATE SOLICITED BY PHONE	DATE SOLICITED BY MAIL	COMMITMENT MADE YES (IF YES, GIVE DATE)	COMMITMENT MADE NO	GIVE REASON(S) IF NO COMMITMENT MADE
COMPANY NAME						
ADDRESS		QUOTE RECEIVED		AMOUNT COMMITTED		
CONTACT PERSON PHONE		YES	NO	DOLLAR AMOUNT $		
				PERCENT OF TOTAL BID %		

_____MBE _____WBE	TYPE OF SUBCONTRACT WORK OR MATERIALS	DATE SOLICITED BY PHONE	DATE SOLICITED BY MAIL	COMMITMENT MADE YES (IF YES, GIVE DATE)	COMMITMENT MADE NO	GIVE REASON(S) IF NO COMMITMENT MADE
COMPANY NAME						
ADDRESS		QUOTE RECEIVED		AMOUNT COMMITTED		
CONTACT PERSON PHONE		YES	NO	DOLLAR AMOUNT $		
				PERCENT OF TOTAL BID %		

Prepared by: Title: Phone:

NOTE: Certification and letters of intent for each MBE/WBE commitment must accompany this document.

MBE/WBE Participation Plan

I. SMALL BUSINESS PARTICIPATION
Is the Bidder a Small Business as defined by the size and standards in 13 CFR 121?

Yes _____ No _____

II. MINORITY BUSINESS PARTICIPATION
Is the Bidder classified as a Minority Business Enterprise?

Yes _____ No _____

If "No", are any Subcontractors classified as Minority Business enterprises?

Yes _____ No _____

If "Yes", please fill in the following chart:

Consulting Firm(s) (MBE)	$ Value Contract	% of Fee

III. WOMEN-OWNED BUSINESS PARTICIPATION
Is the Bidder classified as a Woman-Owned Business Enterprise?

Yes _____ No _____

If "No", area any Subcontractors classified as Women-Owned Business Enterprises?

Yes _____ No _____

If "Yes", please fill in the following chart:

Consulting Firm(s) (WBE)	$ Value Contract	% of Fee

****All MBE/WBE firms must be certified.**
In order for the MBE/WBE participation plan to be complete, copies of MBE/WBE certification must be included for all firms listed.

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH
MBE/WBE RECORD
MBE/WBE SOLICITATION AND COMMITMENT STATEMENT
MBE/WBE 3-YEAR RECORD

BIDDERS NAME: _____
ADDRESS: _____
TELEPHONE: _____
CONTACT PERSON: _____
PROPOSAL AND BID FOR: _____

List below all contracts with the Housing Authority of the City of Pittsburgh during the past three years and the MBE and WBE participation obtained.					
CONTRACT TITLE	CONTRACT DATE	AMOUNT	% PARTICIPATION MBE	WBE	COMMENTS

Prepared by: Title: Phone:

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH
MBE/WBE SOLICITATION AND COMMITMENT STATEMENT
ADDITIONAL INFORMATION SHEET

The bidder presents the following as additional and supplemental information to its MBE/WBE Solicitation and Commitment Statement.

Prepared by: Title: Phone:

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH
MBE/WBE EXHIBIT

MBE/WBE COMMITMENT WAIVER REQUEST FORM

BIDDER'S FIRM:_____
ADDRESS:_____
TELEPHONE:_____
CONTACT PERSON:_____
PROPOSAL AND BID FOR:_____

Waiver of the MBE/WBE participation requirement is requested for the following reasons:

Prepared by: Title: Phone:

NOTE: The fully completed MBE/WBE Solicitation and Commitment Statement must accompany this waiver request.

Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11625)

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Specifications" set forth herein.

2. The goals for minority and female participation at the Housing Authority of the City of Pittsburgh are pursuant to the Mayor's promulgated Executive Order, and the action of the Housing Authority Board. Expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, these goals are seventeen percent (18%) of the total cost of the contract to be expended for minority participation and six percent (7%) for women participation. These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and nonfederally involved construction.

   The Contractor's compliance with the Executive Order and the regulations in Section 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in Section 41 CFR Part 60-4.3(a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in Section 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification, within 10 working days of award of any construction subcontract in excess of $10,000 at any tier for construction work under the contract resulting from this solicitation, to:

   LaVaris Ross, Labor Relations Specialist
   U.S. Department of Housing and Urban Development
   Office of Labor Relations
   City Crescent Building
   10 S. Howard Street, 5th Floor
   Baltimore, MD 21201

   The notification shall list the name, address and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed.

4. As used in this Notice, and in the contract resulting from this solicitation, the "covered area" is within the Commonwealth of Pennsylvania, County of Allegheny, City of Pittsburgh.

Housing Authority of the City of Pittsburgh

Development & Modernization
100 Ross Street, Suite 200
Pittsburgh, PA 15219
(412) 456-5020
www.hacp.org

NOTICE TO ALL PROSPECTIVE BIDDERS

REQUEST FOR MANPOWER PLAN

Bedford Hope Center Improvements, AMP-02

HACP CONTRACT NO. 600-16-18

Each bid must include a separate Manpower Plan and Major Equipment List for this Invitation for Bids. The Manpower Plan must include (1) the names of the bidder's personnel to be assigned to the Project, (2) trade/position, (3) Social Security Number or Driver's License Number and (4) Employee Date of Hire.

In the event you are bidding on multiple HACP construction work, each bid must include a separate Manpower Plan and Major Equipment List that clearly demonstrates that the bidder has the capacity and will not use the same personnel and equipment on more than one HACP construction work that are being executed simultaneously within the next 180 days.

HACP will use this information to determine whether the bidder has the capacity to perform the work.

Please acknowledge receipt of this Notice by completing the information below and the attached and including copies in your bid.

Bidder's Name: _____

Name of the Person Signing the Bid: _____

Signature of the Person Signing the Bid: _____

Bid Due Date: _____

Housing Authority of the City of Pittsburgh

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(412) 456-5020
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Bidder's Planned Manpower

Provide Employee Name, Trade/Position, Social Security Number or Driver's License Number and Date of Hire for each employee:
(use additional sheets if necessary).

Name	Position	Social Security No. or Driver's License No.		Date of Hire

Housing Authority of the City of Pittsburgh

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SPECIAL PROVISIONS
FOR INVITATION FOR BIDS (IFB)

REQUEST FOR INFORMATION

Each bidder must submit the following information to assist the Owner to determine if the Bidder has the capacity to perform the required work under this **Project Name:_____ IFB No. _____.**

Bidder's Capacity

Provide information demonstrating the Bidder's ability to provide the resources necessary for the timely and efficient implementation of the construction work. Due to the nature of this procurement, capacity will also be evaluated based on the Bidder's ability to complete the work on time and within budget, therefore, please describe the Bidder's Capacity as follows:

1. Manpower Plan and Major Equipment List (Please complete **Form 00435-1 & 2**).
2. List a maximum of three-(3) current or completed ***Housing Authority of the City of Pittsburgh*** related projects, the **Initial Contract Value, Change Orders, if any, and Final Contract Value**. If the project was not completed within budget and on time, please explain the circumstances and/or justification for the change order(s): Please attach a separate sheet if you do not have sufficient space.

Project #	Initial Contract Value	Change Order(s)	Final Contract Value
a.			
b.			
c.			

Justification for Change Orders/Schedule:_____
_____

3. List at least three-(3) other Owners including one current or completed project plus the following information:

Vendor's Name & Contact #	Initial Contract Value	Change Order(s)	Final Contract Value
a.			
b.			
c.			

Justification for Change Orders/Schedule:_____
_____

The Bidder hereby certifies that the information provided above is accurate/correct and provision of false information can be a basis for the rejection of this bid:

Bidder's Name:_____ Bidder's Signature:_____
Date:_____

Housing Authority of the City of Pittsburgh

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(412) 456-5020
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NOTICE TO ALL PROSPECTIVE BIDDERS

Previous Related Experience
for

Bedford Hope Center Improvements, AMP-02

HACP CONTRACT NO. 600-16-18

The bidder shall list three (3) firms, governmental units, or persons for whom the bidder has previously performed work of the nature requested under this IFB. Bidder shall list as references all housing authorities, including HACP, for whom the bidder has previously performed work of the nature requested under this IFB. HACP reserves the right to contact such persons at anytime prior to award and the bidder agrees that HACP may rely on information provided by such persons to determine the bidder's responsibility.

In addition to the references, all bidders will provide the last three jobs they performed, contact information from the job and all change orders related to the job and the reason for each.

All bidders will provide information on the most recet HACP job to include all change order information and the reason for each. The most recent HACP job can be one of the 3 last jobs performed if that is the case.

Reference 1			
Project:			
Contact:			
Contact Telephone Number:			
Contract Amount:			
Change Orders			
Number	**Total $ Value per Change**	**Description of Change**	**Reason for Change**
1			
2			
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Housing Authority of the City of Pittsburgh

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Previous Related Experience
for
Bedford Hope Center Improvements, AMP-02

HACP CONTRACT NO. 600-16-18

The bidder shall list three (3) firms, governmental units, or persons for whom the bidder has previously performed work of the nature requested under this IFB. Bidder shall list as references all housing authorities, including HACP, for whom the bidder has previously performed work of the nature requested under this IFB. HACP reserves the right to contact such persons at anytime prior to award and the bidder agrees that HACP may rely on information provided by such persons to determine the bidder's responsibility.

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All bidders will provide information on the most recet HACP job to include all change order information and the reason for each. The most recent HACP job can be one of the 3 last jobs performed if that is the case.

Reference 2			
Project:			
Contact:			
Contact Telephone Number:			
Contract Amount:			
Change Orders			
Number	**Total $ Value per Change**	**Description of Change**	**Reason for Change**
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Previous Related Experience
for

Bedford Hope Center Improvements, AMP-02

HACP CONTRACT NO. 600-16-18

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In addition to the references, all bidders will provide the last three jobs they performed, contact information from the job and all change orders related to the job and the reason for each.

All bidders will provide information on the most recet HACP job to include all change order information and the reason for each. The most recent HACP job can be one of the 3 last jobs performed if that is the case.

Reference 3			
Project:			
Contact:			
Contact Telephone Number:			
Contract Amount:			
Change Orders			
Number	**Total $ Value per Change**	**Description of Change**	**Reason for Change**
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Previous Related Experience
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HACP CONTRACT NO. 600-16-18

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In addition to the references, all bidders will provide the last three jobs they performed, contact information from the job and all change orders related to the job and the reason for each.

All bidders will provide information on the most recet HACP job to include all change order information and the reason for each. The most recent HACP job can be one of the 3 last jobs performed if that is the case.

Reference 4			
Project:			
Contact:			
Contact Telephone Number:			
Contract Amount:			
Change Orders			
Number	**Total $ Value per Change**	**Description of Change**	**Reason for Change**
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Previous Related Experience
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HACP CONTRACT NO. 600-16-18

The bidder shall list three (3) firms, governmental units, or persons for whom the bidder has previously performed work of the nature requested under this IFB. Bidder shall list as references all housing authorities, including HACP, for whom the bidder has previously performed work of the nature requested under this IFB. HACP reserves the right to contact such persons at anytime prior to award and the bidder agrees that HACP may rely on information provided by such persons to determine the bidder's responsibility.

In addition to the references, all bidders will provide the last three jobs they performed, contact information from the job and all change orders related to the job and the reason for each.

All bidders will provide information on the most recet HACP job to include all change order information and the reason for each. The most recent HACP job can be one of the 3 last jobs performed if that is the case.

Reference 5			
Project:			
Contact:			
Contact Telephone Number:			
Contract Amount:			
Change Orders			
Number	**Total $ Value per Change**	**Description of Change**	**Reason for Change**
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HACP CONTRACT NO. 600-16-18

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In addition to the references, all bidders will provide the last three jobs they performed, contact information from the job and all change orders related to the job and the reason for each.

All bidders will provide information on the most recet HACP job to include all change order information and the reason for each. The most recent HACP job can be one of the 3 last jobs performed if that is the case.

Reference 6			
Project:			
Contact:			
Contact Telephone Number:			
Contract Amount:			
Change Orders			
Number	**Total $ Value per Change**	**Description of Change**	**Reason for Change**
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Previous Related Experience
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HACP CONTRACT NO. 600-16-18

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In addition to the references, all bidders will provide the last three jobs they performed, contact information from the job and all change orders related to the job and the reason for each.

All bidders will provide information on the most recet HACP job to include all change order information and the reason for each. The most recent HACP job can be one of the 3 last jobs performed if that is the case.

Reference 7			
Project:			
Contact:			
Contact Telephone Number:			
Contract Amount:			
Change Orders			
Number	**Total $ Value per Change**	**Description of Change**	**Reason for Change**
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***All contractors MUST submit 3 references and most recent HACP Job if applicable.**

U.S. Department of Housing and Urban Development

Office of Public and Indian Housing

Representations, Certifications, and Other Statements of Bidders

Public and Indian Housing Programs

Representations, Certifications, and Other Statements of Bidders

Public and Indian Housing Programs

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1. Certificate of Independent Price Determination

(a) The bidder certifies that--

(1) The prices in this bid have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other bidder or competitor relating to (i) those prices, (ii) the intention to submit a bid, or (iii) the methods or factors used to calculate the prices offered;

(2) The prices in this bid have not been and will not be knowingly disclosed by the bidder, directly or indirectly, to any other bidder or competitor before bid opening (in the case of a sealed bid solicitation) or contract award (in the case of a competitive proposal solicitation) unless otherwise required by law; and

(3) No attempt has been made or will be made by the bidder to induce any other concern to submit or not to submit a bid for the purpose of restricting competition.

(b) Each signature on the bid is considered to be a certification by the signatory that the signatory--

(1) Is the person in the bidder's organization responsible for determining the prices being offered in this bid or proposal, and that the signatory has not participated and will not participate in any action contrary to subparagraphs (a)(l) through (a)(3) above; or

(2) (i) Has been authorized, in writing, to act as agent for the following principals in certifying that those principals have not participated, and will not participate in any action contrary to subparagraphs (a)(l) through (a)(3) above.

_____ [insert full name of person(s) in the bidder's organization responsible for determining the prices offered in this bid or proposal, and the title of his or her position in the bidder's organization];

(ii) As an authorized agent, does certify that the principals named in subdivision (b)(2)(i) above have not participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above; and

(iii) As an agent, has not personally participated, and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above.

(c) If the bidder deletes or modifies subparagraph (a)2 above, the bidder must furnish with its bid a signed statement setting forth in detail the circumstances of the disclosure.

☑ [Contracting Officer check if following paragraph is applicable]

(d) Non-collusive affidavit. (applicable to contracts for construction and equipment exceeding $50,000)

(1) Each bidder shall execute, in the form provided by the PHA/IHA, an affidavit to the effect that he/she has not colluded with any other person, firm or corporation in regard to any bid submitted in response to this solicitation. If the successful bidder did not submit the affidavit with his/her bid, he/she must submit it within three (3) working days of bid opening. Failure to submit the affidavit by that date may render the bid nonresponsive. No contract award will be made without a properly executed affidavit.

(2) A fully executed "Non-collusive Affidavit" [ ] is, [ ] is not included with the bid.

2. Contingent Fee Representation and Agreement

(a) Definitions. As used in this provision:

"Bona fide employee" means a person, employed by a bidder and subject to the bidder's supervision and control as to time, place, and manner of performance, who neither exerts, nor proposes to exert improper influence to solicit or obtain contracts nor holds out as being able to obtain any contract(s) through improper influence.

"Improper influence" means any influence that induces or tends to induce a PHA/IHA employee or officer to give consideration or to act regarding a PHA/IHA contract on any basis other than the merits of the matter.

(b) The bidder represents and certifies as part of its bid that, except for full-time bona fide employees working solely for the bidder, the bidder:

(1) [ ] has, [ ] has not employed or retained any person or company to solicit or obtain this contract; and

(2) [ ] has, [ ] has not paid or agreed to pay to any person or company employed or retained to solicit or obtain this contract any commission, percentage, brokerage, or other fee contingent upon or resulting from the award of this contract.

(c) If the answer to either (a)(1) or (a)(2) above is affirmative, the bidder shall make an immediate and full written disclosure to the PHA/IHA Contracting Officer.

(d) Any misrepresentation by the bidder shall give the PHA/IHA the right to (1) terminate the contract; (2) at its discretion, deduct from contract payments the amount of any commission, percentage, brokerage, or other contingent fee; or (3) take other remedy pursuant to the contract.

3. Certification and Disclosure Regarding Payments to Influence Certain Federal Transactions (applicable to contracts exceeding $100,000)

(a) The definitions and prohibitions contained in Section 1352 of title 31, United States Code, are hereby incorporated by reference in paragraph (b) of this certification.

(b) The bidder, by signing its bid, hereby certifies to the best of his or her knowledge and belief as of December 23, 1989 that:

(1) No Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress on his or her behalf in connection with the awarding of a contract resulting from this solicitation;

(2) If any funds other than Federal appropriated funds (including profit or fee received under a covered Federal transaction) have been paid, or will be paid, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress on his or her behalf in connection with this solicitation, the bidder shall complete and submit, with its bid, OMB standard form LLL, "Disclosure of Lobbying Activities;" and

(3) He or she will include the language of this certification in all subcontracts at any tier and require that all recipients of subcontract awards in excess of $100,000 shall certify and disclose accordingly.

(c) Submission of this certification and disclosure is a prerequisite for making or entering into this contract imposed by section 1352, title 31, United States Code. Any person who makes an expenditure prohibited under this provision or who fails to file or amend the disclosure form to be filed or amended by this provision, shall be subject to a civil penalty of not less than $10,000, and not more than $100,000, for each such failure.

(d) Indian tribes (except those chartered by States) and Indian organizations as defined in section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450B) are exempt from the requirements of this provision.

4. Organizational Conflicts of Interest Certification

The bidder certifies 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 hereby certify that 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.

5. Bidder's Certification of Eligibility

(a) 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 in which this contract is to be performed; or,

(2) Participate in HUD programs pursuant to 24 CFR Part 24.

(b) The certification in paragraph (a) 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.

6. Minimum Bid Acceptance Period

(a) "Acceptance period," as used in this provision, means the number of calendar days available to the PHA/IHA for awarding a contract from the date specified in this solicitation for receipt of bids.

(b) This provision supersedes any language pertaining to the acceptance period that may appear elsewhere in this solicitation.

(c) The PHA/IHA requires a minimum acceptance period of [Contracting Officer insert time period] calendar days.

(d) In the space provided immediately below, bidders may specify a longer acceptance period than the PHA's/IHA's minimum requirement. The bidder allows the following acceptance period: calendar days.

(e) A bid allowing less than the PHA's/IHA's minimum acceptance period will be rejected.

(f) The bidder agrees to execute all that it has undertaken to do, in compliance with its bid, if that bid is accepted in writing within (1) the acceptance period stated in paragraph (c) above or (2) any longer acceptance period stated in paragraph (d) above.

7. Small, Minority, Women-Owned Business Concern Representation

The bidder represents and certifies as part of its bid/ offer that it --

(a) [ ] is, [ ] is not a small business concern. "Small business concern," as used in this provision, means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding, and qualified as a small business under the criteria and size standards in 13 CFR 121.

(b) [ ] is, [ ] is not a women-owned business enterprise. "Women-owned business enterprise," as used in this provision, means a business that is at least 51 percent owned by a woman or women who are U.S. citizens and who also control and operate the business.

(c) [ ] is, [ ] is not a minority business enterprise. "Minority business enterprise," as used in this provision, means a business which is at least 51 percent owned or controlled by one or more minority group members or, in the case of a publicly owned business, at least 51 percent of its voting stock is owned by one or more minority group members, and whose management and daily operations are controlled by one or more such individuals. For the purpose of this definition, minority group members are:

(Check the block applicable to you)

[ ] Black Americans	[ ] Asian Pacific Americans
[ ] Hispanic Americans	[ ] Asian Indian Americans
[ ] Native Americans	[ ] Hasidic Jewish Americans

8. Indian-Owned Economic Enterprise and Indian Organization Representation (applicable only if this solicitation is for a contract to be performed on a project for an Indian Housing Authority)

The bidder represents and certifies that it:

(a) [ ] is, [ ] is not an Indian-owned economic enterprise. "Economic enterprise," as used in this provision, means any commercial, industrial, or business activity established or organized for the purpose of profit, which is at least 51 percent Indian owned. "Indian," as used in this provision, means any person who is a member of any tribe, band, group, pueblo, or community which is recognized by the Federal Government as eligible for services from the Bureau of Indian Affairs and any "Native" as defined in the Alaska Native Claims Settlement Act.

(b) [ ] is, [ ] is not an Indian organization. "Indian organization," as used in this provision, means the governing body of any Indian tribe or entity established or recognized by such governing body. Indian "tribe" means any Indian tribe, band, group, pueblo, or

community including Native villages and Native groups (including corporations organized by Kenai, Juneau, Sitka, and Kodiak) as defined in the Alaska Native Claims Settlement Act, which is recognized by the Federal Government as eligible for services from the Bureau of Indian Affairs.

9. Certification of Eligibility Under the Davis-Bacon Act (applicable to construction contracts exceeding $2,000)

(a) By the submission of this bid, the bidder certifies that neither it nor any person or firm who has an interest in the bidder's firm is a person or firm ineligible to be awarded contracts by the United States Government by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(b) No part of the contract resulting from this solicitation shall be subcontracted to any person or firm ineligible to be awarded contracts by the United States Government by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(c) The penalty for making false statements is prescribed in the U. S. Criminal Code, 18 U.S.C. 1001.

10. Certification of Nonsegregated Facilities (applicable to contracts exceeding $10,000)

(a) The bidder's attention is called to the clause entitled **Equal Employment Opportunity** of the General Conditions of the Contract for Construction.

(b) "Segregated facilities," as used in this provision, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees, that are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin because of habit, local custom, or otherwise.

(c) By the submission of this bid, the bidder certifies that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The bidder agrees that a breach of this certification is a violation of the Equal Employment Opportunity clause in the contract.

(d) The bidder further agrees that (except where it has obtained identical certifications from proposed subcontractors for specific time periods) prior to entering into subcontracts which exceed $10,000 and are not exempt from the requirements of the Equal Employment Opportunity clause, it will:

(1) Obtain identical certifications from the proposed subcontractors;

(2) Retain the certifications in its files; and

(3) Forward the following notice to the proposed subcontractors (except if the proposed subcontractors have submitted identical certifications for specific time periods):

Notice to Prospective Subcontractors of Requirement for Certifications of Nonsegregated Facilities

A Certification of Nonsegregated Facilities must be submitted before the award of a subcontract exceeding $10,000 which is not exempt from the provisions of the Equal Employment Opportunity clause of the prime contract. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

Note: The penalty for making false statements in bids is prescribed in 18 U.S.C. 1001.

11. Clean Air and Water Certification (applicable to contracts exceeding $100,000)

The bidder certifies that:

(a) Any facility to be used in the performance of this contract [ ] is, [ ] is not listed on the Environmental Protection Agency List of Violating Facilities:

(b) The bidder will immediately notify the PHA/IHA Contracting Officer, before award, of the receipt of any communication from the Administrator, or a designee, of the Environmental Protection Agency, indicating that any facility that the bidder proposes to use for the performance of the contract is under consideration to be listed on the EPA List of Violating Facilities; and,

(c) The bidder will include a certification substantially the same as this certification, including this paragraph (c), in every nonexempt subcontract.

12. Previous Participation Certificate (applicable to construction and equipment contracts exceeding $50,000)

(a) The bidder shall complete and submit with his/her bid the Form HUD-2530, "Previous Participation Certificate." If the successful bidder does not submit the certificate with his/her bid, he/she must submit it within three (3) working days of bid opening. Failure to submit the certificate by that date may render the bid nonresponsive. No contract award will be made without a properly executed certificate.

(b) A fully executed "Previous Participation Certificate"

[ ] is, [ ] is not included with the bid.

13. Bidder's Signature

The bidder hereby certifies that the information contained in these certifications and representations is accurate, complete, and current.

_____
(Signature and Date)

_____
(Typed or Printed Name)

_____
(Title)

_____
(Company Name)

(Company Address)

Previous Participation Certification

OMB Approval No. 2502-0118
(Exp. 05/31/2019)

US Department of Housing and Urban Development
Office of Housing/Federal Housing Commissioner

US Department of Agriculture
Farmers Home Administration

Part I to be completed by Controlling Participant of Covered Projects *(See instructions)* Reason for submission:		**For HUD HQ/FmHA use only**	
1. Agency name and City where the application is filed		**2.** Project Name, Project Number, City and Zip Code	
3. Loan or Contract amount $	**4.** Number of Units or Beds	**5.** Section of Act	**6.** Type of Project (check one) ☐ Existing ☐ Rehabilitation ☐ Proposed (New)

7. List all proposed Controlling Participants and attach organization chart for all organizations

Name and address of Principals and Affiliates (Name: Last, First, Middle Initial) proposing to participate	**8 Role of Each Principal in Project**	**9. SSN or IRS Employer Number**

Certifications: The controlling participants(s) listed above hereby apply to HUD or USDA FmHA, as the case maybe, for approval to participate as controlling participant(s) in the role(s) and project listed above. The controlling participant(s) each certify that all the statements made on this form are true, complete and correct to the best of their knowledge and belief and are made in good faith, including any Exhibits attached to this form.
Warning: HUD will prosecute false claims and statements. Conviction may result in criminal and/or civil penalties. The controlling participants(s) further certify that to the best of their knowledge and belief:

1. Schedule A contains a listing, for the last ten years, of every project assisted or insured by HUD, USDA FmHA and/or State and local government housing finance agencies in which the controlling participant(s) have participated or are now participating.
2. For the period beginning 10 years prior to the date of this certification, and except as shown on the certification:

a. No mortgage on a project listed has ever been in default, assigned to the Government or foreclosed, nor has it received mortgage relief from the mortgagee;
b. The controlling participants have no defaults or noncompliance under any Conventional Contract or Turnkey Contract of Sale in connection with a public housing project;
c. There are no known unresolved findings as a result of HUD audits, management reviews or other Governmental investigations concerning the controlling participants or their projects;
d. There has not been a suspension or termination of payments under any HUD assistance contract due to the controlling participant's fault or negligence;
e. The controlling participants have not been convicted of a felony and are not presently the subject of a complaint or indictment charging a felony. (A felony is defined as any offense punishable by imprisonment for a term exceeding one year, but does not include any offense classified as a misdemeanor under the laws of a State and punishable by imprisonment of two years or less);
f. The controlling participants have not been suspended, debarred or otherwise restricted by any Department or Agency of the Federal Government or of a State Government from doing business with such Department or Agency;
g. The controlling participants have not defaulted on an obligation covered by a surety or performance bond and have not been the subject of a claim under an employee fidelity bond;

3. All the names of the controlling participants who propose to participate in this project are listed above.
4. None of the controlling participants is a HUD/FmHA employee or a member of a HUD/FmHA employee's immediate household as defined in Standards of Ethical Conduct for Employees of the Executive Branch in 5 C.F.R. Part 2635 (57 FR 35006) and HUD's Standard of Conduct in 24 C.F.R. Part 0 and USDA's Standard of Conduct in 7 C.F.R. Part 0 Subpart B.
5. None of the controlling participants is a participant in an assisted or insured project as of this date on which construction has stopped for a period in excess of 20 days or which has been substantially completed for more than 90 days and documents for closing, including final cost certification, have not been filed with HUD or FmHA.
6. None of the controlling participants have been found by HUD or FmHA to be in noncompliance with any applicable fair housing and civil rights requirements in 24 CFR 5.105(a). (If any controlling participants have been found to be in noncompliance with any requirements, attach a signed statement explaining the relevant facts, circumstances, and resolution, if any).
7. None of the controlling participants is 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.
8. Statements above (if any) to which the controlling participant(s) cannot certify have been deleted by striking through the words with a pen, and the controlling participant(s) have initialed each deletion (if any) and have attached a true and accurate signed statement (if applicable) to explain the facts and circumstances.

Name of Controlling Participant	**Signature of Controlling Participant**	**Certification Date (mm/dd/yyyy)**	**Area Code and Tel. No.**
This form prepared by (print name)		**Area Code and Tel. No.**	

Schedule A: List of Previous Projects and Section 8 Contracts. Below is a complete list of the controlling participants' previous participation projects and participation history in multifamily Housing programs of HUD/FmHA, State and local Housing Finance Agencies. **Note:** Read and follow the instruction sheet carefully. Make full disclosure. Add extra sheets if you need more space. Double check for accuracy. If no previous projects, write by your name, "**No previous participation, First Experience**".

1. Controlling Participants' Name (Last, First)	2. List of previous projects (Project name, project ID and, Govt. agency involved)	3.List Participants' Role(s) (indicate dates participated, and if fee or identity of interest participant)	4. Status of loan (current, defaulted, assigned, foreclosed)	5.Was the Project ever in default during your participation **Yes**	**No**	**If yes, explain**	6. Last MOR rating and Physical Insp. Score and date

Part II- For HUD Internal Processing Only

Received and checked by me for accuracy and completeness; recommend approval or refer to Headquarters after checking appropriate box.

Date (mm/dd/yyyy)	Tel No. and area code	☐ A. No adverse information; form HUD-2530 approval recommended.	☐ C. Disclosure or Certification problem
Staff	Processing and Control	☐ B. Name match in system	☐ D. Other (attach memorandum)

Signature of authorized reviewer	Signature of authorized reviewer	Approved ☐ Yes ☐ No	Date (mm/dd/yyyy)

Instructions for Completing the Previous Participation Certificate, form HUD-2530

Carefully read these instructions and the applicable regulations. A copy of those regulations published at 24 C.F.R. part 200, subpart H, can be obtained on-line at www.gpo.gov and from the Account Executive at any HUD Office. Type or print neatly in ink when filling out this form. Mark answers in all blocks of the form. If the form is not filled completely, it will delay approval of your application.

Attach extra sheets as you need them. Be sure to indicate "Continued on Attachments" wherever appropriate. Sign each additional page that you attach if it refers to you or your record. **Carefully read the certification before you sign it.** Any questions regarding the form or how to complete it can be answered by your HUD Account Executive.

Purpose: This form provides HUD with a certified report of all previous participation in HUD programs by those parties making application. The information requested in this form is used by HUD to determine if you meet the standards established to ensure that all controlling participants in HUD projects will honor their legal, financial and contractual obligations and are acceptable risks from the underwriting standpoint of an insurer, lender or governmental agency. HUD requires that you certify your record of previous participation in HUD/USDA-FmHA, State and Local Housing Finance Agency projects by completing and signing this form, before your project application or participation can be approved.

HUD approval of your certification is a necessary precondition for your participation in the project and in the capacity that you propose. If you do not file this certification, do not furnish the information requested accurately, or do not meet established standards, HUD will not approve your certification.

Note that approval of your certification does not obligate HUD to approve your project application, and it does not satisfy all other HUD program requirements relative to your qualifications.

Who Must Sign and File Form HUD-2530: Form HUD-2530 must be completed and signed by all Controlling Participants of Covered Projects, as such terms are defined in 24 CFR 200.212, and as further clarified by the Processing Guide referenced in 24 CFR 200.210(b) and made available on the HUD website at: http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/mfh/prevparticipation.

Where and When Form HUD-2530 Must Be Filed: The original of this form must be submitted to the HUD Office where your project application will be processed at the same time you file your initial project application. This form must be filed with applications for projects listed in 24 CFR 200.214 and for the Triggering Events listed at 24 CFR 200.218.

Review of Adverse Determination: If approval of your participation in a HUD project is denied, withheld, or conditionally granted on the basis of your record of previous participation, you will be notified by the HUD Office. You may request reconsideration in accordance with 24 CFR 200.222 and further clarified by the Processing Guide. Request must be made in writing within 30 days from your receipt of the notice of determination.

Specific Line Instructions are set forth in the Processing Guide.

The Department of Housing and Urban Development (HUD) is authorized to collect this information by law (42 U.S.C. 3535(d) and 24 C.F.R. 200.217) and by regulation at 24 CFR 200.210. This information is needed so that principals applying to participate in multifamily programs can become HUD-approved controlling participants. The information you provide will enable HUD to evaluate your record with respect to established standards of performance, responsibility and eligibility. Without prior approval, a controlling participant may not participate in a proposed or existing multifamily or healthcare project. HUD uses this information to evaluate whether or not controlling participants pose an unsatisfactory underwriting risk. The information is used to evaluate the potential controlling participants and approve only individuals and organizations that will honor their legal, financial and contractual obligations.

Privacy Act Statement: The Housing and Community Development Act of 1987, 42 U.S.C. 3543 requires persons applying for a Federally-insured or guaranteed loan to furnish his/her Social Security Number (SSN). HUD must have your SSN for identification of your records. HUD may use your SSN for automated processing of your records and to make requests for information about you and your previous records with other public agencies and private sector sources. HUD may disclose certain information to Federal, State and local agencies when relevant to civil, criminal, or regulatory investigations and prosecutions. It will not be otherwise disclosed or released outside of HUD, except as required and permitted by law. You must provide all of the information requested in this application, including your SSN.

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. This agency may not collect this information, and you are not required to complete this form, unless it displays a currently valid OMB control number.

A response is mandatory. Failure to provide any of the information will result in your disapproval of participation in this HUD program.

Housing Authority of the City of Pittsburgh

Development & Modernization
100 Ross Street, Suite 200
Pittsburgh, PA 15219
(412) 456-5020
www.hacp.org

SPECIAL PROVISIONS

NOTICE TO ALL PROSPECTIVE BIDDERS

Bedford Hope Center Improvements, AMP-02

Documents Required for Payment
HACP Contract No.: 600-16-18

Pursuant to Sections 27, 38, 40 and 46 of the General Conditions for this Contract, each contractor must submit the following required documents with each Payment Estimate ("PE") in order for HACP to process a PE as follows:

A. Periodic Estimate – HUD 51001

B. Schedule of Stored Materials – HUD 51003 (if applicable)

C. Summary of Stored Materials – HUD 51004 (if applicable)

D. Schedule of Change Orders – HUD 51002 (if applicable)

E. Progress Payment Certification

F. Current/Approved Certified Payrolls (submitted to HACP's Davis-Bacon Wage Clerk).

G. MBE/WBE Utilization Report

H. Section 3 Summary Report

Signature of Authorized Officer: _____ Date: _____

THIS DOCUMENT MUST BE SIGNED.

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

NON-COLLUSION AFFIDAVIT

State of_____

County of_____

_____, being first duly sworn, deposes and says:
(Printed or Typed Name)

That he/she is
(Proprietor, General Partner, President or Vice President)

of _____; and having submitted the foregoing Bid for
(Bidder Name)

Bedford Hope Center Improvements,
AMP-02
_____ 600-16-18 _____;
(Project Name) *(HACP Contract No.)*

and is the party making the foregoing Bid, and that such Bid is genuine and not collusive or sham; that said Bidder has not colluded, conspired, connived or agreed, directly or indirectly, with any Bidder or person, to put in a sham bid, or to refrain from bidding, and has not in any manner, directly or indirectly, sought by agreement or collusion, or communication or conference, with any person, to fix the bid price of affiant or of any bidder, or to fix any overhead, profit or cost element of said bid price, or of that of any bidder, or to secure any advantage against the Housing Authority of the City of Pittsburgh or any person interested in the proposed contract; and that all statements in said Bid are true.

_____
(Signature and Date)

Subscribed and sworn to before me

this_____ day of _____, 20__

My Commission expires _____, 20__

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

FORM OF AGREEMENT

THIS AGREEMENT, made this ____ day of _____ in the year Two Thousand _____(20) by and between:

_____

_____

_____

[ ] An individual doing business in his/her own name
[ ] An individual doing business under a fictitious or assumed name
[ ] A partnership
[ ] A Corporation

(Hereinafter called the Contractor)

AND

The Housing Authority of the City of Pittsburgh (hereinafter called the Authority)
200 Ross Street
Pittsburgh, PA 15219

WITNESSETH: That the Contractor and the Authority, for the consideration stated herein, mutually agree as follows:

ARTICLE 1, STATEMENT OF WORK

The Contractor shall provide all labor, materials and equipment, and services necessary to perform and complete all work required in accordance with Gerard Associates Arch drawings for Bedford Hope Center Improvements, AMP-02 _____ dated March 16, 2018 and Project Manual dated April 16, 2018 regarding:

CONTRACT NO. 600-16-18

and addenda thereto numbered _____, all as prepared by _____, which said specifications, drawings, and addenda are incorporated herein by reference and are a part hereof.

The work shall begin at the time stipulated in the NOTICE TO PROCEED and in no event exceeding 150 consecutive calendar days from notice to proceed.

ARTICLE 2, THE CONTRACT PRICE

The Authority shall pay the contractor for the performance of the Contract in current fund, subject to additions and deductions as provided in the specifications.

_____ ($_____)

ARTICLE 3, CONTRACT DOCUMENTS

The Contract shall consist of the following component parts:

a. This Agreement
b. Project Manual (including all component parts) dated April 16, 2018.
c. Project Drawings issued by Gerard Associates Arch dated March 16, 2018.

This Agreement, together with the other documents enumerated in this Article 3 which said other documents are as fully a part of the Contract as if hereto attached or herein repeated, form the Contract. In the event that any provision in any component part of this Contract conflicts with any provision of any other component part, the provision of the component part first enumerated in this ARTICLE 3, shall govern, except as subsequent parts may establish more specific criteria or language in which case these criteria and language shall govern. The various provisions in Addenda shall be construed in the order of preference of the component part of the Contract which each modified.

SIGNED, SEALED AND DELIVERED IN _____ ORIGINAL COUNTERPARTS

this _____ day of _____ 20_____.

IF THE PRINCIPAL IS AN INDIVIDUAL, SIGN HERE

By signing this Form of Agreement, if the Housing Authority accepts and signs Contract No. 600-16-18 this contract shall be binding on both parties.

_____ _____
(Printed or Typed Name) *(Printed or Typed Name)*

Witness *Principal*

{ {

_____ _____
(Signature and Date) *(Signature and Date)*

IF THE PRINCIPAL IS A PARTNERSHIP, SIGN HERE

By signing this Form of Agreement, if the Housing Authority accepts and signs Contract No. 600-16-18 this contract shall be binding on both parties.

_____ *(Printed or Typed Name)*	_____ *(Printed or Typed Name)*
Witness { _____ *(Signature and Date)*	*Partner** { _____ *(Signature and Date)*
_____ *(Printed or Typed Name)*	_____ *(Printed or Typed Name)*
Witness { _____ *(Signature and Date)*	*Partner** { _____ *(Signature and Date)*

* If the Bidder is a partnership, the Form of Agreement must be signed in the name of the partnership by at least two general partners, whose names and addresses must be listed on the certificate on page BF-3-P of the Bid.

IF THE PRINCIPAL IS A CORPORATION, SIGN HERE

By signing this Form of Agreement, if the Housing Authority accepts and signs Contract No. 600-16-18 this contract shall be binding on both parties.

(CORPORATE SEAL)

_____
(Corporate Name)

_____ *(Printed or Typed Name)*	_____ *(Printed or Typed Name)*
Witness {	*President* *V.P.*** {
_____ *(Signature and Date)*	_____ *(Signature and Date)*
_____ *(Corporate Title)*	_____ *(Corporate Title)*

** If the bidder is a corporation, the Form of Agreement must be executed in the Corporation's correct corporate name by its President or Vice President and attested to by its Secretary or Assistant Secretary or Treasurer or Assistant Treasurer, and the Certification of Corporate Principal (Doc. 00625) must be executed by the Secretary or Assistant Secretary.

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the **Secretary/Assistant Secretary** of the Corporation named a Bidder herein; that

(Circle one)

_____ who signed this Bid on behalf of the

Corporation was then _____ of said Corporation that I know his signature and his signature thereto is genuine; and that said Bid was duly signed, sealed and attested in behalf of said Corporation by authority of its governing body.

(CORPORATE SEAL)

_____
(Signature and Date)

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

Secretary

Attest

{

_____
(Signature and Date)

Kim Detrick, Contracting Officer

Principal

{

_____
(Signature and Date)

Darrell Davis, Chief Development Officer

Approved as to Contents and Costs

{

_____
(Signature and Date)

Associate Counsel

Approved as to Form

{

_____
(Signature and Date)

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

CONTRACTING OFFICER CERTIFICATION

I _____certify that I am the Recording Secretary of the Housing Authority of the City of Pittsburgh; that _____, who signed this Contract on behalf of the Housing Authority, was then Contracting Officer of said Authority; that the said Contract was duly signed for and on behalf of the Housing Authority of the City of Pittsburgh.

_____ (SEAL)
Secretary

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

PERFORMANCE BOND

THIS BOND IS ISSUED SIMULTANEOUSLY WITH PAYMENT BOND IN FAVOR OF THE AUTHORITY CONDITIONED ON THE FULL AND FAITHFUL PERFORMANCE OF THE CONTRACT.

KNOW ALL MEN BY THESE PRESENTS, that we,

_____, as Principal, and
(Insert name and address of contractor exactly as it appears on Form of Agreement)

_____, as Sureties, are held and firmly bound unto the **Housing Authority of the City of Pittsburgh**, its certain attorney, successors, or assigns (the Obligee, hereinafter called the "Authority") in the penal sum of

_____Dollars ($_____)

lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, personal representatives, successors, and assigns, jointly and severally, firmly by these presents:

WHEREAS, the Principal heretofore has submitted to the said Authority a certain bid, dated

_____, 20_____ (the "Bid"), for construction of
(Insert date of bid)

_____
(Insert name of project exactly as it appears on Form of Agreement)
pursuant to specifications, drawings and other related documents constituting the Invitation for Bids (the "IFB"); and

WHEREAS, the said Authority is a "Contracting body" under provisions of Act No. 385 of the General Assembly of the Commonwealth of Pennsylvania, approved by the Governor on December 20, 1967, known and cited as the "Public Works Contractors' Bond Law of 1967" (8 P.S. 191-202) (the "Act"); and

WHEREAS, the Act, in Section 3 (a), requires that, before an award shall be made to the Principal shall furnish this Bond to the said Authority, with this Bond to become binding upon the award of a Contract to the Principal by the said Authority in accordance with the Bid; and

WHEREAS, it also is a condition of the IFB that this Bond shall be furnished by the Principal to the said Authority; and

WHEREAS, Under the Invitation for Bids, it is provided, inter alia, that if the Principal shall furnish this Bond to the said Authority, and if the said Authority shall make an award to the Principal in accordance with the Bid, then the Principal and the said Authority shall enter into a contract with respect to performance of such work (the "Contract"), the Form of Agreement for which is set forth in the IFB.

NOW, therefore, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the principal shall faithfully perform the Contract on his part as of the time and in the manner therein provided and satisfy all claims and demands incurred in or for the same, or growing out of the same, or for injury or damages to persons or property in the performance thereof, and shall fully indemnify and save harmless the said Authority from any and all cost and damage which the said Authority may suffer by reason of the principal's failure to do so, and shall fully reimburse and repay the said Authority any and all outlay and expense which it incurs by reason of any such default, then this obligation shall be null and void, otherwise it shall remain in full force and virtue.

It is further understood and agreed that the principal shall guarantee for a period of one (1) year from completion date of the contract against defects in workmanship or materials in accordance with the terms of the Contract.

The said surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or the Specifications accompanying the same shall in any wise affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work or to the Specifications.

SIGNED, SEALED AND DELIVERED IN _____ ORIGINAL COUNTERPARTS
(2 required by Authority)

this _____ day of _____ 20_____.

IF THE PRINCIPAL IS AN INDIVIDUAL, SIGN HERE

_____ *(Printed or Typed Name)*	_____ *(Printed or Typed Name)*
Witness	*Principal*
{	{
_____ *(Signature and Date)*	_____ *(Signature and Date)*

IF THE PRINCIPAL IS A PARTNERSHIP, SIGN HERE

	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Witness		*Partner**	
	{		{
	_____ *(Signature and Date)*		_____ *(Signature and Date)*
	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Witness		*Partner**	
	{		{
	_____ *(Signature and Date)*		_____ *(Signature and Date)*

* If the Bidder is a partnership, the Bond must be signed in the name of the partnership by at least two general partners, whose names and addresses must be listed on the certificate on page BF-3-P of the Bid.

IF THE PRINCIPAL IS A CORPORATION, SIGN HERE

(CORPORATE SEAL)

_____
(Corporate Name)

_____ *(Printed or Typed Name)*	_____ *(Printed or Typed Name)*
Witness	*President V.P.***
{	{
_____ *(Signature and Date)*	_____ *(Signature and Date)*
_____ *(Corporate Title)*	_____ *(Corporate Title)*

** If the bidder is a corporation, the Bond must be executed in the Corporation's correct corporate name by its President or Vice President and attested to by its Secretary or Assistant Secretary or Treasurer or Assistant Treasurer, and the Certification of Corporate Principal below must be executed by the Secretary or Assistant Secretary.

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the
Secretary/Assistant Secretary of the Corporation named a Bidder herein; that
(Circle one)
_____ who signed this Bid on behalf of the

Corporation was then _____ of said Corporation that I know his signature and his signature thereto is genuine; and that said Bid was duly signed, sealed and attested in behalf of said Corporation by authority of its governing body.

(CORPORATE SEAL)

_____
(Signature and Date)

SURETY SIGN HERE

(SURETY SEAL)

_____
(Printed or Typed Name)

_____
(Printed or Typed Name)

Attest
{
_____
(Signature and Date)

Surety ***
{
_____
(Signature and Date)

***Power of attorney must be attached to this Bid Bond.

The rate of premium charged is $_____ per thousand.
(To be filled in by Surety)

The total amount of premium charged is $_____
(To be filled in by Surety)

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

PAYMENT BOND
(Labor and Materialmen's Bond)

THIS BOND IS ISSUED SIMULTANEOUSLY WITH PERFORMANCE BOND IN FAVOR OF THE AUTHORITY CONDITIONED ON THE FULL AND FAITHFUL PERFORMANCE OF THE CONTRACT.

KNOW ALL MEN BY THESE PRESENTS, that we,

_____, as Principal, and
(Insert name and address of Contractor exactly as it appears on Form of Agreement)

_____, as Sureties, are held and firmly bound unto the **Housing Authority of the City of Pittsburgh**, its certain attorney, successors, or assigns (the Obligee, hereinafter called the "Authority") in the penal sum of

_____Dollars ($_____)

lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, personal representatives, successors, and assigns, jointly and severally, firmly by these presents:

WHEREAS, the Principal heretofore has submitted to the said Obligee a certain bid, dated

_____, 20_____ (the "Bid"), for construction of
(Insert date of bid)

_____
(Insert name of project exactly as it appears on Form of Agreement)
pursuant to specifications, drawings and other related documents constituting the Invitation for Bids (the "IFB"); and

WHEREAS, the said Authority is a "Contracting body" under provisions of Act No. 385 of the General Assembly of the Commonwealth of Pennsylvania, approved by the Governor on December 20, 1967, known and cited as the "Public Works Contractors' Bond Law of 1967" (8 P.S. 191-202) (the "Act"); and

WHEREAS, the Act, in Section 3 (a), requires that, before an award shall be made to the Principal shall furnish this Bond to the said Authority, with this Bond to become binding upon the award of a Contract to the Principal by the said Authority in accordance with the Bid; and

WHEREAS, it also is a condition of the IFB that this Bond shall be furnished by the Principal to the said Authority; and

WHEREAS, Under the Invitation for Bids, it is provided, inter alia, that if the Principal shall furnish this Bond to the said Authority, and if the said Authority shall make an award to the Principal in accordance with the Bid, then the Principal and the said Authority shall enter into a contract with respect to performance of such work (the "Contract"), the Form of Agreement for which is set forth in the IFB.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH that if said principal and all subcontractors to whom any portion of the work provided for in said contract is sublet and all assignees of said principal and of such subcontractors shall promptly make payment for all material furnished, labor supplied or performed, rental for equipment employed, and services rendered by public utilities in or in connection with the prosecution of the work, whether or not the said material, labor, equipment or services enter into and become component parts of the work or improvement contemplated in said contract, or in any amendment or extension of or addition to said Contract, then the above obligation shall be void; otherwise to remain in full force and effect. PROVIDED, however, that this bond is subject to the following conditions and limitations.

(a) All persons who have performed labor, rendered services or furnished materials or machinery, shall have direct right of action against the principal and surety on this bond, which right of action shall be asserted in proceedings instituted in the State in which such labor was performed, services rendered or materials furnished (or where labor has been performed, services rendered or materials furnished under said Contract is more than one State, then in any such State). Insofar as permitted by the laws of such State, such right of action shall be asserted in a proceeding instituting such action and any or all other persons having claims hereunder, and any other person having a claim hereunder shall have the right to be made a party to such proceeding (but not later than one year after the complete performance of said Contract and final settlement thereof) and to have such claim adjudicated in such action and judgment rendered thereon.

(b) The surety shall not be liable hereunder for any damages or compensation recoverable under any workmen's compensation or employer's liability statute.

(c) In no event shall the surety be liable for a greater sum than the penalty of this bond, or subject to any suit, action or proceeding thereon that is instituted later than one year after the complete performance of said contract and final settlement thereof.

(d) As used herein: The term "person" refers to any individual, firm or corporation who have furnished materials or machinery or public utility services to be used on or incorporated in the work or the prosecution thereof provided for in said Contract or in any amendment or extension of or addition to said Contract, and/or to any person engaged in the prosecution of the work provided for in said Contract or in any amendment or extension of or addition to said Contract, who is an agent, servant or employee of the principal, or of any subcontractor, or of any assignee of said principal or of any subcontractor and also anyone so engaged who performs the work of a laborer or of a mechanic regardless of any contractual relationship between the principal, or any sub-contractor, or any assignee of said principal or of said subcontractor, and such laborer or mechanic, but shall not include office employees not regularly stationed at the site of the work.

The said surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract, or to the work to be performed thereunder or the Specifications accompanying the same, shall in any wise affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work or to the Specifications.

SIGNED, SEALED AND DELIVERED IN _____ ORIGINAL COUNTERPARTS
(2 required by Authority)

this _____ day of _____ 20_____.

IF THE PRINCIPAL IS AN INDIVIDUAL, SIGN HERE

_____	_____
(Printed or Typed Name)	*(Printed or Typed Name)*
Witness	*Principal*
{	{
_____	_____
(Signature and Date)	*(Signature and Date)*

IF THE PRINCIPAL IS A PARTNERSHIP, SIGN HERE

_____	_____
(Printed or Typed Name)	*(Printed or Typed Name)*
Witness	*Partner**
{	{
_____	_____
(Signature and Date)	*(Signature and Date)*
_____	_____
(Printed or Typed Name)	*(Printed or Typed Name)*
Witness	*Partner**
{	{
_____	_____
(Signature and Date)	*(Signature and Date)*

* If the Bidder is a partnership, the Bond must be signed in the name of the partnership by at least two general partners, whose names and addresses must be listed on the certificate on page BF-3-P of the Bid.

IF THE PRINCIPAL IS A CORPORATION, SIGN HERE

(CORPORATE SEAL)

_____
(Corporate Name)

_____ *(Printed or Typed Name)*			_____ *(Printed or Typed Name)*
Witness	{	*President V.P.***	{
_____ *(Signature and Date)*			_____ *(Signature and Date)*
_____ *(Corporate Title)*			_____ *(Corporate Title)*

** If the bidder is a corporation, the Bond must be executed in the Corporation's correct corporate name by its President or Vice President and attested to by its Secretary or Assistant Secretary or Treasurer or Assistant Treasurer, and the Certification of Corporate Principal (Doc. 00625) must be executed by the Secretary or Assistant Secretary.

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the **Secretary/Assistant Secretary** of the Corporation named a Bidder herein; that *(Circle one)* _____ who signed this Bid on behalf of the Corporation was then _____ of said Corporation that I know his signature and his signature thereto is genuine; and that said Bid was duly signed, sealed and attested in behalf of said Corporation by authority of its governing body.

(CORPORATE SEAL)

_____
(Signature and Date)

SURETY SIGN HERE

(SURETY SEAL)

	_____ *(Printed or Typed Name)*		_____ *(Printed or Typed Name)*
Attest		*Surety*	
	{		{
	_____ *(Signature and Date)*		_____ *(Signature and Date)*

The rate of premium charged is $_____ per thousand.
(To be filled in by Surety)

The total amount of premium charged is $_____
(To be filled in by Surety)

General Conditions for Construction Contracts - Public Housing Programs

U.S. Department of Housing and Urban Development
Office of Public and Indian Housing
OMB Approval No. 2577-0157 (exp. 3/31/2020)

Applicability. This form is applicable to any construction/development contract greater than $150,000.

This form includes those clauses required by OMB's common rule on grantee procurement, implemented at HUD in 2 CFR 200, and those requirements set forth in Section 3 of the Housing and Urban Development Act of 1968 and its amendment by the Housing and Community Development Act of 1992, implemented by HUD at 24 CFR Part 135. The form is required for construction contracts awarded by Public Housing Agencies (PHAs).
The form is used by Housing Authorities in solicitations to provide necessary contract clauses. If the form were not used, HAs would be unable to enforce their contracts.
Public reporting burden for this collection of information is estimated to average 1.0 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Responses to the collection of information are required to obtain a benefit or to retain a benefit.
The information requested does not lend itself to confidentiality.
HUD may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB number.

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1. Definitions

(a) "Architect" means the person or other entity engaged by the PHA to perform architectural, engineering, design, and other services related to the work as provided for in the contract. When a PHA uses an engineer to act in this capacity, the terms "architect" and "engineer" shall be synonymous. The Architect shall serve as a technical representative of the Contracting Officer. The Architect's authority is as set forth elsewhere in this contract.

(b) "Contract" means the contract entered into between the PHA and the Contractor. It includes the forms of Bid, the Bid Bond, the Performance and Payment Bond or Bonds or other assurance of completion, the Certifications, Representations, and Other Statements of Bidders (form HUD-5370), these General Conditions of the Contract for Construction (form HUD-5370), the applicable wage rate determinations from the U.S. Department of Labor, any special conditions included elsewhere in the contract, the specifications, and drawings. It includes all formal changes to any of those documents by addendum, change order, or other modification.

(c) "Contracting Officer" means the person delegated the authority by the PHA to enter into, administer, and/or terminate this contract and designated as such in writing to the Contractor. The term includes any successor Contracting Officer and any duly authorized representative of the Contracting Officer also designated in writing. The Contracting Officer shall be deemed the authorized agent of the PHA in all dealings with the Contractor.

(d) "Contractor" means the person or other entity entering into the contract with the PHA to perform all of the work required under the contract.

(e) "Drawings" means the drawings enumerated in the schedule of drawings contained in the Specifications and as described in the contract clause entitled Specifications and Drawings for Construction herein.

(f) "HUD" means the United States of America acting through the Department of Housing and Urban Development including the Secretary, or any other person designated to act on its behalf. HUD has agreed, subject to the provisions of an Annual Contributions Contract (ACC), to provide financial assistance to the PHA, which includes assistance in financing the work to be performed under this contract. As defined elsewhere in these General Conditions or the contract documents, the determination of HUD may be required to authorize changes in the work or for release of funds to the PHA for payment to the Contractor. Notwithstanding HUD's role, nothing in this contract shall be construed to create any contractual relationship between the Contractor and HUD.

(g) "Project" means the entire project, whether construction or rehabilitation, the work for which is provided for in whole or in part under this contract.

(h) "PHA" means the Public Housing Agency organized under applicable state laws which is a party to this contract.

(j) "Specifications" means the written description of the technical requirements for construction and includes the criteria and tests for determining whether the requirements are met.

(l) "Work" means materials, workmanship, and manufacture and fabrication of components.

2. Contractor's Responsibility for Work

(a) The Contractor shall furnish all necessary labor, materials, tools, equipment, and transportation necessary for performance of the work. The Contractor shall also furnish all necessary water, heat, light, and power not made available to the Contractor by the PHA pursuant to the clause entitled Availability and Use of Utility Services herein.

(b) The Contractor shall perform on the site, and with its own organization, work equivalent to at least [✓] (12 percent unless otherwise indicated) of the total amount of work to be performed under the order. This percentage may be reduced by a supplemental agreement to this order if, during performing the work, the Contractor requests a reduction and the Contracting Officer determines that the reduction would be to the advantage of the PHA.

(c) At all times during performance of this contract and until the work is completed and accepted, the Contractor shall directly superintend the work or assign and have on the work site a competent superintendent who is satisfactory to the Contracting Officer and has authority to act for the Contractor.

(d) The Contractor shall be responsible for all damages to persons or property that occur as a result of the Contractor's fault or negligence, and shall take proper safety and health precautions to protect the work, the workers, the public, and the property of others. The Contractor shall hold and save the PHA, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance. The Contractor shall also be responsible for all materials delivered and work performed until completion and acceptance of the entire work, except for any completed unit of work which may have been accepted under the contract.

(e) The Contractor shall lay out the work from base lines and bench marks indicated on the drawings and be responsible for all lines, levels, and measurements of all work executed under the contract. The Contractor shall verify the figures before laying out the work and will be held responsible for any error resulting from its failure to do so.

(f) The Contractor shall confine all operations (including storage of materials) on PHA premises to areas authorized or approved by the Contracting Officer.

(g) The Contractor shall at all times keep the work area, including storage areas, free from accumulations of waste materials. After completing the work and before final inspection, the Contractor shall (1) remove from the premises all scaffolding, equipment, tools, and materials (including rejected materials) that are not the property of the PHA and all rubbish caused by its work; (2) leave the work area in a clean, neat, and orderly condition satisfactory to the Contracting Officer; (3) perform all specified tests; and, (4) deliver the installation in complete and operating condition.

(h) The Contractor's responsibility will terminate when all work has been completed, the final inspection made, and the work accepted by the Contracting Officer. The Contractor will then be released from further obligation except as required by the warranties specified elsewhere in the contract.

3. Architect's Duties, Responsibilities, and Authority

(a) The Architect for this contract, and any successor, shall be designated in writing by the Contracting Officer.

(b) The Architect shall serve as the Contracting Officer's technical representative with respect to architectural, engineering, and design matters related to the work performed under the contract. The Architect may provide direction on contract performance. Such direction shall be within the scope of the contract and may not be of a nature which: (1) institutes additional work outside the scope of the contract; (2) constitutes a change as defined in the Changes clause herein; (3) causes an increase or decrease in the cost of the contract; (4) alters the Construction Progress Schedule; or (5) changes any of the other express terms or conditions of the contract.

(c) The Architect's duties and responsibilities may include but shall not be limited to:

(1) Making periodic visits to the work site, and on the basis of his/her on-site inspections, issuing written reports to the PHA which shall include all observed deficiencies. The Architect shall file a copy of the report with the Contractor's designated representative at the site;

(2) Making modifications in drawings and technical specifications and assisting the Contracting Officer in the preparation of change orders and other contract modifications for issuance by the Contracting Officer;

(3) Reviewing and making recommendations with respect to - (i) the Contractor's construction progress schedules; (ii) the Contractor's shop and detailed drawings; (iii) the machinery, mechanical and other equipment and materials or other articles proposed for use by the Contractor; and, (iv) the Contractor's price breakdown and progress payment estimates; and,

(4) Assisting in inspections, signing Certificates of Completion, and making recommendations with respect to acceptance of work completed under the contract.

4. Other Contracts

The PHA may undertake or award other contracts for additional work at or near the site of the work under this contract. The Contractor shall fully cooperate with the other contractors and with PHA employees and shall carefully adapt scheduling and performing the work under this contract to accommodate the additional work, heeding any direction that may be provided by the Contracting Officer. The Contractor shall not commit or permit any act that will interfere with the performance of work by any other contractor or by PHA employees

Construction Requirements

5. Pre-construction Conference and Notice to Proceed

(a) Within ten calendar days of contract execution, and prior to the commencement of work, the Contractor shall attend a preconstruction conference with representatives of the PHA, its Architect, and other interested parties convened by the PHA. The conference will serve to acquaint the participants with the general plan of the construction operation and all other requirements of the contract. The PHA will provide the Contractor with the date, time, and place of the conference.

(b) The contractor shall begin work upon receipt of a written Notice to Proceed from the Contracting Officer or designee. The Contractor shall not begin work prior to receiving such notice.

6. Construction Progress Schedule

(a) The Contractor shall, within five days after the work commences on the contract or another period of time determined by the Contracting Officer, prepare and submit to the Contracting Officer for approval three copies of a practicable schedule showing the order in which the Contractor proposes to perform the work, and the dates on which the Contractor contemplates starting and completing the several salient features of the work (including acquiring labor, materials, and equipment). The schedule shall be in the form of a progress chart of suitable scale to indicate appropriately the percentage of work scheduled for completion by any given date during the period. If the Contractor fails to submit a schedule within the time prescribed, the Contracting Officer may withhold approval of progress payments or take other remedies under the contract until the Contractor submits the required schedule.

(b) The Contractor shall enter the actual progress on the chart as required by the Contracting Officer, and immediately deliver three copies of the annotated schedule to the Contracting Officer. If the Contracting Officer determines, upon the basis of inspection conducted pursuant to the clause entitled Inspection and Acceptance of Construction, herein that the Contractor is not meeting the approved schedule, the Contractor shall take steps necessary to improve its progress, including those that may be required by the Contracting Officer, without additional cost to the PHA. In this circumstance, the Contracting Officer may require the Contractor to increase the number of shifts, overtime operations, days of work, and/or the amount of construction plant, and to submit for approval any supplementary schedule or schedules in chart form as the Contracting Officer deems necessary to demonstrate how the approved rate of progress will be regained.

(c) Failure of the Contractor to comply with the requirements of the Contracting Officer under this clause shall be grounds for a determination by the Contracting Officer that the Contractor is not prosecuting the work with sufficient diligence to ensure completion within the time specified in the Contract. Upon making this determination, the Contracting Officer may terminate the Contractor's right to proceed with the work, or any separable part of it, in accordance with the Default clause of this contract.

7. Site Investigation and Conditions Affecting the Work

(a) The Contractor acknowledges that it has taken steps reasonably necessary to ascertain the nature and location of the work, and that it has investigated and satisfied itself as to the general and local conditions which can affect the work or its cost, including but not limited to, (1) conditions bearing upon transportation, disposal, handling, and storage of materials; (2) the availability of labor, water, electric power, and roads;(3) uncertainties of weather, river stages, tides, or similar physical conditions at the site; (4) the conformation and conditions of the ground; and (5) the character of equipment and facilities needed preliminary to and during work performance. The Contractor also acknowledges that it has satisfied itself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is

reasonably ascertainable from an inspection of the site, including all exploratory work done by the PHA, as well as from the drawings and specifications made a part of this contract. Any failure of the Contractor to take the actions described and acknowledged in this paragraph will not relieve the Contractor from responsibility for estimating properly the difficulty and cost of successfully performing the work, or for proceeding to successfully perform the work without additional expense to the PHA.

(b) The PHA assumes no responsibility for any conclusions or interpretations made by the Contractor based on the information made available by the PHA. Nor does the PHA assume responsibility for any understanding reached or representation made concerning conditions which can affect the work by any of its officers or agents before the execution of this contract, unless that understanding or representation is expressly stated in this contract.

8. Differing Site Conditions

(a) The Contractor shall promptly, and before the conditions are disturbed, give a written notice to the Contracting Officer of (1) subsurface or latent physical conditions at the site which differ materially from those indicated in this contract, or (2) unknown physical conditions at the site(s), of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in the contract.

(b) The Contracting Officer shall investigate the site conditions promptly after receiving the notice. Work shall not proceed at the affected site, except at the Contractor's risk, until the Contracting Officer has provided written instructions to the Contractor. If the conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performing any part of the work under this contract, whether or not changed as a result of the conditions, the Contractor shall file a claim in writing to the PHA within ten days after receipt of such instructions and, in any event, before proceeding with the work. An equitable adjustment in the contract price, the delivery schedule, or both shall be made under this clause and the contract modified in writing accordingly.

(c) No request by the Contractor for an equitable adjustment to the contract under this clause shall be allowed, unless the Contractor has given the written notice required; provided, that the time prescribed in (a) above for giving written notice may be extended by the Contracting Officer.

(d) No request by the Contractor for an equitable adjustment to the contract for differing site conditions shall be allowed if made after final payment under this contract.

9. Specifications and Drawings for Construction

(a) The Contractor shall keep on the work site a copy of the drawings and specifications and shall at all times give the Contracting Officer access thereto. Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown or mentioned in both. In case of difference between drawings and specifications, the specifications shall govern. In case of discrepancy in the figures, in the drawings, or in the specifications, the matter shall be promptly submitted to the Contracting Officer, who shall promptly make a determination in writing. Any adjustment by the Contractor without such a determination shall be at its own risk and expense. The Contracting Officer shall furnish from time to time such detailed drawings and other information as considered necessary, unless otherwise provided.

(b) Wherever in the specifications or upon the drawings the words "directed", "required", "ordered", "designated", "prescribed", or words of like import are used, it shall be understood that the "direction", "requirement", "order", "designation", or "prescription", of the Contracting Officer is intended and similarly the words "approved", "acceptable", "satisfactory", or words of like import shall mean "approved by", or "acceptable to", or "satisfactory to" the Contracting Officer, unless otherwise expressly stated.

(c) Where "as shown" "as indicated", "as detailed", or of similar import are used, it shall be understood that the reference is made to the drawings accompanying this contract unless stated otherwise. The word "provided" as used herein shall be understood to mean "provide complete in place" that is "furnished and installed".

(d) "Shop drawings" means drawings, submitted to the PHA by the Contractor, subcontractor, or any lower tier subcontractor, showing in detail (1) the proposed fabrication and assembly of structural elements and (2) the installation (i.e., form, fit, and attachment details) of materials of equipment. It includes drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, and similar materials furnished by the Contractor to explain in detail specific portions of the work required by the contract. The PHA may duplicate, use, and disclose in any manner and for any purpose shop drawings delivered under this contract.

(e) If this contract requires shop drawings, the Contractor shall coordinate all such drawings, and review them for accuracy, completeness, and compliance with other contract requirements and shall indicate its approval thereon as evidence of such coordination and review. Shop drawings submitted to the Contracting Officer without evidence of the Contractor's approval may be returned for resubmission. The Contracting Officer will indicate an approval or disapproval of the shop drawings and if not approved as submitted shall indicate the PHA's reasons therefore. Any work done before such approval shall be at the Contractor's risk. Approval by the Contracting Officer shall not relieve the Contractor from responsibility for any errors or omissions in such drawings, nor from responsibility for complying with the requirements of this contract, except with respect to variations described and approved in accordance with (f) below.

(f) If shop drawings show variations from the contract requirements, the Contractor shall describe such variations in writing, separate from the drawings, at the time of submission. If the Architect approves any such variation and the Contracting Officer concurs, the Contracting Officer shall issue an appropriate modification to the contract, except that, if the variation is minor or does not involve a change in price or in time of performance, a modification need not be issued.

(g) It shall be the responsibility of the Contractor to make timely requests of the PHA for such large scale and full size drawings, color schemes, and other additional information, not already in his possession, which shall be

required in the planning and production of the work. Such requests may be submitted as the need arises, but each such request shall be filed in ample time to permit appropriate action to be taken by all parties involved so as to avoid delay.

(h) The Contractor shall submit to the Contracting Officer for approval four copies (unless otherwise indicated) of all shop drawings as called for under the various headings of these specifications. Three sets (unless otherwise indicated) of all shop drawings, will be retained by the PHA and one set will be returned to the Contractor. As required by the Contracting Officer, the Contractor, upon completing the work under this contract, shall furnish a complete set of all shop drawings as finally approved. These drawings shall show all changes and revisions made up to the time the work is completed and accepted.

(i) This clause shall be included in all subcontracts at any tier. It shall be the responsibility of the Contractor to ensure that all shop drawings prepared by subcontractors are submitted to the Contracting Officer.

10. As-Built Drawings

(a) "As-built drawings," as used in this clause, means drawings submitted by the Contractor or subcontractor at any tier to show the construction of a particular structure or work as actually completed under the contract. "As-built drawings" shall be synonymous with "Record drawings."

(b) As required by the Contracting Officer, the Contractor shall provide the Contracting Officer accurate information to be used in the preparation of permanent as-built drawings. For this purpose, the Contractor shall record on one set of contract drawings all changes from the installations originally indicated, and record final locations of underground lines by depth from finish grade and by accurate horizontal offset distances to permanent surface improvements such as buildings, curbs, or edges of walks.

(c) This clause shall be included in all subcontracts at any tier. It shall be the responsibility of the Contractor to ensure that all as-built drawings prepared by subcontractors are submitted to the Contracting Officer.

11. Material and Workmanship

(a) All equipment, material, and articles furnished under this contract shall be new and of the most suitable grade for the purpose intended, unless otherwise specifically provided in this contract. References in the contract to equipment, material, articles, or patented processes by trade name, make, or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition. The Contractor may, at its option, use any equipment, material, article, or process that, in the judgment of, and as approved by the Contracting Officer, is equal to that named in the specifications, unless otherwise specifically provided in this contract.

(b) Approval of equipment and materials.

(1) The Contractor shall obtain the Contracting Officer's approval of the machinery and mechanical and other equipment to be incorporated into the work. When requesting approval, the Contractor shall furnish to the Contracting Officer the name of the manufacturer, the model number, and other information concerning the performance, capacity, nature, and rating of the machinery and mechanical and other equipment. When required by this contract or by the Contracting Officer, the Contractor shall also obtain the Contracting Officer's approval of the material or articles which the Contractor contemplates incorporating into the work. When requesting approval, the Contractor shall provide full information concerning the material or articles. Machinery, equipment, material, and articles that do not have the required approval shall be installed or used at the risk of subsequent rejection.

(2) When required by the specifications or the Contracting Officer, the Contractor shall submit appropriately marked samples (and certificates related to them) for approval at the Contractor's expense, with all shipping charges prepaid. The Contractor shall label, or otherwise properly mark on the container, the material or product represented, its place of origin, the name of the producer, the Contractor's name, and the identification of the construction project for which the material or product is intended to be used.

(3) Certificates shall be submitted in triplicate, describing each sample submitted for approval and certifying that the material, equipment or accessory complies with contract requirements. The certificates shall include the name and brand of the product, name of manufacturer, and the location where produced.

(4) Approval of a sample shall not constitute a waiver of the PHA right to demand full compliance with contract requirements. Materials, equipment and accessories may be rejected for cause even though samples have been approved.

(5) Wherever materials are required to comply with recognized standards or specifications, such specifications shall be accepted as establishing the technical qualities and testing methods, but shall not govern the number of tests required to be made nor modify other contract requirements. The Contracting Officer may require laboratory test reports on items submitted for approval or may approve materials on the basis of data submitted in certificates with samples. Check tests will be made on materials delivered for use only as frequently as the Contracting Officer determines necessary to insure compliance of materials with the specifications. The Contractor will assume all costs of retesting materials which fail to meet contract requirements and/or testing materials offered in substitution for those found deficient.

(6) After approval, samples will be kept in the Project office until completion of work. They may be built into the work after a substantial quantity of the materials they represent has been built in and accepted.

(c) Requirements concerning lead-based paint. The Contractor shall comply with the requirements concerning lead-based paint contained in the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. 4821-4846) as implemented by 24 CFR Part 35.

12. Permits and Codes

(a) The Contractor shall give all notices and comply with all applicable laws, ordinances, codes, rules and regulations. Notwithstanding the requirement of the Contractor to comply with the drawings and specifications in the contract, all work installed shall comply with all applicable codes and regulations as amended by any

waivers. Before installing the work, the Contractor shall examine the drawings and the specifications for compliance with applicable codes and regulations bearing on the work and shall immediately report any discrepancy it may discover to the Contracting Officer. Where the requirements of the drawings and specifications fail to comply with the applicable code or regulation, the Contracting Officer shall modify the contract by change order pursuant to the clause entitled Changes herein to conform to the code or regulation.

(b) The Contractor shall secure and pay for all permits, fees, and licenses necessary for the proper execution and completion of the work. Where the PHA can arrange for the issuance of all or part of these permits, fees and licenses, without cost to the Contractor, the contract amount shall be reduced accordingly.

13. Health, Safety, and Accident Prevention

(a) In performing this contract, the Contractor shall:
  (1) Ensure that no laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his/her health and/or safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation;
  (2) Protect the lives, health, and safety of other persons;
  (3) Prevent damage to property, materials, supplies, and equipment; and,
  (4) Avoid work interruptions.

(b) For these purposes, the Contractor shall:
  (1) Comply with regulations and standards issued by the Secretary of Labor at 29 CFR Part 1926. Failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act (Public Law 91-54, 83 Stat. 96), 40 U.S.C. 3701 et seq.; and
  (2) Include the terms of this clause in every subcontract so that such terms will be binding on each subcontractor.

(c) The Contractor shall maintain an accurate record of exposure data on all accidents incident to work performed under this contract resulting in death, traumatic injury, occupational disease, or damage to property, materials, supplies, or equipment, and shall report this data in the manner prescribed by 29 CFR Part 1904.

(d) The Contracting Officer shall notify the Contractor of any noncompliance with these requirements and of the corrective action required. This notice, when delivered to the Contractor or the Contractor's representative at the site of the work, shall be deemed sufficient notice of the noncompliance and corrective action required. After receiving the notice, the Contractor shall immediately take corrective action. If the Contractor fails or refuses to take corrective action promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. The Contractor shall not base any claim or request for equitable adjustment for additional time or money on any stop order issued under these circumstances.

(e) The Contractor shall be responsible for its subcontractors' compliance with the provisions of this clause. The Contractor shall take such action with respect to any subcontract as the PHA, the Secretary of Housing and Urban Development, or the Secretary of Labor shall direct as a means of enforcing such provisions.

14. Temporary Heating

The Contractor shall provide and pay for temporary heating, covering, and enclosures necessary to properly protect all work and materials against damage by dampness and cold, to dry out the work, and to facilitate the completion of the work. Any permanent heating equipment used shall be turned over to the PHA in the condition and at the time required by the specifications.

15. Availability and Use of Utility Services

(a) The PHA shall make all reasonably required amounts of utilities available to the Contractor from existing outlets and supplies, as specified in the contract. Unless otherwise provided in the contract, the amount of each utility service consumed shall be charged to or paid for by the Contractor at prevailing rates charged to the PHA or, where the utility is produced by the PHA, at reasonable rates determined by the Contracting Officer. The Contractor shall carefully conserve any utilities furnished without charge.

(b) The Contractor, at its expense and in a manner satisfactory to the Contracting Officer, shall install and maintain all necessary temporary connections and distribution lines, and all meters required to measure the amount of each utility used for the purpose of determining charges. Before final acceptance of the work by the PHA, the Contractor shall remove all the temporary connections, distribution lines, meters, and associated paraphernalia.

16. Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements

(a) The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site, which are not to be removed under this contract, and which do not unreasonably interfere with the work required under this contract.

(b) The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place. If any limbs or branches of trees are broken during performance of this contract, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Contracting Officer.

(c) The Contractor shall protect from damage all existing improvements and utilities (1) at or near the work site and (2) on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. Prior to disturbing the ground at the construction site, the Contractor shall ensure that all underground utility lines are clearly marked.

(d) The Contractor shall shore up, brace, underpin, secure, and protect as necessary all foundations and other parts of existing structures adjacent to, adjoining, and in the vicinity of the site, which may be affected by the excavations or other operations connected with the construction of the project.

(e) Any equipment temporarily removed as a result of work under this contract shall be protected, cleaned, and replaced in the same condition as at the time of award of this contract.

(f) New work which connects to existing work shall correspond in all respects with that to which it connects and/or be similar to existing work unless otherwise required by the specifications.
(g) No structural members shall be altered or in any way weakened without the written authorization of the Contracting Officer, unless such work is clearly specified in the plans or specifications.
(h) If the removal of the existing work exposes discolored or unfinished surfaces, or work out of alignment, such surfaces shall be refinished, or the material replaced as necessary to make the continuous work uniform and harmonious. This, however, shall not be construed to require the refinishing or reconstruction of dissimilar finishes previously exposed, or finished surfaces in good condition, but in different planes or on different levels when brought together by the removal of intervening work, unless such refinishing or reconstruction is specified in the plans or specifications.
(i) The Contractor shall give all required notices to any adjoining or adjacent property owner or other party before the commencement of any work.
(j) The Contractor shall indemnify and save harmless the PHA from any damages on account of settlement or the loss of lateral support of adjoining property, any damages from changes in topography affecting drainage, and from all loss or expense and all damages for which the PHA may become liable in consequence of such injury or damage to adjoining and adjacent structures and their premises.
(k) The Contractor shall repair any damage to vegetation, structures, equipment, utilities, or improvements, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the Contracting Officer may have the necessary work performed and charge the cost to the Contractor.

17. Temporary Buildings and Transportation of Materials

(a) Temporary buildings (e.g., storage sheds, shops, offices, sanitary facilities) and utilities may be erected by the Contractor only with the approval of the Contracting Officer and shall be built with labor and materials furnished by the Contractor without expense to the PHA. The temporary buildings and utilities shall remain the property of the Contractor and shall be removed by the Contractor at its expense upon completion of the work. With the written consent of the Contracting Officer, the buildings and utilities may be abandoned and need not be removed.
(b) The Contractor shall, as directed by the Contracting Officer, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the Contracting Officer. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any federal, state, or local law or regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.

18. Clean Air and Water

The contactor shall comply with the Clean Air Act, as amended, 42 USC 7401 et seq., the Federal Water Pollution Control Water Act, as amended, 33 U.S.C. 1251 et seq., and standards issued pursuant thereto in the facilities in which this contract is to be performed.

19. Energy Efficiency

The Contractor shall comply with mandatory standards and policies relating to energy efficiency which are contained in the energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Pub.L. 94-163) for the State in which the work under the contract is performed.

20. Inspection and Acceptance of Construction

(a) Definitions. As used in this clause -
(1) “Acceptance” means the act of an authorized representative of the PHA by which the PHA approves and assumes ownership of the work performed under this contract. Acceptance may be partial or complete.
(2) “Inspection” means examining and testing the work performed under the contract (including, when appropriate, raw materials, equipment, components, and intermediate assemblies) to determine whether it conforms to contract requirements.
(3) “Testing” means that element of inspection that determines the properties or elements, including functional operation of materials, equipment, or their components, by the application of established scientific principles and procedures.
(b) The Contractor shall maintain an adequate inspection system and perform such inspections as will ensure that the work performed under the contract conforms to contract requirements. All work is subject to PHA inspection and test at all places and at all reasonable times before acceptance to ensure strict compliance with the terms of the contract.
(c) PHA inspections and tests are for the sole benefit of the PHA and do not: (1) relieve the Contractor of responsibility for providing adequate quality control measures; (2) relieve the Contractor of responsibility for loss or damage of the material before acceptance; (3) constitute or imply acceptance; or, (4) affect the continuing rights of the PHA after acceptance of the completed work under paragraph (j) below.
(d) The presence or absence of the PHA inspector does not relieve the Contractor from any contract requirement, nor is the inspector authorized to change any term or condition of the specifications without the Contracting Officer’s written authorization. All instructions and approvals with respect to the work shall be given to the Contractor by the Contracting Officer.
(e) The Contractor shall promptly furnish, without additional charge, all facilities, labor, and material reasonably needed for performing such safe and convenient inspections and tests as may be required by the Contracting Officer. The PHA may charge to the Contractor any additional cost of inspection or test when work is not ready at the time specified by the Contractor for inspection or test, or when prior rejection makes reinspection or retest necessary. The PHA shall perform all inspections and tests in a manner that will not unnecessarily delay the work. Special, full size, and performance tests shall be performed as described in the contract.

(f) The PHA may conduct routine inspections of the construction site on a daily basis.

(g) The Contractor shall, without charge, replace or correct work found by the PHA not to conform to contract requirements, unless the PHA decides that it is in its interest to accept the work with an appropriate adjustment in contract price. The Contractor shall promptly segregate and remove rejected material from the premises.

(h) If the Contractor does not promptly replace or correct rejected work, the PHA may (1) by contract or otherwise, replace or correct the work and charge the cost to the Contractor, or (2) terminate for default the Contractor's right to proceed.

(i) If any work requiring inspection is covered up without approval of the PHA, it must, if requested by the Contracting Officer, be uncovered at the expense of the Contractor. If at any time before final acceptance of the entire work, the PHA considers it necessary or advisable, to examine work already completed by removing or tearing it out, the Contractor, shall on request, promptly furnish all necessary facilities, labor, and material. If such work is found to be defective or nonconforming in any material respect due to the fault of the Contractor or its subcontractors, the Contractor shall defray all the expenses of the examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the contract, the Contracting Officer shall make an equitable adjustment to cover the cost of the examination and reconstruction, including, if completion of the work was thereby delayed, an extension of time.

(j) The Contractor shall notify the Contracting Officer, in writing, as to the date when in its opinion all or a designated portion of the work will be substantially completed and ready for inspection. If the Architect determines that the state of preparedness is as represented, the PHA will promptly arrange for the inspection. Unless otherwise specified in the contract, the PHA shall accept, as soon as practicable after completion and inspection, all work required by the contract or that portion of the work the Contracting Officer determines and designates can be accepted separately. Acceptance shall be final and conclusive except for latent defects, fraud, gross mistakes amounting to fraud, or the PHA's right under any warranty or guarantee.

21. Use and Possession Prior to Completion

(a) The PHA shall have the right to take possession of or use any completed or partially completed part of the work. Before taking possession of or using any work, the Contracting Officer shall furnish the Contractor a list of items of work remaining to be performed or corrected on those portions of the work that the PHA intends to take possession of or use. However, failure of the Contracting Officer to list any item of work shall not relieve the Contractor of responsibility for complying with the terms of the contract. The PHA's possession or use shall not be deemed an acceptance of any work under the contract.

(b) While the PHA has such possession or use, the Contractor shall be relieved of the responsibility for (1) the loss of or damage to the work resulting from the PHA's possession or use, notwithstanding the terms of the clause entitled Permits and Codes herein; (2) all maintenance costs on the areas occupied; and, (3) furnishing heat, light, power, and water used in the areas occupied without proper remuneration therefore. If prior possession or use by the PHA delays the progress of the work or causes additional expense to the Contractor, an equitable adjustment shall be made in the contract price or the time of completion, and the contract shall be modified in writing accordingly.

22. Warranty of Title

The Contractor warrants good title to all materials, supplies, and equipment incorporated in the work and agrees to deliver the premises together with all improvements thereon free from any claims, liens or charges, and agrees further that neither it nor any other person, firm or corporation shall have any right to a lien upon the premises or anything appurtenant thereto.

23. Warranty of Construction

(a) In addition to any other warranties in this contract, the Contractor warrants, except as provided in paragraph (j) of this clause, that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, or workmanship performed by the Contractor or any subcontractor or supplier at any tier. This warranty shall continue for a period of _____ (one year unless otherwise indicated) from the date of final acceptance of the work. If the PHA takes possession of any part of the work before final acceptance, this warranty shall continue for a period of (one year unless otherwise indicated) from the date that the PHA takes possession.

(b) The Contractor shall remedy, at the Contractor's expense, any failure to conform, or any defect. In addition, the Contractor shall remedy, at the Contractor's expense, any damage to PHA-owned or controlled real or personal property when the damage is the result of—
(1) The Contractor's failure to conform to contract requirements; or
(2) Any defects of equipment, material, workmanship or design furnished by the Contractor.

(c) The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for (one year unless otherwise indicated) from the date of repair or replacement.

(d) The Contracting Officer shall notify the Contractor, in writing, within a reasonable time after the discovery of any failure, defect or damage.

(e) If the Contractor fails to remedy any failure, defect, or damage within a reasonable time after receipt of notice, the PHA shall have the right to replace, repair or otherwise remedy the failure, defect, or damage at the Contractor's expense.

(f) With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall:
(1) Obtain all warranties that would be given in normal commercial practice;
(2) Require all warranties to be executed in writing, for the benefit of the PHA; and,
(3) Enforce all warranties for the benefit of the PHA.

(g) In the event the Contractor's warranty under paragraph (a) of this clause has expired, the PHA may bring suit at its own expense to enforce a subcontractor's, manufacturer's or supplier's warranty.

(h) Unless a defect is caused by the negligence of the Contractor or subcontractor or supplier at any tier, the Contractor shall not be liable for the repair of any defect of material or design furnished by the PHA nor for the repair of any damage that results from any defect in PHA furnished material or design.
(i) Notwithstanding any provisions herein to the contrary, the establishment of the time periods in paragraphs (a) and (c) above relate only to the specific obligation of the Contractor to correct the work, and have no relationship to the time within which its obligation to comply with the contract may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to its obligation other than specifically to correct the work.
(j) This warranty shall not limit the PHA's rights under the Inspection and Acceptance of Construction clause of this contract with respect to latent defects, gross mistakes or fraud.

24. Prohibition Against Liens

The Contractor is prohibited from placing a lien on the PHA's property. This prohibition shall apply to all subcontractors at any tier and all materials suppliers.

Administrative Requirements

25. Contract Period

this contract within 150 calendar days of the effective date of the contract, or within the time schedule established in the notice to proceed issued by the Contracting Officer.

26. Order of Provisions

In the event of a conflict between these General Conditions and the Specifications, the General Conditions shall prevail. In the event of a conflict between the contract and any applicable state or local law or regulation, the state or local law or regulation shall prevail; provided that such state or local law or regulation does not conflict with, or is less restrictive than applicable federal law, regulation, or Executive Order. In the event of such a conflict, applicable federal law, regulation, and Executive Order shall prevail.

27. Payments

(a) The PHA shall pay the Contractor the price as provided in this contract.
(b) The PHA shall make progress payments approximately every 30 days as the work proceeds, on estimates of work accomplished which meets the standards of quality established under the contract, as approved by the Contracting Officer. The PHA may, subject to written determination and approval of the Contracting Officer, make more frequent payments to contractors which are qualified small businesses.
(c) Before the first progress payment under this contract, the Contractor shall furnish, in such detail as requested by the Contracting Officer, a breakdown of the total contract price showing the amount included therein for each principal category of the work, which shall substantiate the payment amount requested in order to provide a basis for determining progress payments. The breakdown shall be approved by the Contracting Officer and must be acceptable to HUD. If the contract covers more than one project, the Contractor shall furnish a separate breakdown for each. The values and quantities employed in making up this breakdown are for determining the amount of progress payments and shall not be construed as a basis for additions to or deductions from the contract price. The Contractor shall prorate its overhead and profit over the construction period of the contract.
(d) The Contractor shall submit, on forms provided by the PHA, periodic estimates showing the value of the work performed during each period based upon the approved

submitted not later than 45 days in advance of the date set for payment and are subject to correction and revision as required. The estimates must be approved by the Contracting Officer with the concurrence of the Architect prior to payment. If the contract covers more than one project, the Contractor shall furnish a separate progress payment estimate for each.
(e) Along with each request for progress payments and the required estimates, the Contractor shall furnish the following certification, or payment shall not be made: I hereby certify, to the best of my knowledge and belief, that:
(1) The amounts requested are only for performance in accordance with the specifications, terms, and conditions of the contract;
(2) Payments to subcontractors and suppliers have been made from previous payments received under the contract, and timely payments will be made from the proceeds of the payment covered by this certification, in accordance with subcontract agreements; and,
(3) This request for progress payments does not include any amounts which the prime contractor intends to withhold or retain from a subcontractor or supplier in accordance with the terms and conditions of the subcontract.

_____
Name:

_____
Title:

_____
Date:

(f) Except as otherwise provided in State law, the PHA shall retain ten (10) percent of the amount of progress payments until completion and acceptance of all work under the contract; except, that if upon completion of 50 percent of the work, the Contracting Officer, after consulting with the Architect, determines that the Contractor's performance and progress are satisfactory, the PHA may make the remaining payments in full for the work subsequently completed. If the Contracting Officer subsequently determines that the Contractor's performance and progress are unsatisfactory, the PHA shall reinstate the ten (10) percent (or other percentage as provided in State law) retainage until such time as the Contracting Officer determines that performance and progress are satisfactory.
(g) The Contracting Officer may authorize material delivered on the site and preparatory work done to be taken into consideration when computing progress payments.

Material delivered to the Contractor at locations other than the site may also be taken into consideration if the Contractor furnishes satisfactory evidence that (1) it has acquired title to such material; (2) the material is properly stored in a bonded warehouse, storage yard, or similar suitable place as may be approved by the Contracting Officer; (3) the material is insured to cover its full value; and (4) the material will be used to perform this contract. Before any progress payment which includes delivered material is made, the Contractor shall furnish such documentation as the Contracting Officer may require to assure the protection of the PHA's interest in such materials. The Contractor shall remain responsible for such stored material notwithstanding the transfer of title to the PHA.

(h) All material and work covered by progress payments made shall, at the time of payment become the sole property of the PHA, but this shall not be construed as (1) relieving the Contractor from the sole responsibility for all material and work upon which payments have been made or the restoration of any damaged work; or, (2) waiving the right of the PHA to require the fulfillment of all of the terms of the contract. In the event the work of the Contractor has been damaged by other contractors or persons other than employees of the PHA in the course of their employment, the Contractor shall restore such damaged work without cost to the PHA and to seek redress for its damage only from those who directly caused it.

(i) The PHA shall make the final payment due the Contractor under this contract after (1) completion and final acceptance of all work; and (2) presentation of release of all claims against the PHA arising by virtue of this contract, other than claims, in stated amounts, that the Contractor has specifically excepted from the operation of the release. Each such exception shall embrace no more than one claim, the basis and scope of which shall be clearly defined. The amounts for such excepted claims shall not be included in the request for final payment. A release may also be required of the assignee if the Contractor's claim to amounts payable under this contract has been assigned.

(j) Prior to making any payment, the Contracting Officer may require the Contractor to furnish receipts or other evidence of payment from all persons performing work and supplying material to the Contractor, if the Contracting Officer determines such evidence is necessary to substantiate claimed costs.

(k) The PHA shall not; (1) determine or adjust any claims for payment or disputes arising there under between the Contractor and its subcontractors or material suppliers; or, (2) withhold any moneys for the protection of the subcontractors or material suppliers. The failure or refusal of the PHA to withhold moneys from the Contractor shall in nowise impair the obligations of any surety or sureties under any bonds furnished under this contract.

28. Contract Modifications

(a) Only the Contracting Officer has authority to modify any term or condition of this contract. Any contract modification shall be authorized in writing.

(b) The Contracting Officer may modify the contract unilaterally (1) pursuant to a specific authorization stated in a contract clause (e.g., Changes); or (2) for administrative matters which do not change the rights or responsibilities of the parties (e.g., change in the PHA address). All other contract modifications shall be in the form of supplemental agreements signed by the Contractor and the Contracting Officer.

(c) When a proposed modification requires the approval of HUD prior to its issuance (e.g., a change order that exceeds the PHA's approved threshold), such modification shall not be effective until the required approval is received by the PHA.

29. Changes

(a) The Contracting Officer may, at any time, without notice to the sureties, by written order designated or indicated to be a change order, make changes in the work within the general scope of the contract including changes:
(1) In the specifications (including drawings and designs);
(2) In the method or manner of performance of the work;
(3) PHA-furnished facilities, equipment, materials, services, or site; or,
(4) Directing the acceleration in the performance of the work.

(b) Any other written order or oral order (which, as used in this paragraph (b), includes direction, instruction, interpretation, or determination) from the Contracting Officer that causes a change shall be treated as a change order under this clause; provided, that the Contractor gives the Contracting Officer written notice stating (1) the date, circumstances and source of the order and (2) that the Contractor regards the order as a change order.

(c) Except as provided in this clause, no order, statement or conduct of the Contracting Officer shall be treated as a change under this clause or entitle the Contractor to an equitable adjustment.

(d) If any change under this clause causes an increase or decrease in the Contractor's cost of, or the time required for the performance of any part of the work under this contract, whether or not changed by any such order, the Contracting Officer shall make an equitable adjustment and modify the contract in writing. However, except for a adjustment based on defective specifications, no proposal for any change under paragraph (b) above shall be allowed for any costs incurred more than 20 days (5 days for oral orders) before the Contractor gives written notice as required. In the case of defective specifications for which the PHA is responsible, the equitable adjustment shall include any increased cost reasonably incurred by the Contractor in attempting to comply with the defective specifications.

(e) The Contractor must assert its right to an adjustment under this clause within 30 days after (1) receipt of a written change order under paragraph (a) of this clause, or (2) the furnishing of a written notice under paragraph (b) of this clause, by submitting a written statement describing the general nature and the amount of the proposal. If the facts justify it, the Contracting Officer may extend the period for submission. The proposal may be included in the notice required under paragraph (b) above. No proposal by the Contractor for an equitable adjustment shall be allowed if asserted after final payment under this contract.

(f) The Contractor's written proposal for equitable adjustment shall be submitted in the form of a lump sum proposal supported with an itemized breakdown of all increases and decreases in the contract in at least the following details:

(1) Direct Costs. Materials (list individual items, the quantity and unit cost of each, and the aggregate cost); Transportation and delivery costs associated with materials; Labor breakdowns by hours or unit costs (identified with specific work to be performed); Construction equipment exclusively necessary for the change; Costs of preparation and/ or revision to shop drawings resulting from the change; Worker's Compensation and Public Liability Insurance; Employment taxes under FICA and FUTA; and, Bond Costs when size of change warrants revision.

(2) Indirect Costs. Indirect costs may include overhead, general and administrative expenses, and fringe benefits not normally treated as direct costs.

(3) Profit. The amount of profit shall be negotiated and may vary according to the nature, extent, and complexity of the work required by the change. The allowability of the direct and indirect costs shall be determined in accordance with the Contract Cost Principles and Procedures for Commercial Firms in Part 31 of the Federal Acquisition Regulation (48 CFR 1-31), as implemented by HUD Handbook 2210.18, in effect on the date of this contract. The Contractor shall not be allowed a profit on the profit received by any subcontractor. Equitable adjustments for deleted work shall include a credit for profit and may include a credit for indirect costs. On proposals covering both increases and decreases in the amount of the contract, the application of indirect costs and profit shall be on the net-change in direct costs for the Contractor or subcontractor performing the work.

(g) The Contractor shall include in the proposal its request for time extension (if any), and shall include sufficient information and dates to demonstrate whether and to what extent the change will delay the completion of the contract in its entirety.

(h) The Contracting Officer shall act on proposals within 30 days after their receipt, or notify the Contractor of the date when such action will be taken.

(i) Failure to reach an agreement on any proposal shall be a dispute under the clause entitled Disputes herein. Nothing in this clause, however, shall excuse the Contractor from proceeding with the contract as changed.

(j) Except in an emergency endangering life or property, no change shall be made by the Contractor without a prior order from the Contracting Officer.

30. Suspension of Work

(a) The Contracting Officer may order the Contractor in writing to suspend, delay, or interrupt all or any part of the work of this contract for the period of time that the Contracting Officer determines appropriate for the convenience of the PHA.

(b) If the performance of all or any part of the work is, for an unreasonable period of time, suspended, delayed, or interrupted (1) by an act of the Contracting Officer in the administration of this contract, or (2) by the Contracting Officer's failure to act within the time specified (or within a reasonable time if not specified) in this contract an adjustment shall be made for any increase in the cost of performance of the contract (excluding profit) necessarily caused by such unreasonable suspension, delay, or interruption and the contract modified in writing accordingly. However, no adjustment shall be made under this clause for any suspension, delay, or interruption to the extent that performance would have been so suspended, delayed, or interrupted by any other cause, including the fault or negligence of the Contractor or for which any equitable adjustment is provided for or excluded under any other provision of this contract.

(c) A claim under this clause shall not be allowed (1) for any costs incurred more than 20 days before the Contractor shall have notified the Contracting Officer in writing of the act or failure to act involved (but this requirement shall not apply as to a claim resulting from a suspension order); and, (2) unless the claim, in an amount stated, is asserted in writing as soon as practicable after the termination of the suspension, delay, or interruption, but not later than the date of final payment under the contract.

31. Disputes

(a) "Claim," as used in this clause, means a written demand or written assertion by one of the contracting parties seeking, as a matter of right, the payment of money in a sum certain, the adjustment or interpretation of contract terms, or other relief arising under or relating to the contract. A claim arising under the contract, unlike a claim relating to the contract, is a claim that can be resolved under a contract clause that provides for the relief sought by the claimant. A voucher, invoice, or other routine request for payment that is not in dispute when submitted is not a claim. The submission may be converted to a claim by complying with the requirements of this clause, if it is disputed either as to liability or amount or is not acted upon in a reasonable time.

(b) Except for disputes arising under the clauses entitled Labor Standards - Davis Bacon and Related Acts, herein, all disputes arising under or relating to this contract, including any claims for damages for the alleged breach thereof which are not disposed of by agreement, shall be resolved under this clause.

(c) All claims by the Contractor shall be made in writing and submitted to the Contracting Officer for a written decision. A claim by the PHA against the Contractor shall be subject to a written decision by the Contracting Officer.

(d) The Contracting Officer shall, within 60 (unless otherwise indicated) days after receipt of the request, decide the claim or notify the Contractor of the date by which the decision will be made.

(e) The Contracting Officer's decision shall be final unless the Contractor (1) appeals in writing to a higher level in the PHA in accordance with the PHA's policy and procedures, (2) refers the appeal to an independent mediator or arbitrator, or (3) files suit in a court of competent jurisdiction. Such appeal must be made within (30 unless otherwise indicated) days after receipt of the Contracting Officer's decision.

(f) The Contractor shall proceed diligently with performance of this contract, pending final resolution of any request for relief, claim, appeal, or action arising under or relating to the contract, and comply with any decision of the Contracting Officer.

32. Default

(a) If the Contractor refuses or fails to prosecute the work, or any separable part thereof, with the diligence that will insure its completion within the time specified in this contract, or any extension thereof, or fails to complete said work within this time, the Contracting Officer may, by written notice to the Contractor, terminate the right to

proceed with the work (or separable part of the work) that has been delayed. In this event, the PHA may take over the work and complete it, by contract or otherwise, and may take possession of and use any materials, equipment, and plant on the work site necessary for completing the work. The Contractor and its sureties shall be liable for any damage to the PHA resulting from the Contractor's refusal or failure to complete the work within the specified time, whether or not the Contractor's right to proceed with the work is terminated. This liability includes any increased costs incurred by the PHA in completing the work.

(b) The Contractor's right to proceed shall not be terminated or the Contractor charged with damages under this clause if—

(1) The delay in completing the work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor. Examples of such causes include (i) acts of God, or of the public enemy, (ii) acts of the PHA or other governmental entity in either its sovereign or contractual capacity, (iii) acts of another contractor in the performance of a contract with the PHA, (iv) fires, (v) floods, (vi) epidemics, (vii) quarantine restrictions, (viii) strikes, (ix) freight embargoes, (x) unusually severe weather, or (xi) delays of subcontractors or suppliers at any tier arising from unforeseeable causes beyond the control and without the fault or negligence of both the Contractor and the subcontractors or suppliers; and

(2) The Contractor, within days (10 days unless otherwise indicated) from the beginning of such delay (unless extended by the Contracting Officer) notifies the Contracting Officer in writing of the causes of delay. The Contracting Officer shall ascertain the facts and the extent of the delay. If, in the judgment of the Contracting Officer, the findings of fact warrant such action, time for completing the work shall be extended by written modification to the contract. The findings of the Contracting Officer shall be reduced to a written decision which shall be subject to the provisions of the Disputes clause of this contract.

(c) If, after termination of the Contractor's right to proceed, it is determined that the Contractor was not in default, or that the delay was excusable, the rights and obligations of the parties will be the same as if the termination had been for convenience of the PHA.

33. Liquidated Damages

(a) If the Contractor fails to complete the work within the time specified in the contract, or any extension, as specified in the clause entitled Default of this contract, the Contractor shall pay to the PHA as liquidated damages, the sum of $____ $ 200.00 Contracting Officer insert amount] for each day of delay. If different completion dates are specified in the contract for separate parts or stages of the work, the amount of liquidated damages shall be assessed on those parts or stages which are delayed. To the extent that the Contractor's delay or nonperformance is excused under another clause in this contract, liquidated damages shall not be due the PHA. The Contractor remains liable for damages caused other than by delay.

(b) If the PHA terminates the Contractor's right to proceed, the resulting damage will consist of liquidated damages until such reasonable time as may be required for final completion of the work together with any increased costs occasioned the PHA in completing the work.

(c) If the PHA does not terminate the Contractor's right to proceed, the resulting damage will consist of liquidated damages until the work is completed or accepted.

34. Termination for Convenience

(a) The Contracting Officer may terminate this contract in whole, or in part, whenever the Contracting Officer determines that such termination is in the best interest of the PHA. Any such termination shall be effected by delivery to the Contractor of a Notice of Termination specifying the extent to which the performance of the work under the contract is terminated, and the date upon which such termination becomes effective.

(b) If the performance of the work is terminated, either in whole or in part, the PHA shall be liable to the Contractor for reasonable and proper costs resulting from such termination upon the receipt by the PHA of a properly presented claim setting out in detail: (1) the total cost of the work performed to date of termination less the total amount of contract payments made to the Contractor; (2) the cost (including reasonable profit) of settling and paying claims under subcontracts and material orders for work performed and materials and supplies delivered to the site, payment for which has not been made by the PHA to the Contractor or by the Contractor to the subcontractor or supplier; (3) the cost of preserving and protecting the work already performed until the PHA or assignee takes possession thereof or assumes responsibility therefore; (4) the actual or estimated cost of legal and accounting services reasonably necessary to prepare and present the termination claim to the PHA; and (5) an amount constituting a reasonable profit on the value of the work performed by the Contractor.

(c) The Contracting Officer will act on the Contractor's claim within days (60 days unless otherwise indicated) of receipt of the Contractor's claim.

(d) Any disputes with regard to this clause are expressly made subject to the provisions of the Disputes clause of this contract.

35. Assignment of Contract

The Contractor shall not assign or transfer any interest in this contract; except that claims for monies due or to become due from the PHA under the contract may be assigned to a bank, trust company, or other financial institution. Such assignments of claims shall only be made with the written concurrence of the Contracting Officer. If the Contractor is a partnership, this contract shall inure to the benefit of the surviving or remaining member(s) of such partnership as approved by the Contracting Officer.

36. Insurance

(a) Before commencing work, the Contractor and each subcontractor shall furnish the PHA with certificates of insurance showing the following insurance is in force and will insure all operations under the Contract:

(1) Workers' Compensation, in accordance with state or Territorial Workers' Compensation laws.

(2) Commercial General Liability with a combined single limit for bodily injury and property damage of not less than $ 1MILLION [Contracting Officer insert amount]

per occurrence to protect the Contractor and each subcontractor against claims for bodily injury or death and damage to the property of others. This shall cover the use of all equipment, hoists, and vehicles on the site(s) not covered by Automobile Liability under (3) below. If the Contractor has a "claims made" policy, then the following additional requirements apply: the policy must provide a "retroactive date" which must be on or before the execution date of the Contract; and the extended reporting period may not be less than five years following the completion date of the Contract.

(3) Automobile Liability on owned and non -owned motor vehicles used on the site(s) or in connection therewith for a combined single limit for bodily injury and property damage of not less than $ 1MILLION [Contracting Officer insert amount] per occurrence.

(b) Before commencing work, the Contractor shall furnish the PHA with a certificate of insurance evidencing that Builder's Risk (fire and extended coverage) Insurance on all work in place and/or materials stored at the building site(s), including foundations and building equipment, is in force. The Builder's Risk Insurance shall be for the benefit of the Contractor and the PHA as their interests may appear and each shall be named in the policy or policies as an insured. The Contractor in installing equipment supplied by the PHA shall carry insurance on such equipment from the time the Contractor takes possession thereof until the Contract work is accepted by the PHA. The Builder's Risk Insurance need not be carried on excavations, piers, footings, or foundations until such time as work on the superstructure is started. It need not be carried on landscape work. Policies shall furnish coverage at all times for the full cash value of all completed construction, as well as materials in place and/or stored at the site(s), whether or not partial payment has been made by the PHA. The Contractor may terminate this insurance on buildings as of the date taken over for occupancy by the PHA. The Contractor is not required to carry Builder's Risk Insurance for modernization work which does not involve structural alterations or additions and where the PHA's existing fire and extended coverage policy can be endorsed to include such work.

(c) All insurance shall be carried with companies which are financially responsible and admitted to do business in the State in which the project is located. If any such insurance is due to expire during the construction period, the Contractor (including subcontractors, as applicable) shall not permit the coverage to lapse and shall furnish evidence of coverage to the Contracting Officer. All certificates of insurance, as evidence of coverage, shall provide that no coverage may be canceled or non-renewed by the insurance company until at least 30 days prior written notice has been given to the Contracting Officer.

37. Subcontracts

(a) Definitions. As used in this contract -

(1) "Subcontract" means any contract, purchase order, or other purchase agreement, including modifications and change orders to the foregoing, entered into by a subcontractor to furnish supplies, materials, equipment, and services for the performance of the prime contract or a subcontract.

(2) "Subcontractor" means any supplier, vendor, or firm that furnishes supplies, materials, equipment, or services to or for the Contractor or another subcontractor.

(b) The Contractor shall not enter into any subcontract with any subcontractor who has been temporarily denied participation in a HUD program or who has been suspended or debarred from participating in contracting programs by any agency of the United States Government or of the state in which the work under this contract is to be performed.

(c) The Contractor shall be as fully responsible for the acts or omissions of its subcontractors, and of persons either directly or indirectly employed by them as for the acts or omissions of persons directly employed by the Contractor.

(d) The Contractor shall insert appropriate clauses in all subcontracts to bind subcontractors to the terms and conditions of this contract insofar as they are applicable to the work of subcontractors.

(e) Nothing contained in this contract shall create any contractual relationship between any subcontractor and the PHA or between the subcontractor and HUD.

38. Subcontracting with Small and Minority Firms, Women's Business Enterprise, and Labor Surplus Area Firms

The Contractor shall take the following steps to ensure that, whenever possible, subcontracts are awarded to small business firms, minority firms, women's business enterprises, and labor surplus area firms:

(a) Placing qualified small and minority businesses and women's business enterprises on solicitation lists;

(b) Ensuring that small and minority businesses and women's business enterprises are solicited whenever they are potential sources;

(c) Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses and women's business enterprises;

(d) Establishing delivery schedules, where the requirements of the contract permit, which encourage participation by small and minority businesses and women's business enterprises; and

(e) Using the services and assistance of the U.S. Small Business Administration, the Minority Business Development Agency of the U.S. Department of Commerce, and State and local governmental small business agencies.

39. Equal Employment Opportunity

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

(a) The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin, or handicap.

(b) The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, national origin, or handicap. Such action shall include, but not be limited to, (1) employment, (2) upgrading, (3) demotion, (4) transfer, (5) recruitment or recruitment advertising, (6) layoff or termination, (7) rates of pay or other forms of compensation, and (8) selection for training, including apprenticeship.

(c) The Contractor shall post in conspicuous places available to employees and applicants for employment the notices to be provided by the Contracting Officer that explain this dause.

(d) The Contractor shall, 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 race, color, religion, sex, national origin, or handicap.

(e) The Contractor shall send, to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, the notice to be provided by the Contracting Officer advising the labor union or workers' representative of the Contractor's commitments under this clause, and post copies of the notice in conspicuous places available to employees and applicants for employment.

(f) The Contractor shall comply with Executive Order 11246, as amended, and the rules, regulations, and orders of the Secretary of Labor.

(g) The Contractor shall furnish all information and reports required by Executive Order 11246, as amended, Section 503 of the Rehabilitation Act of 1973, as amended, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto. The Contractor shall permit access to its books, records, and accounts by the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(h) In the event of a determination that the Contractor is not in compliance with this clause or any rule, regulation, or order of the Secretary of Labor, this contract may be canceled, terminated, or suspended in whole or in part, and the Contractor may be declared ineligible for further Government contracts, or Federally assisted construction contracts under the procedures authorized in Executive Order 11246, as amended. In addition, sanctions may be imposed and remedies invoked against the Contractor as provided in Executive Order 11246, as amended, the rules, regulations, and orders of the Secretary of Labor, or as otherwise provided by law.

(i) The Contractor shall include the terms and conditions of this clause in every subcontract or purchase order unless exempted by the rules, regulations, or orders of the Secretary of Labor issued under Executive Order 11246, as amended, so that these terms and conditions will be binding upon each subcontractor or vendor. The Contractor shall take such action with respect to any subcontract or purchase order as the Secretary of Housing and Urban Development or the Secretary of Labor may direct as a means of enforcing such provisions, including sanctions for noncompliance; provided that if the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction, the Contractor may request the United States to enter into the litigation to protect the interests of the United States.

(j) Compliance with the requirements of this clause shall be to the maximum extent consistent with, but not in derogation of, compliance with section 7(b) of the Indian Self-Determination and Education Assistance Act and the Indian Preference clause of this contract.

40. Employment, Training, and Contracting Opportunities for Low-Income Persons, Section 3 of the Housing and Urban Development Act of 1968.

(a) 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 by section 3, shall, to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.

(b) 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.

(c) 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.

(d) 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.

(e) 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 24 CFR Part 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR Part 135.

(f) 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.

(g) 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. 450e) 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 derogation of compliance with section 7(b).

41. Interest of Members of Congress

No member of or delegate to the Congress of the United States of America shall be admitted to any share or part of this contract or to any benefit that may arise therefrom.

42. Interest of Members, Officers, or Employees and Former Members, Officers, or Employees

No member, officer, or employee of the PHA, no member of the governing body of the locality in which the project is situated, no member of the governing body of the locality in which the PHA was activated, and no other public official of such locality or localities who exercises any functions or responsibilities with respect to the project, shall, during his or her tenure, or for one year thereafter, have any interest, direct or indirect, in this contract or the proceeds thereof.

43. Limitations on Payments made to Influence Certain Federal Financial Transactions

(a) The Contractor agrees to comply with Section 1352 of Title 31, United States Code which prohibits the use of Federal appropriated funds to pay any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, and officer or employee of Congress, or an employee of a Member of Congress in connection with any of the following covered Federal actions: the awarding of any Federal contract; the making of any Federal grant; the making of any Federal loan; the entering into of any cooperative agreement; or the modification of any Federal contract, grant, loan, or cooperative agreement.

(b) The Contractor further agrees to comply with the requirement of the Act to furnish a disclosure (OMB Standard Form LLL, Disclosure of Lobbying Activities) if any funds other than Federal appropriated funds (including profit or fee received under a covered Federal transaction) have been paid, or will be paid, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a Federal contract, grant, loan, or cooperative agreement.

44. Royalties and Patents

The Contractor shall pay all royalties and license fees. It shall defend all suits or claims for infringement of any patent rights and shall save the PHA harmless from loss on account thereof; except that the PHA shall be responsible for all such loss when a particular design, process or the product of a particular manufacturer or manufacturers is specified and the Contractor has no reason to believe that the specified design, process, or product is an infringement. If, however, the Contractor has reason to believe that any design, process or product specified is an infringement of a patent, the Contractor shall promptly notify the Contracting Officer. Failure to give such notice shall make the Contractor responsible for resultant loss.

45. Examination and Retention of Contractor's Records

(a) The PHA, HUD, or Comptroller General of the United States, or any of their duly authorized representatives shall, until 3 years after final payment under this contract, have access to and the right to examine any of the Contractor's directly pertinent books, documents, papers, or other records involving transactions related to this contract for the purpose of making audit, examination, excerpts, and transcriptions.

(b) The Contractor agrees to include in first-tier subcontracts under this contract a clause substantially the same as paragraph (a) above. "Subcontract," as used in this clause, excludes purchase orders not exceeding $10,000.

(c) The periods of access and examination in paragraphs (a) and (b) above for records relating to (1) appeals under the Disputes clause of this contract, (2) litigation or settlement of claims arising from the performance of this contract, or (3) costs and expenses of this contract to which the PHA, HUD, or Comptroller General or any of their duly authorized representatives has taken exception shall continue until disposition of such appeals, litigation, claims, or exceptions.

46. Labor Standards - Davis-Bacon and Related Acts

If the total amount of this contract exceeds $2,000, the Federal labor standards set forth in the clause below shall apply to the development or construction work to be performed under the contract.

(a) Minimum Wages.

(1) All laborers and mechanics employed under this contract in the development or construction of the project(s) involved will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the regular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits in the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein; provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1321) shall

be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(2) (i) Any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefor only when all the following criteria have been met: (A) The work to be performed by the classification requested is not performed by a classification in the wage determination; and (B) The classification is utilized in the area by the construction industry; and (C) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(ii) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, Employee Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary.

(iii) In the event the Contractor, the laborers or mechanics to be employed in the classification or their representatives, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator of the Wage and Hour Division for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary.

(iv) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (a)(2)(ii) or (iii) of this clause shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in classification.

(3) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(4) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program; provided, that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(b) Withholding of funds. HUD or its designee shall, upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the Contractor under this contract or any other Federal contract with the same prime Contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime Contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working in the construction or development of the project, all or part of the wages required by the contract, HUD or its designee may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the Contractor, disburse such amounts withheld for and on account of the Contractor or subcontractor to the respective employees to whom they are due.

(c) Payrolls and basic records.

(1) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working in the construction or development of the project. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made, and actual wages paid. Whenever the Secretary of Labor has found, under 29 CFR 5.5(a)(1)(iv), that the wages of any laborer or mechanic include the amount of costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(2) (i) The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the Contracting Officer for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under subparagraph (c)(1) of this clause. This information may be submitted in any form desired. Optional Form WH-347 (Federal Stock Number 029-005-00014-1) is available for this purpose and may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. The Contractor is responsible for the submission of copies of payrolls by all subcontractors. (Approved by the Office of Management and Budget under OMB Control Number 1214-0149.)

(ii) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(A) That the payroll for the payroll period contains the information required to be maintained under paragraph (c) (1) of this clause and that such information is correct and complete;

(B) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3; and

(C) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(iii) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirements for submission of the "Statement of Compliance" required by subparagraph (c)(2)(ii) of this clause.

(iv) The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 3729 of Title 31 of the United States Code.

(3) The Contractor or subcontractor shall make the records required under subparagraph (c)(1) available for inspection, copying, or transcription by authorized representatives of HUD or its designee, the Contracting Officer, or the Department of Labor and shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(d) (1) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship and Training, Employer and Labor Services (OATELS), or with a State Apprenticeship Agency recognized by OATELS, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by OATELS or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated in this paragraph, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator of the Wage and Hour Division determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event OATELS, or a State Apprenticeship Agency recognized by OATELS, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(2) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under

the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed in the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate in the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate in the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate in the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(3) Equal employment opportunity. The utilization of apprentices, trainees, and journeymen under this clause shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

(e) Compliance with Copeland Act requirements. The Contractor shall comply with the requirements of 29 CFR Part 3, which are hereby incorporated by reference in this contract.

(f) Contract termination; debarment. A breach of this contract clause may be grounds for termination of the contract and for debarment as a Contractor and a subcontractor as provided in 29 CFR 5.12.

(g) Compliance with Davis-Bacon and related Act requirements. All rulings and interpretations of the Davis-Bacon and related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract.

(h) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this clause shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the PHA, HUD, the U.S. Department of Labor, or the employees or their representatives.

(i) Certification of eligibility.

(1) By entering into this contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded contracts by the United States Government by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(2) No part of this contract shall be subcontracted to any person or firm ineligible for award of a United States Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(3) The penalty for making false statements is prescribed in the U. S. Criminal Code, 18 U.S.C. 1001.

(j) Contract Work Hours and Safety Standards Act. As used in this paragraph, the terms "laborers" and "mechanics" include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics, including watchmen and guards, shall require or permit any such laborer or mechanic in any workweek in which the individual is employed on such work to work in excess of 40 hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the provisions set forth in subparagraph (j)(1) of this clause, the Contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic (including watchmen and guards) employed in violation of the provisions set forth in subparagraph (j)(1) of this clause, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by provisions set forth in subparagraph (j)(1) of this clause.

(3) Withholding for unpaid wages and liquidated damages. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the Contractor or subcontractor under any such contract or any Federal contract with the same prime Contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime Contractor, such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or subcontractor for unpaid wages and liquidated damages as provided in the provisions set forth in subparagraph (j)(2) of this clause.

(k) Subcontracts. The Contractor or subcontractor shall insert in any subcontracts all the provisions contained in this clause, and such other clauses as HUD or its designee may by appropriate instructions require, and also a clause requiring the subcontractors to include these provisions in any lower tier subcontracts. The prime Contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all these provisions.

47. Non-Federal Prevailing Wage Rates

(a) Any prevailing wage rate (including basic hourly rate and any fringe benefits), determined under State or tribal law to be prevailing, with respect to any employee in any trade or position employed under the contract, is inapplicable to the contract and shall not be enforced against the Contractor or any subcontractor, with respect to employees engaged under the contract whenever such non-Federal prevailing wage rate exceeds:
(1) The applicable wage rate determined by the Secretary of Labor pursuant to the Davis-Bacon Act (40 U.S.C. 3141 et seq.) to be prevailing in the locality with respect to such trade;
(b) An applicable apprentice wage rate based thereon specified in an apprenticeship program registered with the U.S. Department of Labor (DOL) or a DOL-recognized State Apprenticeship Agency; or
(c) An applicable trainee wage rate based thereon specified in a DOL-certified trainee program.

48. Procurement of Recovered Materials.

(a) In accordance with Section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, the Contractor shall procure items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR Part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition. The Contractor shall procure items designated in the EPA guidelines that contain the highest percentage of recovered materials practicable unless the Contractor determines that such items: (1) are not reasonably available in a reasonable period of time; (2) fail to meet reasonable performance standards, which shall be determined on the basis of the guidelines of the National Institute of Standards and Technology, if applicable to the item; or (3) are only available at an unreasonable price.
(b) Paragraph (a) of this clause shall apply to items purchased under this contract where: (1) the Contractor purchases in excess of $10,000 of the item under this contract; or (2) during the preceding Federal fiscal year, the Contractor: (i) purchased any amount of the items for use under a contract that was funded with Federal appropriations and was with a Federal agency or a State agency or agency of a political subdivision of a State; and (ii) purchased a total of in excess of $10,000 of the item both under and outside that contract.

Housing Authority of the City of Pittsburgh

Development & Modernization
100 Ross Street, Suite 200
Pittsburgh, PA 15219
(412) 456-5020
www.hacp.org

Bedford Hope Center Improvements, AMP-02

HACP Contract No. 600-16-18

SUPPLEMENTAL GENERAL CONDITIONS

SUPPLEMENTAL GENERAL CONDITIONS

To the extent that there is a conflict between the terms of the General Conditions and the terms of the Supplemental General Conditions, the terms of the Supplemental General Conditions shall govern to the extent of such conflict.

If HUD 5370 applies:

Section 31(e) of the General Conditions shall be deleted in its entirety and replaced by the following:

31(e). Forum. The Contracting Officer's decision shall be final unless, within thirty (30) days of receipt of the Contracting Officer's decision, the Contractor files suit in a court of competent jurisdiction.

If HUD 5370-EZ applies:

Section 3(d) of the General Conditions shall be deleted in its entirety and replaced by the following:

31(d). Forum. The Contracting Officer's decision shall be final unless, within thirty (30) days of receipt of the Contracting Officer's decision, the Contractor files suit in a court of competent jurisdiction.

If HUD 5370-C applies:

Section 1 Item 7(d) of the General Conditions shall be deleted in its entirety and replaced by the following:

Section 1 Item 7(d). Forum. The Contracting Officer's decision shall be final unless, within thirty (30) days of receipt of the Contracting Officer's decision, the Contractor files suit in a court of competent jurisdiction.

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

Date: _____ Signature: _____
Contracting Officer

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_____
Vendor Name(Insert vendor company name above)

Date: _____ Signature: _____

Title: _____

THE HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

Bedford Hope Center Improvements, AMP-02

HACP Contract No. 600-16-18

WAGE DETERMINATION SCHEDULE

The construction covered by this contract is subject to the requirements of Clause 47 **Labor Standards - Davis-Bacon and Related Acts** of the General Conditions of the Contract for Construction. In accordance with 47 (a)(1) the wage determination of the Secretary of Labor is attached.

General Decision Number: PA180001 03/16/2018 PA1

Superseded General Decision Number: PA20170001

State: Pennsylvania

Construction Type: Building

County: Allegheny County in Pennsylvania.



BUILDING ERECTION AND FOUNDATION EXCAVATION PROJECTS (does not include residential construction consisting of single family homes and apartmennts up to and including 4 stories) EXCLUDING SEWAGE AND TREATMENT PLANT PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.35 for calendar year 2018 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.35 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2018. The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/05/2018
1	01/12/2018
2	02/09/2018
3	03/16/2018

ASBE0002-001 08/01/2017

	Rates	Fringes
Asbestos Workers/Insulator Includes the application of all insulating materials, protective coverings, coatings and finishings to all types of mechanical systems	$ 39.76	24.17

BOIL0154-001 01/01/2017

	Rates	Fringes
BOILERMAKER	$ 40.90	27.27

BRPA0009-029 12/01/2017

	Rates	Fringes

BRICKLAYER.....$ 31.69 21.27

BRPA0009-060 12/01/2017

	Rates	Fringes
MASON - STONE.....	$ 32.66	20.56

BRPA0009-061 12/01/2017

	Rates	Fringes
TILE SETTER.....	$ 30.75	18.38

CARP0142-001 06/01/2017

	Rates	Fringes
Carpenter/Lather.....	$ 33.01	16.45

CARP1759-001 06/01/2017

	Rates	Fringes
FLOOR LAYER: Carpet.....	$ 33.01	16.45

CARP2235-001 06/01/2017

	Rates	Fringes
MILLWRIGHT.....	$ 39.83	18.62

CARP2235-007 01/01/2018

	Rates	Fringes
PILEDRIVERMAN.....	$ 33.55	18.55

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* ELEC0005-007 12/23/2017

	Rates	Fringes
ELECTRICIAN.....	$ 39.76	25.43

ELEC0126-006 05/29/2017

	Rates	Fringes
Line Construction:		
Groundmen.....	$ 27.14	28.25%+11.00
Lineman.....	$ 45.24	28.25%+11.00
Truck Driver.....	$ 29.41	28.25%+11.00
Winch Truck Operator.....	$ 31.67	28.25%+11.00

ELEV0006-001 01/01/2018

	Rates	Fringes
ELEVATOR MECHANIC.....	$ 47.22	32.645+A+B

FOOTNOTE: A. Employer contributes 8% of regular hourly rate as vacation pay credit for employees with more than 5 years of service, and 6% for 6 months to 5 years of service.

B. Eight Paid Holidays (provided employee has worked 5 consecutive days before and the working day after the holiday): New Years's Day; Memorial Day; Independence Day; Labor Day; Veteran's Day; Thanksgiving Day and the Friday after Thanksgiving Day, and Christmas Day.

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* ENGI0066-001 06/12/2017

	Rates	Fringes
Power equipment operators:		
CLASS 1	$ 34.49	20.15
CLASS 2	$ 29.58	20.15
CLASS 3	$ 27.25	20.15

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

CLASS I

Asphalt Paver, Asphalt Roller, Asphalt Plant Operator, Athey Loader, Auger (Truck or Tractor Mounted), Auto Grader (C.M.I. and similar), Backhoe (180' and 360' swing), Back-Filling Machine, Batch Plant, Bulldozer, Cable Layer, Cableway, Caisson Drill, Central Mix Plant, Compactor with Blade, Concrete Pump (all types), Over-Head Crane, Crane (Crawler or Truck Mounted)*, Tower Crane (Stationary or Climbing Type), Rough Terrain Crane**, Wagon Crane, Crushing and/or Screening Plant, Derrick Traveler, Derrick (all types)(when assistance is needed it will be an oiler or apprentice), Derrick Boats, Dragline, Drill (Davey or similar), Dredge, Drill (Well and Core)(Truck or Skid Mounted), Elevator, Excavating Equipment (all other), Fork Lift (Lull or similar), Franki Pile Machine (or similar), Guard Post Driver, Gradall (all types), Grader, Elevating Grader, Equipment Greaser, Helicopter, Helicopter Hoist Operators, Front End Loader, Hoist, Hydraulic Boom Truck, Jumbo Operator, Kocal, Koehring Scooper, Locomotive, Metro Chip Harvester (or similar), Mix Mobile, Mixer - Paver, Mucking Machine, Multiple Bowl Machines, Pile Driver (Sonic or similar), Scrapers, Shovels (powered), Slip Form Paver (C.M.I. and similar), Spreader (Concrete, Asphalt, or Stone), Tire Repairman (when assigned to a jobsite), Tower Mobile, Tractors (all types), Trencher, Tug Boat, Vermeer Saw, Welder (repairman), Whirley

* Cranes with Boom or Mast length (including jib) 100 ft or over shall be paid an additional $.50 per hour for each 50-foot increment of additional boom and/or jib length)

** Rough Terrain Cranes with Boom or Mast length (including jib) 101 ft or over shall be paid an Additional $.50 per hour for each 50-foot increment of additional boom and/or jib length)

Note: An additional $1.25 per hour (not counting boom pay) shall be paid for any crane (excluding overhead cranes) rated 100 ton or over.

CLASS II

Ballast Regulator, Boat (material or personnel)(powered), Boiler, Boring Machine, Compressor (combined with Air Tugger, Air Pump, Gunite Machine, or Sand Blaster), Concrete Belt Placer, Concrete Saw, Conveyor, Carry Crane,

Crushing/Screening Plants, Curb Builder (self-propelled), Forklifts (ridden or self-propelled), Form Line Machine, Generator (over 5KW), Grout Pump, Heaters, Hoist (monorail, roof, one drum-regardless of power used), Huck Machine (or similar), Hydraulic Jack (single or multiple)(power driven), Ladavator, Mortar Mixer, Mulching Machine, Pavement Breaker (self-propelled or ridden), Pin Puller (powered), Pipe Cleaning Machine, Pipe Dream, Power Broom (except push type), Pulverizer, Pumps (regardless of power used), Roller/Compactor (Dirt), Refrigeration Plant, Ross Carrier (or similar), Seeding Machine, Skid Steer Loader (or similar), Slab Lifting Machine (hydraulic), Soil Stabilizer (pump type), Spray Cure Machine (power driven), Side Delivery Shoulder Spreader (attachment), Steam Jenny (or similar), Stone Crusher, Stone Spreader (self-propelled), Siphon (steam or air), Tie Tamper (multiple heads), Tractor (when used for landscaping, snaking, or hauling), Truck (Winch)(when hoisting and placing), Tube Finisher (C.M.I. and similar), Tugger, Water Blaster, Welding Machine, Well Point System

CLASS III

Brakeman, Deck Hand, Helicopter Signalman, Oiler*, Elevator (Alterations & Remodeling Commercial Buildings),

* Oilers on Truck Cranes: less than 50 ton shall receive $.10 over the Class III base rate; 50 ton up to 100 ton rated capacity shall be paid an additional $.25 per hour over the Class III base rate; 100 ton and over shall be paid an additional $1.00 per hour over the Class III base rate.

General Note: Hazardous Material Sites Level C & D receive $1.00 per hour premium for all classifications and Levels A & B receive $2.50 premium for all classifications

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IRON0003-002 06/01/2017

	Rates	Fringes
IRONWORKER	$ 33.54	29.87

LABO0613-002 01/01/2016

	Rates	Fringes
Laborers:		
GROUP 1	$ 22.22	14.60
GROUP 2	$ 22.37	14.60
GROUP 3	$ 22.50	14.60
GROUP 4	$ 22.97	14.60

LABORERS CLASSIFICATIONS

GROUP 1: COMMON LABORER - Building laborer; Brick removal for alterations; Carryable pumps; West brick buggy or similar; Walk behind forklift or similar (non self-propelled); Stripper and mover of forms; Toolroom man; all material conveyors (regardless of power used, including starting and stopping); Pouring of mortar or aggregate into blocks of voids

GROUP 2: SKILLED LABORER - West brick buggy or similar (self

propelled); Power wheelbarrows and buggies; walk behind forklift or similar (self-propelled); Drill runner; All operators of compacting equipment; Pipe layer; Burner; Jackhammer man - concrete buster; Vibrator operator; Clay spade and/or similar; Gunnite nozzleman; Blaster; Concrete saw operator; Hod carrier; Scaffold builder; Air track operator; Bell and Bottom Man on furnace and stacks; Grout machine feeder and pump operator; Gunnite machine operator or similar; Gunnite machine potman or similar; Mortar Mixer; Mortar mixer machine (regardless of power used, including starting and stopping); Wagon drill operator; Laser cleaner; Lancer

GROUP 3: Asbestos removal or abatement laborer

GROUP 4: Toxic or Hazardous waste handling laborer

LABO0952-004 07/01/2015

	Rates	Fringes
Landscaping		
GROUP 1	$ 18.50	13.30
GROUP 2	$ 18.92	13.30
GROUP 3	$ 19.22	13.30

LANDSCAPING CLASSIFICATIONS

GROUP 1: Landscape laborer to include general landscaping work and the driving of trucks for the distribution of materials on the job site but not to include trucks used to transport supplies to the job

GROUP 2: Skilled Landscape Laborer to plant all types of trees and shrubs without direct supervision.

GROUP 3 - Landscape tractor operator to operate small industrial rubber tire tractor equipped with front end loader and backhoe attachment or a skid loader with landscape attachments used for the sole purpose of landscape work including soil spreading, unloading and loading of materials and such other landscaping work but not for heavy and highway construction work

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PAIN0057-003 06/01/2017

	Rates	Fringes
PAINTER		
Brush & Roller	$ 27.50	18.43

PAIN0057-005 06/01/2017

	Rates	Fringes
DRYWALL FINISHER/TAPER	$ 27.80	18.75

PAIN0751-001 09/01/2017

	Rates	Fringes

GLAZIER	$ 28.00	22.36

PLAS0031-014 06/01/2015

	Rates	Fringes
PLASTERER	$ 27.97	14.26

PLAS0526-007 06/01/2017

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 29.52	18.39

PLUM0027-002 06/01/2017

	Rates	Fringes
PLUMBER	$ 39.20	21.27

PLUM0449-001 06/01/2017

	Rates	Fringes
PIPEFITTER	$ 39.35	20.97

ROOF0037-001 06/01/2017

	Rates	Fringes
ROOFER	$ 31.00	15.17

SFPA0542-001 07/01/2017

	Rates	Fringes
SPRINKLER FITTER	$ 37.17	19.52

SHEE0012-002 07/01/2017

	Rates	Fringes
SHEET METAL WORKER	$ 33.70	27.21

TEAM0040-002 01/01/2017

	Rates	Fringes
Truck drivers:		
GROUP 1	$ 28.10	17.42
GROUP 2	$ 28.24	17.50
GROUP 3	$ 28.71	17.80

FOOTNOTES:

A. Hazardous/toxic waste material/work level A & B receive additional $2.50 per hour above classification rate

B. Hazardous/toxic waste materials/Work level C & D receive $1.00 per hour above classification

TRUCK DRIVERS CLASSIFICATIONS

GROUP 1 - Single Axle (2 axles including steering axle); Includes partsman and warehoueman

GROUP 2 - Tandem - Tri-Axle - Semi-Tractor Trailer (combination) (3 axles or more including steering axle)

GROUP 3 - Specialty Vehicles; Heavy equipment whose capacity exceeds that for which state licenses are issued specifically refers to units in excess of eight (8) feet width (such as Euclids, Atley Wagon, Payloder, Tournawagons, and similar equipment when not self loaded); Tar and Asphalt Distributors Trucks, Heavy Duty Trailer, such as Low Boy, High Boy

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WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example:

PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on

* a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

PART 4: TECHNICAL SPECIFICATIONS

Bedford Hope Center Improvements,
AMP-02

IFB CONTRACT NO. 600-16-18

SPECIFICATIONS MANUAL FOR RENOVATIONS AND UPGRADES

BEDFORD HOPE CENTER

2305 BEDFORD AVENUE
PITTSBURGH, PENNSYLVANIA 15219

Housing Authority of the City of Pittsburgh
PA 1-02 / Task Order #19 and #30

December 5, 2016
March 16, 2018 (Revised for Re-Bid)

GERARD
ASSOCIATES ARCHITECTS

410 FT. PITT COMMONS, 445 FT. PITT BLVD.
PITTSBURGH, PENNSYLVANIA 15219-1532

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SECTION 011000 - SUMMARY

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. Project information.
2. Work covered by Contract Documents
3. Phased construction.
4. Access to site.
5. Coordination with occupants.
6. Work restrictions.
7. Specification and drawing conventions.

B. Related Requirements:

1. Section 015000 “Temporary Facilities and Controls” for limitations and procedures governing temporary use of HACP’s Facilities.

1.3 PROJECT INFORMATION

A. Project Identification: Housing Authority of the City of Pittsburgh, Hope Center Renovations, Upgrades at the Bedford Dwellings PA-1-02

1. Project Location: 2305 Bedford Avenue, Pittsburgh, Pennsylvania

B. Owner: (HACP) Housing Authority of the City of Pittsburgh, 100 Ross Street, 2nd Floor, Pittsburgh, Pennsylvania 15219.

1. HACP Contact: John McCracken, Project Manager

C. Architect: Gerard Associates Architects, L.L.C., 445 Fort Pitt Boulevard, Suite 410, Pittsburgh, Pennsylvania 15219.

1. Representative: Dawn Danyo DiMedio, A.I.A., LEED AP BD+C
Steve Chiang, R.A.

D. Architect’s Consultants: The Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:

1. Mechanical and Plumbing Engineer: Univesco, L.L.C., 2420 Traci Drive, Pittsburgh, Pennsylvania 15237
   a. Representative: Thomas J. Poerio, PH.D., P.E.

E. Contractor: To be determined.

F. Construction Manager / HACP's Representative: To be determined.

1. Construction Manager will be engaged for this Project to serve as an advisor to HACP and to provide assistance in administering the Contract for Construction between HACP and each Prime Contractor, according to a separate contract between HACP and Construction Manager.

G. Project Web Site: Not applicable to this project.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. The Scope of Work Area includes but is not limited to selective demolition and construction on the interior and exterior of the existing Bedford Hope Center. The building shall be fully occupied throughout the course of demolition and construction. The project shall be bid as Multiple Prime.

2. General Prime Contractor: The Scope of Work includes but shall not be limited to the installation of new flooring for the common areas, office areas, community rooms and daycare center; interior painting thought-out; refinishing of existing interior wood systems; minor interior partition and gypsum board systems installation; door hardware and security systems upgrades; window modifications and roof replacement.

3. Electrical Prime Contractor: The Scope of Work includes but shall not be limited to the wiring and installation of new fixtures and equipment; power wiring as necessary for new door security; and the installation of a new photovoltaic system.

4. Mechanical Prime Contractor: The Scope of Work includes but shall not be limited to the replacement of rooftop HVAC equipment.

5. Plumbing Prime Contractor: NO PLUMBING WORK.

6. All associated fees for permit and inspections required to complete the scope of work described above.

B. Type of Contract:
1. Project will be constructed under a multi-prime contract, General Prime, Electrical Prime and Mechanical Prime.

1.5 PHASED CONSTRUCTION AND OCCUPANT DISRUPTION

A. The Work shall be conducted in a single phase and will be required to be coordinated and sequenced by the General Prime Contractor.

1. General Prime Contractor is responsible for the Construction Schedule; Occupant Disruption Schedule, (DCPOD Schedule), coordination with all Contractors and disciplines and providing an update on a weekly bases during the Construction Phase. All Contractors and disciplines are required to coordinate and provide detailed Construction Schedules, for their disciplines scope of work, to the General Prime Contractor, to be incorporated into the comprehensive schedule. All milestones and occupancy disruptions shall be identified within the schedule and shall be provided at least 1 week prior to occupant disruptions, to allow HACP's Representative to coordinate with occupants.

    a. General Phasing and Occupant Disruption Schedule Milestones to be minimally identified: Start and End dates of specific scope of work milestones, occupant milestones, substantially complete milestones, ready for occupancy milestones and other associated milestones for approval from HACP and the Architect minimally for the Site, Building, each Elevation, each Public Area, each Employee Occupied Area, Roofs and all Interior Scope of Work. Schedules to be inclusive of all required Occupant Disruption and Displacement time frames for each scope of work Weekly and Daily. Listing all types of disruption. IE: Noise, Light, Odors, Displacement of Occupant, etc.

2. General Prime Contractor to Schedule a Demolition and Construction Phase Occupant Disruption Meeting within 7 calendar days of receiving the Notice to Proceed.

3. Demolition and Construction Phasing Occupant Disruption Schedule (DCPOD Schedule) shall be provided by each Contractor/Discipline to the General Prime Contractor within 14 calendar days from Notice to Proceed.

4. General Prime Contractor is to provide the initial DCPOD Schedule within 28 calendar days after the Notice to Proceed.

5. Phases can include multiple areas of scope of work simultaneously.

6. No Demolition or Construction shall start until the DCPOD Schedule has been provided and approved by HACP's Representative to Proceed.

B. Before commencing Work of each phase, submit an updated copy of Contractor's construction schedule showing the sequence, commencement and completion dates for all phases of the Work.

1.6 USE OF PREMISES

A. General: 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 Project site to work zones delineated in General Prime Contractor's approved CDPOD Plan and Schedule. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Limits: Continue construction operations to HACP approved limits of work per construction plan.
2. HACP Occupancy: Allow for HACP resident and employee occupancy of Project site.
3. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to HACP, HACP's employees and emergency vehicles at all times. Each Prime Contractor will be responsible for providing offsite parking, offsite storage of materials, and offsite placement of trailer.

    a. Schedule deliveries to minimize use of driveways and entrances by construction operations and minimize space and time requirements for materials and equipment onsite.

C. Condition of Existing Building: Maintain existing building in a weather-tight condition throughout all phases of the demolition and construction period. Repair damage caused by construction operations. Protect building and its occupants at all times during construction period.

1.7 COORDINATION WITH OCCUPANTS

A. Full HACP Resident and Employee Occupancy: HACP employees and residents will occupy the site and existing building during entire construction period. Cooperate with Construction Manager/HACP Representative during construction operations to minimize conflicts and facilitate HACP usage. Perform the Work so as not to interfere with HACP's day to day operations and to have minimal daily disruption to each apartment resident. Maintain existing exits unless otherwise indicated.

1. 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 HACP and approval of authorities having jurisdiction.
2. Notify HACP not less than 120 hours in advance of activities that will affect HACP's operations.

B. Owner Limited Occupancy of Completed Areas of Construction: HACP reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of furniture and limited occupancy shall not constitute acceptance of the total Work.

1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to HACP acceptance of the completed Work.

2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited HACP occupancy.

3. Before limited HACP occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, HACP will operate and maintain mechanical and electrical systems serving occupied portions of the Work.

4. On occupancy, HACP will assume responsibility for maintenance and custodial service for occupied portions of Work.

C. Access to Occupied Building and Occupied Areas of the Building during Construction: HACP shall require access to occupied buildings and occupied areas of the building during the entire construction period. The Contractor shall provide temporary access and cooperate with HACP and HACP's contractors to provide access for the duration of the Work. Any temporary entrances shall be accessible as determined by UFAS standards and meet HACP's requirements for secure access to the buildings.

1. General Prime Contractor (G.C.) shall provide:

a. Demolition to accommodate temporary entrances and the reinstallation or replacement in like kind of materials removed or damage during the work.
b. Temporary Security Door and Frame:
   1) Door to be insulated hollow metal painted lack to match existing frame, with half wire glass for security. Door to be UFAS compliant.
   2) Frame to be hollow metal.
c. Wall area adjacent to opening to be in filled. Interior – drywall, exterior with material to maintain building weather tightness.
d. Any ramp and landing required to provide temporary access to the entrance area shall be removed without visible signs or have areas replaced in kind.

1.8 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 8:00 a.m. to 5:00 p.m., Monday through Friday, unless otherwise indicated or directed by HACP Contracting Officer in writing.

1. Weekend Hours: Only upon receipt of written approval from HACP Contracting Officer in writing.
2. Early Morning Hours: None without prior approval of HACP Contracting Officer in writing.
3. Hours for Utility Shutdowns: None without prior approval of HACP Contracting Officer in writing.
4. Hours for noisy activity: 8:00 a.m. to 5:00 p.m.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by HACP or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify HACP's Representative and Architect not less than 7 calendar days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without HACP's written permission.
3. Interruptions shall be scheduled such that current tenants are not without service for more than 2 hours.

4. Schedule interruptions such that the minimum numbers of units are without heat or water at any given time.

D. Noise, Vibration and Odors: Coordinate operations that may result in high levels of noise and vibration, odors other disruption to HACP occupancy with HACP.

1. Notify HACP Representative not less than two days in advance of proposed disruptive operations.
2. Obtain HACP's written permission before proceeding with disruptive operations.

E. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet (8M) of entrances, operable windows, or outdoor-air intakes.

F. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

G. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

H. Employee Screening: Comply with HACP's requirements for drug and background screening of Contractor personnel working on Project site.

1. Maintain list of approved screened personnel with HACP's Representative.

1.9 SPECIFICATION AND DRAWING CONVENTIONS

A. 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:

1. Imperative mood and streamlined language are generally used in the Specifications. 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.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specification Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 011200 – MULTIPLE CONTRACT SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY

A. Section includes a summary of each contract, including responsibilities for coordination and temporary facilities and controls.

B. Specific requirements for work of each contract are also indicated in individual Specification Sections and on Drawings.

C. Related Sections:

1. Division 01 Section “Summary” for the Work covered by the Contract Documents, restrictions on use of the Project site, phased construction, coordination with occupants, and work restrictions, and continual fire protection systems.
2. Division 01 Section “General Conditions Responsibility Matrix” for division of responsibilities for the work.
3. Division 01 Section “Project Management and Coordination” for general coordination requirements.

1.3 DEFINITIONS

A. Permanent Enclosure: As determined by Architect, the condition at which roofing is insulated and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures equivalent in weather protection to permanent construction.

1.4 PROJECT COORDINATION

A. General Construction Contractor shall be responsible for coordination between the General Construction Contract, HVAC Contract, Electrical Contract and hazardous remediation and Owner’s telecommunication and security departments.

1.5 COORDINATION ACTIVITIES

A. Refer to “General Conditions Responsibility Matrix” that describes ownership of each of the following coordination activities, but are not limited to the following:

1. Provide overall coordination of the Work.
2. Coordinate shared access to workspaces.
3. Coordinate product selections for compatibility.
4. Provide overall coordination of temporary facilities and controls.
5. Coordinate, schedule, and approve interruptions of permanent and temporary utilities, including those necessary to make connections for temporary services.
6. Coordinate construction and operations of the Work with work performed by each Contract and Owner's construction forces.
7. Prepare coordination drawings in collaboration with each contractor to coordinate work by more than one contract.
8. Coordinate sequencing and scheduling of the Work. Include the following:
    a. Initial Coordination Meeting: At earliest possible date, arrange and conduct a meeting with all contractors and Owner's Representative for sequencing and coordinating the Work; negotiate reasonable adjustments to schedules.
    b. Prepare a combined Contractors' construction schedule for entire Project. Base schedule on preliminary construction schedule. Secure time commitments for performing critical construction activities from contractors. Show activities of each contract on a separate sheet. Prepare a simplified summary sheet indicating combined construction activities of contracts.
        1) Submit schedules for approval
        2) Distribute copies of approved schedules to contractors.
9. Provide quality-assurance and quality-control services specified in Division 01 Section "Quality Requirements".
10. Coordinate sequence of activities to accommodate tests and inspections, and coordinate schedule of tests and inspections.
11. Provide information necessary to adjust, move, or relocate existing utility structures affected by construction.
12. Provide progress cleaning of common areas and coordinate progress cleaning of areas or pieces of equipment where more than one contractor has worked.
13. Coordinate cutting and patching.
14. Coordinate protection of the Work.
15. Coordinate firestopping.
16. Coordinate completion of interrelated punch list items.
17. Coordinate preparation of Project record documents if information from more than one contractor is to be integrated with information from other contractors to form one combined record.
18. Print and submit record documents if installations by more than one contractor are indicated on the same contract drawing or shop drawing.
19. Collect record specification sections from contractors, collate Sections into numeric order, and submit complete set.
20. Coordinate preparation of operation and maintenance manuals if information from more than one contractor is to be integrated with information from other contractors to form one combined record.
21. Coordinate the waste disposal plan for the project to include all communications with sub-contractors.
22. Verify provision of waste management facilities, to divert as much waste as possible from landfill and provide training to other prime contractors.
    a. Evaluate facilities in enough time prior to removal from the site to ensure load complies with requirements or to require responsible prime to remove inappropriate items.

b. Allow each prime a minimum of half a working day to correct incorrect disposal of waste items.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011200

SECTION 012100 – ALLOWANCES

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 administrative and procedural requirements governing allowances.

1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:

1. Contingency allowances.
2. Quantity allowances.

C. Related Requirements:

1, Section 012200 “Unit Prices” for procedures for using unit prices.

1.3 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At Architect’s request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect from the designated supplier.

1.4 ACTION SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

1.5 INFORMATIONAL SUBMITTALS

A. Submit invoices or deliver slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.6 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.7 QUALITY ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials selected by HACP and Architect under allowance and shall include taxes, freight, and delivery to Project site.

B. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to HACP, after installation has been completed and accepted.

1.8 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead and profit.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher or lower priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. Allowance No. 1: Square Footage Allowance: Where existing roofing material is removed and existing substrate is unsuitable to receive new roofing, provide new 3/4" plywood, weather treated substrate with 30 lb. roofing felt. Provide all materials and labor as necessary for a complete installation up to 1,000 sf.

1. Coordinate quantity allowance adjustment with unit-price requirements in Section 012200 "Unit Prices".

B. Allowance No. 2: Gypsum board repair and patching allowance: Where visible cracks and holes are present on existing gypsum board wall and ceiling surfaces, General Contractor to repair and patch existing gypsum board (see Specification Section 092900) prior to final painting. Provide all materials and labor as necessary for complete Gypsum board repair and patching up to 3,700 SF.

1. Coordinate quantity allowance adjustment with unit-price requirements in Section 012200 "Unit Prices".

END OF SECTION 012100

SECTION 012200 – UNIT PRICES

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 administrative and procedural requirements for unit prices.

B. Related Requirements:

1. Section 012100 “Allowances” for coordination with Unit Prices.
2. Section 012600 “Contract Modification Procedures” for procedures for submitting and handling Change Orders.
3. Section 014000 “Quality Requirements” for general testing and inspecting requirements.

1.3 DEFINITIONS

A. Unit price is an amount proposed by bidders as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

C. HACP reserves the right to reject Contractor’s measurement of work-in-place that involves use of established unit prices and to have this work measured, at HACP’s expense, by an independent surveyor acceptable to Contractor.

D. List of Unit Prices: (Not Used)

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012200

SECTION 012500 – SUBSTITUTION PROCEDURES

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 administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 012100 “Allowances” for products selected under an allowance.
2. Section 016000 “Product Requirements” for requirements for submitting “equal” product submittals for products by listed manufacturers.
3. Divisions 02 through 27 Sections for specific requirements and limitations for substitutions.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or HACP that are not required in order to meet other Project requirements but may offer advantage to Contractor or HACP.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Identify product, fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles. E-mail all pertinent information to HACP Representative and Architect for approval, minimum 5 work days prior to bid due date. No substitution will be entertained after the construction contracts are issued.

1. Substitution Request Form: No substitution form required.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
   a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.

b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by HACP and separate contractors that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work Specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

1.5 ARCHITECT'S ACTION

A. Substitution: If necessary, Architect will request additional information or documentation for evaluation. Architect will notify Contractor of acceptance or rejection of proposed substitution within 5 days of receipt of request.
   a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
   b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.6 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.7 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work o the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Requested substitution provides sustainable design characteristics that specified product provided.
c. Substitution request is fully documented and properly submitted.
d. Requested substitution will not adversely affect Contractor's construction schedule.
e. Requested substitution has received necessary approvals of authorities having jurisdiction.
f. Requested substitution is compatible with other portions of the Work.
g. Requested substitution has been coordinated with other portions of the Work.
h. Requested substitution provides specified warranty.
i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed unless otherwise indicated.
C. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after the Notice of Award. Requests received after that time may be considered or rejected at discretion of Architect.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution offers HACP a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities HACP must assume. HACP's additional responsibilities may include compensation to Architect for redesign ad evaluation services, increased cost of other construction by HACP, and similar considerations.
b. Requested substitution does not require extensive revisions to the Contract Documents.

c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
d. Requested substitution provides sustainable design characteristics that specified product provided.
e. Substitution request is fully documented and properly submitted.
f. Requested substitution will not adversely affect Contractor's construction schedule.
g. Requested substitution has received necessary approvals of authorities having jurisdiction.
h. Requested substitution is compatible with other portions of the Work.
i. Requested substitution has been coordinated with other portions of the Work.
j. Requested substitution provides specified warranty.
k. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION - (NOT USED)

END OF SECTION 012500

SECTION 012600 – CONTRACT MODIFICATION PROCEDURES

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 administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:

1. Section 012500 “Substitution Procedures” for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 MINOR CHANGES IN THE WORK

A. HACP’s General Conditions for Construction Contracts – Public Housing Programs govern supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change to the HACP’s Contracting Officer.

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Include costs of labor and supervision directly attributable to the change.
d. Include an updated Contractor’s construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times,

and activity relationship. Use available total float before requesting an extension of the Contract Time.

e. Include all required by HACP's General Conditions for Construction Contracts – Public Housing Programs to the Contracting Officer.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to HACP's Contracting Officer.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change on the Contract Sum and Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate appl8icable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Include all required by HACP's General Conditions for Construction Contracts - Public Housing Programs to the Contracting Officer.

1.5 ADMINISTRATIVE CHANGE ORDERS.

A. Allowance Adjustment: See Section 012100 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

B. Unit-Price Adjustment: See Section 012200 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.6 CHANGE ORDER PROCEDURES

A. On HACP's Contacting Officer's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of HACP and Contractor on appropriate HUD forms.

1.7 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Work Change Directive: On HACP's Contracting Officer's approval, Architect may issue a Construction Work Change Directive on appropriate HUD forms. Construction Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Work Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 – Payment Procedures

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 administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1. Section 012100 “Allowances” for procedural requirements governing the handling and processing of allowances.
2. Section 012200 “Unit Prices” for administrative requirements governing the use of unit prices.
3. Section 012600 “Contract Modification Procedures” for administrative procedures for handling changes to the Contract.
4. Section 013200 “Construction Progress Documentation” for administrative requirements governing the preparation and submittal of the Contractor’s construction schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to Various portions of the Work and used as the basis for reviewing Contractor’s Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor’s construction schedule. Cost-loaded Critical Path Method Schedule may serve to satisfy requirements for the schedule of values.

1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with continuation sheets.
b. Submittal schedule.
c. Items required to be indicated as separate activities in Contractor’s construction schedule.

2. Submit the schedule of values to Architect through Construction Manager/HACP's Representative at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
3. Sub-schedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide sub-schedules showing values coordinated with each phase of payment.
4. Sub-schedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide sub-schedules showing values coordinated with each element.
5. Sub-schedules for Separate Design Contracts: Where HACP has retained design professionals under separate contracts who will each provide certification of payment requests, provide sub-schedules showing values coordinated with the scope of each design services contract as described in Section 011000 "Summary".

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

    a. Project name and location.
    b. Name of Architect.
    c. Architect's project number.
    d. HACP's Project number.
    e. Contractor's name and address.
    f. Date of submittal.

2. Arrange schedule of values consistent with format of appropriate HUD forms. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:

    a. Related Specification Section or Division.
    b. Description of the Work.
    c. Name of subcontractor.
    d. Name of manufacturer or fabricator.
    e. Name of supplier.
    f. Change Orders (numbers) that affect value.
    g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

        1) Labor
        2) Materials.
        3) Equipment.

3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of Contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.

6. Provide separate line items in the schedule of values for initial cost materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
8. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate HACP payments or deposits, if any, and balance to be paid by Contractor.
9. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

10. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and Construction Manager/HACP's Representative and reviewed and paid upon approval of HACP's Contracting Officer.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Applicati0n for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between HACP and Each Prime Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Times: Submit Application for Payment to Project Manager/HACP's Representative by the 21st day of the month, unless indicated otherwise. The period covered by each Application for Payment is one month, ending on the last day of the month.

1. Submit draft copy of Application for Payment seven days prior to due date for review by Construction Manager/HACP's Representative and the Architect.

D. Application for Payment Forms: Use forms provided by HACP for Applications for Payment.

E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Application will be returned without action if incomplete.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to HACP, and consent of surety to payment, for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:

    a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

G. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Construction Manager/HACP's Representative and Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction to retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. HACP reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Forms: Submit executed waivers of lien on forms acceptable to HACP.

I. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion on an item, submit conditional final or full waivers.
3. HACP reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or proceeded by conditional final waivers from every entity involved with performance of the Work covered by the application, which is lawfully entitled to a lien.
5. Waiver Forms: Submit executed waivers of lien on forms, acceptable to HACP.

J. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
5. Products list (preliminary if not final).
6. Schedule of unit prices.
7. Submittal schedule (preliminary if not final).
8. List of Contractor's staff assignments.
9. List of Contractor's principal consultants.
10. Copies of building permits.
11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
12. Initial progress report.
13. Report of preconstruction conference.
14. Certificates of insurance and insurance policies.
15. Performance and payment bonds.
16. Data needed to acquire HACP's insurance.

K. Interim application for Payment: Administrative actions and submittals that are scheduled at regular intervals to coincide with Application submission.

1. Updated Schedule of Values.
2. Schedule of salvaged, refurbished and reused materials.
3. Schedule of recycled product content.
4. Schedule of regional material compliance.
5. Schedule of certified wood products used on the project.

L. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.

2. This application shall reflect Certificate(s) of Substantial Completion issued previously for HACP occupancy of designated portions of the Work.

M. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. Use appropriate HUD or approved HACP form for, “Contractor’s Affidavit of Payment of Debts and Claims”.
5. Use appropriate HUD or approved HACP form, “Contractor’s Affidavit of Release of Liens”.
6. AIA Document G707 or approved HACP form, “Consent of Surety to Final Payment”.
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when HACP took possession of and assumed responsibility for corresponding elements of the Work.
9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 – PROJECT MANAGEMENT AND COORDINATION

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 administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Administrative and supervisory personnel.
3. Coordination drawings.
4. Requests for Information (RFIs).
5. Project meetings.

B. Contractor shall participate in coordination requirements for all work proceeding on site, not just work included in this contract. Certain areas of responsibility are assigned to a specific contractor.

C. Reference to “Contractor” on the drawings and the specifications shall refer to the each separate Prime Contractor, unless noted otherwise, with coordination responsibilities specified within this Section.

D. Related Requirements:

1. Section 011200 “Multiple Contract Summary” for a description of the division of work among separate contracts and responsibility for coordination activities not in this Section.
2. Section 013200 “Construction Progress Documentation” for preparing and submitting Contractor’s construction schedule.
3. Section 017300 “Execution” for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
4. Section 017700 “Closeout Procedures” for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.4 COORDINATION

A. Coordination: The contractors shall coordinate their construction operations with those of the HACP's Contractors and Construction Manager/HACP's Representative and entities to ensure efficient and orderly installation of each part of the Work and the work by other HACP's Contractors.

B. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.
4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service and repair of all components, including mechanical and electrical.
5. Maintain safe access to all existing areas of Bedford HOPE Center.
6. Coordinate access to Bedford HOPE Center that will be concurrently under construction with other contractors.

C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for HACP and separate contractors if coordination of their Work is required.

D. Administrative Procedures: Coordinate scheduling and timing of administrative procedures with construction activities and activities of other contractors to ensure orderly progress of the Work. Activities include:

1. Preparation of Contractors' construction schedule.
2. Preparation of Contractors' Demolition and Construction Phasing Occupant Disruption Schedule (DCPOD).
3. Preparation of the schedule of values.
4. Preparation of the submittal schedule.
5. Installation and removal of temporary facilities and controls.
6. Delivery and processing of submittals.
7. Progress meetings.
8. Pre-installation conferences.
9. Project closeout activities.
10. Startup and adjustment of systems.
11. Project closeout activities.
12. All RFI's logged and coordinated through General Construction contractor.

E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water and materials.

1.5 SUBMITTALS

A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

    a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    b. Locate existing utilities that enter the building.
    c. Locate existing Building Automation System (BAS) lines that enter the building.
    d. Indicate required installation sequences.
    e. Indicate functional and spatial relationships for components of systems.
    f. Show location and size of access doors required for access to concealed controls.
    g. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

2. Sheet Size: At least 11 by 17 inches bout no larger than 30 by 42 inches.
3. Submit Digitally to Architect through General Contractor's project web site: PDF electronic files.
4. After return from Architect, mark up and provide one printed copy to be located in trailer as a Project Record Drawing, and provide HACP with five printed copies.
5. Refer to individual Sections for Coordination Drawing requirements for Work in those Sections.

B. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:

1. File Preparation Format: Same digital data software program, version and operating system as original Drawings.
2. File Preparation Format: DWG, Version 2013, operating in Microsoft Windows operating system.
3. File Submittal Format: Submit or post coordination drawing files using Portable Data File (PDF) format.
4. Architect will furnish the Contractor one set of digital data files of Drawings for use in preparing coordination digital data files. Refer to associated fees.

    a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
    b. Refer to "Division 01 Section Summary for requirements for using Architect's digital files.
    c. Digital Data Software Program: Drawings are available in Autodesk AutoCAD 2013 DWG format.

C. Key Personnel Names: Within 7 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone

numbers, including home and office telephone numbers. Provide names, addresses and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1. Post copies of list in Project meeting room, in temporary field office, on Project Website and by each temporary telephone. Keep list current at all times.

1.6 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1. Include special personnel required for coordination of operations with other contractors.

1.7 PROJECT MEETINGS

A. General: Construction Manager/HACP's Representative will schedule and conduct meetings and conferences at Project site. Prepare the meeting agenda. Distribute agenda, record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including HACP and Architect, within three days of the meeting.

B. Preconstruction Conference: Construction Manager/HACP's Representative will schedule and conduct a preconstruction conference before starting construction, at a time convenient to HACP and Architect, but no later than 7 days after execution of the Agreement. Hold the conference at Project site. Conduct the meeting to review responsibilities and personnel assignments.

C. Progress Meetings: Construction Manager/HACP's Representative will Schedule and conduct progress meetings at weekly intervals. Coordinate dates of meetings with preparation of payment requests.

1. Attendees: In addition to representatives of HACP, Architect and Construction Manager/HACP's Representative, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Review schedule for next period.
    b. Cutting and Patching: Review requirements for cutting and patching work for each prime contract. Assign responsibility for each prime contractor to identify prime contract. Assign responsibility for each prime contractor to identify areas requiring

cutting for the general to execute. Periodic meetings shall be held until the requirement for cutting and patching has been satisfied. Cutting and patching for all prime contractors shall be performed by the General Construction Contractor based upon locations as identified by the Prime Contractors.

3. Minutes: The Architect will record the meeting minutes.
4. Reporting: The Architect will distribute the meeting minutes to each party present and to parties who should have been present, via email in digital format with-in 3 days of the meetings date.

D. Pre-installation Conference: Conduct a pr-installation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Construction manager of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

    a. Contract Documents.
    b. Options.
    c. Related RFIs.
    d. Related Change Orders.
    e. Purchases.
    f. Deliveries.
    g. Submittals.
    h. Review of mockups.
    i. Possible conflicts.
    j. Compatibility problems.
    k. Time schedules.
    l. Weather limitations.
    m. Manufacturer’s written recommendations.
    n. Warranty requirements.
    o. Compatibility of materials.
    p. Acceptability of substrates.
    q. Temporary facilities and controls.
    r. Space and access limitations.
    s. Regulations of authorities having jurisdiction.
    t. Testing and inspecting requirements.
    u. Installation procedures.
    v. Coordination with other work.
    w. Required performance results.
    x. Protection of adjacent work.
    y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.

4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

E. Project Closeout Conference: Construction Manager/HACP's Representative will schedule and conduct a project closeout conference, at a time convenient to HACP and Architect, but no later than 10 days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of HACP, Construction Manager/HACP's Representative, Architect and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

a. Preparation of record documents.
b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
c. Submittal of written warranties.
d. Requirements for preparing sustainable design documentation.
e. Requirements for preparing operations and maintenance data.
f. Requirements for delivery of material samples, attic stock, and spare parts.
g. Requirements for demonstration and training.
h. Preparation of Contractor's punch list.
i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
j. Submittal procedures.
k. Coordination of separate contracts.
l. HACP's partial occupancy requirements.
m. Installation of HACP's furniture, fixtures and equipment.
n. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

1.8 REQUESTS FOR INTERPRETATION (RFI's)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.

1. RFI's shall originate with Contractor. RFI's submitted by entities other than Contractor will be returned with no response.

    a. RFI's should be submitted through the coordinating contractor.

2. Coordinate and submit RFI's in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:

1. Project name.
2. Date.
3. Name of Contractor.
4. Name of Architect and Construction Manager/HACP's Representative.
5. RFI number, numbered sequentially.
6. Specification Section number and title and related paragraphs, as appropriate.
7. Drawing number and detail references, as appropriate.
8. Field dimensions and conditions, as appropriate.
9. Contractor's suggested solution(s). If contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
10. Contractor's signature.
11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.

    a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies and attachments.

C. Format of RFI"s:

1. RFI's shall be submitted electronically via email on standard RFI form. Paper copies may be substituted in addition.
2. Identify each page of attachments with the RFI number and sequential page number.

D. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow seven working days for Architect's response for each RFI. RFI's received after 1:00 p.m. will be considered as received the following work day.

1. The following RFI's will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for coordination information already indicated in the Contract Documents.
    d. Requests for adjustments in the Contract Time or the Contract Sum.

e. Requests for interpretation of Architect's actions on submittals.
f. Incomplete RFI's or RFI's with numerous errors.

2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
3. Architect's action on RFI's that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 1 Section "Contract Modification Procedures".

a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and Construction Manager/HACP's Representative in writing within 7 days of receipt of the RFI response.

E. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect and Construction Manager/HACP's Representative within seven days if Contractor disagrees with response.

F. RFI Log: Prepare, maintain, and submit a tabular log of RFI's organized by the RFI number. RFI Log shall be submitted electronically via email. Submit log weekly. Use CSI Log Form 13.2B. Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect and Construction Manager/HACP's Representative.
4. RFI number including RFI's that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's and Construction Manager's/HACP's Representative response was received.
8. Identification of related Minor Change in the Work. Construction Change Directive, and Proposal Request, as appropriate.

G. The Architect shall maintain the RFI Log between the Architect and Contractor. It is recommended that the Contractor maintain a separate RFI log with subcontractors.

1.9 PROJECT WEB SITE (Not Used)

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

Project Name: Hope Center Renovations

GAA Project Number: 1448

Date:

In accepting and using digital files, provided by Gerard Associates Architects, L.L.C. the undersigned recognizes and accepts that:

1. Gerard Associates Architects, L.L.C. is providing these digital files for the undersigned's sole convenience, and does not assume any responsibility for the accuracy or suitability of information contained therein for the use intended by the undersigned; and

2. The undersigned is fully and solely responsible to verify the accuracy of the digital files and the actual built conditions, as it may affect the undersigned's work; and

3. The digital files are an instrument of service of Gerard Associates Architects, L.L.C. who shall be deemed the author of the digital files and shall retain all common law, statutory and other reserved rights, including the copyright; and

4. Under no circumstances shall the transfer of the digital files, or other instruments of service for use by the undersigned be deemed to be a sale by Gerard Associates Architects, L.L.C. and Gerard Associates Architects, L.L.C. makes no warranties, express or implied, of merchantability or of fitness for a particular purpose; and

5. The digital files shall not be used in whole or part for any project or purpose, other than The Housing Authority of the City of Pittsburgh PA-1-02/Task Order #19 Renovations and Upgrades for Bedford Hope Center.

6. To the fullest extent permitted by law, the undersigned hereby indemnifies and holds harmless Gerard Associates Architects, L.L.C. and its officers, directors, employees and consultants from and against all claims, damages, losses and expenses, including, but not limited to, attorney's fees arising out of, relating to and resulting from use of any information provided by Gerard Associates Architects, L.L.C.

7. A service and administrative fee of $100 for each digital file is payable to Gerard Associates Architects, L.L.C. prior to transfer of the requested files.

The Undersigned:

Signature	Company Name (Print Clearly)
Name and Title (Print Clearly)	Date

SECTION 013200 – CONSTRUCTION PROGRESS DOCUMENTATION

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 administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Startup construction schedule.
2. Contractors' Construction Schedule.
3. DCPOD: Contractors' Demolition and Construction Phasing Occupant Disruption Schedule.
4. Construction schedule updating reports.
5. Daily construction reports.
6. Material location reports.
7. Site condition reports.
8. Special reports.
9. Draft and final waste management plan.
10. Draft and final construction-indoor air quality management plan.

B. Related Requirements:

A. Section 013100 "Project Management and Coordination" for report and schedule formats and inclusion of project web site in document management.
B. Section 014000 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 PURPOSE

A. The Construction Progress Schedule ('CPS") shall be utilized to track job progress, analyze potential delays, identify potential progress problems early, determine the project completion date, issue progress payments, determine validity of time extension requests, and complete cost projections and analysis.

1.4 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.

C. CPM: Critical path method, which is method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either HACP or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

H. Submittal Packages: A group of submittals packaged together for submission and approval by Architect and consultants. Refer to Division 01 Section “Submittal Procedures”.

I. Mandatory Project Schedule and Submittals Meeting: This is a meeting prior to the Pre-construction Job conference.

1.5 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. PDF electronic file.

B. Startup Construction Schedule.

1. Approval of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

C. “Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

D. Contractor’s Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working electronic copy of schedule, using software indicated, labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

E. DCPOD: Initial schedule integrated with Contractors’ Construction Schedule, of size required to display entire schedule for entire construction period. Submit a working electronic copy of schedule using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

F. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Reports: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date known.
3. Total Float Report: List of all activities sorted in ascending order of total float.

G. Field Condition Reports: Submit at time of discovery of differing conditions.

H. Special Reports: Submit at time of unusual event.

I. Qualification Data: For scheduling consultant.

1.6 FORMAT

A. The CPS shall be in time scale CPM Gantt Chart format.

B. The CPS shall provide graphical (horizontal bar chart) representation for each major portion of work or operation (Summary Tasks).

C. The CPS shall provide a graphical representation for each of the activities/tasks and events that will occur during the performance of the work.

D. The CPS shall show the complete sequence of construction by activity/task, with dates for beginning and completion of each element of construction.

E. Activities shall be listed in a logical, sequential order, and shall use proper precedence logic (Chronological/Sequential System),

F. Each activity shall have a predecessor and/or successor ties. The CPS shall show the interrelations/interdependencies of activities/tasks.

G. No onsite activity shall have, a duration of greater than ten (10) working days.

H. The Critical Path shall be clearly identified.

I. All CPS's, CPS revisions, preliminary submissions, and associated backup documentation shall be submitted in hard copy and electronic formats. Six (6) hard copies of each document shall be submitted to the Housing Authority, and one (1) hard copy of each document shall be submitted to the A/E.

J. Sheet Size: Minimum 8.5 x 14 inches.

1.7 CONTENTS

A. The CPS shall begin at the Notice to Proceed ("NTP") date. The initial CPS shall be based on the anticipated NTP date as provided by the Housing Authority.

B. The CPS shall identify each phase/stage of demolition, construction, occupancy/relocation, and other logically grouped activities (Summary Tasks).

C. The CPS shall set forth milestone dates and deadlines, including substantial completion of ALL work, i.e., the entire project.

D. The CPS shall identify all project constraints.

E. The CPS shall identify work for each building unit/apartment (unless authorization is obtained in writing from the Contracting Officer allowing the CPS to only identify work for each floor or building). Each task for each unit/apartment shall be identified on the CPS.

F. The CPS shall identify all Housing Authority, governmental and/or regulatory review periods.

G. CPS duration shall not exceed contractual construction period.

H. The CPS shall indicate submittal package submission dates for review and approval.

I. The CPS shall indicate decision dates for selection of finishes.

J. The CPS shall clearly identify order dates and lead times for all specified products, particularly long lead time items, items requiring fabrication, and major equipment.

K. The CPS shall indicate delivery dates for Housing Authority furnished products.

L. The contractor(s) shall coordinate the CPS content with the Schedule of Values (Schedule of Amounts). All progress payment amounts will be derived from, and tied to, the Schedule of Values and CPS; therefore all activities on the CPS shall be consistent with the information contained in the Schedule of Values.

1.8 SUBMITTALS AND APPROVALS

A. The Building Work Area – General Contractor is responsible for consolidating his work efforts of other Contractors for the Scope of Work into one realistic, aggressive CPS, and for submitting the CPS to the Housing Authority for approval.

1. General Prime Contractor will also be responsible for submitting to Electrical Prime Contractor that will be performing work on site, in a timely manner, to aid in their preparation of realistic, aggressive CPS and for submitting the CPS to the Housing Authority for approval.

B. Failure of any contractor to submit required information in a timely manner shall be a default in accordance with the terms of this contract.

C. If any contractor is found to be in default by the Contracting Officer for failure to submit schedule information in a timely manner, the Contracting Officer may terminate the Contractor's right to proceed with the schedule preparation and may elect to complete the contractor's schedule information in his stead, in which case the contractor will be bound by any approved CPS as if the schedule information was prepared/developed by the contractor's own personnel. The Contractor and its surety shall then be liable for any damage to the Housing Authority resulting from the contractor's failure to submit the schedule information within the specified time frame.

D. All CPS's submitted to the Contracting Officer for approval shall be dated and signed by a representative of all prime contractors involved in the project. The signatures shall represent an acknowledgement that all prime contractors are in agreement with the submitted schedule. The General contractor shall be responsible for obtaining all signatures.

E. Submittal of the initial CPS and subsequent updates/revisions for approval shall be understood to be the contractors' representation that the submitted CPS meets all of the conditions of the contract documents, accurately reflects work to be completed, and that the work will be executed in the sequence indicated on the submitted CPS.

F. In no event shall any adjustment proposed in a progress report of corrective plan constitute an adjustment in the CPS, contract time, or any milestone date unless any such adjustment is agreed to and authorized in writing by the Contracting Officer.

G. All contractors shall be aware that time is of the essence when submitting CPS information and when completing the Work in the timeframes established in the approved CPS.

1.9 INITIAL CPS SUBMITTAL AND APPROVAL

A. The General Construction Contractor shall submit at the Mandatory Project Schedule and Submittals Meeting the proposed CPS to the Construction Manager and HACP for review.

B. The proposed CPS shall not be saved as a baseline until written approval is received from the Contracting Officer. Upon approval, the General Contractor shall be responsible for saving the baseline schedule, and monitoring and maintaining the CPS.

C. The Contracting Officer shall review the initial CPS submission, (and any required resubmission), and respond with comments, recommendations, requests, or acceptance within five (5) working days of receipt.

D. If the proposed CPS is not accepted by the Contracting Officer, the CPS shall be revised by the contractor(s) in accordance with the comments, recommendations, requests, or acceptance within three (3) working days of receipt of said comments, recommendations, or requests. The contractor shall be required to make the changes as directed by the Contracting Officer to arrive at a reasonable, realistic and acceptable CPS.

E. The NTP will not be issued and the project shall not begin without a CPS approved in writing by the Contracting Officer. The NTP will be issued within five (5) working days of written CPS approval provided all required back up documentation is received by the Housing Authority in the timeframe required in the contract.

F. Upon acceptance by the Contracting Officer of the proposed CPS, the accepted schedule shall be deemed the “Construction Project Schedule” and will be considered part of the contract.

G. The Housing Authority’s approval or acceptance of the CPS shall not impose on the Housing Authority any responsibility for the CPS, for timely submittals of complete and project-conforming shop drawings, for work sequencing, scheduling milestones, or progress of the work, nor shall acceptance interfere with or relieve the Contractor from the contractor’s full responsibility to complete all work in accordance with the contract. Contractors are solely responsible for the development and performance of the means, methods, and execution of performance reflected in the CPS.

H. A separate submittal schedule shall be submitted along with the initial CPS. The submittal schedule shall include and identify dates for shop drawing submittal and approval, product data, and samples including Housing Authority furnished products. The submittal schedule must include dates reviewed submittals will be required from the Housing Authority. Contractors are required to relate submittal tasks to construction activities/tasks. The submittal schedule may be incorporated into the CPS provided written authorization is obtained from the Contracting Officer.

I. The General Contractor shall keep the submittal schedule current. The submittal schedule shall be coordinated with the CPS, and shall allow for reasonable time for Housing Authority submittal review as documented in the contract.

1.10 MONTLY UPDATED CPS SUBMITTAL AND APPROVAL

A. A Preliminary updated CPS and all associated backup documentation shall be submitted by the General Contractor for review along with the “pencil copy” of the application for payment. The preliminary updated CPS should be submitted to the Housing Authority and the A/E no later than three (3) working days before the pay application progress meeting, with the site walk occurring no later than one (1) working day before the pay application progress meeting.

B. Backup documentation shall include a narrative discussion of the progress to date, forecasted work for next period, problem areas, and anticipated delays. If applicable, the narrative shall document schedule slippage, provide a detailed explanation concerning the reason(s) for the slippage, how each prime contractor is affected, and shall include a written recovery plan for getting the project back on schedule. The written recovery plan shall include any necessary overtime or additional labor and what steps are being taken to recover the original schedule, and/or what logic changes occurred and why said changes occurred. The plan shall indicate the date by which the progress of the work will comply with the current approved CPS.

C. The preliminary updated CPS and the pencil copy of the application for payment shall be reviewed by all contractors, Housing Authority representative(s), and the A/E during the site walk meeting.

D. The General Prime Contractor shall make any revisions as noted during the site walk meeting, and shall submit the formal/finalized updated CPS and all associated backup documentation along with the finalized monthly application for payment at the pay application progress meeting.

E. The formal/finalized updated CPS and associated backup documentation shall be considered part of the application for payment submission. Failure to submit an accurate updated CPS and all associated backup documentation with the application for payment will be cause for rejection of the application for payment.

1.11 CRITICAL PATH, LOGIC, OR TASK CHANGES CPS UPDATE SUBMITTAL

A. The General Prime Contractor shall immediately submit a revised CPS and a written recovery/corrective action plan to the Contracting Officer any time a critical path item is three (3) working days behind the current approved CPS, if a non-critical activity becomes critical, or if there are changes in schedule logic and /or tasks.

B. The Contracting Officer shall review the updated CPS submission and respond with comments, recommendations, requests, or acceptance within three (3) working days of receipt.

C. If the revised/updated CPS is not accepted by the Contracting Officer, the schedule shall be revised by the contractor(s) in accordance with the comments, recommendations, or requests of the Contracting Officer and resubmitted for acceptance within five (5) working days of receipt of said comments, recommendations, or requests.

D. The contractor(s) shall be required to make the changes as directed by the Contracting Officer to arrive at a reasonable, realistic, and acceptable CPS.

1.12 CHANGE ORDER OR DIRECTED WORK CPS SUBMITTALS.

A. Any contractor submitting a Request for Change Order ("RFCO") shall submit as backup documentation along with said RFCO a proposed CPS outlining how the change would impact the current approved CPS. The proposed CPS shall show in detail the work involved in the proposed change, how the proposed change will be incorporated into the current approved CPS, and the impact on other work caused by the adjustment to the current approved CPS.

B. Within three (3) working days of receipt of any executed change order(s), change directive, or proceed order that affects the CPS, the contractor to whom the change order, directive, or proceed order was issued shall submit to the General Contractor a proposed revised CPS. The General Contractor shall then incorporate the changes into the current approved schedule and within three (3) working days of receipt of the proposed revised CPS from the contractor to whom the change order, directive, or proceed order was issued, issue a proposed CPS to the Contracting Officer for review and approval.

C. Along with the proposed CPS, the General Contractor shall submit a written narrative outlining the change and how it affects the current, approved CPS.

D. The Contracting Officer shall review the proposed CPS submission and respond with comments, recommendations, requests, or acceptance within three (3) working days of receipt.

E. If the proposed CPS is not accepted by the Contracting Officer, the proposed CPS shall be revised by the contractor(s) in accordance with the comments, recommendations, or requests of the Contracting Officer and resubmitted for acceptance within three (3) working days of receipt of said comments, recommendations or requests,

F. The contractor(s) shall be required to make the changes as directed by the Contracting Officer to arrive at a reasonable, realistic, and acceptable CPS.

1.13 AS-BUILT CPS SUBMITTAL

A. As a condition precedent to the release of final retention, the last update of the CPS submitted shall be identified by the General Contractor as the "As-Built" CPS. The As-Built CPS shall reflect the exact manner in which the project was actually constructed (including actual start and finish dates, activities, sequences, and logic), and shall be certified in writing by all contractors as being a true reflection of the way the project was actually constructed. The As-Built CPS shall be submitted with final close-out documents.

1.14 REVISIONS TO CONSTRUCTION PROGRESS SCHEDULES

A. All revised CPS's should be saved with the project # and revision # clearly noted.

B. The lead contractor shall be responsible for updating/revising the current approved CPS.

C. All revised/updated CPS's shall include but not be limited to the following information.

1. Actual and baseline construction start and finish dates.
2. Actual and baseline procurement start and finish dates.
3. Graphical representation of the baseline and actual task start and finish dates.
4. Logic revisions – any revised sequences.
5. Added or changed work, including change order work and RFIU submittals that affect the work.
6. Activity duration projections/revisions.
7. Activity percent complete – actual percent complete of each activity not based on cost.
8. Current events that affect construction progress – adverse weather, strikes, differing site conditions.

1.15 TIME EXTENSIONS AND DELAY CLAIMS

A. Time extensions will only be granted for delays that will demonstratively delay the contractual project completion date as of the date of the delay and are authorized by executed change orders from the Contracting Officer. Please note that the delay MUST affect the contract completion date at the time of the delay.

B. Contractors may not request additional compensation and/or time from the Housing Authority unless the cause of any delay is attributable to the act or failure to act of the Housing Authority or its representative, or to other causes beyond the contractors control for which time extensions are available per the contract.

1.16 DISTRIBUTION

A. The General Contractor shall distribute all reviewed and approved CPS's to all project participants within one (1) working day of approval by the Contracting Officer.

B. The General Contractor shall keep a copy of all approved (past and current) CPS's on the project site at all times.

PART 2 – PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the work. Comply with the following:

1. Activity Duration: Define Activities so no activity is longer than 20 days, unless specifically allowed by Architect.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication and delivery.
3. Submittal Review Time: Include review and re-submittal times indicated in Section 013300 “Submittal Procedures” in schedule. Coordinate submittal review times in Contractor’s construction schedule with submittal schedule.
4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date establishing for Substantial Completion, and allow time for Architect’s administrative procedures necessary for certification of Substantial Completion.
6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work under More Than One Contract: Include a separate activity for each contract.
3. Work by Owner: Include a separate activity for each portion of the Work performed by HACP.
4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 011000 “Summary”. Deliver dates indicated stipulate the earliest possible delivery date.
5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 011000 “Summary”. Delivery dates indicated stipulate the earliest possible delivery date.
6. Work Restrictions: Show the effect of the following items on the schedule:
    a. Coordination with existing construction.
    b. Limitations of continued occupancies.
    c. Uninterruptible services.
    d. Partial occupancy before Substantial Completion.
    e. Use of premises restrictions.
    f. Provisions for future construction.
    g. Seasonal variations.
    h. Environmental control.

7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
    a. Subcontract awards.
    b. Submittals.
    c. Purchases.
    d. Mockups.
    e. Fabrication.
    f. Sample testing.
    g. Deliveries.
    h. Installation.
    i. Tests and inspections.
    j. Adjusting.
    k. Curing.
    l. Startup and placement into final use and operation.
8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
    a. Structural completion.
    b. Permanent space enclosure.
    c. Completion of mechanical installation.
    d. Completion of electrical installation.
    e. Substantial Completion.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.

E. Cost Correlation: At the head of schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of the Work performed as of dates used for preparation of payment requests.

1. Refer to Section - 012900 “Payment Procedures” for cost reporting and payment procedures.

F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.

G. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes and equipment required to achieve compliance, and date by which recovery will be accomplished.

H, Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

1, Use Microsoft Project, for Windows XP operating system.
2. Compatible with project Web site software.

2.2 STARTUP CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within seven days of date established for commencement of the Work.

B. Preparation: Indicate each significant construction activity separately, Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.

1. In-House Option: HACP may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.

B. Contractors' Construction Schedule Updating: At two week intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

C. Contractors' Demolition and Construction Phasing Occupant Disruption schedule (DCPOD): At weekly intervals, update DCPOD to reflect actual construction occupant disruptive activities and durations of activities for the following week. Issue schedule one week before each regularly scheduled progress meeting to allow time for HACP Representative and On Site Manager to coordinate and approve. Close coordination which is required to minimize disruption to occupants and Contractors' are not to proceed without approval.

D. Distribution: Distribute copies of approved schedule to Architect, HACP, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in the performance of construction activities.

END OF SECTION 013200

SECTION 013233 – PHOTOGRAPHIC DOCUMENTATION

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 administrative and procedural requirements for the following:

1. Pre-construction photographs.
2. Periodic construction photographs.
3. Final completion construction photographs.

B. Related Requirements:

1. Section 012200 “Unit Prices” for procedures for unit prices for extra photographs.
2. Section 013300 “Submittal Procedures” for submitting photographic documentation.
3. Section 017700 “Closeout Procedures” for submitting photographic documentation as project record documents at Project closeout.
4. Section 017900 “Demonstration and Training” for submitting video recordings of demonstration of equipment and training of HACP’s personnel.
5. Section 024119 “Selective Structure Demolition” for photographic documentation before selective demolition operations commence.

1.3 ALLOWANCES: (Not Used)

1.4 UNIT PRICES (Not Used)

1.5 INFORMATION SUBMITTALS

A. Qualification Data: For photographer.

B. Digital Photographs: Submit image files weekly via email to HACP and Architect.

1. Digital Camera: Minimum sensor resolution of 16 megapixels.
2. Format: Minimum 3200 by 2400 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped.

1.6 QUALITY ASSURANCE (Not Used)

1.7 USAGE RIGHTS

A. HACP reserves all rights for unlimited reproduction of photographic documentation.

PART 2 – PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 16 megapixels, and at an image resolution of not less than 3200 by 2400 pixels.

PART 3 - EXECUTION

1.1 CONSTRUCTION PHOTOGRAPHS

A. Photographer: Contractor representative who is familiar with the project progress and critical items in scope of work.

B. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

C. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1. Date and Time: Include date and time in file name for each image.

D. Pre-construction Photographs: Before commencement of demolition, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect and HACP.

1. Take 20 photographs to show existing conditions adjacent to property before starting Work.
2. Take 20 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
3. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

E. Periodic Construction Photographs: Take 20 photographs weekly, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

F. Architect-Directed Construction Photographs: From time to time, Architect will instruct photographer about number and frequency of photographs and general directions on vantage points. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken.

G. Final Completion Construction Photographs: Take 20 color photographs after date of Substantial Completion for Submission as project record documents. Architect will inform photographer of desired vantage points.

1. Do not include date stamp.

END OF SECTION 013233

SECTION 013300 – SUBMITTAL PROCEDURES

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 administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples and other submittals.

B. Related Requirements:

1. Section 012900 “Payment Procedures” for submitting Applications for Payment and the schedule of values.
2. Section 013200 “Construction Progress Documentation” for submitting schedules and reports, including Contractor’s construction schedule.
3. Section 017823 “Operation and Maintenance Data” for submitting operation and maintenance manuals.
4. Section 017839 “Project Record Documents” for submitting record Drawings, record Specifications and record Product Data.
5. Section 017900 “Demonstration and Training” for submitting video recordings of demonstration of equipment and training of HACP”s personnel.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Architect’s responsive action.

B. Informational Submittals: Written information does not require Architect’s responsive action. Submittals may be rejected for not complying with requirements.

C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution- independent fixed-layout document format.

1.4 SUBMITTAL PROCEDURES

A. General: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by Architect for Contractor’s use in preparing submittals.

1. E-mail all submittals as PDF file attachments to HACP Representative and Architect for review.

a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
b. No hardcopies of the submittal is required unless specifically requested by the Architect or HACP representative.

2. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.

3. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Submittals Schedule: Comply with requirements in Division 1 Section “Construction Progress Documentation” for list of submittals and time requirements for scheduled performance of related construction activities.

1, Submittals shall be “packaged” together by the due date they are needed by.

a. Contractor shall allow time for resubmission of items.
b. Contractor shall prioritize submissions with-in packages.

2. Submittal Packages shall be submitted at time indicated on the agreed upon schedule.

D. Processing Time: Allow enough time for submittal review, including time for re-submittals, as follows. Time for review shall commence in Architect’s receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including re-submittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Re-submittal Review: Allow 7 days for review of each re-submittal.

4. Sequential Review: Where sequential review of submittals by Architect's Consultants, HACP or other parties is indicated, allow 21 days for initial review of each submittal.
   a. Sequential review shall be required for Submittals specified in the HVAC and Electrical disciplines.

E. Identification: Place a permanent label or title block on each submittal for identification.

1, Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information on label for processing and recording action taken:
   a. Project name.
   b. Date.
   c. Name and address of Architect.
   d. Name and address if Contractor.
   e. Name and address of subcontractor.
   f. Name and address of supplier.
   g. Name of manufacturer.
   h. Submittal number or other unique identifier, including revision identifier.
      1) Submittal number shall use Specification Section number followed by a decimal point and than a sequential number (e.g., 061000.01). Re-submittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
   i. Number and title of appropriate Specification Section.
   j. Drawing number and detail references, as appropriate.
   k. Location(s) where product is to be installed, as appropriate.
   l. Other necessary identification.

F. Deviations: Highlight or otherwise specifically identify deviations from the Contract Documents on submittals.

G. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

1. Submit one copy of submittal to Architect in addition to specified number of copies to concurrent reviewer.
2. Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.

H. Electronic Submittal Delivery

1. Submittals shall be processed and delivered electronically via E-mail and PDF file attachments. Comments and sketches by the Architect shall be delivered to the Contractor electronically via E-mail and PDF file attachments.
2. The following types of submittals included in, but not limited to, the list below shall be delivered to the architect electronically:
   a. Product Data.
   b. Certifications.
   c. Test Data.
   d. Schedules.

e. Calculations.
f. Mix Designs.
g. Warranty Information

3. All submittals which are 11" x 17" or smaller shall be delivered electronically via E-mail and PDF file attachment. The Contractor shall contact the Architect regarding delivery method for submittals larger than 11" x 17"
4. Shop Drawings may be delivered via E-mail and PDF file attachment. The Shop Drawings shall be packaged to assist the electronic review process on a computer screen. This includes keeping the number of pages to a minimum. Shop Drawings shall be broken down into 20 page increments and issued under separate submittal numbers.
5. All samples and color selections shall be delivered by mail or courier to the Architect for review. Samples and color selection shall not be reviewed electronically. See separate section of specifications for quantities and sample selection process. The Architect shall return review comments via web-based software.

I. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.

1. Transmittal Form: Provide locations on form for the following information:
   a. Project name.
   b. Date.
   c. Destination To:
   d. Source (From:).
   e. Names of subcontractor, manufacturer, and supplier.
   f. Category and type of submittal.
   g. Submittal purpose and description.
   h. Specification Section number and title according to specifications.
   i. Drawing number and detail references, as appropriate.
   j. Transmittal number, numbered consecutively.
   k. Submittal and transmittal distribution record.
   l. Remarks.
   m. Signature of transmitter.
2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.

J. Re-submittals: Make re-submittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked "No Exception Taken".

K. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

L. Use for Construction: Use only final submittals with mark indicating “No Exception Taken” taken by Architect.

M. Submittal Logs: The Architect shall maintain the submittal log between the Architect and Contractor. It is recommended that the Contractor maintain a submittal log with subcontractors.

1.5 CONTRACTOR’S USE OF ARCHITECT’S CAD FILES

A. General: At Contractor’s written request, copies of Architect’s CAD files will be provided to Contractor for Contractor’s use in connection with Project, subject to the following conditions:

1. The Architect will provide electronic files for a fee. Drawings or Electronic media requested by the Contractor on the Drawings/Electronic Media Request Form, as provided by the Architect can be purchased upon completion of the “Release for Use of Electronic Drawing Media” form, also available from the Architect. Fees associated with a request are limited to administrative expenses incurred in satisfying a request and are set at $100 per file request.

PART 2 - PRODUCTS

2.1 SUBMITTAL SCHEDULE

A. Contractor must submit to the Architect for review a submittal schedule that is included as part of the construction schedule. The specific requests for review of product data; shop drawings for product and systems must be identified with critical timing requirements, both for submission and review.

1. Contractor to submit a draft to Architect for agreement with required approval dates with submission time and submission packages.
2. Architect will review for items that will require earlier than scheduled review to meet required approval dates.
3. Submittals shall be “packaged” together by the due date the contractor will need approval by in order to timely order material.
   a. Contractor shall allow time for resubmission of rejected items.
   b. Contractor shall prioritize submissions with-in packages.
4. Submittal Packages shall be submitted at time indicated on the agreed upon schedule.
5. See Division 1 Section “Construction Progress Schedules” for additional requirements.

B. Timing of submittals will adhere to the submitted agreed upon schedule.

1. Contractor will prioritize groups of submittals together in packages as defined in the contract for review and approval by architects and consulting engineers.
2. Contractor shall schedule the submission packages the Architect, return due times, and critical Lead times on the construction schedule. To aid the Architect in staffing large volume of submittals for review.
   a. Contractor shall allow sufficient time for resubmission for items that may be rejected.
   b. The submittal packages and schedule shall be evaluated and items that have longer review times as determined by HACP, or Architect shall be submitted in an earlier package by the contractor.

2.2 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:
   a. Manufacturer's written recommendations.
   b. Manufacturer's product specifications.
   c. Manufacturer's installation instructions.
   d. Standard color charts.
   e. Manufacturer's catalog cuts.
   f. Wiring diagrams showing factory-installed wiring.
   g. Printed performance curves.
   h. Operational range diagrams.
   i. Mill reports.
   j. Standard product operation and maintenance manuals.
   k. Compliance with specified referenced standards.
   l. Testing by recognized testing agency.
   m. Application of testing agency labels and seals
   n. Notation of coordination requirements.
4. Submit Product Data before or concurrent with Samples.
   a. E-mail submittals as PDF file attachments to Architect for review. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
   b. Mark up and retain one returned copy as a Project Record Document.

C. Shop Drawings: Prepare Project specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the contract Documents or standard printed data, unless submittal of Architect's CAD Drawings are otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
   a. Dimensions.
   b. Identification of Products.
   c. Fabrication and installation drawings.
   d. Roughing-in and setting diagrams.
   e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
   f. Shop work manufacturing instructions.
   g. Templates and patterns.
   h. Schedules.
   i. Design Calculations.
   j. Compliance with specified standards.
   k. Notation of coordination requirements.

l. Notation of dimensions established by field measurement.
m. Relationship to adjoining construction clearly indicated.
n. Seal and signature of professional engineer, if specified.
o. Wiring Diagrams: Differentiate between manufacturer-installed and field installed wiring.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
   a. E-mail shop drawings as PDF file attachments to Architect for review. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
   b. Mark up and retain one returned copy as a Project Record Document.
   c. Submit five copies where copies are required for operation and maintenance manuals.

D. Samples: Submit Samples for review of kind, color, pattern and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:
   a. Generic description of Sample.
   b. Product name and name of manufacturer.
   c. Sample Source
   d. Number and title of appropriate Specification Section.
3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
   a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
   b. Samples not incorporated into the Work, or otherwise designated as HACP's property, are the property of Contractor.
4. Samples for initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
   a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches, showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
   a. Number of Samples: Submit three sets of Samples. Architect will retain one Sample set, provide HACP Representative with on Sample set and return one set as a Project Record Sample.
      1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation and other similar characteristics are to be demonstrated.

2) If variation in color, pattern, texture or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of pared units that show approximate limits of variations.

E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product.
2. Number and name of room or space.
3. Location within room or space.
   a. E-mail information as PDF file attachment to Architect for review. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
   b. Mark up and retain one returned copy as a Project Record Document.
   c. Submit five copies where copies are required to operation and maintenance manuals.

F. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation".

G. Submittals Schedule: Comply with requirements of this section and those specified in Division 1 Section "Construction Progress Documentation".

H. Application for Payment: Comply with requirements specified in Division 1 Section "Payment Procedures".

I. Schedule of Values: Comply with requirements specified in Division 1 Section "Payment Procedures".

J. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.
4. Number of Copies: Submit three copies of subcontractor list, unless otherwise indicated. Architect will return copies.
   a. Mark up and retain one returned copy as a Project Record Document.

2.3 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit informational Submittals required by other Specification Sections.
   1. Number of Copies:
      a. E-mail submittals as PDF file attachment to Architect for review. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
      b. Mark up and retain one returned copy as a Project Record Document.
      c. Submit five copies where copies are required for operation and maintenance manuals. Certificates and Certifications: Provide a notarized statement that includes signature of

entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

2. Test and Inspection Reports: Comply with requirements specified in Division 1 Section "Quality Requirements".

B. Coordination Drawings: Comply with requirements specified in Division 1 Section "Project Management and Coordination".

C. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

D. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

E. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

F. Manufacturer's Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

G. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

H. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

I. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

J. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

K. Schedule of Tests and inspections: Comply with requirements specified in Division 1 Section "Quality Requirements".

L. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

M. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation

of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

N. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 1 Section “Operation and Maintenance Data”.

O. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

P. Manufacturer’s Instructions: Prepare written or published information that documents manufacturer’s recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:

1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation or erection.
4. Required installation tolerances.
5. Required adjustments.
6. Recommendations for cleaning and protection.

Q. Manufacturer’s Field Reports: Prepare written information documenting factory-authorized service representative’s tests and inspections. Include the following, as applicable:

1. Name address, and telephone number of factory-authorized service representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement weather conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

R. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

S. Material Safety Data Sheets (MSDS’s): Do not submit information directly to HACP or Architect.

1. Architect will not review submittals that include MSDS’s and will return the entire submittal for resubmittal.

2.4 DELEGATED-DESIGN

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data and other required submittals, submit three copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:

1. "No Exception Taken": Proceed with work covered by submittal provided it complies with requirements of Contract Documents; final acceptance will depend upon that compliance.
2. "Make Corrections Noted": Proceed with work covered by submittal provided it complies with notations or corrections on submittal and requirements of Contract Documents; final acceptance will depend on that compliance.
3. "Revise and Resubmit": Do not proceed with work covered by submittal, including purchasing, fabrication, delivery or other activity. Revise and/or prepare a new submittal in accordance with notations, and resubmit without delay. Repeat this procedure, if necessary, to obtain a different action mark. Do not use submittals marked "Revise and Resubmit" at Project site, or elsewhere where work is in progress.
4. "Not Acceptable": Work covered by this submittal is completely unacceptable. Prepare new submittal and submit without delay.

5. "Subject to Action by Architect's Consultant": Work covered by this submittal has been reviewed by the Architect but must also be reviewed by Architect's consultant before work covered by submittal can be purchased, fabricated, delivered, or used on this project.

B. Informational Submittals: Architect will review each submittal and will return it with appropriate comments. Architect will forward each submittal to appropriate party.

C. Partial submittals are not acceptable, will be considered non-responsive, and will be returned without review.

D. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 013300

SECTION 014000 – QUALITY REQUIREMENTS

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 administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and control services required by Architect, HACP, or authorities having jurisdiction are not limited by provisions of this Section.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Mock-ups: Full size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.

D. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

E. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Using a term such as “carpentry” does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as “carpenter”. It also does not imply that requirements specified apply exclusively to trades people of the corresponding generic name.

F. Experienced: When used with an entity or individual, “experienced” means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

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

1.5 ACTION SUBMITTALS

A. Shop Drawings: For integrated exterior mockups, provide plan, sections, and elevations, indicating materials and size of mockup construction.

1, Indicate manufacturer and model number of individual components.
2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 SUBMITTALS

A. Qualification Data: For testing agencies specified in “Quality Assurance” Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Description of test and inspection.
3. Identification of applicable standards.
4. Identification of test and inspection methods.
5. Number of tests and inspections required.
6. Time schedule or time span for tests and inspections.
7. Entity responsible for performing tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

C. Reports: Prepare and submit certified written reports that include the following:

1. Date of issue.
2. Project title and number.
3. Name, address and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspection.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and re-inspecting.

D. Permits, Licenses and Certificates: For HACP's records, submit copies of permits, licenses certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.7 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Install Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated or this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. "Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for this Project in material, design and extent.

F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirement for specialists shall not supersede building codes and regulations governing the Work.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: a nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements and test methods, comply with the following:

1. Contractor responsibilities include the following:
   a. Provide test specimens representative of proposed products and construction.
   b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
   c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
   d. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
   e. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.
2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.8 QUALITY CONTROL

A. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Tests and inspections are the Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
   a. Contractor shall not employ same entity engaged by HACP, unless agreed to in writing by HACP.
2, Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not require by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 1 Section "Submittal Procedures".

D. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-sit-tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections and similar quality control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples and similar activities.

H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within 30 days of date established for the Notice to Proceed.

1. Distribution: Distribute schedule to HACP, Architect, testing agencies and each party involved in performance of portions of the Work where tests and inspections are required.

1.9 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and re-inspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking and similar services, repair damaged construction and restore substrates and finishes.
1. Comply with the Contract Document requirements for Division 1 Section "Cutting and Patching".

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 015000 – TEMPORARY FACILITIES AND CONTROLS

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 PROJECT CONDITIONS

A. This Section is not intended to limit types and amounts of temporary construction facilities and controls required. Omission from this Section will not be accepted as an application that such temporary activity is not required for successful completion of the work and compliance with requirements of the Contract Documents.

B. Provide and maintain each temporary construction facility and control when required for proper performance of the work. Terminate and remove when no longer needed or when permanent facilities, with proper authorization, are available for use.

C, Obtain and pay for all required applications, fees, permits and inspections required for temporary construction facilities and controls.

D. Install, operate, maintain and protect temporary construction facilities and controls in a manner and at locations which are safe, non-hazardous, sanitary and adequately protect project work, workmen and the public.

E. The building will be occupied during construction. Provide temporary barriers to restrict access to the area(s) of construction for the health, safety and welfare of the Occupants and other members of the Public, to only those individuals that need for access to the area to complete the Work. Temporary barriers shall be required to coordinate with the Demolition and Construction Phasing and Occupant Disruption Schedule, provided by the General Prime Contractor, updated on a weekly bases and as approved by HACP. Access to individual apartment units on a daily bases is required. Maintain means of egress at all times.

1.3 REQUIREMENTS OF REGULATORY AGENCIES

A. Provide and maintain all temporary facilities off-site in compliance with governing rules, regulations, codes, ordinances and laws of agencies and utility companies having jurisdiction over work involved in project.

B. Be responsible for all temporary work provided and obtain any necessary permits and inspections for such work.

C. Confine equipment, storage of materials, and operation of workmen to the limits indicated or directed and shall abide by law, ordinances, conditions stated in permits and directions of the Construction Manager/HACP's Representative.

D. Do not interfere with normal use of roads in vicinity of project site, except as absolutely necessary to execute required work, and then only after proper arrangements have been made with authorities having jurisdiction, including permits, approvals and temporary traffic control as applicable.

1.4 TEMPORARY FIELD OFFICES AND TRAILERS

A. Due to the scope and size of the project, as well as the lack of available space on site, the bidding contractors are not required to provide temporary field offices and trailers. No available area inside the existing HOPE Center will be provided for the contractors' use.

1.5 TEMPORARY SANITARY FACILITIES

A. No facilities are available on site. General Prime Contractor to provide temporary portable toilet(s), acceptable to public health authorities, as required to service the project for the use of all construction personnel on site, including personnel from other prime contracts. Maintain in a clean, sanitary condition; provide all supplies. Locate as directed by Construction Manager/HACP's Representative within secure construction area.

1.6 TEMPORARY LIGHT AND POWER

A. Temporary use of on-site electrical power for construction shall be made available for use.

1.7 CONSTRUCTION AIDS

A. Shoring and Bracing: Provide all shoring and bracing required for safety and proper execution of their work. Remove these items when the work is completed

B. Barriers: Provide protective barriers and fencing as required to protect the public from demolition operations, including demolition preparation work, and construction activities for the duration of the Work.

a. Provide and maintain OSHA approved barriers where required by OSHA.

C. First Aid Facilities: Provide a minimum of one (1) 16-unit first-aid kit (or equivalent) for each 25 persons (or fraction thereof) on the worksite.

1.8 WATCHMAN SERVICE

A. If Contractor considers watchman services necessary or desirable for protection of their own interest, such services may be employed at their own complete expense.

1.9 SAFETY

A. Safety requirements shall be in accordance with the General Conditions.

B. Provide and maintain guard lights at all barricades, railings, obstructions in the roadways or sidewalks.

C. Strict attention and full adherence must be given the Williams-Steiger Occupational Safety and Health Act of 1970, U.S. Department of Labor.

1.10 TEMPORARY SIGNS

A. Temporary Signs: Provide as required to adequately direct traffic, personnel and the public regarding the project.

1.11 STREETS AND TRAFFIC

A. Cleaning and Repair

1. Contractors shall remove mud and spillage from public walks, streets and sewers without delay. Failure to clean areas promptly will result in areas being cleaned by HACP at the responsible Contractor's expense.
2. Damage to roads or other facilities on the grounds, resulting from hauling, storage of materials, or other activities in connection with the work shall be repaired or replaced, at no expense to HACP, by the Contractor causing the damage. Repairs or replacements shall be made to the satisfaction of the Construction Manager/HACP's Representative and the Architect.

B. Traffic

1. Notify City of Pittsburgh Police Department at least two (2) weeks in advance of any anticipated work affecting traffic flow.
    a. To assure maintenance of flow and to safeguard all parties involved in planning to maintain flow, a field inspection should be made jointly by the Construction Manager/HACP's Representative, the Architect and Contractor personnel before performing any work which would interrupt normal traffic patterns.
    b. Re-routing of traffic shall be planned, as to route and direction, in cooperation with the City of Pittsburgh Police Department.

1.12 PARKING

A. There are no on-site or assigned parking for employees of Contractors and subcontractors. Parking on streets or in restricted areas is prohibited. Specific parking plans will be discussed at the Pre-Construction Meeting.

1.13 USE CHARGES

A. General: Shall be as dictated by the General Conditions for Construction Contracts – Public Housing Programs and agreed upon between HACP and each Prime Contractor.

1.14 INFORMATIONAL SUBMITTALS

A. Off-Site Plans: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

C. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.

1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

D. Dust and HVAC Control Plan: Submit coordination drawing and narrative that indicates the dust and HVAC control measures proposed for use, proposed locations, and proposed time frame for their operation. Indentify further options if proposed measures are later determined to be inadequate. Include the following:

1. Locations of dust control partitions at each phase of work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air-filtration system discharge.
4. Waste handling procedures.
5. Other dust-control measures.

1.15 QUALITY ASSURANCE

A. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board’s ADA-ABA Accessibility Guidelines and ICC./ANSI A117.1.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch (3.8-mm) thick, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high galvanized-steel pipe posts; minimum 2-3/8 inch (60-mm) OD line posts and 2-7/8 inch (73-mm) OD corner and pull posts, with 1-5/8 inch (42-mm) OD top rails.

B. Lumber and Plywood: Comply with requirements in Division 6 Section “Rough Carpentry”.

C. Polyethylene Sheets: Reinforced, fire-resistive sheet, 10-mil (0.25-mm) minimum thickness, with flame-spread rating of 15 or less per ASTM E 84.

D. Dust Control Adhesive Surface Walk-off Mats: Provide mats minimum 36 by 60 inches (914 by 1624 mm).

E. Gypsum Board: Minimum 1/2 inch thick by 48 inches wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36/C 36M.

F. Insulation: Un-faced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

G. Paint: Comply with requirements in Division 9 painting Sections.

2.2 TEMPORARY FACILITIES (Not Used)

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

PART 3 – EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities off-site in close proximity where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate temporary facilities to limit site disturbance and that minimize disruption of daily activities of HACP and residents.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized.

3.2 TEMPORARY UTILITY INSTALLATION

A. Water Service: Use of HACP's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to HACP. At Substantial Completion, restore these facilities to condition existing before initial use.

1. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.

B. Sanitary Facilities: Prime General Contractor to provide temporary toilets, wash facilities, and drinking water for use of all construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

C. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

1. At all times during demolition and construction, HACP may request the contractor to provide temporary heating or insulating accommodations.

D. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.
   a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
   b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
3. Contractors are required to continuously clean floor areas to keep areas not under demolition and construction clean.
4. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

E. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

F. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity and power characteristics required for construction operations.

1. Connect temporary service to HACP's existing power source, as directed by HACP.

G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
2. Install lighting for Project identification sign.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide incombustible construction for temporary offices, shops and sheds located off-site of the occupied building and construction area. Comply with NFPA 241.
2. Maintain support facilities until Construction Manager/HACP's Representative schedules Substantial Completing inspection. Remove before Substantial Completion.

B. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

C. Parking: See Section 1.12.

D. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution".

E. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

F. Existing Elevator Use: Use of HACP's existing elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to HACP. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes and similar items of limited life.

1. Do not load elevators beyond their rated weight capacity.
2. Provide protective coverings, barriers, devices, signs other procedures to protect elevator car and entrance doors and frame. If despite such protection, elevators become damaged, engage elevator installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.

G. Existing Stair Usage: Use of HACP's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to HACP. At Substantial Completion, restore stairs to condition existing before initial use.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of authorities having jurisdiction.

1. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
2. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
3. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

D. Tree and Plant Protection: Provide measures to prevent damage to existing tree and plants.

E. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

F. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

G. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather-tight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

H. Temporary Partitions: Provide floor-to ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by HACP and Residents from fumes and noise.

1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire –retardant-treated plywood on construction operations side.

2. Construct dustproof partitions with two layers of 3-mil polyethylene sheet on each side.. Cover floor with two layers of 3-mil polyethylene sheet, extending sheets 18 inches (460 mm) up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood. This shall occur in the existing lobbies where adjacent to the units under construction.
3. Insulate partitions to control noise transmission to occupied areas.
4. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
5. Provide walk-off mats at each entrance through temporary partition.

I. Existing exterior wall mural:

1. Protect temporary protection for existing exterior wall mural during cleaning of building and demolition and construction with materials and methods as required.

J. Temporary Fire Protection: Maintain existing fire-protection systems.

1. Smoking is prohibited on site and within construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.5 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Project stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Phase: After installation of weather barriers, but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard, replace, or clean stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

3.6 OPERATION, TERMINATION AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

   1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

   1. Materials and facilities that constitute temporary facilities are property of Contractor. HACP reserves right to take possession of Project identification signs.
   2. At Substantial Completion, repair, renovate and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 “Closeout Procedures”.

END OF SECTION 015000

SECTION 016000 – PRODUCT REQUIREMENTS

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 administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and equal products.

B. Related Requirements:

1. Division 01 Section "Substitution Procedures" for requests and reviews of substitutions.
2. Division 01 Section "Allowances" for products selected under an allowance.
3. Division 01 Section "Alternates" for products selected under an alternate.
4. Division 01 through 26 for specific product requirements.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material", "equipment", "system", and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. "Equal" Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis of Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis of design product", including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance and other characteristics for purposes of evaluating "Equal" products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

A. "Equal" Product Requests: Submit request for consideration of each "Equal" product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "'Equal' Products" Article.
2. Include any previously submitted Substitution Request Forms whether for "during Bid phase" (form 012500.01) or "after Bid phase" (012500.02) with Architect's approval verification.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of an "Equal" product request. Architect will notify Contractor of approval or rejection of proposed "Equal" product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
   a. Form of Approval: As specified in Section 013300 "Submittal Procedures".
   b. Use product specified if Architect does not issue a decision on use of an "Equal" product request within time allocated.

B. Basis of Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures". Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selected but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Delivery, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.

4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weather-tight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure off-site for storage of materials and equipment by HACP's construction forces. Coordinate location with HACP.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to HACP.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for HACP.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, read for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. Refer to 02 through 49 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures".

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. HACP reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term “as selected”, Architect will make selection.
5. Descriptive, performance, and referenced standard requirements in the Specifications establish salient characteristic of products.
6. Or Equal: For products specified by name and accompanied by the term “or equal”, or “or approved equal”, or “or approved”, comply with requirements in “Equal Products” Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. “Equal” products or substitutions for Contractor’s convenience will not be considered.
2. Products:
   a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. “Equal” products or substitutions for Contractor’s convenience will be considered unless otherwise indicated.
   b. Non-restricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in “’Equal’ Products” Article for consideration of an unnamed product.
3. Manufacturers:
   a. Restricted List: Where Specifications include a list of manufacturer’s names, provide a product by one of the manufacturers listed that complies with requirements. “Equal” products or substitutions for Contractor’s convenience will be considered unless otherwise indicated.
   b. Non-Restricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in “’Equal’ Products” Article for consideration of an unnamed manufacturers product.
4. Basis of Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or an “Equal” product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in “’Equal’ Products” Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require “match Architect’s sample” provide a product that complies with requirements and matches Architect’s sample. Architect’s decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 “Substitution Procedures” for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase “as selected by Architect from manufacturer’s full range” or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density or texture from manufacturer’s product line that includes both standard and premium items.

2.2 “EQUAL” PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor’s request for equal product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

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 general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.
9. Correction of the Work.

B. Related Requirements:

1. Section 011000 “Summary” for limits on use of Project site.
2. Section 013300 “Submittal Procedures” for submitting surveys.
3. Section 017700 “Closeout Procedures” for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
4. Section 024119 “Selective Structure Demolition” for demolition and removal of selected portions of the building.
5. Section 078413 “Penetration Firestopping” for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 SUBMITTALS

A. Qualification Data: For professional engineer.

B. Certificates: Submit certificate signed by professional engineer certifying that location and elevation of improvements comply with requirements.

C. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Products: List products to be used for patching and firms or entities that will perform patching work.
3. Dates: Indicate when cutting and patching will be performed.
4. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
    a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

1.5 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that result in increased maintenance or decreased operational life or safety. Operational elements include the following:
    a. Primary operational systems and equipment.
    b. Fire separation assemblies.
    c. Air or smoke barriers.
    d. Fire-suppression systems.
    e. Mechanical systems piping and ducts.
    f. Control systems.
    g. Communication systems.
    h. Fire-detection and alarm systems.
    i. Conveying systems.
    j. Electrical wiring systems.
    k. Operating systems of special construction.
2. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that result in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
    a. Equipment supports.
    b. Piping, ductwork, vessels and equipment.
3. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner

that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

B. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of utilities and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems, and other construction affecting the Work.

B. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine walls, floors and roofs for suitable conditions where products and systems are to be installed.
2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.

3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect and Construction Manager promptly.

B. General: Engage a professional engineer to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect and Construction Manager/HACP's Representative when deviations from required lines and levels exceed allowable tolerances.

C. Building Lines and Levels: Locate and lay out control lines and levels for exterior wall systems against existing structures and floor levels.

3.4 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts and wiring in finished areas unless otherwise indicate.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so o part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Tools and Equipment: Do not use tools or equipment that produces harmful noise levels.

F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the work.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Exiting Warranties: Remove, replace, patch and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 “Summary”.

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/system are required to be removed, relocated or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer’s written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.

H. Patching: Patch construction by filling, repairing, refinishing, closing up and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
3. Floors and Walls: Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends the adjacent surfaces.
4. Ceilings: Patch, repair, existing drywall bulkheads and prepare and paint ceiling grids.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather-tight condition and ensure thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty and similar materials from adjacent finished surfaces.

3.6 OWNER-INSTALLED PRODUCTS

A. Provide access to Project site for HACP’s construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by HACP's construction personnel.

1. Construction Schedule: Inform HACP of Contractor's preferred construction schedule for HACP's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify HACP if changes to schedule are required due to differences in actual construction progress.
2. Pre-installation Conferences: Include HACP's construction forces at pre-installation conferences covering portions of the Work that are to receive HACP's work. Attend pre-installation conferences conducted by HACP's construction personnel if portions of the Work depend on HACP's construction.

3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction completed or in progress, is subject to harmful, dangerous, damaging or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Section 014000 "Quality Requirements".

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.10 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching".

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence or repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

SECTION 017329 – CUTTING AND PATCHING

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 procedural requirements for cutting and patching.

B. Related Sections include the following:

1. Division 01 Section “Selective Structure Demolition” for demolition of selected portions of the building.
2. Division 02 through 26 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
3. Division 07 Section “Penetration Firestopping” for patching fire-rated construction.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:

1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building’s appearance and other significant visual elements.
3. Products: List products to be used and firms or entities that will perform the Work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and

those that will be temporarily out of service. Indicate how long services/systems will be disrupted.

6. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory Work.

1.5 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. Operational elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that result in increased maintenance or decreased operational life or safety. Operating elements include the following:

1. Primary operational systems and equipment.
2. Air or smoke barriers.
3. Fire-suppression systems.
4. Mechanical systems piping and ducts.
5. Control systems.
6. Communication systems.
7. Conveying systems.
8. Electrical wiring systems.
9. Operating systems of special construction in Division 13 Sections.

C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity that results in reducing their capacity to perform as intended, or that result in increased maintenance or decreased operational life or safety. Miscellaneous elements include the following:

1. Water, moisture, or vapor barriers.
2. Membranes and flashings.
3. Equipment supports.
4. Piping, ductwork, vessels and equipment.
5. Noise and vibration control elements and systems.
6. Structural members not specifically noted to be modified.

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding. Mechanical and electrical contractors shall clearly identify locations requiring cutting with the general Contractor present. Mechanical and Electrical prime contractors shall make

every effort to minimize area of cutting required. Multiple conferences may be required to identify all areas requiring cuts and patches.

1.6 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be use, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible tie and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore expose finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
   a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
   b. Restore damaged pipe covering to its original condition.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
   a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
4. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather-tight condition.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty and similar materials.

END OF SECTION 017329

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

1.2 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.3 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest control inspection.

D. Record Drawings: Maintain a set of prints of the Contract Drawings as record drawings. Mark to show actual installation where installation varies from that shown originally.

1. Identify and date each record drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

B. Operation and Maintenance Data: Submit **four (4)** copy of manual. Organize data into three-ring binders with identification on front and spine of each binder, and envelopes for folded drawings. Include the following:

1. Manufacturer's operation and maintenance documentation.
2. Maintenance and service schedules.
3. Maintenance service contracts.
4. Emergency instructions.
5. Spare parts list.
6. Wiring diagrams.
7. Copies of warranties.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of ten (10) days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.

5. Submit test/adjust/balance records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of ten (10) days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings.
6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of ten (10) days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.6 FINAL COMPLETION PROCEDURES

A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.

5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection to determine acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest space number to highest space number.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Submit list of incomplete items in the following format:

a. PDF electronic file. Architect will return annotated copy.

1.8 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3.2 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

   a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
   b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
   d. Remove tools, construction equipment, machinery, and surplus material from Project site.
   e. Remove snow and ice to provide safe access to building.
   f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
   g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
   h. Sweep concrete floors broom clean in unoccupied spaces.
   i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
   j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
   k. Remove labels that are not permanent.
   l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
   m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
   n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
   o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
   p. Leave Project clean and ready for occupancy.

2. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

3. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

3.3 DEMONSTRATION AND TRAINING

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system. Include a detailed review of the following:
   1. Include instruction for basis of system design and operational requirements, review of documentation, emergency procedures, operations, adjustments, troubleshooting, maintenance, and repairs.

END OF SECTION 017700

SECTION 017839 – PROJECT RECORD DOCUMENTS

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 administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

B. Related Requirements:

1. Section 011200 “Multiple Contract Summary” for coordinating project record documents covering the Work of multiple contracts.
2. Section 0173600 “Execution” for final property survey.
3. Section 017700 “Closeout Procedures” for general closeout procedures.
4. Section 017823 “Operation and Maintenance Data” for operation and maintenance manual requirements.

1.3 SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit copies of record Drawings as follows:
   a. Initial Submittal: Submit one set of PDF’s from corrected Record CAD Drawings and Record PDF Specifications through the Project Web Site. Architect will initial and date each and mark whether general scope of changes, additional information recorded, and quality of drafting are acceptable. Architect will return digitally.
   b. Final Submittal: Submit one set of marked-up Record Prints, one set of Record CAD Drawing files, one set of Record CAD Drawing plots, and three (3) copies printed from record plots. Plot and print each Drawing, whether or not changes and additional information were recorded.
      1) Electronic Media: DVD

B. Record Specifications: Submit one paper copy of Project’s Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one paper copy of each Product Data submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked up Record Prints.
   a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
   b. Accurately record information in an acceptable drawing technique.
   c. Record data as soon as possible after obtaining it.
   d. Record and check the markup before enclosing concealed installations.
2. Content: Types of items requiring marking include, but are not limited to, the following:
   a. Dimensional changes to Drawings.
   b. Revisions to details shown on Drawings.
   c. Actual equipment locations.
   d. Changes made by Change Order or Construction Change Directive.
   e. Changes made following Architect's written orders.
   f. Details not on the original Contract Drawings.
   g. Field records for variable and concealed conditions.
   h. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record CAD Drawings: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect and Construction Manager. When authorized, prepare a full set of corrected CAD Drawings of the Contract Drawings, as follows:

1. Format: Same CAD program, version, and operating system as the original Contract Drawings.
2. Format: DWG, Version AutoCAD 2010, Microsoft Windows operating system.
3. Incorporate changes and additional information previously marked on record prints. Delete, redraw and add details and notations where applicable.
4. Refer instances of uncertainty to Architect through Construction Manager for resolution.

5. Architect will furnish Contractor one set of CAD Drawings of the Contract Drawings for use in recording information.
   a. Architect makes no representations as to the accuracy or completeness of CAD Drawings as they relate to the Contract Drawings.
   b. CAD Software Program: The Contract Drawings are available in AutoCAD 2010.

C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.

1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
2. Consult Architect and Construction Manager for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

D. Format: Identify and date each record Drawing; include the designation “PROJECT RECORD DRAWING” in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Record CAD Drawings: Organize CAD information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each CAD file.
3. Identification: As follows:
   a. Project name.
   b. Date.
   c. Designation “PROJECT RECORD DRAWINGS”.
   d. Name of Architect and Construction Manager.
   e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders, Record Product Data, and Recorded Drawings where applicable.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, Record Specifications and Record Drawings were applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project recorded document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's and Construction Manager's reference during normal working hours.

END OF SECTION 017839

SECTION 017900 – DEMONSTRATION AND TRAINING

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 administrative and procedural requirements for instructing HACP's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Demonstration and training video recordings.

1.3 SUBMITTALS

A. Instruction Program: Submit two (2) copies of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. At completion of training, submit one complete training manual for HACP's use.

B. Qualification Data: For instructor.

C. Attendance Record: For each training module, submit list of participants and length of documentation of performance-based test.

D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 QUALITY ASSURANCE

A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements", experienced in operation and maintenance procedures and training.

B. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination". Review methods and procedures related to demonstration and training including, but not limited to, the following:

1. Inspect and discuss locations and other facilities required for instruction.
2. Review and finalize instruction schedule and verify availability of educational materials, instructors; personnel, audiovisual equipment, and facilities needed to avoid delays.
3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.5 COORDINATION

A. Coordinate instruction schedule with HACP's operations. Adjust schedule as required to minimize disrupting HACP's operations.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time and course content.

C. Coordination content of training modules with content of approved emergency, operation and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 – PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
    a. System, subsystem and equipment descriptions.
    b. Performance and design criteria if Contractor is delegated design responsibility.
    c. Operating standards.
    d. Regulatory requirements.
    e. Equipment function.
    f. Operating characteristics.
    g. Limiting conditions.
    h. Performance curves.
2. Documentation: Review the following items in detail:
    a. Emergency manuals.
    b. Operations manuals.
    c. Maintenance manuals.
    d. Project record documents.
    e. Identification systems.
    f. Warranties and bonds.
    g. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:

a. Instructions on meaning of warnings, trouble indications, and error messages.
b. Instructions on stopping.
c. Shutdown instructions for each type of emergency.
d. Operating instructions for conditions outside of normal operating limits.
e. Sequences for electric or electronic systems.
f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:
   a. Startup procedures.
   b. Equipment or system break-in procedures.
   c. Routine and normal operating instructions.
   d. Regulation and control procedures.
   e. Control sequences.
   f. Safety procedures.
   g. Instructions on stopping.
   h. Normal shutdown instructions.
   i. Operating procedures for emergencies.
   j. Operating procedures for system, subsystem, or equipment failure.
   k. Seasonal and weekend operating instructions.
   l. Required sequences for electric or electronic systems.
   m. Special operating instructions and procedures.
5. Adjustments: Include the following:
   a. Alignments.
   b. Checking adjustments.
   c. Noise and vibration adjustments.
   d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
   a. Diagnostic instructions.
   b. Test and inspection procedures.
7. Maintenance: Include the following:
   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.
   c. List of cleaning agents and methods of cleaning detrimental to product.
   d. Procedures for routine cleaning.
   e. Procedures for preventive maintenance.
   f. Procedures for routine maintenance.
   g. Instruction on use of special tools.
8. Repairs: Include the following:
   a. Diagnosis instructions.
   b. Repair instructions.
   c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   d. Instructions for identifying parts and components.
   e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.

B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors and to coordinate between Contractor and HACP for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct HACP's personnel to adjust, operate and maintain systems, subsystems and equipment not part of a system.

1. HACP will furnish an instructor to describe HACP's operational philosophy.
2. HACP will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with HACP with at least seven (7) days advance notice.

D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

E. Cleanup: Collect used and leftover educational materials and give to HACP. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION 017900

SECTION 061053 - MISCELLANEOUS GENERAL CARPENTRY

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: ICC-ES evaluation reports for treated wood.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: Provide dressed lumber, S4S, marked with grade stamp of inspection agency.

2.2 TREATED MATERIALS

A. Preservative-Treated Materials: AWPA C2, except that lumber not in ground contact and not exposed to the weather may be treated according to AWPA C31 with inorganic boron (SBX).

1. Use treatment containing no arsenic or chromium.
2. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
3. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

B. Provide preservative-treated materials for all miscellaneous rough carpentry unless otherwise indicated.

1. Wood members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Concealed members in contact with masonry or concrete.
3. Wood framing members that are less than 18 inches above the ground.
4. Wood floor plates that are installed over concrete slabs-on-grade.

C. Fire-Retardant-Treated Materials: Comply with performance requirements in AWPA C20.

1. Use Exterior type for exterior locations and where indicated.
2. Use Interior Type A, High Temperature (HT) where indicated.
3. Use Interior Type A unless otherwise indicated.
4. Identify with appropriate classification marking of a testing and inspecting agency acceptable to authorities having jurisdiction.

D. Provide fire-retardant treated materials for all miscellaneous rough carpentry.

2.3 LUMBER

A. Dimension Lumber:

1. Maximum Moisture Content: 15 percent.
2. Miscellaneous Framing: Construction, Stud, or No. 3.

B. Exposed Boards: Eastern white, Idaho white, lodgepole, ponderosa, or sugar pine, Premium or 2 Common (Sterling): NeLMA, NLGA, WCLIB, or WWPA; with 15 percent maximum moisture content.

C. Concealed Boards: Eastern softwoods, No. 3 Common: NELMA; with 15 percent maximum moisture content.

D. Miscellaneous Lumber: Standard, Stud, or No. 3 grade with 15 percent maximum moisture content of any species. Provide for nailers, blocking, and similar members.

2.4 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: Plywood, Exterior, fire-retardant treated, not less than 1/2-inch nominal thickness.

2.5 FASTENERS

A. Fasteners: Size and type indicated. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

1. Power-Driven Fasteners: CABO NER-272.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set miscellaneous rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

B. Securely attach miscellaneous rough carpentry to substrates, complying with the following:

1. CABO NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in the IBC.

END OF SECTION 061053

SECTION 073113 FIBERGLASS REINFORCED SHINGLES

PART 1 GENERAL

1.1 SUMMARY

A. Includes But Not Limited To
   1. Furnish and install roofing system as described in Contract Documents.
B. Products Installed But Not Supplied Under This Section
   1. Sheet metal work

1.2 REFERENCES

A. American Society For Testing And Materials
   1. ASTM D 226-89, 'Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing'
   2. ASTM D 3018-90, 'Standard Specification for Class 'A' Asphalt Shingles Surfaced with Mineral Granules'
   3. ASTM D 4586-93, 'Standard Specification for Asphalt Roof Cement, Asbestos-Free'

1.3 SYSTEM DESCRIPTION

A. Design Requirements - This specification sets minimum standards for materials and workmanship. Manufacturer's warranty requirements or governing building codes shall apply where they impose higher standards.

1.4 SUBMITTALS

A. Product Data
   1. Manufacturer's literature or cut sheet for each component of system
   2. Color and style selection
B. Samples - Full size shingle.

1.5 QUALITY ASSURANCE

A. Pre-Installation Meeting - Schedule meeting during installation of or immediately after completion of field sample.

1.6 PROJECT/SITE CONDITIONS

A. Environmental Requirements
   1. When temperature at installation will be 45 deg F or less, store shingles at 70 deg F minimum for 72 hours minimum. Do not take more shingles to site than can be installed during same working day unless provisions to maintain 60 deg F minimum storage temperature are provided.
   2. In addition to above requirements, do not install shingles at lower temperatures than allowed by Manufacturer for application.

1.7 WARRANTY

A. Shingle Manufacturer's 30 year minimum labor and material warranty. Minimum warranty will

provide for full replacement cost including tear-off and disposal for first year with 29 years pro-rated replacement cost including tear-off and disposal thereafter. Warranty shall include –

1. Roofing system will resist blow-offs in winds up to 90 mph for 5 years.
2. Defects for first year.

B. Written two year guarantee covering repairs and replacements for any defect or failure due to faulty workmanship at no additional cost to Owner counter-signed by installer and General Contractor. Guarantee shall also cover correction of interior consequential damage to building and contents.

1.8 MAINTENANCE

A. Extra Materials - Provide 3 bundles of shingles for Owner's future use.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Shingles
1. Fiberglass matt shingles meeting or exceed requirements of ASTM D 3018, Type I and the following requirements-
a. Minimum manufactured weight -
1) Standard Shingles - 225 lbs per square minimum, limited lifetime warranty.
2) Starter Strip Shingles - 200 lbs per square and of style offering 20 year warranty.
b. Hip and ridge shingles shall be dimensional factory pre-formed.
c. UL Class A.
2. Color: As selected by Architect.
3. Approved Types & Manufacturers -
a. GAF/ELK Timberline Prestique 40 by GAF Shingles, 1361 Alps Road, Wayne, NJ (717) 866-8300.
b. No Substitutions.

B. Underlayment
1. Primary - 30 lb felt meeting requirements of ASTM D 226, Type II.
2. Secondary -
a. Single-layer of 36 mil rubberized asphalt on 4 mil polyethylene carrier sheet.
b. Approved Products & Manufacturers -
1) Vycor, Ice & Water Shield by Grace Construction Products,, Cambridge, MA (800) 354-5414
2) Miradri WIP 200 HT by Mirafi Inc, Charlotte, NC (800) 234-0484
3) AC POLY Ice & StormSeal by NEI, Brentwood, NH (800) 998-4634
4) Weather Lock waterproofing underlayment by Owens Corning Fiberglass Corp. Toledo, OH (800) 832-3585.

C. Fasteners
1. Primary Underlayment -
a. Roofing nails with one inch diameter head and 3/4 inch long shank minimum.
b. Acceptable Manufacturers -
1) Plasti-Top Felt Nail by National Nail Corp, Grand Rapids, MI (800) 253-7774
2) ButtonKap by Carolina Nail Inc, Rural Hall, NC
3) Equal as approved by Architect prior to bid.
2. Shingles -

a. Eleven gauge barb shanked hot-dipped galvanized roofing nails with 7/16 inch nominal diameter head.
   1) Field - 1-1/2 inch long minimum
   2) Ridge - 2 inch long minimum
   3) Use longer nails where additional roofing material is used or if required by Manufacturer.

b. Hand driven nails and Gun driven nails only. Staples not permitted.

D. Asphalt Plastic Cement - Any manufacturer's product meeting requirements of ASTM D 4586 and acceptable to Shingle Manufacturer.
   1. Winter grade cement not acceptable

E. (For solar panel installation) PV Mount / Anchor - shall be an aluminum, single bolt support with integrated water-shedding flashing designed for asphalt shingle roofs.

1. Flashing to be a minimum 16AWG

2. Hardware shall be stainless steel with 5/16” lag screw capable of penetrating 3” into Rafter/Truss.

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

a. Ironridge Flashfoot 2

b. PV Quickmount QMSC E-Mount Lag

c. Eco-Fasten Greenfasten GF1

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not install underlayment over roof sheathing that exceeds 19 percent moisture content. Conduct moisture test if requested by Architect.

3.2 PREPARATION

A. Clean roof sheathing, including removal of dirt and debris, before installation of underlayment.
B. It is not necessary to remove existing secondary underlayment that is adhered to roof deck unless it effects the installation of the new roof system.

3.3 INSTALLATION

A. Underlayment
   1. Do not use permanent underlayment installation as temporary roof. If temporary roof is used, remove completely before installation of permanent underlayment.
   2. Secondary -
      a. Lap end joints 6 inches and side joints 3 inches.
      c. At eave locations, install to 3 feet beyond inside surface of the exterior wall measured horizontally, as described in contract documents.
      d. At rake locations, install 3 feet from rake edge.
      e. After installation of valley metal, sweep surface of primary underlayment along edges of valley metal to remove dirt and debris so secondary underlayment will seal to surface. Immediately apply continuous strip of secondary underlayment over edges of valley metal. Leave 8 inches between strips at top of valley and

diverge 3/32 inch per foot of valley.

f. At roof to wall transition, install 36 inch wide sheet 1 inch above plywood furring strip on wall with remainder on deck.

g. Install 3 feet into field around roof penetrations.

h. Do not leave exposed to weather more than 15 days after beginning of installation.

3. Primary -

a. Apply 36 inch wide sheets over complete deck, including area covered with secondary underlayment. Maintain end laps of 8 inches and side laps of 19 inches. Double through valleys.

b. Do not leave exposed to weather more than 14 days after beginning of underlayment installation.

c. Nailing -

1) Secure by nailing 8 inches on center along bottom edge and ends, and 16 inches on center on exposed lap; or as otherwise recommended by Shingle Manufacturer.

2) Do not drive nails through valley.

B. Valley Metal - Nail top of each section and lap 8 inches in direction of flow. Seal laps with calk in accordance with contract documents.

C. Shingles

1. Before installing shingles, inspect underlayment and metal installation with Architect. Correct improperly installed and damaged material before beginning shingle installation.

2. Cut starter strip shingles on slotted end to 9 inch width. Nail to eave granule side up with slot end up-slope and edge overhanging eave 3/8 inch. Apply 4 quarter sized dabs of asphalt cement equally spaced along starter strip edge. Install shingles with 5-1/2 inch nominal maximum exposure unless Manufacturer recommends less. Lay first course directly over starter strip with ends flush with starter strip at eaves and so joints in starter strip do not coincide with joints in first course.

3. Insure alignment by running vertical line down center of roof and laying shingles from center to rake and, in addition, snapping chalk line at least each fifth course to control horizontal alignment.

4. Lay shingles so end joints are offset in accordance with Manufacturer's installation procedures.

5. Except over valley metal, use 6 nails in each shingle placed on line 5/8 inch under bottom edge of next line of shingles. Place nails in accordance with manufacturer’s specifications for 6 nail application. Should any nail fail to penetrate solid decking, drive additional nail nearby. Place nail flush and tight to deck without cutting shingle surface. Over valley metal, hand tab shingles. Do not drive nails through valley metal. Drive nails perpendicular to shingle surface so nail head is flat against shingle.

6. Run chalk line so valley will be 6 inches wide at top and diverge 3/32 inch per ft down to eaves. Neatly trim shingles to this line.

7. Use factory supplied hip and ridge shingles. Apply with 5 inch exposure, blind nailed, and tabbed with asphalt plastic cement. Run ridge shingles as directed by Architect.

8. At penetration flashings, fit shingles under lower edge and over sides and upper edge. Set flange in asphalt plastic cement. Strip in unexposed flanges with a 12 inch wide sheet of 30 lbs felt set in asphalt plastic cement. Embed shingles in asphalt plastic cement where they overlap flange.

9. Run courses true to line with end joints properly placed. Leave shingles flat without wave and properly placed.

10. Hand-Tabbing -

a. Clip off and seal upper inside corner of each shingle to flange with asphalt plastic cement.

b. If ambient temperature or exposure to sun will not be sufficient to secure

adhesive strip to under-lying shingle within one week, hand tab shingles with asphalt plastic cement.

c. In areas of high wind, apply 4 dime-sized dabs of asphalt plastic cement to back of shingle tab. Press shingles firmly into cement.

3.4 CLEANING

A. Clean shingles and building of soiling caused by this installation.
B. Leave metals clean and free of defects, stains, and damaged finish.
C. Remove debris resulting from work of this Section from roof and site.

END OF SECTION 073113

SECTION 075323 - ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Adhered EPDM membrane roofing system.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.
B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
C. Samples: For each product included in the roofing system.

1.3 INFORMATIONAL SUBMITTALS

A. Research/evaluation reports.
B. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.
B. Source Limitations: Obtain components including for membrane roofing system from same manufacturer as membrane roofing.
C. Exterior Fire-Test Exposure: ASTM E 108, Class A; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.
D. Pre-installation Roofing Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 EPDM MEMBRANE ROOFING

A. EPDM: ASTM D 4637, Type II, scrim or fabric internally reinforced, uniform, flexible EPDM sheet.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Carlisle SynTec Incorporated. (No substitutions.)
2. Thickness: 60 mils (1.5 mm) nominal.
3. Exposed Face Color: Black.

2.2 AUXILIARY MEMBRANE ROOFING MATERIALS

A. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
B. Sheet Flashing: 60-mil thick EPDM, partially cured or cured, according to application.
C. Protection Sheet: Epichlorohydrin or neoprene non-reinforced flexible sheet, 55- to 60-mil thick, recommended by EPDM manufacturer for resistance to hydrocarbons, non-aromatic solvents, grease, and oil.
D. Bonding Adhesive: Manufacturer's standard.
E. Seaming Material: Single-component, butyl splicing adhesive and splice cleaner.
F. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to roofing system manufacturer.
G. Miscellaneous Accessories: Provide lap sealant, water cutoff mastic, metal termination bars, metal battens, pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, reinforced EPDM securement strips, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.

2.3 ROOF INSULATION

A. Composite Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2 with factory-applied facing board on one major surface, as indicated below by type, and felt or glass-fiber mat facer on the other.
1. Type IV, cellulosic-fiber-insulation-board facer, Grade 2, 1/2 inch (13 mm) thick.
2. Tapered systems: 1/4”/ft minimum.
3. Minimum R=21.
B. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.4 INSULATION ACCESSORIES

A. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.
B. Insulation Adhesive: Insulation manufacturer's recommended cold-applied adhesive formulated to attach roof insulation to substrate or to another insulation layer.

2.5 ASPHALT MATERIALS

A. Roofing Asphalt: ASTM D 312, Type III or Type IV.
B. Asphalt Primer: ASTM D 41.

2.6 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads, approximately 3/16 inch (5 mm) thick, and acceptable to membrane roofing system manufacturer.

PART 3 - EXECUTION

3.1 INSULATION INSTALLATION

A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
B. Comply with membrane roofing system and insulation manufacturer's written instructions for installing roof insulation.
C. Install tapered insulation under area of roofing to conform to slopes indicated.
D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches (68 mm) or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.
E. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:
    1. Prime surface of concrete deck with manufacturer’s recommended primer.
    2. Set each layer of insulation in insulation adhesive, firmly pressing and maintaining insulation in place.

3.2 ADHERED MEMBRANE ROOFING INSTALLATION

A. Adhere membrane roofing over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll membrane roofing and allow to relax before installing.
B. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
C. Bonding Adhesive: Apply to substrate and underside of membrane roofing at rate required by manufacturer and allow to partially dry before installing membrane roofing. Do not apply to splice area of membrane roofing.
D. In addition to adhering, mechanically fasten membrane roofing securely at terminations, penetrations, and perimeters.
E. Adhesive Seam Installation: Clean both faces of splice areas, apply splicing cement, and firmly roll side and end laps of overlapping membrane roofing according to manufacturer's written instructions to

ensure a watertight seam installation. Apply lap sealant and seal exposed edges of membrane roofing terminations.

F. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping membrane roofing according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of membrane roofing terminations.

G. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.

3.3 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.4 WALKWAY INSTALLATION

A. Flexible Walkways: Install walkway products in locations indicated. Adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.5 FIELD QUALITY CONTROL

A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

B. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.

END OF SECTION 075323

SECTION 081113 STANDARD STEEL FRAMES

PART 1 GENERAL

1.1 SUMMARY

A. Products Supplied But Not Installed Under This Section
   1. Quality of hollow metal frames
B. Related Sections
   1. Division 06 - Installation
   2. Division 08.

1.2 SUBMITTALS

A. Quality Assurance/Control - SDI technical bulletin 105-92, 'Recommended Erection Instructions for Steel Frames'

PART 2 PRODUCTS

2.1 MANUFACTURED UNITS

A. Frames
   1. Cold rolled furniture steel.
      a. Interior Frames - 16 gauge
      b. Exterior Frames - 16 gauge
   2. Provide labeled frame to match fire rating of door.
   3. Finish -
      a. Prime surfaces with rust inhibiting primer for interior doors.
      b. Galvanize exterior doors.
   4. Anchors -
      a. 16 US gauge minimum meeting UL or other code acceptable requirements for door rating involved.

2.2 APPROVED MANUFACTURERS

A. Any current member of the Steel Door Institute.

2.3 FABRICATION

A. General Requirements
   1. Frames shall be welded units. Provide temporary spreader on each welded frame.
   2. Provide Manufacturer's gauge label for each item.
   3. Make breaks, arises, and angles uniform, straight, and true. Accurately fit corners.
B. Provide mortar guards at strikes and hinges.
C. Anchors
   1. Provide 3 jamb anchors minimum for each jamb. On hinge side, install one anchor at each hinge location. On strike side, install one anchor at strike level and anchors at same level as top and bottom hinges.

2. Frames installed before walls are constructed shall be provided with extended base anchors in addition to other specified anchors.
3. Anchor types and configurations shall meet wall conditions.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install frames in accordance with ANSI/SDI-100 and DHI.
B. Coordinate with masonry and wallboard construction for anchor placement.
C. Coordinate installation of glass and glazing.
D. Coordinate installation of frames with installation of doors and hardware.

3.2 ERECTION TOLERANCES

A. Maximum Diagonal Distortion: 1/16 inch, measured with straight edges, crossed corner to corner.

END OF SECTION 081113

SECTION 082120 FLUSH WOOD DOORS

PART 1 GENERAL

1.1 SUMMARY

A. Products Supplied But Not Installed Under This Section
   1. Quality of flush wood doors
B. Related Sections
   1. Division 06 – Installation
   2. Division 08.

1.2 SUBMITTALS

A. Product Data
   1. Manufacturer's product literature.
   2. Maintenance and repair instructions.
B. Shop Drawings - Schedule showing type of door at each location. Included shall be size, veneer, core type, fire rating, hardware prep, openings, blocking, etc.
C. Quality Assurance/Control - Submit copies of fire tests showing accessories and configurations necessary for rated doors to achieve ratings.

1.3 DELIVERY, STORAGE, & HANDLING

A. Deliver in clean truck and, in wet weather, under cover. Deliver to building site after plaster, cement, and taping compound are dry. At time of delivery of unfinished doors, seal top and bottom rails of doors that are to remain on site in storage longer than seven days before they are installed.
B. Store doors in a space having controlled temperature and humidity range between 25 and 55 percent. Store flat on level surface in dry, well ventilated space. Cover to keep clean but allow air circulation. Do not subject doors to direct sunlight, abnormal heat, dryness, or humidity.
C. Handle with clean gloves and do not drag doors across one another or across other surfaces.

1.4 WARRANTY

A. Manufacturer's standard full door warranty for lifetime of original installation
   1. Warranty shall include finishing, hanging, and installing hardware if manufacturing defect was discovered after door was finished and installed.
   2. Warranty to include defects in materials including following -
      a. Delamination in any degree.
      b. Warp or twist of 1/4 inch or more in door panel at time of one year warranty inspection.
      c. Telegraphing of core assembly - Variation of 1/100 inch or more in a 3 inch span.

PART 2 PRODUCTS

2.1 MANUFACTURED UNITS

A. Wood Doors
1. For Transparent Finish -
a. Door Grade - AWI Premium
b. Face Veneer -
1) Plain Sliced Red Oak meeting requirements of AWI Grade A, 1/50 inch thick minimum immediately prior to finishing.
c. Fully Type I-Adhere all glue lines with Type I adhesive, including veneer lay-up.
2. Core -
a. Fully bonded to stiles and rails and sanded as a unit prior to applying veneers.
b. Non-Rated & Fire-Rated -
1) 32 lb density meeting requirements of ANSI A 208.1 Mat Formed Wood Particle Board, Grade 1-L-1 minimum.

2.2 APPROVED MANUFACTURERS

A. Mohawk Wood Door Co., Northumberland, PA
B. Buell Door Co, Dallas, TX
C. Fenestra Wood Door Division, Oshkosh, WI
D. VT Industries, Holstein, IA
E. Substitutions: Under provisions of Section 01600

2.3 SOURCE QUALITY CONTROL

A. Verification of Performance
1. Doors shall have following information permanently affixed on top of door -
a. Manufacturer
b. Door designation or model
c. Veneer species
2. Conform to National Fire Protection Standards, NFPA-80, for fire-rated doors. Required fire-rated doors shall bear approved labels of UL, Warnock Hersey International, or other code acceptable agency. Machining for hardware shall be complete prior to application of label.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify frame opening conditions under provisions of Division 01.
B. Verify that opening sizes and tolerances are acceptable.
C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size of alignment.

3.2 INSTALLATION

A. Install doors in accordance with manufacturer's instructions.
B. Trim non-rated door width by cutting equally on both jamb edges.
C. Trim door height by cutting bottom edges to a maximum of 3/4 inch.
D. Pilot drill screw and bolt holes.
E. Machine cut for hardware. Core for handsets and cylinders.

F. Coordinate installation of doors with installation of frames and hardware.
G. Coordinate installation of glass and glazing.
H. Install door louvers, plumb and level.

3.3 INSTALLATION TOLERANCES

A. Maximum Diagonal Distortion (Warp): 1/8 inch measured with straight edge or taught string, corner to corner, over an imaginary 36 x 84 inch surface area.
B. Maximum Vertical Distortion (Bow): 1/8 inch measured with straight edge or taught string, top to bottom, over an imaginary 36 x 84 inch surface area.

3.4 ADJUST

A. Adjust work under provisions of Division 01.
B. Adjust door for smooth balance door movement.

END OF SECTION 082120

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

B. STC-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 90 and classified per ASTM E 413 by a qualified independent testing and inspecting agency.

2.2 PANEL PRODUCTS

A. Provide in maximum lengths available to minimize end-to-end butt joints.

B. Interior Gypsum Board: ASTM C 36/C 36M or ASTM C 1396/C 1396M, 1/2-inch in thickness unless otherwise indicated on Drawings, with manufacturer's standard edges. Type X where indicated; Sag-resistant type for ceiling surfaces.

C. Exterior Gypsum Sheathing: ASTM C 1177, 5/8-inch in thickness unless otherwise indicated on Drawings. Type X where required for fire-resistance-rated assemblies and where indicated.

1. Product: FIBEROCK Aqua-Tough Sheathing by USG Corporation.

2.3 ACCESSORIES

A. Trim Accessories: ASTM C 1047, formed from galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.

1. Provide corner-bead at outside corners unless otherwise indicated.
2. Provide LC-bead (J-bead) at exposed panel edges.
3. Provide control joints where indicated.

B. Joint-Treatment Materials: ASTM C 475/C 475M.

1. Joint Tape: Paper unless otherwise recommended by panel manufacturer.
2. Joint Compounds: Drying-type, ready-mixed, all-purpose compounds.

3. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.
4. Cementitious Backer Unit Joint-Treatment Materials: Products recommended by cementitious backer unit manufacturer.

C. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant complying with ASTM C 834.

D. Sound-Attenuation Blankets: ASTM C 665, Type I (unfaced).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install gypsum board to comply with ASTM C 840.

1. Isolate gypsum board assemblies from abutting structural and masonry work. Provide edge trim and acoustical sealant.
2. Single-Layer Fastening Methods: Fasten gypsum panels to supports with screws.
3. Multilayer Fastening Methods: Fasten base layers and face layer separately to supports with screws.

B. Install cementitious backer units to comply with ANSI A108.11.

C. Fire-Resistance-Rated Assemblies: Comply with requirements of listed assemblies.

D. Finishing Gypsum Board: ASTM C 840.

1. At concealed areas, unless a higher level of finish is required for fire-resistance-rated assemblies, provide Level 1 finish: Embed tape at joints.
2. At substrates for ceramic tile and acoustical ceiling tile, provide Level 2 finish: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges.
3. Unless otherwise indicated, provide Level 4 finish: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges.
4. Where indicated, provide Level 5 finish: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges. Apply skim coat to entire surface.

END OF SECTION 092900

SECTION 095123 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and material Samples.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

B. Seismic Standard: Provide acoustical tile ceilings designed and installed to withstand the effects of earthquake motions according to the following:

1. CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's "Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings - Seismic Zones 0-2."
2. CISCA's Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies - Seismic Zones 3 & 4."
3. UBC Standard 25-2, "Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings."

2.2 ACOUSTICAL TILE

A. Products:

1. “MESA” #683 as Manufactured by Armstrong Ceiling Systems, 1-877-276-7876.

B. Classification: As follows, per ASTM E 1264:

1. Type and Form: Type III, Form 2.
2. Pattern: CE (perforated small holes and lightly textured).
3. Color: White.
4. Light Reflectance (LR) Coefficient: Not less than .85 LR.
5. Noise Reduction Coefficient (NRC): Not less than 0.60.
6. Ceiling Attenuation Class (CAC): Not less than 30 CAC.

C. Surface-Burning Characteristics: ASTM E 1264, Class A materials, tested per ASTM E 84.

D. Edge Detail: Square, Lay-in.

E. Thickness: 3/4 inch.

F. Modular Size: 24 x 48 inches.

2.3 SUSPENSION SYSTEM

A. Ceiling Suspension System: Armstrong World Industries, Inc. “Prelude ML”

1. Intermediate Duty per ASTM C 635
2. Color: White.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.

1. Fit adjoining tile to form flush, tight joints. Scribe and cut tile for accurate fit at borders and around penetrations through tile.

B. Arrange directionally patterned acoustical panels as indicated on Drawings.

END OF SECTION 095123

SECTION 096500 RESILIENT FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Resilient sheet flooring.
B. Resilient rubber base.

1.2 REFERENCES

A. ASTM E84 - Surface Burning Characteristics of Building Materials
B. ASTM F2034 – Standard Specification for Linoleum Sheet Flooring.
C. FS SS-W-40 - Wall Base: Rubber and Vinyl Plastic

1.3 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame/fuel/smoke rating requirements in accordance with ASTM E84.

1.4 SUBMITTALS

A. Submit shop drawings and product data under provisions of Division 1.
B. Provide product data on specified products, describing physical and performance characteristics, sizes, patterns, and colors available.
C. Submit one sample 2 x 2 inches in size, illustrating color and pattern for each floor materials specified.
D. Submit one 2 inch long sample of base and stair material for each type specified.
E. Submit manufacturer's installation instructions.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit cleaning and maintenance data under provisions of Section 01700.
B. Maintain ambient temperature required by adhesive manufacturer three days prior to, during, and 24 hours after installation of materials.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Store materials for three days prior to installation in area of installation to achieve temperature stability.
B. Maintain ambient temperature required by adhesive manufacturer three days prior to, during and 24 hours after installation of materials.

PART 2 PRODUCTS

2.1 MANUFACTURERS – RESILIENT SHEET FLOORING

A. Marmoleum “Real”, as manufactured by Forbo Flooring Systems.

2.2 ACCEPTABLE MANUFACTURERS - BASE MATERIALS

A. Johnsonite - colors as selected by Architect.

2.3 BASE MATERIALS

1. Base: Type I rubber; 4 inch high; 1/8 inch thick; top set coved; premolded external corners.
2. Base Accessories: Premolded end stops and external corners, of same material, size, and color as base.

2.4 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by flooring material manufacturer.
B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.
C. Edge Strips: Flooring material.
D. Sealer and Wax: Types recommended by flooring manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are smooth and flat with maximum variation of 1/8 inch in 10 ft and are ready to receive Work.
B. Verify concrete floors are dry to a maximum moisture content of 7 percent and exhibit negative alkalinity, carbonization, or dusting.
C. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 PREPARATION

A. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with subfloor filler.
B. Apply, trowel, and float filler to leave a smooth, flat, hard surface.
C. Prohibit traffic from area until filler is cured.
D. Vacuum clean substrate.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.4 PROTECTION

A. Prohibit traffic on floor finish for 48 hours after installation.

3.5 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.
B. Clean, seal, and wax floor and base surfaces in accordance with manufacturer's instructions.

3.6 SCHEDULE

A. Refer to Finish Schedule on Drawing for locations of materials. Patterns and layout, if not shown on Drawings, will be provided by Architect.

END OF SECTION 096500

SECTION 096513 RESILIENT BASE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Resilient rubber base.

1.2 REFERENCES

A. ASTM E84 - Surface Burning Characteristics of Building Materials
B. FS SS-T-312 - Tile, Floor: Asphalt, Rubber, Vinyl, Vinyl Composition.
C. FS SS-W-40 - Wall Base: Rubber and Vinyl Plastic

1.3 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame/fuel/smoke rating requirements in accordance with ASTM E84.

1.4 SUBMITTALS

A. Submit shop drawings and product data under provisions of Division 01.
B. Provide product data on specified products, describing physical and performance characteristics, sizes, patterns, and colors available.
C. Submit samples under provision of Division 01.
D. Submit Manufacturer's full color range samples for all materials indicated above. Floor materials samples shall be 2 x 2 inches, base and stair samples shall be 2-inches in length. All finish colors shall be selected by Architect unless noted herein.
E. Submit manufacturer's installation instructions under provisions of Division 01.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit cleaning and maintenance data under provisions of Division 01.
B. Maintain ambient temperature required by adhesive manufacturer three days prior to, during, and 24 hours after installation of materials.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Store materials for three days prior to installation in area of installation to achieve temperature stability.
B. Maintain ambient temperature required by adhesive manufacturer three days prior to, during and 24 hours after installation of materials.

PART 2 PRODUCTS

2.1 MANUFACTURERS – RESILIENT BASE

A. Johnsonite, Inc., Division of Tarkett, Inc. (No Substitutions)

2.2 BASE MATERIALS

A. Base: FS SS-W-40, Type I rubber; 4 inch high; 1/8 inch thick; top set coved; pre-molded external corners.
B. Base Accessories: Pre-molded end stops and external corners, of same material, size, and color as base.

2.3 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by flooring material manufacturer.
B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer. Use adhesive and Epoxy nose filler for stair treads.
C. Edge Strips: Flooring material.
D. Sealer and Wax: Types recommended by flooring manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are smooth and flat with maximum variation of 1/8 inch in 10 ft and are ready to receive Work.
B. Verify concrete floors are dry to a maximum moisture content of 7 percent and exhibit negative alkalinity, carbonization, or dusting.
C. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 PREPARATION

A. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with subfloor filler.
B. Apply, trowel, and float filler to leave a smooth, flat, hard surface.
C. Prohibit traffic from area until filler is cured.
D. Vacuum clean substrate.

3.3 INSTALLATION - TILE MATERIAL

A. Install in accordance with manufacturer's instructions.
B. Mix tile from container to ensure shade variations are consistent.
C. Spread only enough adhesive to permit installation of materials before initial set.
D. Set flooring in place, press with heavy roller to attain full adhesion.
E. Lay flooring with joints and seams parallel to building lines to produce minimum number of seams.
F. Install tile to pattern indicated with all joints aligned. Allow minimum ½ full size tile width at room or area perimeter.
G. Terminate flooring at center line of door openings where adjacent floor finish is dissimilar.
H. Install edge strips at unprotected or exposed edges and where flooring terminates.
I. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints. Make cuts as required to achieve pattern indicated.
J. Install edge strips where required. Fit joints tightly.

3.4 INSTALLATION - BASE MATERIAL

A. Fit joints tight and vertical. Maintain minimum measurement of 18 inches between joints.
B. Miter internal corners. At external corners, use pre-molded units. At exposed ends use pre-molded units.
C. Install base on solid backing. Bond tight to wall and floor surfaces.
D. Scribe and fit to door frames and other interruptions.

3.5 PROTECTION

A. Prohibit traffic on floor finish for 48 hours after installation.

3.6 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.
B. Clean, seal, and wax floor and base surfaces in accordance with manufacturer's instructions.

3.7 SCHEDULE

A. Refer to Finish Schedule on Drawings for locations of materials.

END OF SECTION 096513

SECTION 096816 SHEET CARPETING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and Samples.

B. Extra Materials: Deliver to Owner full-width carpet equal to 5 percent of each type and color carpet installed, packaged with protective covering for storage.

PART 2 - PRODUCTS

2.1 CARPET

A. Products:

1. Endless Wonder “Carolsel” as manufactured by The Mohawk Group, 1-800-554-6637.

B. Fiber Content: Perma Strand Olefin

C. Pile Characteristic: Level-loop pile.

D. Density: 5200

E. Weight: 26 oz. / sq. yd.

F. Pile Height: 5/32”.

G. Pattern Repeat: None.

H. Width: Manufacturer’s standard widths.

I. Dye Method: Solution Space Dyed.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with CRI 104.

B. Installation Method: Direct glue-down.

C. Maintain uniformity of carpet direction and lay of pile. At doorways, center seams under door in closed position. Bind or seal cut edges as recommended by carpet manufacturer.

D. Install pattern parallel to walls and borders.

END OF SECTION 096816

SECTION 099100 PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Surface preparation and field painting of exposed exterior and interior items and surfaces.

1.2 SUBMITTALS

A. Product Data: For each product indicated.
B. Samples: For each type of finish-coat material indicated.

1.3 QUALITY ASSURANCE

A. Samples (Mockups): Provide a full-coat finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5.
1. Wall Surfaces: Provide samples on at least 100 sq. ft.
2. Small Areas and Items: Architect will designate items or areas required.
3. Finals approval of colors will be from samples.

1.4 PROJECT CONDITIONS

A. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.
B. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.
C. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.
D. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.5 EXTRA MATERIALS

A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.
1. Quantity: 5 percent, but not less than 1 gal. or 1 case, as appropriates, of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.
B. Approved Manufacturers:
1. Sherwin-Williams Co.

2.2 PAINT MATERIALS, GENERAL

A. Materials Compatibility: Provide black fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
B. Material Quality: Provide manufacturer's best-quality paint materials of the various coating types specified

that are factory formulated and recommended by manufacturer for application indicated. Paint material containers not displaying manufacturer's product identification will not be acceptable.

C. Colors: As selected from manufacturer's full range.

2.3 PREPARATORY COATS

A. Concrete Unit Masonry Block Filler: High-performance latex block filler of finish coat manufacturer and recommended in writing by manufacturer for use with finish coat and on substrate indicated.
B. Exterior Primer: Exterior alkyd or latex-based primer of finish coat manufacturer and recommended in writing by manufacturer for use with finish coat and on substrate indicated.
   1. Ferrous-Metal and Aluminum Substrates: Rust-inhibitive metal primer.
   2. Zinc-coated metal substrates: Galvanized metal primer.
   3. Where manufacturer does not recommend a separate primer formulation on substrate indicated, use paint specified for finish coat.
C. Interior Primer: Interior latex-based or alkyd primer of finish coat manufacturer and recommended in writing by manufacturer for use with finish coat and on substrate indicated.
   1. Ferrous-Metal Substrates: Quick drying, Rust-inhibitive metal primer.
   2. Zinc-coated metal substrates: Galvanized metal primer.
   3. Where manufacturer does not recommend a separate primer formulation on substrate indicated, use paint specified for finish coat.

2.4 EXTERIOR FINISH COATS

A. Exterior Low-Luster Acrylic Paint:
   1. Sherwin-Williams; A-100 Exterior Latex Satin House & Trim Paint A82 Series.
B. Exterior Semigloss Acrylic Enamel:
   1. Sherwin-Williams; A-100 Latex Gloss A8 Series.
C. Exterior Full-Gloss Acrylic Enamel for Concrete, Masonry, and Wood:
   1. Sherwin-Williams; SuperPaint Exterior High Gloss Latex Enamel A85 Series.
D. Exterior Full-Gloss Acrylic Enamel for Ferrous and Other Metals:
   1. Sherwin-Williams; DTM Acrylic Coating Gloss (Waterborne) B66W100 Series.

2.5 INTERIOR FINISH COATS

A. Interior Low-Luster Acrylic Enamel:
   1. Sherwin-Williams; "Super Paint" Acrylic Latex Enamel.
B. Interior Semigloss Acrylic Enamel:
   1. Sherwin-Williams; "Super Paint" Acrylic Latex Enamel.
C. Interior Full-Gloss Acrylic Enamel:
   1. Sherwin-Williams; "Super Paint" Acrylic Latex Enamel.

PART 3 - EXECUTION

3.1 APPLICATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.
B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
C. Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the items, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
D. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instruction for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.
2. Cementations Materials: Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
   a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
   b. Prime, Stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
   c. If transparent finish is required, back prime with spar varnish.
   d. Back prime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on backside.
   e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
4. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.
   a. Touch up bare areas and shop-applied prime coats that have been damaged. Wire brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.
5. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from stock by mechanical methods.

E. Material Preparation:
   1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
   2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.

F. Exposed Surfaces: Include areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
   1. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
   2. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
   3. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
   4. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
   5. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.

G. Sand lightly between each succeeding enamel or varnish coat.

H. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
   1. Omit primer over metal surfaces that have been shop primed and touchup painted.
   2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance.

I. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to to manufacturer's written instructions.

J. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by manufacturer.

K. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.

L. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

M. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots of unsealed areas in first coat appears, to ensure a finish-coat with no burn-through or other defects due to insufficient sealing.

N. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque

surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

O. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.

3.2 CLEANING AND PROTECTING

A. At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.
B. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
C. Provide “Wet Paint” signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by other to protect their work.
    1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PCDA P1.

3.3 EXTERIOR PAINT SCHEDULE

A. Ferrous Metal:
    1. Acrylic Finish: Two finish coats over a rust-inhibitive primer.
        a. Primer: Exterior ferrous-metal primer (not required on shop primed items).
        b. Finish Coats: Exterior full-gloss acrylic enamel for ferrous and other metals.
B. Zinc-Coated Metal:
    1. Acrylic Finish: Two finish coats over a galvanized metal primer.
        a. Primer: Exterior galvanized metal primer.
        b. Finish Coats: Exterior full-gloss acrylic enamel for ferrous and other metals.

3.4 INTERIOR PAINT SCHEDULE

A. Concrete Unit Masonry:
    1. Acrylic Finish: Two finish coats over a block filler.
        a. Block Filler: Concrete unit masonry block filler.
        b. Finish Coats: Interior semigloss acrylic enamel.
B. Gypsum Board:
    1. Acrylic Enamel Finish: Two finish coats over a primer.
        a. Primer: Interior gypsum board primer.
        b. Finish Coats: Interior semigloss acrylic enamel.
C. Wood and Hardboard:
    1. Acrylic-Enamel Finish: Two finish coats over a primer.
        a. Primer: Interior wood primer for acrylic-enamel and semigloss alkyd enamel finishes.
        b. Finish Coats: Interior semigloss acrylic enamel.
D. Ferrous Metal:
    1. Acrylic Finish: Two finish coats over a primer.
        a. Primer: Interior ferrous-metal primer.
        b. Finish Coats: Interior semigloss acrylic enamel.
E. Zinc-Coated Metal:
    1. Acrylic Finish: Two finish coats over a primer.
        a. Primer: Interior zinc-coated metal primer.
        b. Finish Coats: Interior semigloss acrylic enamel.

END OF SECTION 099100

SECTION 102800 TOILET ROOM ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Products Supplied But Not Installed Under This Section
   1. Accessories for Toilet Rooms
B. Related Sections
   1. Division 06 -
      a. Blocking
      b. Installation

1.2 SUBMITTALS

A. Product Data - Manufacturer's literature or cut sheets
B. Shop Drawings - Schedule showing items used, location where installed, and proper attaching devices to substrate.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Approved Products & Manufacturers
   1. Rest Rooms - Model numbers as scheduled or indicated on Drawings.

2.2 APPROVED MANUFACTURERS

A. A & J Washroom Accessories, New Windsor, NY (914) 562-3332
B. ASI - American Specialties Inc, Yonkers, NY (914) 476-9000
C. Bobrick Washroom Equipment Inc, North Hollywood, CA (818) 764-1000
D. Bradley Corp, Menomonee Falls, WI (414) 251-6000
E. GAMCO - General Accessory Manufacturing Co, Dallas, TX (800) 451-5766
F. McKinney/Parker,

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install items in accordance with Manufacturer's instructions. Provide mounting devices proper for base structure.
   1. Install grab bars to with stand a downward load of at least 250 lb/ft when tested according to method in ASTM F446.
B. Locate as shown on Drawings.
C. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.
D. Remove temporary labels and protective coatings and films.

END OF SECTION 102800

SECTION 122113 – HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and Samples.

B. Product Standard: Unless otherwise indicated, comply with WCMA A 100.1.

PART 2 - PRODUCTS

2.1 HORIZONTAL LOUVER BLINDS

A. Products:

1. Riviera Dust Guard by Levelor.

B. Provide blinds passing flame-resistance testing according to NFPA 701.

C. Louver Slats: Aluminum, antistatic polyester coated.

D. Slat Width: 1-inch.

E. Headrail: Formed steel or extruded aluminum; long edges returned or rolled; fully enclosing operating mechanisms on three sides and ends.

F. Tilt Operation: Manual with wand.

G. Valance: Manufacturer's standard.

H. Mounting: Ceiling within gypsum board window returns.

I. Colors, Textures, Patterns, and Gloss: As selected from manufacturer's full range.

J. Fabrication: Comply with AWCMA Document 1029 unless otherwise indicated.

1. Fabricate concealed components from non-corrodible or corrosion-resistant-coated materials.
2. Provide lifting and tilting mechanisms with permanently lubricated moving parts.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install blinds level, plumb, and located not closer than 1-inch to interior face of glass.

B. Adjust horizontal louver blinds to operate smoothly and easily throughout entire operational range.

END OF SECTION 122113

SECTION 230500 - COMMON WORK RESULTS FOR HVAC

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.

B. All Division 23 Specification Sections also 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. Dielectric fittings.
3. Sleeves
4. HVAC demolition.
5. Equipment installation requirements common to equipment sections.
6. Painting and finishing.
7. Fire stopping.
8. Roof curbs.
9. Supports and anchorages.
10. Access doors and panels.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, 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. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.4 SUBMITTALS

A. Product Data: For the following:
   1. Dielectric fittings.
   2. Roof curbs.

1.5 QUALITY ASSURANCE

A. Electrical Characteristics for HVAC 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.

B. Deliver ducts with shop-applied plastic covers over each opening of every duct. Prior to applying the plastic covers on each duct, vacuum all dirt and debris from its interior. Maintain the plastic covers through shipping and storage. Handle ducts to prevent damage to the ducts and to the plastic covers. If a duct's plastic cover(s) is damaged or comes loose, re-vacuum the interior of the duct and apply new plastic covers. The plastic cover shall be maintained over the openings of each duct until that duct is ready to be installed.

1.7 COORDINATION

A. Arrange for pipe spaces in building structure during progress of construction, to allow for HVAC 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 HVAC items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

1.8 INTENT OF DRAWINGS AND SPECIFICATIONS

A. The implied and stated intent of the drawings and specifications is to establish minimum acceptable quality standards for materials, equipment and workmanship, and to provide operable mechanical systems complete in every respect.

B. Any apparatus, appliance, material or work not typically shown on drawings as standard industry practice but is mentioned in the specifications, or vice versa, shall be provided by the HVAC Trade without additional expense to the Owner.

C. The drawings are diagrammatic, intending to show general arrangement and location of system components, and are not intended to be rigid in detail.

D. Due to the small scale of the drawings, all offsets and fittings required for a complete installation may not be shown but shall be provided at no change in Contract price.

E. The equipment schedules shown on the drawings list the manufacturer used as the basis of design in the preparation of the Bid Drawings. The equipment specifications list that manufacturer as well as other manufacturers the Engineer, Architect and/or Owner find acceptable from a performance and product quality standpoint. Listing these other manufacturers in no way implies that the Engineer or Architect has exhaustively researched the products available by these manufacturers to determine whether they have a positive or negative monetary impact on the design shown on the Bid Drawings. In addition, listing these other manufacturers in no way implies that the Engineer or Architect has exhaustively researched the products available by these manufacturers to determine whether the dimensions of these products will have a negative impact on the space allotted for this equipment. If the Contractor or his Subcontractors decide to use a product or manufacturer that is listed as acceptable in the specifications but is different from the product or manufacturer scheduled on the drawings, it will be the responsibility of the Contractor or his Subcontractors to fully explore the product to ensure that it can be installed in the space allotted and shall pay any and all costs (including additional professional design fees) associated with the use of these products or manufacturers that impact the structure, the electrical system(s), the plumbing system(s) and/or the fire protection system(s) due to an increase in weight, electrical load, drain and vent requirements, connection sizes, etc., between the scheduled item and the equipment item used.

1. Use of a product or manufacturer not scheduled on the Bid Drawings constitutes a representation that:

   a. The HVAC Trade has investigated the proposed product and determined that the product can be installed within the space allotted.
   b. The HVAC Trade will coordinate the installation of product used into the work
   c. The HVAC Trade will be responsible for making all changes as may be required to make the work complete in all respects; waives all claims for additional costs under his responsibility, which may subsequently become apparent.

PART 2 - PRODUCTS

2.1 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 23 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.

2.2 JOINING MATERIALS

A. Refer to individual Division 23 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 (3.2-mm) maximum thickness unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.

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

2.3 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 Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

a. Calpico, Inc.
b. Lochinvar Corp.

D. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

a. Perfection Corp.
b. Precision Plumbing Products, Inc.
c. Sioux Chief Manufacturing Co., Inc.
d. Victaulic Co. of America.

2.4 SLEEVES

A. Galvanized-Steel Sheet (For Ductwork Only): 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

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

2.5 METAL SUPPORTS AND ANCHORAGES

A. Structural design shall be provided through the HVAC trade by a civil or structural Engineer who is registered in the Commonwealth of Pennsylvania.

B. Details of all structural steel shall be provided in shop drawing format. All structural steel shop drawings shall be stamped by the HVAC Trade's design Engineer prior to submittal.

C. The design, materials, fabrication and erection shall conform to "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings" of the American Institute of Steel Construction, "Code of Standard Practice for Steel Buildings and Bridges", of the American Institute of Steel Construction, and also, when applicable, shall conform to the "Code for Welding Building Construction" of the American Welding Society.

D. Steel angles, channels, and plate shall be in accord with ASTM A36.

E. Bolts, including nuts and washers, used for fabricating steel members shall be in accord with ASTM A325.

F. Steel members, including fasteners, exposed to weather shall be galvanized.

2.6 FIRESTOPPING

A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

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

1. Nelson Firestop Products.
2. 3M Fire Protection Products.
3. Tremco, Inc.; Tremco Fire Protection Systems Group.
4. USG Corporation.

C. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).

1. Fire-resistance-rated walls include fire walls, fire-barrier walls, smoke-barrier walls and fire partitions.
2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

D. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).

1. Horizontal assemblies include floors, floor/ceiling assemblies and ceiling membranes of roof/ceiling assemblies. Refer to the Architectural Drawings for locations and types of rated horizontal assemblies.
2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
3. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

E. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.

2.7 ROOF CURBS

A. All roof curbs shall be sloped to match the pitch of the roof to provide a level equipment installation.

B. The HVAC trade shall furnish all roof mounted air handling units and packaged rooftop air conditioning units with adapter curbs to mate with existing roof curbs.

C. The HVAC trade shall furnish all other roof mounted equipment items, such as gravity roof ventilators, roof exhaust fans, etc., with factory built roof curbs. Roof curbs serving equipment items shall be furnished by their respective equipment manufacturers. Refer to equipment specifications in other Division 23 Sections for roof curb requirements that are indicated to be furnished by the particular equipment manufacturers.

D. The HVAC trade shall furnish factory built roof curbs at all duct openings.

1. Factory built roof curbs shall be of box section design, 18 gauge galvanized steel with continuous welded corner seams, factory installed wood nailer and insulated with 1-1/2 inch, 3 pound density rigid fiberglass board.
2. The base of each curb shall be manufactured to match the roof pitch while maintaining a level equipment installation or a vertical duct installation.
3. Minimum installed height of curb shall be 24 inches above the finished surface of the roof. Coordinate the height of the roofing materials with the Architectural Drawings and with the Roofing trade.
4. Roof curbs shall be similar to the Roof Products Systems (RPS) Type RC-4.

PART 3 - EXECUTION

3.1 HVAC DEMOLITION

A. Refer to Division 01 Section "Cutting and Patching" and Division 02 Section "Selective Structure Demolition" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove HVAC systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
3. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
4. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
5. Equipment to Be Removed: Disconnect and cap services and remove equipment.
6. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
7. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

D. The HVAC trade shall demolish all work as outlined on the drawings.

E. The Owner shall decide the disposition of all removed materials. The HVAC trade shall deliver to the Owner all materials identified to be salvaged. The HVAC trade shall properly dispose of all materials not identified to be salvaged.

F. Refer to the paragraph entitled "Special Conditions Related to HVAC Work" in this section for requirements related to utility shut downs, capping of existing system, and air balancing services which may be required.

G. When demolishing existing equipment, the HVAC trade shall remove all existing piping, ductwork, insulation, supports, hangers, hanger rods, anchor bolts, structural steel, and concrete pads related to the work being removed. When demolishing piping or ductwork branch runouts, remove the entire branch which is accessible above lay-in ceilings or accessible during the construction period back to the main, unless otherwise noted. When demolishing equipment and diffusers and the branch runouts are inaccessible, cap, seal, and abandon the branch runouts in an approved manner.

H. Where demolition of work results in unsightly openings in occupied spaces or jeopardizes the integrity of a fire or smoke barrier, the opening shall be patched in accordance with the paragraph in this section entitled "Cutting and Patching".

I. Where demolition requires the removal of a concrete equipment pad, remove the pad, cut all anchor bolts, dowel pins, and steel bases off flush with the floor so as to eliminate any tripping hazard. Fill any openings, voids, or holes with a fine cement grout or another appropriate floor patching material. Provide surface finish to match adjacent flooring material.

3.2 CUTTING AND PATCHING

A. Cutting and patching shall be in accordance with the General Conditions and the applicable Section of Division 01, General Requirements.

B. The HVAC trade shall seal all openings he has utilized in fire-rated floors, ceilings or partitions after his work has been installed. The material used for sealing the openings shall have a fire-rating equal to or greater than the rating of the floor, ceiling or partition material.

C. The HVAC trade shall be responsible for providing all cutting, patching, and finishing of existing construction which is not specifically shown on the Architectural Drawings and which is required for the proper installation of his equipment and materials which are to be installed in the existing portion of this project. This work shall also be provided when removing existing equipment and materials. All cutting shall be kept to an absolute minimum consistent with the requirements of the project.

D. Cutting, patching and finishing shall be performed by workmen skilled in this type of work. All patching shall be done utilizing materials of the same quality and texture as the adjacent undisturbed areas. All finishing shall match the undisturbed adjacent areas. Painting of the final finished areas, where general construction work occurs, will be the responsibility of the General Trade. Painting of the final finished areas, where no general construction work occurs, shall be the responsibility of the HVAC trade. The HVAC trade shall paint entire plane in which damage occurs whether the surface is a wall or a ceiling.

E. No cutting shall be done which may affect the building structurally or architecturally without first consulting with the General Trade and then securing the approval of the Architect. Cutting shall be accomplished in such a manner as not to cause damage to the building or leave unsightly surfaces which cannot be concealed by plates, escutcheons or other construction. Where such unsightly conditions are caused, the HVAC trade shall be required, at his own expense, to repair the damaged areas. Note: all holes or openings in existing concrete or masonry shall be drilled, core bored or saw cut.

F. Where present equipment or material is removed and unused openings remain in walls, floors, partitions, etc., the HVAC trade shall properly patch all such openings.

3.3 SPECIAL CONDITIONS RELATED TO HVAC WORK

A. During the course of construction, cap or otherwise seal off, in an approved manner, those portions of the piping or duct system in which work is not being performed, in order to prevent the entry of dirt or dust. Should the HVAC trade fail to cover open ends of ducts, he may be required to vacuum the entire duct system and remove sections of ductwork for inspection.

B. The HVAC trade shall coordinate all utility shutdowns with the Owner to determine when the most advantageous time is for the Owner to accommodate the utility shutdown. The HVAC trade shall coordinate the utility shutdown a minimum of **7-days** in advance.

C. When the HVAC trade demolishes only a portion of an existing air system and the remainder of the system is to remain in service, the Testing and Balancing trade shall measure the air flow in the undisturbed portions of system prior to disconnecting work in the construction areas. The Testing and Balancing trade shall rebalance the affected systems to these measurements immediately following the disconnection of the ductwork being demolished/modified and also immediately after placing the new/modified system into service.

D. Install equipment along with control devices and all replaceable fittings with sufficient clearance for operation and maintenance functions.

E. Do not install piping and ductwork in transformer vaults, elevator equipment rooms or electrical equipment rooms unless the piping and/or ductwork serves HVAC equipment located in that room and is dedicated to provide cooling and/or heating to that room. Do not install piping and ductwork adjacent to or above any surface of electrical controls, panels, switches, terminals, boxes or similar electrical equipment. Drip-pan protection shall not be permitted, except where detailed.

F. Exposed piping shall be run so as to allow maximum headroom consistent with proper pitch. Piping shall not interfere with any light, opening, door, window or equipment. Headroom in front of openings, doors and windows shall not be less than the top of the opening. Minimum clearance of 1 inch shall be maintained around all piping, valves and fittings.

G. Lay out the work and establish all heights and grades required for installation.

H. Provide safety guards for all pulleys, belt-drives and rotating equipment. Safety requirements of OSHA shall be met.

3.4 SPACE PRIORITY

A. Ensure equitable use of available space for materials and equipment installed above ceilings. Allocate space in the order of priority as listed below. Items are listed in the order of priority, with items of equal importance listed under a single priority number.

1. Gravity flow piping systems.
2. Vent piping systems.
3. Ceiling recessed lighting fixtures.
4. Concealed air terminal units, fans.
5. Air duct systems.
6. Sprinkler systems piping.
7. Forced flow piping systems.
8. Electrical conduit, wiring, control wiring.

B. Order of priority does not dictate installation sequence. Installation sequence shall be as mutually agreed by all affected trades.

C. Change in order of priority is permissible by mutual agreement of all affected trades.

D. The work of a particular trade shall not infringe upon the allocated space of another trade without permission of the contractor for the affected trade.

E. The work of a particular trade shall not obstruct access for installation, operation and maintenance of the Work, materials and equipment of another trade.

3.5 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 23 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 above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

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

J. Install piping to allow application of insulation.

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

L. Verify final equipment locations for roughing-in.

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

3.6 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 23 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. 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.

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

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

H. Mechanical (Grooved) Joints: Provide factory fabricated joint fittings constructed according to ASTM A 536, Grade 65-45-12 ductile iron; ASTM A 47/A 47M, Grade 32510 malleable iron; ASTM A 53/A 53M, Type F, E, or S, Grade B fabricated steel; or ASTM A 106, Grade B that is capable of mating with steel piping having grooves rolled into it. Furnish nuts, bolts, locking pin, locking toggle, or lugs to secure factory fabricated mechanical joint (grooved) pipe fittings to roll grooved piping.

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

3.8 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 HVAC 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.

3.9 PAINTING

A. Painting of HVAC systems, equipment, and components is specified in Division 09 Sections "Interior Painting" and "Exterior Painting."

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

3.10 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Provide all materials, equipment, supplies and labor necessary to construct all miscellaneous steel required for supporting piping, ductwork and equipment for installation of the HVAC system. All miscellaneous steel, metal supports and anchorages required for supporting ductwork, piping and equipment is not shown on the Drawings, but shall be provided.

B. All structural steel shall be designed to attach to the main building structure in such a manner as to not overstress this structure. Reinforcement of the building structure may be required in work areas located in existing buildings and in areas where the HVAC trade has relocated ductwork, piping, and equipment to areas other than is shown on the Drawings.

C. Refer to Division 05 Section "Metal Fabrications" for structural steel.

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

E. Shop and Field Welding: Shop and field welding shall be in accordance with AWS D1.1.

3.11 FIRESTOPPING

A. Firestopping is required in the following locations:
   1. Where exposed and concealed horizontal ducts penetrate fire rated walls and shaft walls, except where fire dampers are installed in ducts.
   2. Where exposed and concealed vertical ducts penetrate rated and non-rated floors, except where fire dampers are installed in ducts.

B. Clean surfaces to be in contact with firestopping materials of dirt, grease, oil, loose materials, rust, or other substances that may affect proper fitting, adhesion, or the required fire resistance.

C. Install materials in accordance with printed instructions of the UL Fire Resistance Directory and per manufacturer's published instructions.

D. Place firestopping in annular space around fire dampers before installation of damper's anchoring flanges which are installed in accordance with fire damper manufacturer's recommendations.

E. Where large openings are created in walls or floors to permit installation of ducts or other items, close unused portions of opening with firestopping material tested for the application.

F. Fill annular space between duct and sleeve, with approved material. Depth of material shall be in accord with laboratory tests for 1, 2, or 3 hour rated assemblies.

G. Damming material may be temporary non-fire approved, or permanent fire-approved. Where permanent fire-approved damming material is used, depth of firestopping material may be decreased in accord with manufacturer's recommendations. Temporary damming material shall be removed after installation of firestopping material.

H. Seal all gaps or voids in cured foam with material to match the firestopping material.

I. Trim excess cured foam from around all openings and leave smooth, flush surface.

J. Position metal collar on duct penetrating floors or walls in air plenums and air shafts. Secure neck of collar to duct with screws.

3.12 INSTALLATION OF ROOF CURBS

A. Prefabricated roof curbs shall be furnished by the HVAC Trade and delivered to the General Trade. All roof curbs, including base flashing, shall be installed by the General Trade. Counter flashing shall be provided by the General Trade.

B. Cutting of roof deck will be performed by the General Trade. The HVAC Trade shall coordinate the exact opening sizes with the entity designated to cut the roof deck to ensure roof deck is not over-cut. Verify the exact opening requirements with the unit manufacturer.
   1. For rooftop units, the void space on the interior of the roof curb shall be completely filled with alternating layers of flexible sound barrier and acoustical insulation for sound attenuation purposes by the HVAC Trade. Refer to Division 23 Section “Vibration Controls for HVAC Piping and Equipment” for in-curb acoustical treatment requirements.
   2. All openings between the ducts and the roof deck, within the curb area, shall be caulked with Dow Corning 799 Silicone Metal Building Sealant by the HVAC Trade.

3.13 FINAL HVAC CONNECTIONS

A. Provide rough-in and final connection of all HVAC services needed for equipment provided by the Owner or by other trades. Shop Drawings will be furnished by those providing the equipment. These Drawings shall be checked by the trade responsible for rough-in and final connections before submission to the Architect for approval. The work shall be done in accordance with the approved Shop Drawings.

B. In general, connection and termination points are given in the Contract Documents. Where not given or where conflicts occur, refer the question to the Architect for a binding decision.

3.14 RECORD DOCUMENTS

A. In addition to the requirements described in Division 01, the HVAC Trade shall also submit the following:

   1. Furnish to the Architect a CD-Rom containing all of the HVAC Drawings. The Drawings shall be in AutoCAD 2004 format or later, and shall show all “as-built” conditions. The Drawings shall indicate all changes made during construction, including tagging and room names. The CD-Rom shall accompany the submission of the red-lined Drawings required in Division 01.
   2. Red-line a clean set of Specifications to indicate approved substitutions, change orders and actual equipment and materials used and installed.

END OF SECTION 230500

SECTION 230511 - BASIC ELECTRICAL REQUIREMENTS FOR HVAC EQUIPMENT

PART 1- GENERAL

1.1 GENERAL CONDITIONS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, other Division 1 Specification sections, and requirements listed in Section 15000 apply to work of this section.

1.2 WORK INCLUDED

A. Starters

B. Disconnect Switches

C. Fuses

D. Duct Mounted Smoke Detector Installation

E. Piping and Ductwork Coordination

1.3 RELATED WORK

A. All Division 23 Sections are related to this section.

B. Division 26: Electrical

1.4 SUBMITTALS

A. Submit product data in accordance with Section 15000, Mechanical General Provisions.

B. Submit manufacturer's data and wiring diagrams on the following:

1. Combination Motor Starters.

C. The following items shall be submitted with the equipment that it serves.

1. Disconnect Switches.
2. Motors

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Motors

1. General Electric
2. Reliance Electric
3. Baldor
4. Marathon Electric

B. Motor Starters

1. General Electric
2. Square D
3. Furnas
4. Cutler-Hammer
5. Allen-Bradley

C. Disconnect Switches

1. Square D
2. Cutler Hammer
3. General Electric
4. Westinghouse

D. Fuses

1. Bussman Division of Cooper Industries, Inc.
2. Shawmut Division of Gould, Inc.
3. Littlefuse, Inc.

2.2 STARTERS

A. The HVAC Contractor shall furnish properly-sized starters for all three-phase motors provided under HVAC Division 15000. Starters shall be as follows, unless provided as a part of packaged equipment or noted otherwise elsewhere. All starters shall be standard NEMA sizes and be UL-listed. Starters for indoor locations shall have NEMA 1 enclosure. Starters for outdoor locations shall have NEMA 3R enclosure. Where motors will operate at a different temperature than the starters serving them provided ambient compensated overload relays. Furnish overload haters sized for the nameplate running amps of the motor protected.

B. For all three-phase motors, the HVAC Contractor shall furnish a magnetic combination starter with fusible disconnect switch, Hand-Off-Auto switch and red "run" pilot light on cover, integral 120V secondary control transformer with dual primary fusing and a fuse in a hot secondary leg, one normally open auxiliary contact and a NEMA class 20 three-phase overload relay. For starters with external control voltages, furnish an auxiliary contact on the disconnect switch to disconnect the external voltage source when the disconnect switch is off.

C. For three-phase motors 50 HP and greater, the HVAC Contractor shall furnish a combination reduced voltage magnetic motor starter (size 1 minimum). Provide with circuit breaker type disconnects and auxiliary control devices as required. HVAC Contractor shall coordinate the control device requirement with the automatic temperature controls (Section15900). Starter units shall be

designed with 50,000 amperes minimum, RMS symmetrical fault withstand-ability. Starter shall be equipped with thermal and magnetic overload protection device for each motor circuit, unit-mounted pilot devices, START-STOP buttons, selector switches, indicating lights and control relays. Starter shall provide with not less than two (2) normally-open and normally-closed auxiliary contacts. Provide method of locking the unit in the de-energized position.

D. For three-phase two-speed motors, the HVAC Contractor shall furnish a combination magnetic starter as specified herein with the following exceptions; provide a High-Off-Low-Auto cover switch in lieu of a Hand-Off-Auto cover switch, high and low speed contactors must be electrically and mechanically interlocked to prevent simultaneous pull in and provide a low speed compelling relay and deceleration relay factory wired in starter enclosure.

E. For the hot water system that can be powered by emergency power, provide the starters for the hot water pumps and the air handing units with time delay relays. The pumps shall start after 60 seconds of power.

F. For equipment operated for smoke and fire control and egress, or other life safety equipment provide a Hand-Auto covers switch in lieu of a Hand-Off-Auto cover switch. The disconnect switch for life safety equipment should be left padlocked in the ON position. For equipment which must never be run continuously due to safety considerations (for example air compressors, fuel pumps) provide an Off-Auto cover switch in lieu of a Hand-Off-Auto switch in lieu of a Hand-Off-Auto switch.

G. All safety devices shall be wired so that they stop the motor with the Hand-Off-Auto switch in the Hand as well as the Auto position. This will normally mean breaking the common wire from the Hand-Off-Auto switch to the starter's holding coil through the safety devices.

2.3 DISCONNECT SWITCHES

A. The HVAC Contractor shall provide a disconnect switch for each piece of HVAC equipment.

B. Non-fused disconnect switches may be used provided that the equipment nameplate makes no reference to "maximum fuse size", "fuse size" or "MFS".

C. Disconnect switches specified as being an integral part of a piece of equipment shall come factory installed and wired.

2.4 FUSES

A. All fuses shall be Class RK1, time delay type.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The Electrical Contractor shall be responsible for proper direction of rotation of all three phase equipment.

B. Equipment delivered with terminal boxes that are inadequate shall be equipped with special boxes that suit the conditions by the HVAC Contractor furnishing the equipment.

C. In general, rigid conduit or tubing shall be used, but equipment that requires movement or that would transmit vibration to conduit shall be wired with flexible (liquid tight) steel conduit not exceeding 18" in length.

D. All equipment shall be grounded with a green-covered ground wire run inside the conduit and connected to equipment frame on one end and to grounding system on the other end.

E. All electrical work required in the HVAC Contracts shall conform to all applicable requirements of Division 16 of these Specifications, and shall comply with the latest edition of the National Electric Code.

F. The HVAC Contractor shall assign all low-voltage and line-voltage Electrical Control Work required under this Contract to the Automatic Temperature Control Sub-Contractor, who shall perform this work with qualified electricians employed by that Sub-Contractor.

G. The HVAC Contractor shall co-operate with the contractor for Electrical Work in making all necessary tests and in receiving, storing and setting all motor-driven equipment, electrical devices, and controls furnished and/or installed under these Contracts.

H. Single phase equipment controls and wiring shall be as follows:

1. HVAC Contractors shall retain the services of an ATC Contractor, who shall furnish and install all control devices, such as motor sentinel switches, PE switches, thermostats, etc.
2. The Electrical Contractor shall complete all power wiring and connections for single phase equipment, through the disconnect and/or the thermal cutouts and local control stations to the equipment as required.
3. The HVAC Contractor will furnish a THERMAL OVERLOAD SWITCH for all single phase motors except where units are furnished with built-in Thermal Protection, in which case he will furnish a single pole switch.

I. Three phase equipment controls and wiring shall be as follows:

1. The HVAC Contractor shall furnish all combination motors starters. The Electrical Contractor shall install all combination motor starters.
2. The HVAC Contractor shall retain the services of an ATC Contractor, who shall furnish and install all control devices, such as EP and PE switches, thermostats, etc.
3. The ATC Contractor shall furnish and install all controls and control wiring from control devices to motor starters and contactors and between control devices.
4. The Electrical Contractor shall complete all electrical connections through the disconnect, starter and motor terminals of all three phase equipment. He shall be responsible for all power wiring and connections.

3.2 DUCT-MOUNTED SMOKE DETECTOR INSTALLATION

A. All duct-mounted smoke detectors will be furnished by the Electrical Contractor. The HVAC Contractors shall install all duct-mounted smoke detectors furnished by the Electrical Contractor under this project.

B. The Electrical Contractor will provide all power wiring for duct-mounted smoke detectors.

C. The HVAC contractor shall provide all control wiring from the smoke detector(s) auxiliary contacts to its (their) associated system supply and/or return fan(s) motor starter(s) for the purpose of de-energizing the fan motor when smoke is detected within the duct system.

3.3 PIPING AND DUCTWORK COORDINATION

A. The HVAC Contractor shall not run ductwork or piping above switchboards or panelboards in accordance with the National Electric Code Article 384. Before ductwork or piping is installed coordinate the exact locations with the Electrical Contractor. Failure to comply with this requirement shall be cause for the ductwork and piping to be removed and relocated at no additional cost to the Owner.

END OF SECTION 230511

SECTION 230523 - GENERAL-DUTY VALVES FOR HVAC 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.

B. All Division 23 Specification Sections also apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Bronze ball valves.
2. Iron, single-flange butterfly valves.
3. Iron, grooved-end butterfly valves.
4. Bronze swing check valves.
5. Iron swing check valves.
6. Iron, grooved-end swing-check valves.
7. Bronze gate valves.
8. Iron gate valves.
9. Bronze globe valves.
10. Iron globe valves.

B. Related Sections:

1. Division 23 HVAC piping Sections for specialty valves applicable to those Sections only.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene copolymer rubber.

C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

D. NRS: Nonrising stem.

E. OS&Y: Outside screw and yoke.

F. RS: Rising stem.

G. SWP: Steam working pressure.

1.4 SUBMITTALS

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

1. Bronze ball valves.
2. Iron, single-flange butterfly valves.
3. Iron, grooved-end butterfly valves.
4. Bronze swing check valves.
5. Iron swing check valves.
6. Iron, grooved-end swing-check valves.
7. Bronze gate valves.
8. Iron gate valves.
9. Bronze globe valves.
10. Iron globe valves.

1.5 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
2. ASME B31.1 for power piping valves.
3. ASME B31.9 for building services piping valves.

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 gate and globe valves closed to prevent rattling.
4. Set ball valves open to minimize exposure of functional surfaces.
5. Set butterfly valves closed or slightly open.
6. 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 handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to HVAC valve schedule articles for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

C. Valve Sizes: Same as upstream piping unless otherwise indicated.

D. Valve Actuator Types:

1. Gear Actuator: For quarter-turn valves NPS 8 (DN 200) and larger.
2. Handwheel: For valves other than quarter-turn types.
3. Handlever: For quarter-turn valves NPS 6 (DN 150) and smaller.

E. Valves in Insulated Piping: With 2-inch (50-mm) stem extensions and the following features:

1. Gate Valves: With rising stem.
2. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
3. Butterfly Valves: With extended neck.

F. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.
2. Grooved: With grooves according to AWWA C606.
3. Threaded: With threads according to ASME B1.20.1.

G. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE BALL VALVES

A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:

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

a. American Valve, Inc.
b. Conbraco Industries, Inc.; Apollo Valves.
c. Crane Co.; Crane Valve Group; Crane Valves.
d. Hammond Valve.
e. Milwaukee Valve Company.
f. NIBCO INC.
g. Red-White Valve Corporation.
h. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-110.
b. SWP Rating: 150 psig (1035 kPa).
c. CWP Rating: 600 psig (4140 kPa).
d. Body Design: Two piece.
e. Body Material: Bronze.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Bronze.
i. Ball: Chrome-plated brass.
j. Port: Full.

2.3 IRON, SINGLE-FLANGE BUTTERFLY VALVES

A. 150 CWP, Iron, Single-Flange Butterfly Valves with EPDM or NBR Seat and Aluminum-Bronze or Stainless-Steel Disc:

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

a. Bray Controls; a division of Bray International.
b. Conbraco Industries, Inc.; Apollo Valves.
c. Crane Co.; Crane Valve Group; Jenkins Valves.
d. Crane Co.; Crane Valve Group; Stockham Division.
e. DeZurik Water Controls.
f. Hammond Valve.
g. Milwaukee Valve Company.
h. NIBCO INC.
i. Red-White Valve Corporation.
j. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-67, Type I.
b. CWP Rating: 150 psig (1035 kPa).
c. Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
d. Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
e. Seat: EPDM or NBR.
f. Stem: One- or two-piece stainless steel.
g. Disc: Aluminum bronze or stainless-steel.

2.4 IRON, GROOVED-END BUTTERFLY VALVES

A. 300 CWP, Iron, Grooved-End Butterfly Valves:

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

a. Anvil International, Inc.
b. Kennedy Valve; a division of McWane, Inc.
c. Mueller Steam Specialty; a division of SPX Corporation.

d. NIBCO INC.
e. Shurjoint Piping Products.
f. Tyco Fire Products LP; Grinnell Mechanical Products.
g. Victaulic Company.

2. Description:

a. Standard: MSS SP-67, Type I.
b. NPS 8 (DN 50) and Smaller CWP Rating: 300 psig (2070 kPa).
c. NPS 10 (DN 250) and Larger CWP Rating: 200 psig (1380 kPa).
d. Body Material: Coated, ductile iron.
e. Stem: Two-piece stainless steel.
f. Disc: Coated, ductile iron.
g. Seal: EPDM.

2.5 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Bronze Disc:

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

a. American Valve, Inc.
b. Crane Co.; Crane Valve Group; Crane Valves.
c. Crane Co.; Crane Valve Group; Jenkins Valves.
d. Crane Co.; Crane Valve Group; Stockham Division.
e. Hammond Valve.
f. Milwaukee Valve Company.
g. NIBCO INC.
h. Red-White Valve Corporation.
i. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-80, Type 3.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Design: Horizontal flow.
d. Body Material: ASTM B 62, bronze.
e. Ends: Threaded.
f. Disc: Bronze.

2.6 IRON SWING CHECK VALVES

A. Class 125, Iron Swing Check Valves with Metal Seats:

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

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Crane Co.; Crane Valve Group; Stockham Division.

d. Hammond Valve.
e. Milwaukee Valve Company.
f. NIBCO INC.
g. Red-White Valve Corporation.
h. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-71, Type I.
b. NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 200 psig (1380 kPa).
c. NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 150 psig (1035 kPa).
d. Body Design: Clear or full waterway.
e. Body Material: ASTM A 126, gray iron with bolted bonnet.
f. Ends: Flanged.
g. Trim: Bronze.
h. Gasket: Asbestos free.

2.7 IRON, GROOVED-END SWING CHECK VALVES

A. 300 CWP, Iron, Grooved-End Swing Check Valves:

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

a. Anvil International, Inc.
b. Shurjoint Piping Products.
c. Tyco Fire Products LP; Grinnell Mechanical Products.
d. Victaulic Company.

2. Description:

a. CWP Rating: 300 psig (2070 kPa).
b. Body Material: ASTM A 536, ductile iron.
c. Seal: EPDM.
d. Disc: Spring operated, ductile iron or stainless steel.

2.8 BRONZE GATE VALVES

A. Class 125, RS Bronze Gate Valves:

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

a. American Valve, Inc.
b. Crane Co.; Crane Valve Group; Crane Valves.
c. Crane Co.; Crane Valve Group; Jenkins Valves.
d. Crane Co.; Crane Valve Group; Stockham Division.
e. Hammond Valve.
f. Milwaukee Valve Company.
g. NIBCO INC.
h. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-80, Type 2.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded.
e. Stem: Bronze.
f. Disc: Solid wedge; bronze.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron.

2.9 IRON GATE VALVES

A. Class 125, OS&Y, Iron Gate Valves:

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

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Crane Co.; Crane Valve Group; Stockham Division.
d. Flo Fab Inc.
e. Hammond Valve.
f. Milwaukee Valve Company.
g. NIBCO INC.
h. Red-White Valve Corporation.
i. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-70, Type I.
b. NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 200 psig (1380 kPa).
c. NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 150 psig (1035 kPa).
d. Body Material: ASTM A 126, gray iron with bolted bonnet.
e. Ends: Flanged.
f. Trim: Bronze.
g. Disc: Solid wedge.
h. Packing and Gasket: Asbestos free.

2.10 BRONZE GLOBE VALVES

A. Class 125, Bronze Globe Valves with Bronze Disc:

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

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Stockham Division.
c. Hammond Valve.
d. Milwaukee Valve Company.
e. NIBCO INC.

f. Red-White Valve Corporation.
g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded.
e. Stem and Disc: Bronze.
f. Packing: Asbestos free.
g. Handwheel: Malleable iron.

2.11 IRON GLOBE VALVES

A. Class 125, Iron Globe Valves:

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

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Crane Co.; Crane Valve Group; Stockham Division.
d. Hammond Valve.
e. Milwaukee Valve Company.
f. NIBCO INC.
g. Red-White Valve Corporation.
h. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-85, Type I.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Material: ASTM A 126, gray iron with bolted bonnet.
d. Ends: Flanged.
e. Trim: Bronze.
f. Packing and Gasket: Asbestos free.

PART 3 - EXECUTION

3.1 EXAMINATION

A. 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.

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

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

D. 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.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

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

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

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

E. Install check valves for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level.

3.3 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.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball, butterfly**,** or gate valves.
2. Butterfly Valve Dead-End Service: Single-flange (lug) type.
3. Throttling Service except Steam: Globe, ball, or butterfly valves.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

C. Select valves with the following end connections:

1. For Copper Tubing, NPS 2 (DN 50) and Smaller: Threaded or Soldered-joint ends.
2. For Steel Piping, NPS 2-1/2 (DN 65) and Larger: Flanged ends.
3. For Grooved-End Steel Piping (except Steam and Steam Condensate Piping): Valve ends may be grooved.

3.5 HOT WATER VALVE SCHEDULE

A. Pipe NPS 2 (DN 50) and Smaller:

1. Bronze Valves: Threaded or Soldered-joint ends.

2. Ball Valves: Two-piece, full port, bronze with bronze or stainless-steel trim.
3. Bronze Swing Check Valves: Class 125, bronze disc.
4. Bronze Gate Valves: Class 125, rising-stem, bronze.
5. Bronze Globe Valves: Class 125, bronze disc.

END OF SECTION 230523

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC 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.

B. All Division 23 Specification Sections also apply to this Section.

1.2 SUMMARY

A. This Section includes the following hangers and supports for HVAC system piping and equipment:

1. Steel pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal-hanger shield inserts.
5. Fastener systems.
6. Pipe stands.
7. Equipment supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society for The Valve and Fittings Industry Inc.

B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.4 SUBMITTALS

A. Product Data: For the following:

1. Steel pipe hangers and supports.
2. Thermal-hanger shield inserts.
3. Powder-actuated fastener systems.
4. Trapeze pipe hangers. Include Product Data for components.
5. Metal framing systems. Include Product Data for components.
6. Pipe stands. Include Product Data for components.
7. Equipment supports.

1.5 QUALITY ASSURANCE

A. 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 STEEL PIPE HANGERS AND SUPPORTS

A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.

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

1. AAA Technology & Specialties Co., Inc.
2. B-Line Systems, Inc.; a division of Cooper Industries.
3. ERICO/Michigan Hanger Co.
4. Globe Pipe Hanger Products, Inc.
5. Grinnell Corp.
6. GS Metals Corp.
7. National Pipe Hanger Corporation.
8. PHD Manufacturing, Inc.

C. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.

D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

2.2 FASTENER SYSTEMS

A. Mechanical-Expansion Anchors: Insert-wedge-type stainless steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

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

a. B-Line Systems, Inc.; a division of Cooper Industries.
b. Empire Industries, Inc.
c. Hilti, Inc.
d. ITW Ramset/Red Head.
e. MKT Fastening, LLC.
f. Powers Fasteners.

2.3 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

2.4 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

A. Specific hanger and support requirements are specified 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. 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 noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30 (DN 15 to DN 750).

F. 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 20 (DN 20 to DN 500).
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20 (DN 20 to DN 500), if longer ends are required for riser clamps.

G. 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.

H. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.

2. C-Clamps (MSS Type 23): For structural shapes.
3. 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).

I. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
2. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

J. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.

K. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.

L. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

3.2 HANGER AND SUPPORT INSTALLATION

A. Steel 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 building structure.

1. Suspend hangers from building structural members and concrete floor slabs as follows:

    a. Install hangers plumb and free from contact with objects within ceiling plenum that are not part of supporting structural system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
    b. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support loads within performance limits established by referenced standards.
    c. Secure hangers either directly to structural steel or to inserts, eyescrews, or other devices that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
    d. Anchors must be installed in “rib” portion of metal deck/concrete slab (thickest portion of slab).
    e. Do not attach hangers to steel deck tabs.
    f. Do not attach hangers to steel roof deck. Provide supplemental framing between structural members where spacing of members exceeds required spacing of hangers.

B. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

C. Fastener System Installation:

1. 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.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

D. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

E. Install hangers and supports to allow controlled thermal 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.

F. Install lateral bracing with pipe hangers and supports to prevent swaying.

G. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2½ (DN 65) and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

H. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

I. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.

J. Insulated Piping: Comply with the following:

1. Attach clamps and spacers to piping.
2. Insulation shall pass through pipe hangers and pipe clamps uninterrupted.
3. Do not exceed pipe stress limits according to ASME B31.1 for power piping and ASME B31.9 for building services piping.

4. 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.

5. Shield Dimensions for Pipe: Not less than the following:

    a. 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.
6. Insert Material: Length at least as long as protective shield.
7. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.3 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 smooth bearing surface.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.5 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 1½-inches (40 mm) unless ceiling height dictates a smaller excess length. Coordinate with ceiling height and trim

3.6 PAINTING

A. Touch Up: 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 230529

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

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.

B. All Division 23 Specification Sections also apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Balancing Air Systems:

a. Variable-air-volume systems.

2. Balancing Hydronic Piping Systems:

a. Variable-flow hydronic systems.

1.3 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. NEBB: National Environmental Balancing Bureau.

C. TAB: Testing, adjusting, and balancing.

D. TABB: Testing, Adjusting, and Balancing Bureau.

E. TAB Specialist: An entity engaged to perform TAB Work.

1.4 SUBMITTALS

A. Certified TAB reports.

B. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

1.5 QUALITY ASSURANCE

A. TAB Contractor Qualifications: Engage a TAB entity certified by NEBB, AABC or TABB.

1. TAB Field Supervisor: Employee of the TAB contractor and certified by NEBB, AABC or TABB.
2. TAB Technician: Employee of the TAB contractor and who is certified by NEBB, AABC or TABB as a TAB technician.

B. Certify TAB field data reports and perform the following:

1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.

C. TAB Report Forms: Use standard TAB contractor's forms published by AABC or NEBB.

D. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

1.6 PROJECT CONDITIONS

A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.7 COORDINATION

A. Notice: Provide seven (7) days advance notice to the Contractor and Owner prior to commencement of TAB work. Include scheduled test dates and times. Provide seven (7) days advance notice to any changes in the scheduled dates and times.

B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

C. Coordinate with ATC Contractor to balance VAV box and AHU damper positions. Pay particular attention to AHU minimum outside air damper position as listed in Division 23 Section “Sequence of Operations for HVAC Control.”

1.8 TAB SPECIALISTS

A. Subject to compliance with requirements, engage one of the following independent TAB contractors to provide the TAB work:

1. Kahoe Air Balance Co.
2. Northstar Environmental, Ltd.
3. WAE Balancing, Inc.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment. Notify contractor, Architect and Engineer immediately upon discovery of any deficiencies.

B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible. Notify contractor immediately upon discovery of any balancing devices not present that will prevent balancing of the system.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine equipment performance data including fan and pump curves.

E. Obtain and examine start-up test reports to verify that start-up testing, cleaning, and adjusting of HVAC equipment and systems have been performed prior to the commencement of TAB work.

F. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

G. Examine suspended equipment, such as variable-air-volume boxes, fan coil units, in-line fans, etc., and verify that they are accessible and their controls are connected and functioning.

H. Examine strainers. Verify that startup screens are replaced by permanent screens with indicated perforations.

I. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.

J. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

K. Examine system pumps to ensure absence of entrained air in the suction piping.

L. Examine operating safety interlocks and controls on HVAC equipment.

M. Report deficiencies discovered before and during performance of TAB procedures to the contractor, Architect and Engineer.

3.2 PREPARATION

A. Complete system-readiness checks. Verify the following:

1. Permanent electrical-power wiring is complete.
2. Hydronic systems are filled, clean, and free of air.

3. Automatic temperature-control systems are operational.
4. Equipment and duct access doors are securely closed.
5. Balance, smoke, and fire dampers are open.
6. Isolating and balancing valves are open and control valves are operational.
7. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
8. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING, ADJUSTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance," NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems," or SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing," and the requirements contained in this Section.

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Division 23 Section "HVAC Insulation."

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Where the Drawings require the HVAC trade to demolish and/or modify only a portion of an existing air system and the remainder of the system is to remain in service, the Testing, Adjusting and Balancing (TAB) trade shall measure the air flow rates in the undisturbed portions of system prior to disconnecting work in the construction areas. The TAB trade shall rebalance the affected systems to these measurements immediately following the disconnection of the ductwork being demolished/modified and also immediately after placing the new/modified system into service.

B. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.

C. For variable-air-volume systems, develop a plan to simulate diversity.

D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.

F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

G. Verify that motor starters are equipped with properly sized thermal protection.

H. Check dampers for proper position to achieve desired airflow path.

I. Check for airflow blockages.

J. Check condensate drains for proper connections and functioning.

K. Check for proper sealing of air-handling-unit components.

L. Verify that air duct system is sealed as specified in Division 23 Section "Metal Ducts."

3.5 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

A. Compensating for Diversity: When the total airflow of all terminal units is more than the indicated airflow of the fan, place a selected number of terminal units at a minimum set-point airflow with the remainder at maximum-airflow condition until the total airflow of the terminal units equals the indicated airflow of the fan. Select the reduced-airflow terminal units so they are distributed evenly among the branch ducts.

B. Pressure-Independent, Variable-Air-Volume Systems: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

1. Set outdoor-air dampers at minimum, and set return- and exhaust-air dampers at a position that simulates full-cooling load.
2. Select the terminal unit that is most critical to the supply-fan airflow and static pressure. Measure static pressure. Adjust system static pressure so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
3. Measure total system airflow. Adjust to within indicated airflow.
4. Set terminal units at maximum airflow and adjust controller or regulator to deliver the designed maximum airflow. Use terminal-unit manufacturer's written instructions to make this adjustment. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
5. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow the same as described for constant-volume air systems.

    a. If air outlets are out of balance at minimum airflow, report the condition but leave outlets balanced for maximum airflow.

6. Re-measure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.

a. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.

7. Measure static pressure at the most critical terminal unit and adjust the static-pressure controller at the main supply-air sensing station to ensure that adequate static pressure is maintained at the most critical unit.
8. Record final fan-performance data.

C. Pressure-Dependent, Variable-Air-Volume Systems without Diversity: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

1. Balance variable-air-volume systems the same as described for constant-volume air systems.
2. Set terminal units and supply fan at full-airflow condition.
3. Adjust inlet dampers of each terminal unit to indicated airflow and verify operation of the static-pressure controller. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
4. Readjust fan airflow for final maximum readings.
5. Measure operating static pressure at the sensor that controls the supply fan if one is installed, and verify operation of the static-pressure controller.
6. Set supply fan at minimum airflow if minimum airflow is indicated. Measure static pressure to verify that it is being maintained by the controller.
7. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow the same as described for constant-volume air systems.

   a. If air outlets are out of balance at minimum airflow, report the condition but leave the outlets balanced for maximum airflow.

8. Measure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.

   a. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.

D. Pressure-Dependent, Variable-Air-Volume Systems with Diversity: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

1. Set system at maximum indicated airflow by setting the required number of terminal units at minimum airflow. Select the reduced-airflow terminal units so they are distributed evenly among the branch ducts.
2. Adjust supply fan to maximum indicated airflow with the variable-airflow controller set at maximum airflow.
3. Set terminal units at full-airflow condition.
4. Adjust terminal units starting at the supply-fan end of the system and continuing progressively to the end of the system. Adjust inlet dampers of each terminal unit to indicated airflow. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
5. Adjust terminal units for minimum airflow.
6. Measure static pressure at the sensor.

7. Measure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.

3.6 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

A. Where the Drawings require the HVAC trade to demolish and/or modify only a portion of an existing water system and the remainder of the system is to remain in service, the Testing, Adjusting and Balancing (TAB) trade shall measure the water flow rates in the undisturbed portions of system prior to disconnecting work in the construction areas. The TAB trade shall rebalance the affected systems to these measurements immediately following the disconnection of the piping being demolished/modified and also immediately after placing the new/modified system into service.

B. Prepare test reports with pertinent design data, and number in sequence starting at pump to end of system. Check the sum of branch-circuit flows against the approved pump flow rate. Correct variations that exceed plus or minus 5 percent.

C. Prepare hydronic systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:

1. Open all manual valves for maximum flow.
2. Check liquid level in expansion tank.
3. Check makeup water-station pressure gage for adequate pressure for highest vent.
4. Check flow-control valves for specified sequence of operation, and set at indicated flow.
5. Set differential-pressure control valves at the specified differential pressure.

    a. Do not set at fully closed position when pump is positive-displacement type unless several terminal valves are kept open.

6. Set system controls so automatic valves are wide open to heat exchangers.
7. Check pump-motor load. If motor is overloaded, throttle main flow-balancing device so motor nameplate rating is not exceeded.
8. Check air vents for a forceful liquid flow exiting from vents when manually operated.

3.7 PROCEDURES FOR VARIABLE-FLOW HYDRONIC SYSTEMS

A. Balance systems with automatic two- and three-way control valves by setting systems at maximum flow through heat-exchange terminals and proceed as specified above for hydronic systems.

3.8 PROCEDURES FOR HEAT-TRANSFER COILS

A. Measure, adjust, and record the following data for each water coil:

1. Water flow rate.
2. Water pressure drop.
3. Airflow.
4. Air pressure drop.

3.9 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.

1. Measure and record the operating speed, airflow, and static pressure of each fan.
2. Measure and record the water flow and head of each pump.
3. Measure motor voltage and amperage. Compare the values to motor nameplate information.
4. Check the condition of filters.
5. Check the condition of coils.
6. Check the condition and operation of the drain pan and condensate-drain trap.
7. Check bearings and other lubricated parts for condition and proper operation.
8. Measure the airflow rate at each air terminal inlet and outlet.
9. Measure the water flow rate at each equipment item in the system.
10. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.

B. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished. Verify the following:

1. New filters are installed.
2. Coils are clean and fins combed.
3. Drain pans are clean.
4. Fans are clean.
5. Bearings and other parts are properly lubricated.
6. Deficiencies noted in the preconstruction report are corrected.

C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.

1. Compare the indicated airflow of the renovated work to the measured fan airflows, and determine the new fan speed and the face velocity of filters and coils.
2. Verify that the indicated airflows of the renovated work result in filter and coil face velocities and fan speeds that are within the acceptable limits defined by equipment manufacturer.
3. If design flow rates increase or decrease the measured airflow rates and water flow rates by more than 5 percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is 5 percent or less, equipment adjustments are not required.
4. Balance each air outlet.

3.10 TOLERANCES

A. Set HVAC system's air flow rates and water flow rates within the following tolerances:

1. Supply, Return, Relief and Exhaust Fans and Equipment with Fans: Zero to plus 5 percent of scheduled design flow.
2. Air Outlets and Inlets: Plus or minus 10 percent of design flow indicated.
3. Heating-Water Pump Flow Rate: Zero to plus 5 percent of scheduled design flow.
4. Cooling-Water Pump Flow Rate: Zero to plus 5 percent of scheduled design flow.

5. Terminal Unit Cooling-Water Flow Rate: Plus or minus 10 percent of design flow indicated.
6. Terminal Unit Cooling-Water Flow Rate: Plus or minus 10 percent of design flow indicated.

3.11 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Field test reports (start-up reports) prepared by system and equipment installers.
2. Other information relative to equipment performance such as fan curves and pump curves; do not include Shop Drawings and product data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB contractor.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.

12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.
15. Test conditions for fans and pump performance forms including the following:

    a. Settings for outdoor-, return-, and exhaust-air dampers.
    b. Conditions of filters.
    c. Cooling coil, wet- and dry-bulb conditions.
    d. Fan drive settings including settings and percentage of maximum pitch diameter.
    e. Settings for supply-air, static-pressure controller.
    f. Other system operating conditions that affect performance.

D. Air-Handling-Unit and Rooftop Unit Test Reports: For air-handling units and rooftop units with coils, include the following:

1. Unit Data:

   a. Unit identification.
   b. Location.
   c. Make and type.
   d. Model number and unit size.
   e. Manufacturer's serial number.
   f. Unit arrangement and class.
   g. Discharge arrangement.

2. Fan Data: For each fan, include the following:

   a. Fan sheave make, size in inches (mm), and bore.
   b. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).
   c. Number, make, and size of belts.
   d. Number, type, and size of filters.

3. Motor Data: For each motor, include the following:

   a. Motor make, and frame type and size.
   b. Horsepower and rpm.
   c. Volts, phase, and hertz.
   d. Full-load amperage and service factor.
   e. Motor sheave make, size in inches (mm), and bore.
   f. Center-to-center dimensions of fan and motor sheaves, and amount of adjustments in inches (mm).

4. Coil Data: For each coil, include the following:

   a. System identification.
   b. Location.
   c. Coil type.
   d. Number of rows.
   e. Fin spacing in fins per inch (mm) o.c.
   f. Make and model number.
   g. Face area in sq. ft. (sq. m).
   h. Tube size in NPS (DN).
   i. Circuiting arrangement.

5. Gas-fired Heat Exchanger Data: For each gas-fired heat exchanger in rooftop units, include the following:

   a. Location.
   b. Make and type.
   c. Fuel type.
   d. Output capacity in Btu/h.
   e. Ignition type.
   f. Burner-control types.

g. Burner motor volts, phase, hertz, rpm and horsepower.

6. Unit Test Data (Indicated and Actual Values):

a. Total air flow rate in cfm (L/s).
b. Outdoor airflow in cfm (L/s).
c. Return airflow in cfm (L/s).
d. Total system static pressure in inches wg (Pa).
e. Fan rpm for each fan.
f. Unit discharge static pressure in inches wg (Pa).
g. Unit inlet static pressure in inches wg (Pa).
h. Filter static-pressure differential in inches wg (Pa) for each filter bank.
i. Outdoor-air damper position.
j. Return-air damper position.
k. Relief-air damper position.
l. Variable frequency drive speed (for each fan).

7. Coil Test Data (Indicated and Actual Values): For each coil, include the following:

a. Average face velocity in fpm (m/s).
b. Air pressure drop in inches wg (Pa).
c. Water flow rate in gpm (L/s).
d. Water pressure differential in feet of head or psig (kPa).

8. Gas-fired Heat Exchanger Test Data (Indicated and Actual Values):

a. Air static-pressure differential in inches wg (Pa).

E. Terminal Equipment Unit (Without Fan) Test Reports: For terminal boxes include the following:

1. Coil Data:

a. System identification.
b. Location.
c. Make and model number.
d. Tube size in NPS (DN).
e. Fin spacing in fins per inch (mm) o.c.
f. Tube and fin materials.

2. Terminal Heating Unit Water Test Data (Indicated and Actual Values): For cabinet unit heaters, unit heaters, convectors, finned tube radiation units, and radiant ceiling panels, include the following:

a. Water flow rate in gpm (L/s).
b. Water pressure differential in feet of head or psig (kPa).

F. Apparatus-Coil Test Reports: For VAV terminal boxes with reheat coils and for duct-mounted coils, include the following:

1. Coil Data:

a. System identification.

b. Location.
c. Coil type.
d. Number of rows.
e. Fin spacing in fins per inch (mm) o.c.
f. Make and model number.
g. Face area in sq. ft. (sq. m).
h. Tube size in NPS (DN).
i. Tube and fin materials.

2. Water Coil and Steam Coil Test Data (Indicated and Actual Values): For water and steam coils, include the following:

a. Airflow rate in cfm (L/s).
b. Average face velocity in fpm (m/s).
c. Air pressure drop in inches wg (Pa).
d. Water flow rate in gpm (L/s).
e. Water pressure differential in feet of head or psig (kPa).

G. Round, Flat-Oval, and Rectangular Duct Traverse Reports: For main supply and return ducts for each system, include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

a. System and air-handling-unit number.
b. Location and zone.
c. Traverse air temperature in deg F (deg C).
d. Duct static pressure in inches wg (Pa).
e. Duct size in inches (mm).
f. Duct area in sq. ft. (sq. m).
g. Indicated air flow rate in cfm (L/s).
h. Indicated velocity in fpm (m/s).
i. Actual air flow rate in cfm (L/s).
j. Actual average velocity in fpm (m/s).
k. Barometric pressure in psig (Pa).

H. Air-Terminal-Device Reports: For each diffuser, register and grille, include the following:

1. Unit Data:

a. System and air-handling unit identification.
b. Location and zone.
c. Apparatus used for test.
d. Area served.
e. Make.
f. Number from system diagram.
g. Type and model number.
h. Size.
i. Effective area in sq. ft. (sq. m).
j. Design air flow rate in cfm (L/s).

2. Test Data (Indicated and Actual Values):

a. Air flow rate in cfm (L/s).
b. Air velocity in fpm (m/s).
c. Preliminary air flow rate in cfm (L/s).
d. Preliminary velocity in fpm (m/s).
e. Final air flow rate in cfm (L/s).
f. Final velocity in fpm (m/s).

I. Instrument Calibration Reports:

1. Report Data:

a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.
e. Dates of calibration.

3.12 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 230593

SECTION 230700 - HVAC INSULATION

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.

B. All Division 23 Specification Sections also apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Insulation Materials:
   a. Flexible elastomeric.
   b. Mineral fiber.
2. Adhesives.
3. Mastics.
4. Lagging adhesives.
5. Sealants.
6. Factory-applied jackets.
7. Field-applied jackets.
8. Tapes.
9. Securements.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated below as tested in accordance with ASTM E 84.

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.

1.5 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."

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.

1.6 SCHEDULING

A. Schedule insulation application after pressure testing systems. 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 INSULATION MATERIALS

A. Comply with requirements in Part 3 schedule articles for 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. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide the following:

a. CertainTeed Corp.; Duct Wrap.
b. Johns Manville; Microlite.
c. Knauf Insulation; Duct Wrap.
d. Manson Insulation Inc.; Alley Wrap.
e. Owens Corning; All-Service Duct Wrap.

G. Mineral-Fiber, Preformed Pipe Insulation:

1. Products: Subject to compliance with requirements, provide the following:

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.

2. Type I, 850 deg F (454 deg C) Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ or factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 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. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, provide the following:

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.

C. ASJ Adhesive and FSK Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, provide the following:

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.

D. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, provide the following:

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. Speedline Corporation; Speedline Vinyl Adhesive.

2.3 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: Subject to compliance with requirements, provide the following:

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.

2. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm (0.009 metric perm) at 43-mil (1.09-mm) dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).
4. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
5. Color: White.

2.4 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide the following:

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.

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 (Minus 40 to plus 121 deg C).
5. Color: Aluminum.

B. ASJ Flashing Sealants and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide the following:

a. Childers Products, Division of ITW; CP-76.

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 (Minus 40 to plus 121 deg C).
5. Color: White.

2.5 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.6 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921 Type II, for ducts and pipes operating at above ambient temperatures.

B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; 30 mils thickness; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Products: Subject to compliance with requirements, provide the following:

    a. Johns Manville; Zeston.
    b. P.I.C. Plastics, Inc.; FG Series.
    c. Proto PVC Corporation; LoSmoke.
    d. Speedline Corporation; SmokeSafe.

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.

2.7 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide the following:

    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.

2. Width: 3 inches (75 mm).
3. Thickness: 11.5 mils (0.29 mm).
4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch (7.2 N/mm) 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.

1. Products: Subject to compliance with requirements, provide the following:

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.

2. Width: 3 inches (75 mm).
3. Thickness: 6.5 mils (0.16 mm).
4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch (7.2 N/mm) 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: Subject to compliance with requirements, provide the following:

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.

2. Width: 2 inches (50 mm).
3. Thickness: 6 mils (0.15 mm).
4. Adhesion: 64 ounces force/inch (0.7 N/mm) in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch (3.3 N/mm) in width.

2.8 SECUREMENTS

A. Insulation Pins and Hangers:

1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, minimum 0.106-inch- (2.6-mm-) diameter shank, length to suit depth of insulation indicated.

a. Products: Subject to compliance with requirements, provide the following:

1) AGM Industries, Inc.; CWP-1.
2) GEMCO; CD.
3) Midwest Fasteners, Inc.; CD.
4) Nelson Stud Welding; TPA, TPC, and TPS.

2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, minimum 0.106-inch- (2.6-mm-) diameter shank diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch (38-mm) galvanized carbon-steel washer.

    a. Products: Subject to compliance with requirements, provide the following:

        1) AGM Industries, Inc.; CWP-1.
        2) GEMCO; Cupped Head Weld Pin.
        3) Midwest Fasteners, Inc.; Cupped Head.
        4) Nelson Stud Welding; CHP.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- (19-mm-) wide, stainless steel or Monel.

C. Wire: 0.062-inch (1.6-mm) soft-annealed, stainless steel.

1. Manufacturers: Subject to compliance with requirements, provide the following:

    a. C & F Wire.
    b. Childers Products.
    c. PABCO Metals Corporation.
    d. RPR Products, Inc.

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. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL 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. Insulation installed on piping systems shall pass through pipe hangers and pipe clamps uninterrupted.

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

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

G. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

H. Keep insulation materials dry during application and finishing.

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

J. Install insulation with least number of joints practical.

K. 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.

L. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

M. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.

3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). 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 (50 mm) 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.

N. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

O. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

P. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

Q. 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.

3.4 PENETRATIONS

A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

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 (50 mm).

1. Comply with requirements in Division 07 Section "Penetration Firestopping"irestopping and fire-resistive joint sealers.

3.5 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, 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. 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.

3.6 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 (150 mm) 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 (25 mm), 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.

E. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 50 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

    a. On duct sides with dimensions 18 inches (450 mm) and smaller, place pins along longitudinal centerline of duct. Space 3 inches (75 mm) maximum from insulation end joints, and 16 inches (400 mm) o.c.
    b. On duct sides with dimensions larger than 18 inches (450 mm), place pins 16 inches (400 mm) o.c. each way, and 3 inches (75 mm) maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.

c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
d. Do not over compress insulation during installation.
e. Impale insulation over pins and attach speed washers.
f. 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.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch (13-mm) outward-clinching staples, 1 inch (25 mm) o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

   a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
   b. Install vapor stops for ductwork and plenums operating below 50 deg F (10 deg C) at 18-foot (5.5-m) intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than 3 inches (75 mm).

5. Overlap unfaced blankets a minimum of 2 inches (50 mm) on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches (450 mm) o.c.
6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- (150-mm-) wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches (150 mm) o.c.

3.7 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 (38-mm) laps at longitudinal seams and 3-inch- (75-mm-) 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 PVC jackets are indicated, install with 1-inch (25-mm) overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

3.8 INSULATION SCHEDULE FOR DUCTS AND PLENUMS INSTALLED INDOORS

A. Concealed; round and flat-oval; supply-air duct insulation shall be the following:

1. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) thick and 0.75-lb/cu. ft. (12-kg/cu. m) nominal density.

B. Concealed; rectangular; supply-air duct insulation shall be the following:

1. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) thick and 0.75-lb/cu. ft. (12-kg/cu. m) nominal density.

3.9 INSULATION SCHEDULE FOR PIPING INSTALLED INDOORS

A. Heating-Hot-Water Supply and Return, 200 Deg F (93 Deg C) and below:

1. NPS 1½ (DN 40) and Smaller: Mineral-Fiber, Preformed Pipe, Type I, 1½ inches (38 mm) thick.
2. NPS 2 (DN 50) and Larger: Mineral-Fiber, Preformed Pipe, Type I, 2-inches (50 mm) thick.

3.10 FIELD-APPLIED JACKET SCHEDULE FOR DUCTS AND PIPES INSTALLED INDOORS

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. Piping, Exposed and Concealed, Fittings Only:

1. PVC 30 mils (0.8 mm) thick.

END OF SECTION 230700

SECTION 230900 – AUTOMATIC TEMPERATURE CONTROL FOR HVAC

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.

B. All Division 23 Specification Sections also apply to this Section.

1.2 SUMMARY

A. This Section includes control equipment for all HVAC systems and components, including control components for terminal heating and cooling units not supplied with factory-wired controls.

1.3 WORK INCLUDED

A. Automatic Temperature Control (ATC) Subcontractor shall:

1. Furnish and install a new building automation system (BAS), UL listed, incorporating direct digital control (DDC) for energy management, equipment monitoring and control, and operator interface.

    a. Operator interface shall be provided via web-based access.
    b. Electronic actuation shall be employed.
    c. Provide a complete graphics package that includes all automatic temperature control system points and allows for easy adjustment.

2. Provide a complete temperature control system to be DDC as specified herein.
3. Provide all power wiring, control wiring, and conduit for all DDC panels, Application Specific Controllers and DDC temperature control devices, except as detailed within. Provide all electrical work associated with the BAS control system and as called for on the Drawings including:

    a. Providing all line voltage and low voltage power wiring and conduit in accordance with all local codes, the National Electric Code (latest edition), and Division 26.

        1) Power circuits shall be run from normal/emergency power panel(s).

    b. Providing all line voltage and low voltage control wiring, concealed in conduit or exposed as plenum-rated cable, in accordance with local codes, the National Electric Code (latest edition), and Division 26.

        1) Power circuits shall be run from normal/emergency power panel(s).

2) All low voltage electrical control wiring throughout the building shall be as described in Part 3 of this Section.

c. Incorporating and providing surge transient protection in design of system to protect electrical components in all DDC Controllers, Application Specific Controllers, and operator interface devices.

4. The ATC Subcontractor shall hardwire from each duct mounted smoke detector to its associated supply and/or return fan. Fan shutdown via software is not acceptable. Provide all wiring and conduit required.

a. Control circuit shall de-energize fans in the 'Hand', as well as the 'Auto', position.
b. DDC system shall monitor all duct detectors.

5. Furnish all automatic air dampers, including actuators. Provide all power wiring, conduit and controls for automatic air dampers installed.
6. Furnish all control valves. Provide control wiring and conduit, and any power wiring and conduit (if necessary), for each control valve.
7. Provide a field technician to coordinate work with the Testing and Balancing technicians.
8. For all exhaust fans, provide all interlock power/control wiring and conduit between the fan and its motorized damper.
9. Perform functional performance testing for all controls installed.

B. The HVAC Trade shall:

1. Install all automatic air (outdoor-air, return-air, exhaust-air, ventilation-air) control dampers furnished by the ATC Subcontractor.
2. Install all control valves furnished by the ATC Subcontractor.
3. Install all airflow monitoring devices unless provided with equipment and openings for flow switches and alarms furnished by the ATC Subcontractor.
4. Install all control devices, alarms and monitoring devices for all air and water systems required by the Drawings and the Specifications.
5. Mount/install all duct mounted smoke detectors.
6. Provide all required access doors.

1.4 DEFINITIONS

A. DDC: Direct digital control.

B. I/O: Input/output.

C. LonWorks: A control network technology platform for designing and implementing interoperable control devices and networks.

D. MS/TP: Master slave/token passing.

E. PC: Personal computer.

F. PID: Proportional plus integral plus derivative.

G. RTD: Resistance temperature detector.

1.5 SYSTEM PERFORMANCE

A. Comply with the following performance requirements:

1. Graphic Display: Display graphic with minimum 20 dynamic points with current data within 10 seconds.
2. Graphic Refresh: Update graphic with minimum 20 dynamic points with current data within 8 seconds.
3. Object Command: Reaction time of less than two seconds between operator command of a binary object and device reaction.
4. Object Scan: Transmit change of state and change of analog values to control units or workstation within six seconds.
5. Alarm Response Time: Annunciate alarm at workstation within 45 seconds. Multiple workstations must receive alarms within five seconds of each other.
6. Program Execution Frequency: Run capability of applications as often as five seconds, but selected consistent with mechanical process under control.
7. Performance: Programmable controllers shall execute DDC PID control loops, and scan and update process values and outputs at least once per second.
8. Reporting Accuracy and Stability of Control: Report values and maintain measured variables within tolerances as follows:

a. Water Temperature: Plus or minus 1 deg F (0.5 deg C).
b. Water Flow: Plus or minus 5 percent of full scale.
c. Water Pressure: Plus or minus 2 percent of full scale.
d. Space Temperature: Plus or minus 1 deg F (0.5 deg C).
e. Ducted Air Temperature: Plus or minus 1 deg F (0.5 deg C).
f. Outside Air Temperature: Plus or minus 2 deg F (1.0 deg C).
g. Dew Point Temperature: Plus or minus 3 deg F (1.5 deg C).
h. Temperature Differential: Plus or minus 0.25 deg F (0.15 deg C).
i. Relative Humidity: Plus or minus 5 percent.
j. Airflow (Pressurized Spaces): Plus or minus 3 percent of full scale.
k. Airflow (Measuring Stations): Plus or minus 5 percent of full scale.
l. Airflow (Terminal): Plus or minus 10 percent of full scale.
m. Air Pressure (Space): Plus or minus 0.01-inch wg (2.5 Pa).
n. Air Pressure (Ducts): Plus or minus 0.1-inch wg (25 Pa).
o. Electrical: Plus or minus 5 percent of reading.

1.6 SEQUENCE OF OPERATION

A. Refer to Division 23 Section “Sequence of Operation for HVAC Controls” for required operating sequences for each HVAC system, equipment item and component.

1.7 GENERAL PRODUCT DESCRIPTION

A. The building automation system shall consist of the following:

1. Stand-alone Application Specific DDC Controllers (ASCs).
2. DDC Network Panel.

B. The system shall be modular in nature and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, Application Specific Controllers and operator devices.

C. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution. Each DDC Controller shall operate independently by performing its own specified control, alarm management, operator I/O and data collection. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.

D. The DDC system hardware and software installed for this project must maintain compatibility with systems developed in the future. It is a requirement that the ATC Subcontractor support this "Forward and Backward Compatibility" claim with written company literature and local references of facilities where the company's former DDC system ties into their current DDC system.

1.8 QUALITY ASSURANCE

A. Materials and equipment shall be the catalogued products of the manufacturer. The ATC Subcontractor personnel shall have been regularly engaged in production and installation of automatic temperature control systems for a minimum of 5 years. The control system shall be the manufacturer's latest standard design that complies with the specification requirements.

B. Install system using competent workers who are regularly employed and fully trained by the ATC Subcontractor in the installation of temperature control equipment. The ATC shall provide adequate staff to engineer, supervise, program and commission the control system in a timely manner. In addition, ATC shall maintain fully equipped service trucks to provide full warranty service available 24 hours a day, 7 days a week with a minimum 4-hour response time.

C. Single source responsibility of supplier shall be the complete installation and proper operation of the BAS and control system and shall include debugging and proper calibration of each component in the entire system.

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

E. Electronic equipment shall conform to the requirements all government regulations.

1.9 SUBMITTALS

A. Manufacturer's Product Data including:

1. Hardware--cutsheets, product descriptions, and engineering information.
2. Engineering--design requirements for initial installations and/or additions to existing systems.
3. Installation--mounting and connection details for field hardware, accessories, and central site equipment.
4. Field hardware set-up, checkout, and tuning techniques.
5. Central site set-up, software loading, and checkout techniques.

B. Shop Drawings:

1. Drawings shall show proposed layout and installation of all equipment and the relationship to other parts of the work. Shop drawings shall include the following:

    a. Bill of materials of equipment indicating quantity, manufacturer, and model number.
    b. Schematic flow diagrams of:

        1) Each controlled HVAC central system showing dampers, valves, and control devices.
        2) Each controlled HVAC equipment item showing components fans, coils, dampers, valves, and control devices.

    c. Complete wiring diagrams showing all power, signal, and control wiring. Include wire types.
    d. Details of control panel faces, including controls, instruments, and labeling.
    e. Written description of sequence of operation.
    f. Schedule of dampers including size, leakage, and flow characteristics. Include damper size and type, actuator type, torque and damper actuator part numbers.
    g. Schedule of valves including flow characteristics. Include valve size and type, actuator type, torque and valve actuator part numbers.
    h. Points list for each HVAC system or HVAC equipment item being controlled.
    i. Tag number of devices and any other details required to demonstrate that the system will function properly.

2. Shop drawings shall clearly indicate intended sequence of operation for all equipment.
3. For DDC system include configuration diagrams showing all panel types and locations. Submittal data shall include descriptions of software, calculations, communications network and workstations. Submit software flowcharts or program printouts to verify compliance with specifications. Include the overall point's list. Revisions made as a result of the submittal process, during the installation, start-up or acceptance portion of the project, shall be accurately reflected in the "as-built" graphic software flow diagrams herein required by this specification.
4. Shop drawings shall include a list of color graphics indicating monitored systems, data (connected and calculated) point addresses, output schedule, and operator notations.
5. Scaled drawings showing the location of all wall mounted DDC panels, wall mounted sensors, and similar devices.

C. Where installation procedures, or any part thereof, are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Architect/Engineer prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received.

D. Project Specific User Manual to be provided at time of training:

1. System reference material shall contain as a minimum, an overview of the system, its organization, the concepts of networking and central site/field hardware relationships as well as the following:

    a. Activating the central site
    b. Central site screen menus and their definitions

c. Establishing setpoints and schedules
d. Uploading and downloading software, setpoints, schedules, operating parameters and status between the central site and field hardware
e. Collecting trend data and generating trend plots
f. Enabling alarms and messages
g. Report generation
h. Backing up software and data files
i. Using the central site with 'third party' software

2. Software Documentation:

a. Shall contain a listing of the alarm and message conditions, which may be detected for each piece of controlled equipment and the standard alarm and message texts, which can be displayed when those conditions exist.
b. A graphic flow diagram for each software application program provided as part of this project.
c. Graphics generation.
d. At the completion of the project and after final acceptance of the system, the ATC Subcontractor shall provide a complete backup of all system software on CD. Include:

1) Final “As-Built” version of graphics
2) Final “As-Built” version of DDC controller programming

1.10 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provisions of Division 01.

B. Include systems descriptions, set points, and controls settings and adjustments.

C. Include inspection period, cleaning methods, recommend cleaning materials, and calibration tolerances.

D. Provide owner instruction under provisions of Division 01. Use operation and maintenance data as a training manual.

1.11 SEQUENCING, SCHEDULING, AND COORDINATION

A. Coordinate work under provisions of General and Supplementary Conditions, Division 01 and Division 23, and ensure system is completed and commissioned by Date of Substantial Completion.

B. Coordinate installation of system components with installation and checkout of mechanical systems equipment such as rooftop units, VAV terminal boxes, etc.

1.12 WARRANTY

A. Base Bid: All devices and components shall be warranted for a period of two (2) years following the date of final acceptance by the Owner. The warranty period shall not start until all systems under project are accepted by the Owner. No partial warranty shall be permitted.

1. This warranty shall include all labor and material. Any defects arising during the warranty period shall be corrected without cost to the Owner. During the warranty period, the contractor's service personnel shall be available to be physically present at the facility within twenty-four (24) hours for emergency repairs.

1.13 DELIVERY, STORAGE, AND HANDLING

A. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to equipment manufacturer.

B. System Software: Update to latest version of software at Project completion.

1.14 COORDINATION

A. Coordinate location of thermostats, humidistats, and other exposed control sensors with Owner and Architect before installation. Obtain approval for final locations from Owner and Architect prior to installation.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Schneider Electric Smart Structure (furnished and installed by Combustion Service Equipment Company located at 2016 Babcock Boulevard, Pittsburgh, PA).

B. Siemens (Located at 600 Bursca Drive, Bridgeville, PA).

C. Johnson Controls (furnished and installed by OZ Enterprises located at 2415 Kings Lane, Pittsburgh, PA 15241).

D. Approved Equal.

2.2 GENERAL

A. The Owner shall have full rights to all programming software and to all passwords.

B. Control signal from the Building Automation System (BAS) to all controlled components shall be the analog type signal. Pulse signals, or floating point control signals, are not acceptable.

C. All DDC controls shall be fully BACNet, LONWorks, and/or MODBus compatible and shall be EtherNet compatible.

2.3 WEB-BASED ACCESS TO BAS

A. Provide a web-based interface to allow Owner the capability of bi-directional access to the new Building Automation System (BAS). The system shall support unlimited users using standard web browsers such as Internet Explorer and Firefox. The web server software shall operate on standard industry PC servers. Proprietary servers or “black boxes” are not acceptable. Web browser software shall be manufactured by the control system manufacturer and shall have the same look and feel as the operating system.

B. For Local Area Network installations provide access to the control system via the Internet. The owner shall provide a connection to the Internet via high-speed cable modem, ADSL, ISDN, T1 or through the facility ISP. The owner shall pay for all monthly Internet access fees and connection charges.

C. Web-based features shall include:

1. Access to the BAS using workstation browsers, cell phones, and portable computers.
2. Complete control of system operating parameters, such as schedules and setpoints, from virtually any modern communications device inside or outside of the building.
3. The ability to use secure socket layers (SSL), wireless-access-protocol devices, digital subscriber lines, virtual private networks, and other emerging network architectures and technologies that are being developed for the entire Web community.
4. Ability to monitor and control the EMS through any computer with web browser software and Internet or network access, not only certain computers running proprietary software.
5. Reuse existing graphics for web pages or automatically generate web pages utilizing the same tools that are used to engineer the control system graphics. The web pages must be in sync with the actual control system. Systems in which the web pages must be hand crafted separately and which will have a different look than the EMS graphics will not be acceptable.
6. Provide built-in firewall security to protect network. Use industry standard encryption of all communications between the web-based interface and the user.

D. Web Browser Clients:

1. System shall support web clients using a standard Web browser such as Internet Explorer, Firefox, etc.
2. Web browser software shall run on Microsoft Windows platforms.
3. Web browser shall provide the same view of the system, in terms of graphics, logs, alarms, and provide the same interface methodology as is provided by the HMI.
4. Web browser client shall support at a minimum, the following functions:

    a. User log-on identification and password shall be required. If an unauthorized user attempts access the log-on screen is re-displayed. Security using Java authentication and encryption techniques to prevent unauthorized access shall be implemented.
    b. HTML programming shall not be required to display system graphics or data on a Web page. HTML editing of the Web page shall be allowed if the user desires a specific look or format.

c. Storage of graphical screens shall be in the Web Server without requiring any graphics to be stored on the client machine.
d. Real-time values displayed on a Web page shall update automatically without requiring a manual “refresh” of the Web page.
e. Users shall have administrator-defined access privileges. Depending on the access privileges assigned, the user shall be able to perform the following:

1) Modify common application objects, such as set points, in a graphical manner.
2) Commands to start and stop binary objects shall be done by clicking or double clicking, the selected object and selecting the appropriate command from the pop-up menu.
3) View logs, charges, and trend reports.
4) View and acknowledge alarms.

f. Loading of additional software at the web-client is not acceptable. This must be performed via upload from the web-server.
g. Graphic screens on the Web Browser client shall support hypertext links to other locations on the Intranet sites, by specifying the Uniform Resource Locator (URL) for the desired link.

2.4 DDC NETWORK PANEL

A. Each Network Panel shall have sufficient memory to support its own operating system and databases, including: Control processes; Energy management applications; Alarm management applications including custom alarm messages for each level alarm for each point in the system; historical/trend data for points all hardwired I/O points and all set-points; maintenance support applications; custom processes; operator I/O; web-based communications; and manual override monitoring.

B. DDC Network Panel shall provide at least two RS-232C serial data communication ports for operation of operator I/O devices such as industry standard printers, operator terminals, modems and portable laptop operator's terminals. DDC Network Panel shall allow temporary use of portable devices without interrupting the normal operation of permanently connected printers or terminals.

C. Network Panel shall continuously perform self-diagnostics, communication diagnosis and diagnosis of all panel components. The DDC Controller shall provide both local and remote annunciation of any detected component failures, low battery conditions or repeated failure to establish communication.

D. Isolation shall be provided at all peer-to-peer network terminations, as well as all field point terminations to suppress induced voltage transients consistent with IEEE Standards 587-1980.

E. In the event of the loss of normal power, there shall be an orderly shutdown of all DDC controllers to prevent the loss of database or operating system software. Non-volatile memory shall be incorporated for all critical controller configuration data and battery backup shall be provided to support the real-time clock and all volatile memory for a minimum of 72 hours.

1. Upon restoration of normal power, the DDC controllers shall automatically resume full operation without manual intervention.

2. Should DDC controller's memory be lost for any reason, the user shall have the capability of reloading the DDC controllers via the local RS-232C port, via telephone line dial-in or from a network workstation PC.

F. A single process shall be able to incorporate measured or calculated data from any and all other DDC Controllers on the network. In addition, a single process shall be able to issue commands to points in any and all other DDC Controllers on the network.

G. DDC Network Panel shall have the ability to perform any or all the following energy management routines:

1. Time-of-day scheduling, Calendar-based scheduling, Holiday scheduling, temporary schedule overrides
2. Start-Stop Time Optimization, Automatic Daylight Savings Time Switchover, Night setback control
3. Economizer switchover Fan speed/CFM control
4. Peak demand limiting, Temperature-compensated duty cycling

H. Processes shall be able to generate operator messages and advisories to operator I/O devices. A process shall be able to directly send a message to a specified device or cause the execution of a dial-up connection to a remote device such as a cell phone or pager.

I. Alarm management shall be provided to monitor and direct alarm information to operator devices. Each DDC Network Panel shall perform distributed, independent alarm analysis and filtering to minimize operator interruptions due to non-critical alarms, minimize network traffic and prevent alarms from being lost. At no time shall the ability to report alarms be affected by either operator or activity at a PC workstation, local I/O device or communications with other panels on the network.

J. A variety of historical data collection utilities shall be provided to manually or automatically sample, store and display system data for all points identified by the Owner. The ATC Subcontractor shall trend all hardwired I/O points as well as all set points.

1. Provide additional functionality that allows the user to view trended data on trend graph displays. Displays shall be actual plots of both static and/or real-time dynamic point data. A minimum of 4 points may be viewed simultaneously on a single graph, with color selection and line type for each point being user-definable. Displays shall include an 'X' axis indicating elapsed time and a 'Y' axis indicating a range scale in engineering units for each point. The 'Y' axis shall have the ability to be manually or automatically scaled at the user's option. Different ranges for each point may be used with minimum and maximum values listed at the bottom and top of the 'Y' axis. All 'Y' axis data shall be color-coded to match the line color for the corresponding point.

K. DDC Controllers shall automatically accumulate and store run-time hours for digital input and output points as specified in the point I/O summary. DDC Controllers shall automatically sample, calculate and store consumption totals on a daily, weekly or monthly basis. DDC Controllers shall have the ability to count events such as the number of times a pump or fan system is cycled on and off.

L. DDC Network Panel shall provide optimal start/stop feature that integrates schedules and DDC controller setpoints and temperatures to optimize setpoint temperatures with occupancy and

unoccupancy modes. Must include adaptive modeling to self-correct by using historical data of thermal characteristics of building.

M. Multiple-level password access protection shall be provided to allow the user/manager to limit workstation control, display and data base manipulation capabilities as he deems appropriate for each user, based upon an assigned password. Provide a minimum of 5 levels of access control.

N. Reports shall be generated and directed to workstation displays, printers or disk. As a minimum, the system shall allow the user to easily obtain the following types of reports:

1. A general listing of all points in the network
2. List of all points in alarm, in override status, locked out, disabled
3. DDC Controller trend overflow warning
4. List all weekly schedules and holiday programming
5. List of limits and deadbands

O. The system shall be provided complete with all equipment and documentation necessary to allow an operator to independently perform the following functions:

1. Add/delete/modify stand-alone DDC Network Panels, application specific controllers, PC interface.
2. Add/delete/modify points of any type and all associated point parameters, tuning constants, control loops, custom control processes.
3. Add/delete/modify alarm reporting definition, energy management applications, totalization, historical data trending.
4. Add/delete/modify time and calendar-based programming, graphic displays, operator passwords.

P. Provide automatic web-based and dial–up communications as specified. Automatic dial-up communications shall include the following features as a minimum:

1. Dial-Out - Manual dial-out to cell phones and pagers shall be accomplished using only a mouse to select and request the desired remote connection.

Q. Ethernet LAN communications cards:

1. Ethernet LAN communications cards shall be provided and employed as the means of communications between all DDC control panels and application specific controllers.

2.5 APPLICATION SPECIFIC CONTROLLERS (ASC)

A. Each ASC shall operate as a stand-alone controller capable of performing its specified control responsibilities independently of other controllers in the network. Each ASC shall be a microprocessor-based, multi-tasking, real-time digital control processor.

B. Controllers shall include all point inputs and outputs necessary to perform the specified control sequences. Provide each central system controller with sufficient memory to accommodate point databases, operating programs, local alarming and local trending. All databases and programs shall be stored in non-volatile EEPROM or a minimum of 72-hour battery backup shall

be provided. All programs shall be field-customized to meet the user's exact control strategy requirements.

C. Local alarming and trending capabilities shall be provided for convenient troubleshooting and system diagnostics. Alarm limits and trend data information shall be user-definable for any point.

D. Each controller shall have connection provisions for a portable operator's terminal. This tool shall allow the user to display, generate or modify all point databases and operating programs. All new values and programs may then be restored to EEPROM via the programming tool.

E. Each controller performing space temperature control shall be provided with a matching room temperature sensor. The sensor may be either RTD or thermistor type providing the following minimum performance requirements are met:

- Accuracy: ± 0.5°F
- Operating Range: 35° to 115°F
- Set Point Adjustment Range: 55° to 95°F
- Set Point Modes: Independent Heating, Cooling, Night Setback-Heating, Night Setback-Cooling
- Calibration Adjustments: None required
- Installation: Up to 100 ft. from Controller

1. Each room temperature sensor shall include a terminal jack integral to the sensor assembly. The terminal jack shall be used to connect a portable operator's terminal to control and monitor all hardware and software points associated with the controller. In lieu of an internal jack, provide a separate terminal jack mounted on a stainless steel wall plate adjacent to the sensor to facilitate direct access to the controller via the terminal.
2. Each room sensor shall also include the following auxiliary devices: Setpoint Adjustment Dial, Temperature Indicator, and Override Switch.

    a. The setpoint adjustment dial shall allow for modification of the temperature by the occupant. Setpoint adjustment may be locked out, overridden, or limited as to time or temperature through software by an authorized operator at a web-based workstation, DDC Controller, or via the portable operator's terminal.
    b. An override switch shall initiate override of the night setback mode to normal (day) operation when activated by the occupant. The override function may be locked out, overridden or limited as to the time through software by an authorized operator at the central workstation, DDC Controller or via the portable operator's terminal.

3. Provide flush-mount type sensors for all rooms. These shall be Siemens model 540-520 or equivalent.
4. Coordinate the final check-out of the terminal units with the Testing and Balancing Subcontractor.

F. Each controller shall perform its primary control function independent of other DDC controller or if communication is interrupted. Reversion to a fail-safe mode of operation during communications interruption is not acceptable. The controller shall receive its real-time data from the DDC Network Panel time clock to insure continuity. Each controller shall include algorithms incorporating proportional, integral and derivative (PID) gains for all applications. All PID gains and biases shall be field-adjustable by the user via terminals as specified herein.

This functionality shall allow for tighter control of space conditions and shall facilitate optimal occupant comfort and energy savings.

2.6 PC-BASED OPERATOR WORKSTATION

A. Any Owner furnished personal computer shall be capable of being utilized as an operator workstation via web-based access for command entry, information management, network alarm management and database management functions. All real-time control functions shall be resident in the DDC Controllers to facilitate greater fault tolerance and reliability.

1. If graphics and other software must be resident on an Owner furnished personal computer, the ATC Subcontractor shall coordinate with the Owner to determine which Owner furnished personal computer(s) shall be provided with the software.

B. Basic Interface Description:

1. Web-based operator workstation interface software shall minimize operator training through the use of English language prompting, English language point identification and industry standard PC application software. The software shall provide, as a minimum, the following functionality:

    a. Scheduling and override of building operations
    b. Complete alarm reporting and manipulation
    c. Configuration of all reports and point summaries
    d. Collection and analysis of historical data
    e. Editing, programming, storage and downloading of controller databases
    f. Graphical viewing and control of environment

2. Definition and construction of dynamic color graphic displays.
3. Provide a graphical user interface which shall minimize the use of a typewriter style keyboard through the use of a mouse or similar pointing device and "point and click" approach to menu selection. Users shall be able to start and stop equipment or change setpoints from graphical displays through the use of a mouse or similar pointing device
4. The software shall provide a multi-tasking type environment that allows the user to run several applications simultaneously. The mouse shall be used to quickly select and switch between multiple applications. This shall be accomplished through the use of Microsoft Windows or similar industry standard software that supports concurrent viewing and controlling of systems operations.
5. Multiple-level password access protection shall be provided to allow the user/manager to limit workstation control, display and data base manipulation capabilities as he deems appropriate for each user, based upon an assigned password.

    a. A minimum of five levels of access shall be supported:
    b. A minimum of 50 unique passwords, including user initials, shall be supported. Operators will be able to perform only those commands available for their respective passwords. Menu selections displayed shall be limited to only those items defined for the access level of the password used to log-on.
    c. The system shall automatically generate a report of log-on/log-off time and system activity for each user. User-definable, automatic log-off timers of from 5 to 60 minutes shall be provided to prevent operators from inadvertently leaving devices on-line.

6. Reports shall be generated and directed to workstation displays, printers or disk. As a minimum, the system shall allow the user to easily obtain the following types of reports:

    a. A general listing of all points in the network
    b. List of all points in alarm, in override status, locked out, disabled
    c. DDC Controller trend overflow warning
    d. List all weekly schedules and holiday programming
    e. List of limits and deadbands

C. Scheduling:

1. Provide a graphical spreadsheet-type format for simplification of time-of-day scheduling and overrides of building operations. Provide the following spreadsheet graphic types as a minimum.
2. Weekly schedules shall be provided for each building zone or piece of equipment with a specific occupancy schedule. Each schedule shall include columns for each day of the week as well as holiday and special day columns for alternate scheduling on user-defined days. Equipment scheduling shall be accomplished by simply inserting occupancy and vacancy times into appropriate information blocks on the graphic. In addition, temporary overrides and associated times may be inserted into blocks for modified operating schedules. After overrides have been executed, the original schedule will automatically be restored.
3. Zone schedules shall be provided for each building zone as previously described. Each schedule shall include all commandable points residing within the zone. Each point may have a unique schedule of operation relative to the zone's occupancy schedule, allowing for sequential starting and control of equipment within the zone. Scheduling and rescheduling of points may be accomplished easily via the zone schedule graphic.
4. Monthly calendars for a 24-month period shall be provided which allow for simplified scheduling of holidays and special days in advance. Holidays and special days shall be user-selected with the pointing device and shall automatically reschedule equipment operation as previously defined on the weekly schedules.

D. Collection and Analysis of Historical Data:

1. Provide trending capabilities that allow the user to easily monitor and preserve records of system activity over an extended period of time. All system I/O points and set-points will be automatically trended and any other system points selected by the owner may be trended automatically at time-based intervals or changes of value, both of which shall be user-definable. Trend data may be stored on hard disk for future diagnostics and reporting.
2. Trend data report graphics shall be provided to allow the user to view all trended point data. Reports may be customized to include individual points or pre-defined groups of at least 6 points. Provide additional functionality to allow any trended data to be transferred easily to an off-the-shelf spreadsheet package such as Excel Spreadsheet. This shall allow the user to perform custom calculations such as energy usage, equipment efficiency and energy costs and shall allow for generation of these reports on high-quality plots, graphs and charts.
3. Provide additional functionality that allows the user to view trended data on trend graph displays. Displays shall be actual plots of both static and/or real-time dynamic point data. A minimum of 4 points may be viewed simultaneously on a single graph, with color selection and line type for each point being user-definable. Displays shall include an 'X' axis indicating elapsed time and a 'Y' axis indicating a range scale in engineering units for

each point. The 'Y' axis shall have the ability to be manually or automatically scaled at the user's option. Different ranges for each point may be used with minimum and maximum values listed at the bottom and top of the 'Y' axis. All 'Y' axis data shall be color-coded to match the line color for the corresponding point.

a. Static graphs shall represent actual point data that has been trended and stored on disk. Exact point values may be viewed on a data window by pointing or scrolling to the place of interest along the graph. Provide capability to print any graph on the system printer for use as a building management and diagnostics tool.
b. Dynamic graphs shall represent real-time point data. Any point or group of points may be graphed, regardless of whether they have been predefined for trending. The graphs shall continuously update point values. At any time the user may redefine sampling times or range scales for any point. In addition, the user may pause the graph and take "snapshots" of screens to be stored on the workstation disk for future recall and analysis. As with static graphs, exact point values may be viewed and the graphs may be printed.

E. Dynamic Color Graphic Displays:

1. Color graphic floor plan displays and system schematics for each piece of mechanical equipment shall be provided by the ATC Subcontractor to optimize system performance analysis and speed alarm recognition. As indicated in the point I/O summary, these shall include air handling units, chilled water systems and hot water boiler systems, etc.
2. The operator interface shall allow users to access the various system schematics and floor plans via a graphical penetration scheme, menu selection or text-based commands.
3. Dynamic temperature values, humidity values, flow values and status indication shall be shown in their actual respective locations and shall automatically update to represent current conditions without operator intervention.
4. The windowing environment of the PC operator workstation shall allow the user to simultaneously view several graphics at a time to analyze total building operation or to allow the display of a graphic associated with an alarm to be viewed without interrupting work in progress.
5. Graphic generation software shall be provided to allow the user to add, modify or delete system graphic displays.

a. The ATC Subcontractor shall provide libraries of pre-engineered screens and symbols depicting standard air handling unit components (e.g., fans, cooling coils, filters, dampers, etc.), complete mechanical systems (e.g., constant volume-terminal reheat, VAV, etc.) and electrical symbols.
b. Graphical displays can be created to represent any logical grouping of system points or calculated data based upon building function, mechanical system, building layout or any other logical grouping of points which aids the operator in the analysis of the facility. To accomplish this, the user shall be able to build graphic displays that include point data from multiple DDC Controllers.

F. System Configuration and Definition:

1. All temperature and equipment control strategies and energy management routines shall be definable by the operator. System definition and modification procedures shall not interfere with normal system operation and control.
2. The system shall be provided complete with all equipment and documentation necessary to allow an operator to independently perform the following functions:

a. Add/delete/modify stand-alone DDC Global Control panels, Application Specific Controllers, Operator Workstations
b. Add/delete/modify points of any type and all associated point parameters, tuning constants, control loops, custom control processes
c. Add/delete/modify alarm reporting definition, energy management applications, totalization, historical data trending
d. Add/delete/modify time and calendar-based programming, graphic displays, operator passwords

G. Additional Workstation Software:

1. Provide automatic dial-up communications to cell phones and pagers as specified. Automatic dial-up communications shall include the following features as a minimum:
2. Dial-Out
3. Manual dial-out from the workstation to cell phones and pagers shall be accomplishable using only a mouse to select and request the desire remote connection.
4. Dial-Out.
5. Alarms shall automatically be sent to one or more workstations for display at the terminal and for hard copy printout.

a. Alarm Management: Alarms shall be placed into the following categories and the Operator shall be notified of the alarm and its category:

1) Critical - Events that may result in building damage or occupant danger such as smoke/fire, freezestat activation, liquid detector, low space temperature, and power outage. With this alarm, up to 5 of the Owner's service representatives shall be notified automatically via telephone or pager.
2) Urgent - Events that may result in occupants being uncomfortable for a short period such as high temp, high humidity, etc. With this alarm, up to 5 of the Owner's service representatives shall be notified automatically via text message.
3) Maintenance - Events that require routine maintenance such as high filter differential pressure, high CO2, etc.

6. Trend data shall be scheduled for automatic updating to the workstation at operator-selected times. The operator shall also have the option of manually collecting trend data at any time.
7. The DDC system must support the capability of a remote PC or laptop allowing access to DDC system via the web.

2.7 FIELD DEVICES AND EQUIPMENT

A. Temperature Sensors: Temperature transmitters shall be 2-wire, averaging or single point 1000 OHM platinum RTD element with ± .5 degrees accuracy. Room sensors and immersion type sensors shall be the single point type. Duct sensors shall be the averaging type, nickel element, 17 ft. in length evenly strung across the face area of the duct.

1. For units with space sensor or space thermostat, provide the following:

a. Temperature display showing actual measured temperature and setpoint.
b. Setpoint adjustment switch for a minimum of ±3 degrees of adjustment.

c. Override switch to allow switching from unoccupied to occupied mode for a timed period programmed by software.

2. Room Sensor and Room Thermostat Accessories:

a. Thermostat and Sensor Covers: For all thermostats.
b. Insulating Bases: For thermostats located on exterior walls.
c. Thermostat and Sensor Guards: Metal wire guard mounted on separate base for thermostats and sensors located in public areas. Cast aluminum guard with cast aluminum base plate shall be similar to Johnson Controls model GRD10A-601.
d. Adjusting Key: As required for device.

B. Non-DDC Thermostats:

1. Electric Low Limit Duct Thermostat (Freezestat): Snap-acting, double pole, double throw, manual reset switch which trips if temperature sensed across any 12 inches of bulb length is equal to or below setpoint, requiring minimum 20 feet length of bulb. Provide one thermostat for every 20 sq. ft.
2. Line-Voltage, On-Off Thermostats: Bimetal-actuated, open contact or bellows-actuated, enclosed, snap-switch type or equivalent solid-state type with heat anticipator, integral manual Auto-Off selector switch subbase. UL listed for electrical rating.

C. Other Electronic Sensors:

1. Current Sensing Relays: Provide current status switch for pump and fan status. Must be able to detect belt loss and motor failure. Switch shall be 100% solid state and have adjustable setpoint from 1 to 135 Amps. Veris Industries Hawkeye model H-708 or equivalent.
2. Humidity Sensors: bulk polymer sensor element. Multiple signal and power output including 4-20 ma, 0-10vDC; loop and 24v power.

a. Space RH Transmitter: With locking cover to match room sensors. ±3%, accuracy from 5 to 95% RH.
b. Duct and Outside Air RH Transmitter: With element guard and mounting plate. ±3% accuracy from 5 to 95% RH.
3. Pressure Switches: Install differential pressure switches across each bank of prefilters and final filters at each air handling unit for status indication.
4. Velocity, Differential, and Static Pressure Sensors:

a. Pressure sensors shall be Setra, Modus or equal. The sensors shall have a 0 to .25" w.g. range for space applications and they shall have a range of 0 to 1" W.G. or 0 to 5" w.g. for duct applications unless noted otherwise. The range of the sensor shall be 10 to 25 percent above maximum (negative or positive) for fan control.
b. Air Velocity Sensors: The air velocity transducer shall utilize both a velocity sensor and a temperature sensor to accurately measure air velocity (in SFPM, standard feet per minute). The built-in temperature sensor shall automatically correct the flowrate for temperature variations. Both sensors shall be rugged glass-coated platinum resistance detectors (RTDs). The circuit shall heats the velocity sensor to a constant temperature differential above ambient temperature and shall measure the cooling effect of the air flow providing excellent low velocity sensitivity and high accuracy. The sensor shall have a negligible pressure drop. The mass flowrate in

SCFM (standard cubic feet/minute) shall be obtained by multiplying the SFPM velocity indicated by the by the sensor by the cross-sectional area of the duct in square feet. Accuracy of the sensor shall be 1.5% FS at room temperature. The sensor shall have a 4 to 20 mA output.

c. The sensors shall provide a 4 to 20 milli-amp output and they shall have an end-to-end accuracy of ± .25% with repeatability of 0.5%.

d. Differential Pressure Transmitters:

1) General air and water pressure transmitter requirements shall be as follows:

a) Pressure transmitters shall be constructed to withstand 100% pressure over-range without damage, and to hold calibrated accuracy when subject to a momentary 40% over-range input.

b) Pressure transmitters shall transmit a 0 to 5 VDC, 0 to 10 VDC, or 4 to 20 mA output signal.

c) Differential pressure transmitters used for flow measurement shall be sized to the flow sensing device, and shall be supplied with Tee fittings and shut-off valves in the high and low sensing pick-up lines to allow the balancing Contractor and Owner permanent, easy-to-use connection.

d) A minimum of a NEMA 1 housing shall be provided for the transmitter. Transmitters shall be located in accessible local control panels wherever possible.

5. Ebtron Silver Series duct mounted airflow measurement system or equivalent.

a. Glass encapsulated self-heated thermistor and epoxy encapsulated temperature sensor housed in Noryl. Provide 1 to 4 sensors per probe. Tubular aluminum 6061 support struts and 303 stainless steel support bracket.

b. The duct temperature range is –20 to 160°F for a flow velocity range of 0 to 1500 ft/min. The duct temperature range is 30 to 160°F for a flow velocity range of 0 to 3000 ft/min. Flow station pressure drop shall be less than 0.005 in. WC @ 2,000 ft/min. Flow station humidity range 0 to 99% RH.

c. Sensor velocity accuracy ±2% reading 0-3000 ft/min. Repeatability: ±0.25% scale. Installed airflow accuracy 3-10%.

d. Provide airflow transmitter to connect to airflow probes providing adjustable signal (0-10v or 4-40 ma) to ATC. The enclosure shall be aluminum alloy for indoor use and capable of operating over a temperature range of 30°F to 120°F. The electronics shall be installed inside and protected from weather.

D. Control Valves

1. Globe Pattern:

a. Up to 2 inches: Bronze body, bronze trim, rising stem, renewable composition disc, screwed ends with backseating capacity repackable under pressure.

b. Over 2 inches: Iron body, bronze trim, rising stem, plug-type disc, flanged ends, renewable seat and disc.

2. Butterfly Pattern: Iron body, bronze, aluminum-bronze or stainless steel disc, resilient, replaceable seat for service to 250 degrees F. Wafer or lug ends, extended neck.

a. Size for 3 psig maximum pressure drop at design flow rate.

3. Terminal Unit Control Valve: Bronze body, bronze trim, 2 or 3 ports as indicated, replaceable plugs and seats, union and threaded ends.
4. Hydronic Systems:

a. Rate for service pressure of 125 psig at 250 degrees F.
b. Provide valves with replaceable plugs and seats of brass.
c. Size for 5-psig maximum pressure drop (except butterfly valve) at design flow rate.
d. Two-way valves shall have equal percentage characteristics, three way valves linear characteristics.

5. Electric Actuators: Size to operate with sufficient reserve power to provide smooth modulating action or 2-position action to close against pump shutoff head. The actuators shall be spring return type for all outside air and relief air applications.

a. The automatic control valve actuators shall be oil immersed gear train type with a metal housing for all valves that are 2.5 inches up to 6 inches. Spring return models shall have a minimum of 220 inch-pounds of torque. On valves 6 inches or greater, the actuator shall be an industrial type gear train with 800 to 1300 inch-pounds of torque. Provide solid state positioning relays for all modulating actuators. Direct mount actuators shall not be acceptable on valves 2.5 inches or larger.
b. Direct mount actuators shall be gear train type and shall be limited to valves that are 2 inches and smaller. Direct mount actuators shall have a minimum of 90 pound inch of torque.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Install in accordance with manufacturer's instructions.

B. Verify location of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation. Also, confirm locations of thermostats, humidistats, and other exposed control sensors with Architect and/or Owner prior to rough-in. Install devices 48 inches (1220 mm) above the floor to comply with ADA requirements.

1. Install averaging elements in ducts and plenums in crossing or zigzag pattern.

C. Mount outdoor reset thermostats and outdoor sensors indoors, with sensing elements outdoors. Provide sun shield for sensing element.

D. Provide separable sockets for liquids and flanges for air bulb elements.

E. Install guards on thermostats in the following locations:

1. Entrances.
2. Public spaces.

F. Install software in control units and operator workstation(s). Implement all features of programs to specified requirements and as appropriate to sequence of operation.

G. Connect and configure equipment and software to achieve sequence of operation specified.

H. Install automatic air dampers where required by Division 23 Section "Sequence of Operation for HVAC Controls."

1. Install standard automatic air dampers in supply airstreams and return airstreams where both sides of the damper will be exposed to conditioned air.
2. Install low temperature thermally broken automatic air dampers in exhaust airstreams, outdoor airstreams and relief airstreams where one side of the damper will be exposed to ambient conditions or unconditioned air.

I. Install damper motors on outside of duct in warm areas only. Do not install damper motors in locations exposed to outdoor temperatures.

J. Install labels and nameplates to identify control components in accordance with Division 23 Section "Identification for HVAC Piping and Equipment."

K. Install hydronic instrument wells, valves, and other accessories in accordance with Division 23 Section "Hydronic Piping."

3.2 WIRING INSTALLATION

A. Run all line voltage control wiring in conduit in accordance with the National Electric Code and the requirements specified in Division 26, Sections “Basic Electrical Requirements;” “Basic Electrical Materials and Methods,” “Raceways;” “Wires and Cables;” “Cabinets, Boxes, and Fittings;” “Supporting Devices;” and “Electrical Identification.”

B. Power for controls shall be obtained from the nearest normal/emergency power panel.

C. All low voltage power wiring shall be as described below:

1. Provide "plenum-rated" cable for low voltage wiring.

a. Except where otherwise prohibited by applicable codes, conductors and cables operating at less than 30 volts and having "plenum type" insulation listed for compliance with NEC Article 300-22(c) are permitted to be installed without raceways above accessible suspended acoustic ceilings. Accessible suspended ceilings are defined as those having access panels, unsplined tiles for access purposes, and unclipped lay-in tiles for access purposes, or other approved access means at intervals of not more than 20 feet from one another.
b. Where conductors or cables are installed in compliance with the above, the cables shall be neatly supported clear of the ceiling system by means of approved pre-formed nylon tie devices. Supports shall be accessible. Maintain a minimum spacing of than 18" between parallel runs of control wiring and wiring of other systems.

2. Run control wiring in EMT conduit in Mechanical rooms and other exposed wall and ceiling locations.

D. Connect manual-reset limit controls independent of manual-control switch positions.

E. Connect hand-off-auto selector switches to override automatic interlock controls when switch is in hand position.

3.3 MANUFACTURER'S FIELD SERVICES

A. Commission and start control systems. Use attached Commissioning Forms and submit completed forms to Owner and Engineer before training and final punchlist.

3.4 ADJUSTING

A. Calibrating and Adjusting:

1. Calibrate instruments.
2. Make three-point calibration test for both linearity and accuracy for each analog instrument.
3. Calibrate equipment and procedures using manufacturer's written recommendations and instruction manuals. Use test equipment with accuracy at least double that of instrument being calibrated.
4. Control System Inputs and Outputs:

    a. Check analog inputs at 0, 50, and 100 percent of span.
    b. Check analog outputs using milliampere meter at 0, 50, and 100 percent output.
    c. Check digital inputs using jumper wire.
    d. Check digital outputs using ohmmeter to test for contact making or breaking.
    e. Check resistance temperature inputs at 0, 50, and 100 percent of span using a precision-resistant source.

5. Flow:

    a. Set differential pressure flow transmitters for 0 and 100 percent values with 3-point calibration accomplished at 50, 90, and 100 percent of span.
    b. Manually operate flow switches to verify that they make or break contact.

6. Pressure:

    a. Calibrate pressure transmitters at 0, 50, and 100 percent of span.
    b. Calibrate pressure switches to make or break contacts, with adjustable differential set at minimum.

7. Temperature:

    a. Calibrate resistance temperature transmitters at 0, 50, and 100 percent of span using a precision-resistance source.
    b. Calibrate temperature switches to make or break contacts.

8. Stroke and adjust control valves and dampers without positioners, following the manufacturer's recommended procedure, so that valve or damper is 100 percent open and closed.

9. Stroke and adjust control valves and dampers with positioners, following manufacturer's recommended procedure, so that valve and damper is 0, 50, and 100 percent closed.
10. Provide diagnostic and test instruments for calibration and adjustment of system.
11. Provide written description of procedures and equipment for calibrating each type of instrument. Submit procedures review and approval before initiating startup procedures.

B. Adjust initial temperature and humidity set points.

C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide a minimum of two (2) visits to Project during other than normal occupancy hours for this purpose.

3.5 DEMONSTRATION

A. Provide all verification testing prior to functional performance testing.

B. Provide systems demonstration under provisions of Division 01.

C. Demonstrate complete operation of systems including Sequence of Operation after Date of Substantial Completion. The Owner or his appointed representative shall be given the opportunity to witness the functional performance testing and the successful demonstration of the operating sequences. The ATC Subcontractor shall provide the Owner or his appointed representative a minimum of 14-days notice prior to functional performance testing. Also, the ATC Subcontractor shall provide the Owner or his appointed representative a minimum of 14-days notice prior to demonstration of the operating sequences.

3.6 ON-SITE TESTING

A. Provide Engineer-approved operation and acceptance testing of the complete system. The Engineer, the Owner, and/or Owner representative may witness all tests and shall be given sufficient notice prior to any tests being conducted.

B. Field Test: When installation of the system is complete, calibrate equipment and verify transmission media operation before the system is placed on-line. All testing, calibrating, adjusting and final field tests shall be completed by the installer. Provide a detailed cross-check of each sensor within the system by making a comparison between the reading at the sensor and a standard traceable to the National Bureau of Standards.

C. Provide a cross-check of each control point within the system by making a comparison between the control command and the field-controlled device. For each DDC Controller test DDC software sequence to confirm a match with design sequence. Verify that all systems are operable from local controls in the specified failure mode upon panel failure or loss of power. Submit the results of functional and diagnostic tests and calibrations to the Engineer for final system acceptance as shown on Functional Test Checklist.

D. Compliance Inspection Checklist: Submit the requested items of information to the Owner's Representative and Architect/Engineer for verification of compliance to the project specifications. Failure to comply with the specified information shall constitute non-performance of the contract. The Subcontractor shall submit written justification for each item in the checklist

that he is unable to comply with. The Owner's Representative and the Architect/Engineer will initial and date the checklist to signify Subcontractor's compliance before acceptance of system.

3.7 SERVICE AND GUARANTEE

A. General Requirements: Provide all services, materials and equipment necessary for the successful operation of the entire BAS system for a period of two years after completion of successful performance test. Provide necessary material required for the work. Minimize impacts on facility operations when performing scheduled adjustments and non-scheduled work. Without additional cost, provide software upgrades issued during the warranty period.

B. Description of Work: The adjustment and repair of the system includes all computer equipment, software updates, transmission equipment and all sensors and control devices. Provide the manufacturer's required adjustments and all other work necessary.

C. Personnel: Provide qualified personnel to accomplish all work promptly and satisfactorily. Owner shall be advised in writing of the name of the designated service representative, and of any changes in personnel.

D. Emergency Service: Owner will initiate service calls when the system is not functioning properly. Qualified personnel shall be available to provide service to the complete system. Furnish owner with a telephone number where service representative can be reached at all times. Service personnel shall be at the site within 8 hours after receiving a request for service. Restore the control system to proper operating condition within 24 hours.

E. Operation: Performance of scheduled adjustments and repair shall verify operation of the system as demonstrated by the initial performance test.

F. Systems Modifications: Provide any recommendations for system modification in writing to Owner. Do not make any system modifications, including operating parameters and control settings, without prior approval of Owner. Any modifications made to the system shall be incorporated into the operations and maintenance manuals, and other documentation affected.

G. Software: Provide all software updates during the warranty period and verify operation in the system. These updates shall be accomplished in a timely manner, fully coordinated with the system operators, and shall be incorporated into the operations and maintenance manuals, and software documentation.

3.8 TRAINING

A. The ATC Subcontractor shall provide competent instructors to give full instruction to designated personnel in the adjustment, operation and maintenance of the system installed rather than a general training course. Instructors shall be thoroughly familiar with all aspects of the subject matter they are to teach. It is the intent of the Owner to become thoroughly versed in the operation and programming of the DDC system so as to make full use of system capabilities and be able to revise graphics. All information and documentation necessary to do this work must be provided.

1. Provide 40-hours of on-site training for Owner's operating personnel. Split training into minimum five (5) 8-hour sessions to be completed during the period of warranty.

Coordinate/Schedule training sessions with the Owner a minimum of 14-days in advance. Training shall include:

a. Explanation of drawings, operations, and user manuals
b. Walk-thru of the job to locate control components
c. Explanation of manual and automatic control devices
d. DDC Controller and ASC operation/function
e. Operation of operator's terminal, Central computer workstation and laptop computer
f. Hands on training of Central computer workstation menus and commands to include fully functioning system
g. Operator control functions including graphic generation and field panel programming
h. Explanation of maintenance manuals
i. Explanation of adjustment, calibration, and replacement procedures

B. Since the Owner may require personnel to have more comprehensive understanding of the hardware and software, the ATC Contractor must make additional training available. If the Owner requires such training, it will be contracted at a later date. Provide description of available local and factory customer training.

END OF SECTION 230900

SECTION 230993 - SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

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.

B. All Division 23 Specification Sections also apply to this Section.

1.2 SUMMARY

A. This Section includes control sequences for HVAC systems, subsystems, and equipment.

1.3 DEFINITIONS

A. DDC: Direct digital control.

B. ATC: Automatic Temperature Control.

C. BAS: Building Automation System.

D. AI: Analog Input.

E. AO: Analog Output.

F. DI: Digital Input.

G. DO: Digital Output.

H. VAV: Variable air volume.

I. VF: Variable Frequency.

J. RTU: Rooftop Unit.

1.4 MISCELLANEOUS REQUIREMENTS

A. The control strategies described in this section shall be used in conjunction with the Input/Output Summary Tables attached herein for engineering the control systems and preparing the required control drawings.

B. The Input/Output Summary Tables and the sequence have been made to complement one another. The ATC Contractor shall interpret the sequences and the Input/Output Summary Tables such that if a device is called for in one and not the other, it will be treated as if called for in both.

C. Control of all HVAC equipment shall be through the DDC system and by electric control as specified per individual sequence.

D. Whether indicated or not, all temperature setpoints included in the sequences of this Section shall be adjustable.

PART 2 - PRODUCTS

2.1 Refer to Division 23 Section "Automatic Temperature Control for HVAC" for control equipment and devices.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. The following general applications software shall be required on all appropriate equipment (i.e. rooftop units, terminal unit equipment, etc.) for the purpose of optimizing energy consumption while maintaining occupant comfort:

B. Time of Day Scheduling (TOD): The system shall be capable of the following scheduling features:

1. Scheduling by building, area, zone, groups of zones, individually controlled equipment and groups of individually controlled equipment. Each schedule shall provide beginning and ending dates and times (hours: minutes). A weekly repeating schedule, i.e. between 8:00 a.m. and 5:00 p.m., Monday through Friday shall constitute one schedule, not five.
2. Dated schedules shall be entered up to 9 (nine) years in advance.
3. Schedules shall be self-deleting when effective dates have passed.
4. Leap years shall be adjusted automatically without operator intervention.
5. For maximum speed in the communication of schedules, the operator shall have the ability to communicate schedules at the most efficient level with one scheduling command through the mouse interface. This ranges from system wide to individual zones, groups or pieces of equipment.
6. The system shall allow the operator to designate any combination of equipment to form a group that can be scheduled with a single operator command through the mouse interface at the workstation. Any designated group shall have the capability to be a member of another group.
7. The operator shall be able to make all schedule additions, modifications and deletions using the mouse and appropriate dialog boxes. In addition, the operator shall have the capability to edit all schedules off line and then download any or all schedule changes to the control modules with a single operator command through the mouse interface. In the event that a schedule in the control module is different from the workstation, the operator shall have the capability to upload any or all schedules from the control module to the workstation.
8. The operator shall be able to view a color-coded forecast of schedules for instant overview of facilities schedules. Schedule graphic forecast shall include colored coded indication of all types of schedules, i.e. normal, holiday and override.

C. Optimum Start/Stop (OSS)/Optimum Enable/Disable (OED):

1. Provide software to start and stop equipment on a sliding schedule based on the individual zone temperature and the heating/cooling capacity in øF/hour of the equipment serving that zone. The heating/cooling capacity value shall be operator adjustable. Temperature compensated peak demand limiting shall remain in effect during morning start up to avoid setting a demand peak.

D. Day/Night Setback (DNS):

1. The system shall allow the space temperature to drift down [up] within a preset [adjustable] unoccupied temperature range. The heating [cooling] shall be activated upon reaching either end of the DNS range and shall remain activated until the space temperature returns to the DNS range.
2. The system shall be capable of closing all outside air and exhaust air dampers during the unoccupied period, except for 100% outside air units.
3. Unoccupied space temperature shall be monitored by the DDC temperature sensors located in the individual zones being controlled or within a representative room in the building if full DDC control is not being affected.
4. User shall be able to define, modify or delete the following parameters.

    a. DNS setpoint temperature(s)
    b. Temperature band for night heating operation
    c. Period when the DNS is to be activated

E. Timed Local Override (TLO):

1. The system shall have TLO input points that permit the occupants to request an override of equipment that has been scheduled OFF. The system shall turn the equipment ON upon receiving a request from the local input device. Local input devices shall be push button (momentary contact), wind-up timer, or ON/OFF switches as detailed in the I/O summary.
2. If a push button is used the system operator shall be able to define the duration of equipment ON time per input pulse and the total maximum ON time permitted. Override time already entered shall be canceled by the occupant at the input point. If a wind-up timer is used the equipment will stay in override mode until the timer expires. Year to date, month-to-date and current day override history shall be maintained for each TLO input point. History data shall be accessible by the operator at any time and shall be capable of being automatically stored on hard disk and/or printed on a daily basis.

F. Space Temperature Control (STC):There shall be two space temperature setpoints, one for cooling and one for heating, separated by a dead band. Only one of the two setpoints shall be operative at any time. The cooling setpoint is operative if the actual space temperature has more recently been equal to or greater than the cooling setpoint. The heating setpoint is operative if the actual space temperature has more recently been equal to or less than the heating setpoint. There are two modes of operation for the setpoints, one for the occupied mode (example: heating = 72°F or 22°C, cooling = 76°F or 24.4°C) and one for the unoccupied mode (example: heating = 55°F or 12.7°C, cooling = 90°F or 32°C).

G. The occupied/unoccupied modes may be scheduled by time, date, or day of week.

1. If the actual space temperature is in the dead band between the heating setpoint and the cooling setpoint, the color displayed shall be green for the occupied mode, representing ideal comfort conditions. If in the unoccupied mode, the color displayed shall be gray representing 'after-hours' conditions.
2. If the space temperature rises above the cooling setpoint, the color shall change to yellow.
3. When space temperature falls below the heating setpoint, the color shall change to light blue.
4. All setpoints and offsets shall be operator definable. When in the occupied mode, start-up mode, or when heating or cooling during the night setback unoccupied mode, a request shall be sent over the network to other equipment in the HVAC chain, such as to an AHU fan that serves the space, to run for ventilation. The operator shall be able to disable this request function if desired.
5. When comfort conditions are warmer than ideal, indicated by the color yellow a request for additional cooling shall be sent over the network to other cooling equipment in the HVAC chain, such as a chiller. This information is to be used for optimization of equipment in the HVAC chain. The operator shall be able to disable this function if desired.
6. When comfort conditions are cooler than ideal; indicated by the color light blue, a request for additional heating shall be sent over the network to other heating equipment in the HVAC chain, such as a boiler. This information is to be used for optimization of equipment in the HVAC chain. The operator shall be able to disable this function if desired.
7. The cooling [and heating] setpoints may be increased [decreased] under demand control conditions to reduce the cooling (heating) load on the building during the demand control period. Up to three levels of demand control strategy shall be provided. The operator may predefine the amount of setpoint increase [decrease] for each of the three levels. Each space temperature sensor in the building may be programmed independently.
8. An optimum start-up program transitions from the unoccupied setpoints to the occupied setpoints. The optimum start-up algorithm considers the rate of space temperature rise for heating and the rate of space temperature fall for cooling under nominal outside temperature conditions; it also considers the outside temperature; and the heat loss and gain coefficients of the space envelope (AI: Space Temperature).
9. A PID control loop, comparing the actual space temperature to its setpoint, shall modulate the dampers [and heating coil valve or heating stages in sequence] to achieve the setpoint target.

3.2 VAV ROOFTOP UNIT DISCHARGE DUCT STATIC PRESSURE SETPOINT OPTIMIZATION

A. The building automation system (BAS) shall continuously monitor the damper position of all VAV terminal units. The discharge duct static pressure shall be sensed directly at the discharge of the RTU. The sensor must be mounted in a non-turbulent location.

B. When any VAV damper is more than 95% (adj.) open, the supply fan discharge duct static pressure setpoint shall be reset upward by 0.1 in W.C. (adj.) at a frequency of 15 minutes (adj.) until one of the following occur:

1. No damper is more than 95% open.
2. The static pressure setpoint has reset upward to the system maximum duct static pressure setpoint.
3. The RTU variable-frequency drive is at the maximum speed setting.

C. When all VAV dampers are less than 85% (adj.) open, the supply fan discharge duct static pressure setpoint shall be reset downward by 0.1 in W.C.(adj.) at a frequency of 15 minutes (adj.) until one of the following occur:

1. At least one damper is more than 65% open or the static pressure setpoint has reset downward to the system minimum duct static pressure setpoint
2. The RTU variable-frequency drive is at the minimum speed setting.

D. The control bands, setpoint increment values, setpoint decrement values and adjustment frequencies shall be adjusted to maintain maximum static pressure optimization with stable system control and maximum comfort control.

E. The BAS shall have the capability of performing the following functions:

1. Allow the operator to exclude “problem” zones that should not be considered when determining the optimized setpoint.
2. Read the status of the supply air static pressure sensor and display the active duct static pressure reading on the status screen.
3. Identify, and display to the user, the VAV box that serves the Critical Zone (that is, the zone with the most wide-open VAV damper). This information shall update dynamically as the location of the Critical Zone changes based on building load, and duct static pressure setpoint optimization control.

F. During the commissioning process, the ATC Subcontractor shall demonstrate the performance of fan pressure optimization.

3.3 VARIABLE AIR VOLUME PACKAGED ROOFTOP UNIT RTU-1

A. The variable air volume (VAV) rooftop unit (RTU) shall be controlled via DDC type controls to accomplish the sequence described in this article.

B. The VAV RTU consists of an outside-air damper, a return air damper, a gas-fired heat exchanger, a refrigerant (DX) cooling coil, a supply fan with variable frequency (VF) drive, a refrigerant-based air cooled condensing section, and an exhaust fan with VF drive. All actuators shall be electronic.

1. The unit shall be provided with an airflow station mounted in the outdoor airstream to measure the exact amount of outdoor air the unit introduces into the system. The HVAC Trade shall determine whether the ATC subcontractor or the VAV RTU manufacturer shall provide the airflow station.

C. The VAV RTU will be furnished with microprocessor-based controls along with a BACNet, interface device to accommodate full communication and compatibility with the ATC Subcontractor’s building DDC system. The ATC Subcontractor shall provide all additional controls in order to control the rooftop unit according to the operating sequence described below. The ATC Subcontractor shall coordinate his work with the rooftop unit manufacturer.

1. The HVAC Contractor shall be permitted to have the rooftop unit manufacturer furnish the rooftop unit without automatic temperature controls; if this occurs, the ATC Subcontractor shall provide all automatic temperature controls necessary to control the rooftop unit according to the operating sequence described in this article.

D. The DDC system shall determine through the start/stop optimization program and the time schedule program when to energize the VAV RTU for the warm-up mode prior to the area being occupied. The start/stop optimization program and time schedule program shall also determine when to de-energize the VAV RTU.

E. When the VAV RTU is indexed to the warm-up or cool-down mode, the DDC system shall control it according to the following sequence:

1. During the warm-up mode:

   a. The supply fan(s) shall be energized.
   b. The outside air damper shall be closed and its return air damper shall be open.
   c. The exhaust fan shall be de-energized and its associated motorized damper shall be closed.
   d. The air cooled condensing section shall be de-energized.
   e. The gas-fired heat exchanger shall be energized at full capacity and then shall be staged on and off or modulated to maintain space temperature at a setpoint of 72°F (adjustable).

2. During the cool-down mode:

   a. The supply fan(s) shall be energized and shall run continuously while in the morning cool down mode.

      1) A static pressure sensor, mounted 2/3 the distance from the VAV RTU to the most remote terminal, shall modulate the speed of the fan through its variable frequency drive to maintain the duct static pressure setpoint. The ATC Subcontractor shall determine the proper setpoint for the static pressure sensor during air system balancing operations and control system functional performance testing operations. Refer to the article entitled “VAV RTU Fan (Discharge Duct) Static Pressure Setpoint Optimization” in this Section for additional requirements.

   b. The outside air damper shall be closed and its return air damper shall be open.
   c. The exhaust fan shall be de-energized and its associated motorized damper shall be closed.
   d. The air cooled condensing section shall be energized at its full capacity and then its compressors shall be staged on and off to avoid overshoot and to maintain a space air temperature setpoint of 75°F (adjustable).
   e. The gas-fired heat exchanger shall be de-energized.

F. When the VAV RTU is indexed to the Occupied operating mode, the DDC system shall control it according to the following sequence:

1. Supply Fan: The supply fan shall be energized and shall run continuously.

   a. A static pressure sensor, mounted 2/3 the distance from the VAV RTU to the most remote terminal, shall modulate the speed of the fan through its variable frequency drive to maintain the duct static pressure setpoint. The ATC Subcontractor shall determine the proper setpoint for the static pressure sensor during air system balancing operations and control system functional performance testing operations. Refer to the article entitled “VAV RTU Fan (Discharge Duct) Static Pressure Setpoint Optimization” in this Section for additional requirements.

2. Outdoor Air and Return Air Dampers (Comparative Enthalpy Economizer): When the VAV RTU is initially energized, the normally closed outdoor air damper shall remain in its full closed position and the normally open return air damper shall remain in its full-open position for a period of 60 seconds. After 60 seconds has elapsed, the outdoor air damper and return air damper shall be controlled as follows:

    a. Normal Mode: The outdoor air damper shall be placed in its minimum position to introduce the outdoor air into the system indicated in the schedule on the drawings as determined by an airflow station mounted in the unit's outdoor airstream. As the supply fan speed modulates in response to duct static pressure, the outdoor air dampers and return air dampers shall modulate to maintain the required outdoor airflow rate.
    b. Economizer Mode: When free cooling is available and discharge air temperature is above setpoint, the outside air damper and the return air damper shall be modulated to maintain the unit's discharge air temperature setpoint. The DDC system shall compare the enthalpy of the outside air to the enthalpy of the return/exhaust air to determine whether free cooling is available.

        1) The exhaust fan shall be energized and its associated motorized damper shall be open. The exhaust fan's VF drive shall then be modulated to maintain a differential pressure of 0.03-inches w.g. (adjustable) measured between the space and the outdoors.

3. Cooling Mode:

    1) The DDC system shall first determine whether free cooling is available. If free cooling is available, then the unit's outdoor air damper, return air damper, and exhaust fan and associated motorized damper and shall be controlled as previously described in the subparagraph entitled "Outdoor Air and Return Air Dampers (Comparative Enthalpy Economizer)" in this article.
    2) If free cooling is not available, the DDC system shall stage the compressors of the condensing section on and off to maintain a discharge air temperature cooling setpoint of 55°F (adjustable). If the unit is operating in the heating mode, the associated condensing unit shall be de-energized.
    3) If the primary air damper in all VAV terminal boxes and all fan powered terminal boxes are at their minimum position, the discharge air temperature shall be reset upwards by 0.10°F every 30-seconds (adjustable) until one of the primary air dampers opens beyond its minimum position or until discharge air temperature reaches 60°F (adjustable).

4. Heating Mode:

    1) The DDC system shall modulate the gas furnace to maintain a discharge air temperature heating setpoint of 55°F (adjustable). If the unit is operating in the cooling mode, the furnace shall be de-energized.

5. Dehumidification Mode: Provide space humidity sensor(s) in the return air duct. When space relative humidity rises above setpoint of 55% (adjustable), the RTU shall be placed in its dehumidification mode. When space relative humidity drops to 50% (adjustable), the unit shall be returned to its normal control mode. When placed in its dehumidification mode, the following shall occur:

    a. The compressors in the condensing section shall be energized to provide maximum cooling.

b. Each terminal box hot water reheat coil shall be controlled to maintain its space temperature according to the sequence described in the VAV Terminal Boxes with Hot Water Reheat Coils" article in this Section.

G. When the VAV RTU is indexed to the Unoccupied mode, the DDC system shall control it according to the following sequence:

1. The supply fan(s) shall be de-energized.
2. The outside air damper shall be closed and its return air damper shall be open.
3. The exhaust fan shall be de-energized and its associated motorized damper shall be closed.
4. The air cooled condensing section shall be de-energized.
5. The gas furnace shall be de-energized.

H. Night Setback Mode: If space temperature drops below the night setback temperature setpoint of 60°F (adjustable) when the VAV RTU is in the Unoccupied Mode, the following shall occur:

1. The supply fan(s) shall energize.
2. The outside air damper shall remain closed and its return air damper shall remain open.
3. The exhaust/relief fan shall be de-energized and its associated motorized damper shall be closed.
4. The air cooled condensing section shall be de-energized.
5. The gas furnace shall energize, modulate and/or cycle to maintain night setback temperature setpoint.

I. Smoke Control: A duct mounted smoke detector, located in the return air duct, shall stop the supply fan, close the outside air damper, open the return air damper, de-energize the condensing section, de-energize the gas furnace when products of combustion are detected in the exhaust airstream.

J. DDC Input/Output Points for VAV Rooftop Unit RTU-1:

1. AI Mixed Air Temperature
2. AI Discharge Air Temperature (at unit outlet)
3. AI Space Air Temperature
4. AI Space/Return Air Humidity
5. AI Outdoor Air Temperature
6. AI Outdoor Air Humidity
7. AI Space Differential Pressure
8. AI Discharge Temperature Setpoint Adjust
9. AI Outside Airflow Rate
10. AI Supply Fan Variable Frequency Drive Status
11. AI Exhaust Fan Variable Frequency Drive Status
12. AI Gas Furnace Status
13. DI Supply Fan Status
14. DI Exhaust Fan Status
15. DI Manual Over-ride
16. DI Freezestat
17. DI Smoke Detector Alarm
18. DI Compressor Status (each stage)
19. AO OutdoorAir Damper Position
20. AO Return Air Damper Position

21. AO Gas Furnace
22. AO Supply Fan Variable Frequency Drive Speed
23. AO Exhaust Fan Variable Frequency Drive Speed
24. DO Compressor On/Off (each compressor)
25. DO Relief Air Damper Open/Close
26. DO Supply Fan Start/Stop

K. Coordinate the control system requirements described in this Section with the requirements described in Division 23 Section "Packaged Outdoor, Central-Station Air-Handling Units."

3.4 VARIABLE AIR VOLUME (VAV) TERMINAL BOXES WITH HOT WATER REHEAT COILS

A. Each VAV terminal box shall be controlled via the building DDC system. The ATC Subcontractor shall provide DDC control components to accomplish the sequence described below.

B. Each VAV terminal box shall have a primary air damper, a hot water reheat coil with 2-way modulating control valve, inlet velocity sensor and a discharge air temperature sensor. The ATC Subcontractor shall provide DDC control components to accomplish the sequence described below including control valve, damper actuator, VAV DDC controller, discharge air temperature sensor and thermostat.

C. The ATC Subcontractor shall furnish and field-install a DDC VAV box controller which shall be equipped with an integrated air velocity transducer and a motorized bi-directional actuator. Controller shall also include hardware for mounting on a standard VAV box damper shaft.

D. VAV Terminal Box Cool-Down Mode:

1. In the Cool-down Mode the rooftop unit shall energize, the VAV terminal box primary air damper shall open to its maximum position, and the normally open hot water reheat coil control valve shall remain closed.
2. As space temperature approaches its cooling setpoint of 74ºF (adjustable), the VAV terminal box primary air damper shall be modulated to its minimum occupied position.
3. If space temperature drops below the heating setpoint of 72ºF (adjustable), the VAV terminal box's hot water reheat coil control valve shall be modulated to maintain a minimum space temperature of 72ºF (adjustable).

E. VAV Terminal Box Warm-up Mode:

1. In the Warm-up Mode the rooftop unit shall energize and the VAV terminal box primary air damper shall open to its minimum position.
2. If space temperature is below the heating setpoint of 72ºF (adjustable), the VAV terminal box's hot water reheat coil control valve shall open. As space temperature approaches the heating setpoint, the hot water control valve shall be modulated to maintain a minimum space temperature of 72ºF (adjustable).

F. VAV Terminal Box Occupied Mode:

1. In the Occupied mode, the VAV terminal box primary air damper shall open to its minimum position. A space temperature sensor shall modulate the primary air damper

between its minimum occupied position and its maximum occupied position to maintain cooling temperature setpoint of 74ºF (adjustable).

2. When space temperature drops below the cooling temperature setpoint of 74ºF (adjustable) toward the heating setpoint of 72ºF (adjustable), the VAV terminal box primary air damper shall be modulated to its minimum occupied position. If space temperature drops below the heating setpoint of 72ºF (adjustable), then the VAV terminal box's hot water reheat coil control valve shall be modulated to maintain a minimum space temperature of 72ºF (adjustable).). Provide a second minimum position (heating position) to allow the airflow to increase when the hot water reheat coil control valve is open. Provide a discharge air high limit control loop to increase the minimum setpoint so that the discharge air temperature does not exceed 95 degrees (Adjustable).

G. VAV Terminal Box Unoccupied/Night Setback Mode:

1. In the Unoccupied/Night Setback mode, the VAV terminal box primary air damper shall be closed and its hot water reheat coil control valve shall be closed. When room temperature drops below the night setback heating setpoint of 65ºF (adjustable), the rooftop unit supply fan shall energize, the VAV terminal box primary air damper shall open, and the VAV terminal box hot water reheat coil control valve shall open. Once the space temperature rises 2°F (adjustable) above the night setback temperature setpoint, the rooftop unit supply fan shall de-energize, the VAV terminal box primary air damper shall close, and the VAV terminal box hot water reheat coil control valve shall close.
2. The override button on any of the room sensors shall override the night setback mode and shall place the VAV terminal boxes and its associated rooftop unit into the Occupied mode for a timed period of 2-hours (adjustable). Once the timed period is complete, the system shall revert back to the night setback mode.

H. Coordinate the control system requirements with the requirements as described in Division 23 Section "Air Terminal Units."

I. DDC Input/Output Points for VAV Terminal Boxes with Hot Water Reheat Coils:

1. AI Space/Zone Temperature
2. AI Space/Zone Airflow Rate
3. AI Discharge Air Temperature Sensor
4. AO Terminal Box Damper
5. AO Hot Water Reheat Coil Control Valve
6. DI Local Occupied/Unoccupied Override

3.5 GENERAL DDC EXHAUST FANS

A. Fan Status: Each fan shall be provided with a current sensor to monitor the operation of the fan.

B. DDC Scheduled Control: Exhaust fans EF-1 and EF-4 shall be started and stopped through the DDC system. Exhaust fans shall operate during the Occupied Mode and shall not operate during Unoccupied mode. Contractor shall field verify the existence of backdraft dampers for both fans. If motorized dampers, rather than backdraft dampers, are currently installed, the motorized dampers shall be controlled along with the fan such that the damper is open when the fan is energized, and the damper is closed when the fan is off.

C. Exhaust fans EF-2 and EF-3 shall continue to use the existing controls.

D. DDC Points List for Exhaust Fans EF-1 and EF-4

1. DI Exhaust Fan Status (each fan)
2. DO Exhaust Fan Start/Stop (each fan)

3.6 MISCELLANEOUS COMMON POINTS

A. The ATC Subcontractor shall provide the following sensors that shall be common to all sequences:

1. A minimum of two (2) outdoor air temperature sensors shall be provided. These sensors shall be mounted on the north facing side of the building and shall be provided with sun shields (if necessary). The temperature measurements from the two sensors shall be averaged. If a difference of more than 1°F is measured between the two sensors, an alarm shall be registered at the operator's workstation.
2. A minimum of two (2) outdoor air humidity sensors shall be provided. The humidity measurements from the two sensors shall be averaged. If a difference of more than 2% RH is measured between the two sensors, an alarm shall be registered at the operator's workstation.

B. DDC Input/Output Points for Miscellaneous Points

1. AI Outdoor Air Temperature (2 each)
2. AI Outdoor Air Relative Humidity (2 each)

END OF SECTION 230993

SECTION 232113 - HYDRONIC 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.

B. All Division 23 Specification Sections also apply to this Section.

1.2 SUMMARY

A. This Section includes pipe and fitting materials, joining methods, special-duty valves, and specialties for the following:

1. Hot-water heating piping.

1.3 PERFORMANCE REQUIREMENTS

A. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and temperature:

1. Hot-Water Heating Piping: 125 psig (862 kPa) at 200 deg F (93 deg C).

1.4 SUBMITTALS

A. Product Data: For each type of the following:

1. Valves. Include flow and pressure drop curves based on manufacturer's testing for calibrated-orifice balancing valves and automatic flow-control valves.
2. Air control devices.
3. Hydronic specialties.

B. Shop Drawings: Detail, at 1/4 (1:50) scale, the piping layout, fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to the building structure. Detail location of anchors, alignment guides, and expansion joints and loops.

C. Operation and Maintenance Data: For air control devices, hydronic specialties, and special-duty valves to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label.

Fabricate and stamp air separators and expansion tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 01.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Drawn-Temper Copper Tubing: ASTM B 88, Type L (ASTM B 88M, Type B).

B. Wrought-Copper Fittings: ASME B16.22.

C. Copper or Bronze Pressure-Seal Fittings:

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

a. Stadler-Viega.

2. Housing: Copper.
3. O-Rings and Pipe Stops: EPDM.
4. Tools: Manufacturer's special tools.
5. Minimum 200-psig (1379-kPa) working-pressure rating at 250 deg F (121 deg C).

D. Copper, Mechanically Formed Tee Option: For forming T-branch on copper water tube.

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

a. T-DRILL Industries Inc.

E. Wrought-Copper Unions: ASME B16.22.

2.2 JOINING MATERIALS

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

2.3 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:

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

a. Capitol Manufacturing Company.
b. Central Plastics Company.
c. Hart Industries International, Inc.
d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
e. Zurn Plumbing Products Group; AquaSpec Commercial Products Division.

2. Factory-fabricated union assembly, for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C).

D. Dielectric Flanges:

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

a. Capitol Manufacturing Company.
b. Central Plastics Company.
c. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Factory-fabricated companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.

E. Dielectric-Flange Kits:

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

a. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Central Plastics Company.
d. Pipeline Seal and Insulator, Inc.

2. 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.
3. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig (1035- or 2070-kPa) minimum working pressure where required to suit system pressures.

F. Dielectric Couplings:

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

a. Calpico, Inc.
b. Lochinvar Corporation.

2. Galvanized-steel coupling with inert and noncorrosive thermoplastic lining; threaded ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

G. Dielectric Nipples:

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

a. Perfection Corporation; a subsidiary of American Meter Company.
b. Precision Plumbing Products, Inc.
c. Sioux Chief Manufacturing Company, Inc.
d. Victaulic Company of America.

2. Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

2.4 VALVES

A. Gate, Globe, Check, Ball, and Butterfly Valves: Comply with requirements specified in Division 23 Section "General-Duty Valves for HVAC Piping."

B. Automatic Temperature-Control Valves, Actuators, and Sensors: Comply with requirements specified in Division 23 Section "Instrumentation and Control for HVAC."

C. Automatic Flow-Control Valves:

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

a. Flow Design Inc.
b. Griswold Controls.

2. Body: Brass or ferrous metal.
3. Piston and Spring Assembly: Stainless steel, tamper proof, self cleaning, and removable.
4. Combination Assemblies: Include bonze or brass-alloy ball valve.
5. Identification Tag: Marked with zone identification, valve number, and flow rate.
6. Size: Same as pipe in which installed.
7. Performance: Maintain constant flow, plus or minus 5 percent over system pressure fluctuations.
8. Minimum CWP Rating: 175 psig (1207 kPa).
9. Maximum Operating Temperature: 200 deg F (93 deg C).

2.5 AIR CONTROL DEVICES

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

1. Amtrol, Inc.
2. Armstrong Pumps, Inc.
3. Bell & Gossett Domestic Pump; a division of ITT Industries.

B. Manual Air Vents:

1. Body: Bronze.
2. Internal Parts: Nonferrous.
3. Operator: Screwdriver or thumbscrew.
4. Inlet Connection: NPS 1/2 (DN 15).
5. Discharge Connection: NPS 1/8 (DN 6).

6. CWP Rating: 150 psig (1035 kPa).
7. Maximum Operating Temperature: 225 deg F (107 deg C).

C. Automatic Air Vents:

1. Body: Bronze or cast iron.
2. Internal Parts: Nonferrous.
3. Operator: Noncorrosive metal float.
4. Inlet Connection: NPS 1/2 (DN 15).
5. Discharge Connection: NPS 1/4 (DN 8).
6. CWP Rating: 150 psig (1035 kPa).
7. Maximum Operating Temperature: 240 deg F (116 deg C).

2.6 HYDRONIC PIPING SPECIALTIES

A. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 (DN 50) and smaller; flanged ends for NPS 2-1/2 (DN 65) and larger.
3. Strainer Screen: 40-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig (860 kPa).

B. Expansion fittings are specified in Division 23 Section "Expansion Fittings and Loops for HVAC Piping."

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Hot-water heating piping, aboveground, NPS 2 (DN 50) and smaller, shall be the following:

1. Type L (B), drawn-temper copper tubing, wrought-copper fittings, and soldered joints.

B. Air-Vent Piping:

1. Inlet: Same as service where installed.
2. Outlet: Type K (A), annealed-temper copper tubing with soldered or flared joints.

C. Safety-Valve-Inlet and -Outlet Piping for Hot-Water Piping: Same materials and joining methods as for piping specified.

D. Pipe Fittings:

1. Elbows: Elbows shall be constructed of the same material as the piping to which they attach. All pipe elbows shall be factory fabricated and shall have a minimum radius equal to 1.5 times the pipe diameter.

2. Tees: Tees shall be constructed of the same material as the largest pipe size to which they attach. Tees shall be factory fabricated.
3. Reducing Fittings: Reducers shall be constructed of the same material as the largest pipe size to which they attach. Reducers shall be tapered, having a maximum taper angle of 26.6 degrees. Abrupt-type fittings are not permissible.

3.2 VALVE APPLICATIONS

A. Install shutoff-duty valves at each branch connection to supply mains, and at supply connection to each piece of equipment.

B. Install calibrated-orifice, balancing valves at each branch connection to return main.

C. Install calibrated-orifice, balancing valves in the return pipe of each heating or cooling terminal.

3.3 PIPING INSTALLATIONS

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicate piping locations and arrangements if such 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.

B. Do not install piping in transformer vaults, elevator equipment rooms or electrical equipment rooms unless the piping serves HVAC equipment located in that room and is dedicated to provide cooling and/or heating to that room. Do not install piping adjacent to or above any surface of electrical controls, panels, switches, terminals, boxes or similar electrical equipment. Drip-pan protection shall not be permitted, except where detailed.

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 above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

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

J. Install piping to allow application of insulation.

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

L. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

M. Install drains, consisting of a tee fitting, NPS 3/4 (DN 20) ball valve, and short NPS 3/4 (DN 20) threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

N. Install piping at a uniform grade of 0.2 percent upward in direction of flow.

O. Reduce pipe sizes using eccentric reducer fitting installed with level side up.

P. Install branch connections to mains using factory fabricated tee fittings in main pipe, with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.

Q. Install valves according to Division 23 Section "General-Duty Valves for HVAC Piping."

R. Install unions in piping, NPS 2 (DN 50) and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.

S. Install strainers on inlet side of each control valve, pressure-reducing valve, solenoid valve, in-line pump, and elsewhere as indicated. Install NPS 3/4 (DN 20) nipple and ball valve in blowdown connection of strainers NPS 2 (DN 50) and larger. Match size of strainer blowoff connection for strainers smaller than NPS 2 (DN 50).

3.4 HANGERS AND SUPPORTS

A. Hanger, support, and anchor devices are specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment." Comply with the following requirements for maximum spacing of supports.

B. Piping shall be supported directly from the building substrate. Pipes are not permitted to be supported from other pipes, ducts, conduits, or cable tray.

C. Install the following pipe attachments:

1. Adjustable steel clevis hangers for straight runs of individual horizontal piping less than 100 feet (30 m) long.
2. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

D. Install hangers for drawn-temper copper piping with the following maximum spacing and minimum rod sizes:

1. NPS 3/4 (DN 20): Maximum span, 5 feet (1.5 m); minimum rod size, 1/4 inch (6.4 mm).
2. NPS 1 (DN 25): Maximum span, 6 feet (1.8 m); minimum rod size, 1/4 inch (6.4 mm).
3. NPS 1-1/2 (DN 40): Maximum span, 8 feet (2.4 m); minimum rod size, 3/8 inch (10 mm).
4. NPS 2 (DN 50): Maximum span, 8 feet (2.4 m); minimum rod size, 3/8 inch (10 mm).

E. Support vertical runs at roof, at each floor, and at 10-foot (3-m) intervals between floors.

F. For grooved piping, provide a pipe hanger at each coupling and on each side of tees and elbows in accordance with the mechanical joint manufacturer's recommendations.

3.5 PIPE JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 23 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. 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.

F. Grooved Joints: Assemble joints with coupling and gasket, lubricant, and bolts. Roll grooves in ends of pipe based on pipe and coupling manufacturer's written instructions for pipe wall thickness. Use grooved-end fittings and rigid, grooved-end-pipe couplings.
1. Cut groove pipe is not acceptable.
2. Grooved joint piping shall only be installed in accessible locations such as in mechanical equipment rooms, above lay-in ceilings, in spaces without ceilings, etc. Grooved joint piping shall not be installed in inaccessible locations such as in chases, shafts, above drywall or plaster ceilings, etc.

3.6 HYDRONIC SPECIALTIES INSTALLATION

A. Install manual air vents at high points in piping, at heat-transfer coils, and elsewhere as required for system air venting.

3.7 TERMINAL EQUIPMENT CONNECTIONS

A. Sizes for supply and return piping connections shall be the same as or larger than equipment connections.

B. Install control valves in accessible locations close to connected equipment.

C. Install shut-off valves and unions at each control valve to isolate for servicing of valve.

D. Install ports for pressure gages and thermometers at coil inlet and outlet connections for each central station air handling unit, rooftop unit, and elsewhere as noted on the Drawings according to Division 23 Section "Meters and Gages for HVAC Piping."

3.8 FIELD QUALITY CONTROL

A. Prepare hydronic piping according to ASME B31.9 and as follows:

1. Leave joints, including welds, uninsulated and exposed for examination during test.
2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.
4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

B. Perform the following tests on hydronic piping:

1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
3. Isolate expansion tanks and determine that hydronic system is full of water.
4. For hydronic systems other than coil condensate drain piping, subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A in ASME B31.9, "Building Services Piping."
5. For coil condensate drain piping, subject piping system to hydrostatic 15-psig test pressure. Test pressure shall not exceed maximum pressure for any component in system under test.
6. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
7. Prepare written report of testing.

C. Perform the following before operating the system:

1. Open manual valves fully.
2. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
3. Set temperature controls so all coils are calling for full flow.
4. Inspect and set operating temperatures of hydronic equipment, such as boilers to specified values.
5. Verify lubrication of motors and bearings.

END OF SECTION 232113

SECTION 233113 - METAL DUCTS

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.

B. All Division 23 Specification Sections also apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Single-wall round ducts and fittings.
3. Sheet metal materials.
4. Duct liner.
5. Sealants and gaskets.
6. Hangers and supports.

1.3 PERFORMANCE REQUIREMENTS

A. Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in the "Duct Schedule" Article in this Section.

1.4 SUBMITTALS

A. Product Data: For each type of the following products:

1. Liners and adhesives.
2. Sealants and gaskets.

B. Shop Drawings: Plans, drawn to scale at a minimum of ¼" = 1'-0", on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
4. Elevation of top of ducts.
5. Dimensions of main duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.
8. Seam and joint construction.

9. Penetrations through fire-rated and other partitions.
10. Equipment installation based on equipment being used on Project.
11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
12. Hangers and supports, including methods for duct and building attachment and vibration isolation.
13. Suspended ceiling components.
14. Structural members to which duct will be attached.
15. Size and location of ceiling grid modules for acoustical tile.
16. Items penetrating finished ceiling including the following:

    a. Lighting fixtures.
    b. Air outlets and inlets.
    c. Speakers.
    d. Sprinklers.
    e. Access panels.
    f. Bulkheads.
    g. Perimeter moldings.

PART 2 - PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-4, "Transverse (Girth) Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-5, "Longitudinal Seams - Rectangular Ducts," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 2, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 SINGLE-WALL ROUND DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Transverse Joints - Round Duct," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Seams - Round Duct and Fittings," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "90 Degree Tees and Laterals," and Figure 3-5, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G90 (Z275).
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

D. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.4 DUCT LINER

A. Flexible Elastomeric Duct Liner: Preformed, cellular, closed-cell, sheet materials complying with ASTM C 534, Type II, Grade 1; and with NFPA 90A or NFPA 90B.

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

a. Aeroflex USA Inc.
b. Armacell LLC.
c. Rubatex International, LLC

2. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
3. Thickness and Minimum R-Value:

    a. Ductwork Installed Indoors:

        1) Minimum thickness: 1-inch (25-mm).
        2) Minimum Installed R-value: 5.0 at 75 deg F (24 deg C) mean temperature.

4. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.

B. Insulation Pins and Washers:

1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch (3.5-mm) diameter shank, length to suit depth of insulation indicated with integral 1½ -inch (38-mm) galvanized carbon-steel washer.
2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch (0.41-mm) thick galvanized steel; with beveled edge sized as required to hold insulation securely in place but not less than 1½-inches (38 mm) in diameter.

C. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-19, "Flexible Duct Liner Installation."

1. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
3. Butt transverse joints without gaps, and coat joint with adhesive.
4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
5. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.
6. Secure liner with mechanical fasteners 4-inches (100-mm) from corners and at intervals not exceeding 12-inches (300-mm) transversely; at 3-inches (75-mm) from transverse joints and at intervals not exceeding 18-inches (450-mm) longitudinally.
7. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:

    a. Fan discharges.
    b. Intervals of lined duct preceding unlined duct.

8. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

2.5 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.

B. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

C. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.

D. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

2.6 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1 (Table 4-1M), "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct."

C. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.

D. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

E. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

F. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.

PART 3 - EXECUTION

3.1 DUCTWORK, GENERAL

A. Dimensions of ductwork shown/noted on the Drawings indicate inside clear dimensions and do not account for duct liner. When duct liner is indicated to be provided in accordance with this Section of the Specifications and/or in accordance with Division 23 Section “HVAC Insulation,” the size of the duct shall be increased to accommodate the thickness of the duct liner.

B. Do not install ductwork in transformer vaults, elevator equipment rooms or electrical equipment rooms unless the ductwork serves HVAC equipment located in that room and is dedicated to provide cooling and/or heating to that room. Do not install ductwork adjacent to or above any surface of electrical controls, panels, switches, terminals, boxes or similar electrical equipment. Drip-pan protection shall not be permitted, except where detailed.

3.2 PROTECTION OF DUCT

A. Immediately after fabrication, the duct shall be cleaned of all dirt, dust and debris. The ends of the duct section shall then be securely covered with plastic and strapping tape. The duct shall then be completely covered with cloth or plastic.

B. When each duct section transported to the job site, the covering over the ends of each duct shall be maintained to prevent the entrance of dirt, dust and debris. In addition, all ducts shall be covered with plastic or cloth.

C. Immediately after the duct arrives at the job site and prior to being installed, the covering over the ends of each duct shall be maintained to prevent the entrance of dirt, dust and debris. In addition, all ducts shall be covered with plastic or cloth.

D. When each duct is installed, the plastic covering shall be removed. Once installed, the duct section shall be inspected for the existence of dirt or dust; if discovered, the duct section shall be cleaned of all dirt and dust. Unless the next section of duct is in the process of being installed, the end of the duct shall securely covered with plastic and strapping tape.

3.3 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.

B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install round ducts in maximum practical lengths.

D. Install ducts with fewest possible joints.

E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

H. Install ducts with a minimum clearance of 1 inch (25 mm), plus allowance for insulation thickness.

I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches (38 mm).

K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Division 23 Section "Air Duct Accessories" for fire and smoke dampers.

L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "Duct Cleanliness for New Construction Guidelines."

3.4 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.

B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.

C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.

D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.5 DUCT SEALING

A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

3.6 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Hangers and Supports."

B. Ducts shall be supported directly from the building substrate. Ducts are not permitted to be supported from other ducts, pipes, conduits, or cable tray.

C. Building Attachments: Structural-steel fasteners or concrete inserts appropriate for construction materials to which hangers are being attached.

1. Where practical, install concrete inserts before placing concrete.

D. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1 (Table 4-1M), "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches (610 mm) of each elbow and within 48 inches (1200 mm) of each branch intersection.

E. Hangers Exposed to View: Threaded rod and angle or channel supports.

F. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet (5 m).

G. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.7 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Division 23 Section "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.8 PAINTING

A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Division 09 painting Sections.

3.9 DUCT SCHEDULE

A. Duct Material: Fabricate ducts with galvanized sheet steel.

B. Duct Pressure Class, SMACNA Seal Class, and SMACNA Leakage Class: Fabricate ducts for the following pressure, seal and leakage classes:

1. Supply-Air Ducts, Variable Air Volume System, Upstream of Terminal Boxes:

    a. Pressure Class: Positive 3-inches wg (750- Pa).
    b. Seal Class: B.
    c. SMACNA Leakage Class for Rectangular: 12.
    d. SMACNA Leakage Class for Round and Flat Oval: 6.

2. Supply-Air Ducts, Variable Air Volume System, Downstream of Terminal Boxes:

    a. Pressure Class: Positive 2-inches wg (500- Pa).
    b. Seal Class: A.
    c. SMACNA Leakage Class for Rectangular: 24.
    d. SMACNA Leakage Class for Round and Flat Oval: 12.

C. Intermediate Reinforcement:

1. Galvanized-Steel Ducts: Match duct material.

D. Duct Liner Application: Fabricate ducts with duct liner as described below. Refer to Division 23 Section “HVAC Insulation” for additional requirements.

1. Supply-Air Ducts downstream of Variable Air Volume Terminal Boxes.
2. Return-Air Ducts extending from the unit intake to a location 30-feet upstream of the unit intake:
3. Transfer-Air Ducts.

END OF SECTION 233113

SECTION 233300 - AIR DUCT ACCESSORIES

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.

B. All Division 23 Specification Sections also apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Manual volume dampers.
2. Fire dampers.
3. Turning vanes.
4. Flexible connectors.
5. Flexible ducts.
6. Duct accessory hardware.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer’s published data for each type of product indicated.
1. Manual volume dampers.
2. Fire dampers.
3. Turning vanes.
4. Flexible connectors.
5. Flexible ducts.
6. Duct accessory hardware.

B. Coordination Drawings: Refer to Division 23 Sections “Common Work Results for HVAC” and “Metal Ducts” for coordination drawing requirements. Show all duct accessories on coordination drawings. Also, include access panels and access doors required for access to duct accessories on coordination drawings.

C. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

1.4 QUALITY ASSURANCE

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

PART 2 - PRODUCTS

2.1 MATERIALS

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G90 (Z275).
2. Exposed-Surface Finish: Mill phosphatized.

C. Aluminum Sheets: Comply with ASTM B 209 (ASTM B 209M), Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.

D. Extruded Aluminum: Comply with ASTM B 221 (ASTM B 221M), Alloy 6063, Temper T6.

E. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

F. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.2 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:

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

a. Air Balance Inc.; a division of Mestek, Inc.
b. American Warming and Ventilating; a division of Mestek, Inc.
c. Flexmaster U.S.A., Inc.
d. McGill AirFlow LLC.
e. METALAIRE, Inc.
f. Nailor Industries Inc.
g. Pottorff; a division of PCI Industries, Inc.
h. Ruskin Company.

2. Standard leakage rating.
3. Suitable for horizontal or vertical applications.
4. Frames:

a. Hat-shaped, galvanized-steel channels, 0.064-inch (1.62-mm) minimum thickness.
b. Mitered and welded corners.
c. Flanges for attaching to walls and flangeless frames for installing in ducts.

5. Blades:

a. Multiple or single blade.
b. Parallel- or opposed-blade design.
c. Stiffen damper blades for stability.
d. Galvanized-steel, 0.064 inch (1.62 mm) thick.

6. Blade Axles: Galvanized steel or stainless steel.
7. Bearings:

a. Oil-impregnated bronze bearings, molded synthetic bearings or stainless-steel sleeve.
b. Dampers in ducts with pressure classes of 3-inch wg (750 Pa) or less shall have axles full length of damper blades and bearings at both ends of operating shaft.

8. Tie Bars and Brackets: Galvanized steel.

2.3 FIRE DAMPERS

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

1. Air Balance Inc.; a division of Mestek, Inc.
2. Arrow United Industries; a division of Mestek, Inc.
3. Cesco Products; a division of Mestek, Inc.
4. Greenheck Fan Corporation.
5. McGill AirFlow LLC.
6. METALAIRE, Inc.
7. Nailor Industries Inc.
8. NCA Manufacturing, Inc.
9. Pottorff; a division of PCI Industries, Inc.
10. Prefco; Perfect Air Control, Inc.
11. Ruskin Company.
12. Vent Products Company, Inc.
13. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. General Requirements:

1. Labeled according to UL 555 by an NRTL.

C. Type:

1. Furnish static-type fire dampers in systems where the fan is de-energized upon sensing smoke.
2. Furnish dynamic-type fire dampers in systems where the fan is not de-energized upon sensing smoke or where the fan is part of a smoke control system.

a. Closing rating in ducts up to 4-inch wg (1-kPa) static pressure class and minimum 4000-fpm (20-m/s) velocity.

D. Fire Rating: 1½-hours and 3-hours.

E. Frame: Curtain type with blades outside airstream except when located behind grille where blades may be inside airstream; fabricated with roll-formed, 0.034-inch- (0.85-mm-) thick galvanized steel; with mitered and interlocking corners.

F. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.

1. Minimum Thickness: 0.052 or 0.138 inch (1.3 or 3.5 mm) thick as required for the application, and of length to suit application.
2. Exception: Omit sleeve where damper-frame width permits direct attachment of perimeter mounting angles on each side of wall or floor; thickness of damper frame must comply with sleeve requirements.

G. Mounting Orientation: Vertical or horizontal as indicated on the drawings.

H. Blades: Roll-formed, interlocking, 0.034-inch- (0.85-mm-) thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch- (0.85-mm-) thick, galvanized-steel blade connectors.

I. Horizontal Dampers: Include blade lock and stainless-steel closure spring.

J. Heat-Responsive Device: Replaceable, 165 deg F (74 deg C) rated, fusible links.

2.4 TURNING VANES

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

1. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. METALAIRE, Inc.
4. SEMCO Incorporated.
5. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

C. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."

D. Vane Construction: Single wall.

2.5 FLEXIBLE CONNECTORS

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

1. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. Ventfabrics, Inc.
4. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Materials: Flame-retardant or noncombustible fabrics.

C. Coatings and Adhesives: Comply with UL 181, Class 1.

D. Metal-Edged Connectors: Factory fabricated with a fabric strip having a minimum width of 5-3/4 inches (146 mm) attached to 2 strips of 2-3/4-inch- (70-mm-) wide, 0.028-inch- (0.7-mm-) thick, galvanized sheet steel or 0.032-inch- (0.8-mm-) thick aluminum sheets. Provide metal compatible with connected ducts.

E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz./sq. yd. (880 g/sq. m).
2. Tensile Strength: 480 lbf/inch (84 N/mm) in the warp and 360 lbf/inch (63 N/mm) in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F (Minus 40 to plus 93 deg C).

2.6 FLEXIBLE DUCTS

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

1. Flexmaster U.S.A., Inc.
2. McGill AirFlow LLC.
3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Insulated, Flexible Duct: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene vapor-barrier film.

1. Pressure Rating: 10-inch wg (2500 Pa) positive and 1.0-inch wg (250 Pa) negative.
2. Maximum Air Velocity: 4000 fpm (20 m/s).
3. Temperature Range: Minus 10 to plus 160 deg F (Minus 23 to plus 71 deg C).
4. Insulation R-value: Insulation R-value shall be a minimum of 5.0

C. Flexible Duct Connectors:

1. Clamps: Nylon strap in sizes 3 through 18 inches (75 through 460 mm), to suit duct size.

2.7 DUCT ACCESSORY HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.

B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

C. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Install volume dampers a minimum of 5-feet from the diffuser, register or grille in which it is controlling airflow. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.

1. Volume damper shall be constructed of the same material as the duct in which it is to be installed.

D. Set dampers to fully open position before testing, adjusting, and balancing.

E. Install fire dampers according to UL listing.

F. Connect inlet of fan powered terminal boxes and VAV terminal boxes to supply ducts with maximum 12-inch (300-mm) length of flexible duct. Do not use flexible ducts to change directions.

G. Connect each diffuser to duct directly or with maximum 96-inch (2400-mm) length of flexible duct clamped or strapped in place. The flexible duct shall be permitted to have a total maximum change of direction not exceeding 90-degrees.

H. Connect flexible ducts to metal ducts with nylon draw bands.

I. Install duct test holes where required for testing and balancing purposes.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Operate fire dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.

END OF SECTION 233300

SECTION 233600 - AIR TERMINAL UNITS

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. Shutoff, single-duct air terminal units.

1.3 SUBMITTALS

A. Product Data: For each type of the following products, including rated capacities, furnished specialties, sound-power ratings, and accessories.

1. Air terminal units.
2. Liners and adhesives.
3. Sealants and gaskets.
4. Seismic-restraint devices.

B. Shop Drawings: For air terminal units. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Hangers and supports, including methods for duct and building attachment, and vibration isolation.

C. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

1. Ceiling suspension assembly members.
2. Size and location of initial access modules for acoustic tile.
3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

D. Field quality-control reports.

E. Operation and Maintenance Data: For air terminal units to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Instructions for resetting minimum and maximum air volumes.
2. Instructions for adjusting software set points.

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.

PART 2 - PRODUCTS

2.1 SHUTOFF, SINGLE-DUCT AIR TERMINAL UNITS

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

1. Anemostat Products; a Mestek Company.
2. Krueger.
3. Price Industries.
4. Titus.

B. Configuration: Volume-damper assembly inside unit casing with control components inside a protective metal shroud.

C. Casing: 0.032-inch (0.8-mm) steel double wall.

1. Casing Lining: Adhesive attached, 1/2-inch- (13-mm-) thick, coated, fibrous-glass duct liner complying with ASTM C 1071, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
   a. Cover liner with nonporous foil and perforated metal.
2. Air Inlet: Round stub connection or S-slip and drive connections for duct attachment.
3. Air Outlet: S-slip and drive connections.
4. Access: Removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket.

D. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.

1. Maximum Damper Leakage: ARI 880 rated, 2 percent of nominal airflow at 3-inch wg (750-Pa) inlet static pressure.

E. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch (2.5 mm), and rated for a minimum working pressure of 200 psig (1380 kPa) and a maximum entering-water temperature of 220 deg F (104 deg C). Include manual air vent and drain valve.

F. Direct Digital Controls: Single-package unitary controller and actuator specified in Section 230900 "Instrumentation and Control for HVAC."

2.2 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

C. Steel Cables: Galvanized steel complying with ASTM A 603

D. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

E. Air Terminal Unit Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

F. Trapeze and Riser Supports: Steel shapes and plates for units with steel casings; aluminum for units with aluminum casings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install air terminal units according to NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."

B. Install air terminal units level and plumb. Maintain sufficient clearance for normal service and maintenance.

3.2 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Where practical, install concrete inserts before placing concrete.
2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes and for slabs more than 4 inches (100 mm) thick.
4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes and for slabs less than 4 inches (100 mm) thick.

C. Hangers Exposed to View: Threaded rod and angle or channel supports.

D. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.3 CONNECTIONS

A. Install piping adjacent to air terminal unit to allow service and maintenance.

B. Hot-Water Piping: In addition to requirements in Section 232113 "Hydronic Piping," connect heating coils to supply with shutoff valve, strainer, control valve, and union or flange; and to return with balancing valve and union or flange.

C. Connect ducts to air terminal units according to Section 233113 "Metal Ducts."

D. Make connections to air terminal units with flexible connectors complying with requirements in Section 233300 "Air Duct Accessories."

3.4 IDENTIFICATION

A. Label each air terminal unit with plan number, nominal airflow, and maximum and minimum factory-set airflows.

3.5 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. Tests and Inspections:

1. After installing air terminal units and after electrical circuitry has been energized, test for compliance with requirements.
2. Leak Test: After installation, fill water coils and test for leaks. Repair leaks and retest until no leaks exist.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Air terminal unit will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.6 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain air terminal units.

END OF SECTION 233600

SECTION 233713 - DIFFUSERS, REGISTERS, AND GRILLES

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.

B. All Division 23 Specification Sections also apply to this Section.

1.2 SUMMARY

A. This Section includes ceiling- and wall-mounted diffusers, registers, and grilles.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated, include the following:

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.
3. Color Chart: For diffusers, registers, and grilles with factory-applied color finishes for color and finish selection by Architect.

1.4 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, performance, and dimensional requirements of diffusers, registers and grilles, and are based on the specific equipment indicated. Refer to Division 01 for additional requirements.

PART 2 - PRODUCTS

2.1 DIFFUSER OUTLETS

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

1. Anemostat; a Mestek Company.
2. Krueger
3. Price Industries.

4. Titus.

B. Square Plaque Diffuser:

1. Material: Steel.
2. Finish: Baked enamel, in a custom color selected by the Architect.
3. Face Size: 24 by 24 inches (600 by 600 mm).
4. Face Style: Plaque.
5. Mounting: Surface or T-bar. Coordinate with Drawings.
6. Pattern: One-way, Two-way, Three-way or Four-way, core style as indicated on the Drawings.
7. Dampers: None.
8. Accessories:

a. Square to round neck adaptor, where required.
b. Equalizing grid.

2.2 GRILLES

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

1. Anemostat; a Mestek Company.
2. Krueger.
3. Price Industries.
4. Titus.

B. Egg Crate Grille:

1. Material: Aluminum.
2. Finish: Baked enamel, in a custom color selected by the Architect.
3. Face Blade Arrangement: ½" x ½" x ½" grid core.
4. Frame: 1-1/4 inches (32 mm) wide.
5. Mounting: Lay in and sidewall type.
6. Damper Type: None.
7. Accessories: None.

2.3 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install diffusers, registers, and grilles level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713

SECTION 237413 - PACKAGED, OUTDOOR, CENTRAL-STATION AIR-HANDLING UNITS

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 packaged, outdoor, central-station air-handling units (rooftop units) with the following components and accessories:

1. Direct-expansion cooling.
2. Gas furnace.
3. Supply fan with variable frequency drive
4. Exhaust fan with variable frequency drive
5. Filters
6. Economizer outdoor- and return-air damper section.
7. Integral, space temperature controls.
8. Roof curbs.

B. Related Sections include the following:

1. Division 23 Sections “Common Work Results for HVAC”.

2. Division 23 Sections “Vibration Controls for HVAC Piping and Equipment”.

3. Division 23 Sections “Instrumentation and Control for HVAC”.

1.3 DEFINITIONS

A. DDC: Direct-digital controls.

B. RTU: Rooftop unit. As used in this Section, this abbreviation means packaged, outdoor, central-station air-handling units. This abbreviation is used regardless of whether the unit is mounted on the roof or on a concrete base on ground.

C. Supply-Air Fan: The fan providing supply air to conditioned space. "Supply air" is defined as the air entering a space from air-conditioning, heating, or ventilating apparatus.

1.4 ACTION SUBMITTALS

A. Product Data: Include manufacturer's technical data for each RTU, including rated capacities, dimensions, required clearances, characteristics, furnished specialties, and accessories.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Power, signal, and control wiring.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For RTUs to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

A. ARI Compliance:

1. Comply with ARI 210/240 and ARI 340/360 for testing and rating energy efficiencies for RTUs.
2. Comply with ARI 270 for testing and rating sound performance for RTUs.

B. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

C. NFPA Compliance: Comply with NFPA 90A and NFPA 90B.

D. UL Compliance: Comply with UL 1995.

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Carrier Corporation.
2. YORK International Corporation
3. McQuay International.

2.2 GENERAL DESCRIPTION

A. Description: Unit with supply air fan with variable frequency drive, exhaust air fan with variable frequency drive, direct expansion (DX) coil, natural gas furnace, filters, drain pan, outdoor, return, and exhaust dampers, and controls. .

B. The complete unit shall be ETL/UL listed.

C. Each unit shall be specifically designed for outdoor mounting on a roof curb and include a weatherproof cabinet.

D. Unit nameplates shall be fixed to the main control panel door.

E. Installation, operating and maintenance bulletins and start-up forms shall be supplied with each unit.

2.3 CASING

A. General Fabrication Requirements for Casings: Formed and reinforced double-wall insulated panels, fabricated to allow removal for access to internal parts and components, with joints between sections sealed.

B. Exterior Casing Material: Galvanized steel with factory-painted finish, with pitched roof panels and knockouts with grommet seals for electrical and piping connections and lifting lugs.

1. Exterior Casing Thickness: 0.052 inch (1.3 mm) thick.

C. Inner Casing Fabrication Requirements:

1. Inside Casing: Galvanized steel, 0.034 inch (0.86 mm) thick.

D. Casing Insulation and Adhesive: Comply with NFPA 90A or NFPA 90B.

1. Materials: ASTM C 1071, Type I.
2. Thickness: 1 inch (25 mm).
3. Liner materials shall have air-stream surface coated with an erosion- and temperature-resistant coating or faced with a plain or coated fibrous mat or fabric.
4. Liner Adhesive: Comply with ASTM C 916, Type I.

E. Condensate Drain Pans: Formed sections of stainless-steel sheet, a minimum of 2 inches (50 mm) deep, and complying with ASHRAE 62.1.

1. Double-Wall Construction: Fill space between walls with foam insulation and seal moisture tight.
2. Drain Connections: Threaded nipple.

2.4 FANS

A. Supply-Air Fans: Supply fan shall be single width, airfoil, centrifugal. The fan wheel shall be Class II construction with aluminum fan blades. Fan motors shall be heavy-duty 1800 rpm open drip-proof type with grease lubricated ball bearings. Motors shall be premium efficiency, and they shall be mounted on an adjustable base that provides for proper alignment and belt tension adjustment. Motors shall be suitable for use with a variable frequency drive. The supply fan shall be capable of airflow modulation from 30% to 100% of the scheduled designed airflow. The fan shall not operate in a state of surge at any point within the modulation range.

B. Condenser-Coil Fan: Propeller, mounted on shaft of permanently lubricated motor.

C. Exhaust-Air Fan: Propeller with shaft mounted on permanently lubricated motor. The unit DDC controller shall provide building static pressure control. A factory mounted exhaust fan variable

frequency drive shall provide proportional control of the exhaust fan from 25% to 80% of the supply air fan designed airflow. A pressure sensing tube from the building to the factory mounted building static pressure sensor shall be mounted in the field by the contractor.

D. Fan Motor: Comply with requirements in Section 230513 "Common Motor Requirements for HVAC Equipment."

2.5 INDOOR AIR FAN VARIABLE AIR VOLUME CONTROL

A. Separate electronic variable frequency drives shall be provided for the supply and exhaust air fans. Two independent drives, one per fan, shall be provided.

B. Drives shall be cooled by the air stream.

C. The completed unit assembly shall be listed by a recognized safety agency, such as ETL.

D. Mounting arrangements that expose drives to high temperature, unfiltered ambient air are not acceptable.

E. The unit manufacturer shall install all power and control wiring.

F. Control:

1. The drive output shall be controlled by the factory installed main unit control system and drive status and operating speed shall be monitored and displayed at the main unit control panel.
2. The supply and exhaust fan drive outputs shall be independently controlled in order to provide the control needed to maintain building pressure control. Supply and exhaust air fan drives that are slaved off a common control output are not acceptable.

2.6 COILS

A. Supply-Air Refrigerant Coil:

1. Aluminum-plate fin and seamless copper tube in steel casing with equalizing-type vertical distributor.
2. Coil Split: Interlaced.
3. Condensate Drain Pan: Stainless steel formed with pitch and drain connections complying with ASHRAE 62.1.

B. Condenser Coil:

1. Aluminum tube micro channel with aluminum fins brazed to the tubing or copper tube with aluminum fins. Each condenser coil shall be factory leak tested.

2.7 REFRIGERANT CIRCUIT COMPONENTS

A. Number of Refrigerant Circuits: Two.

B. Compressor: Hermetic, scroll, mounted on vibration isolators; with internal overcurrent and high-temperature protection, internal pressure relief.

C. Refrigeration Specialties:
   1. Refrigerant: R-407C or R-410A.
   2. Expansion valve with replaceable thermostatic element.
   3. Refrigerant filter/dryer.
   4. Manual-reset high-pressure safety switch.
   5. Automatic-reset low-pressure safety switch.
   6. Minimum off-time relay.
   7. Automatic-reset compressor motor thermal overload.
   8. Brass service valves installed in compressor suction and liquid lines.

2.8 AIR FILTRATION

A. Minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
   1. Pleated: Minimum 90 percent arrestance, and MERV 7.

2.9 GAS FURNACE

A. Description: Factory assembled, piped, and wired; complying with ANSI Z21.47 and NFPA 54.

   1. CSA Approval: Designed and certified by and bearing label of CSA.

B. Burners: Aluminized steel.

   1. Fuel: Natural gas.
   2. Ignition: Electronically controlled electric spark or hot-surface igniter with flame sensor.

C. Heat-Exchanger and Drain Pan: Stainless steel.

D. Power Vent: Integral, motorized centrifugal fan interlocked with gas valve.

E. Safety Controls:

   1. Gas Control Valve: Modulating.
   2. Gas Train: Single-body, regulated, redundant, 24-V ac gas valve assembly containing pilot solenoid valve, pilot filter, pressure regulator, pilot shutoff, and manual shutoff.

2.10 DAMPERS

A. Outdoor- and Return-Air Mixing Dampers: Parallel- or opposed-blade galvanized-steel dampers mechanically fastened to cadmium plated for galvanized-steel operating rod in reinforced cabinet. Connect operating rods with common linkage and interconnect linkages so dampers operate simultaneously.

   1. Damper Motor: Modulating with adjustable minimum position.
   2. Relief-Air Damper: Motorized, as required by ASHRAE/IESNA 90.1, with bird screen and hood.

2.11 ELECTRICAL POWER CONNECTION

A. Provide for single connection of power to unit with unit-mounted disconnect switch accessible from outside unit and control-circuit transformer with built-in overcurrent protection.

2.12 CONTROLS

A. The Contractor and the manufacturer shall coordinate the factory mounted controls with the field supplied controls to achieve all of the control functions described in this Section, Section 230993 “Sequence of Operation for HVAC Control” and Section 230900 “Instrumentation and Control for HVAC”.

B. DDC Controller:

1. Controller shall have volatile-memory backup.
2. Safety Control Operation:

    a. Smoke Detectors: Stop fan and close outdoor-air damper if smoke is detected. Provide additional contacts for alarm interface to fire alarm control panel.
    b. Firestats: Stop fan and close outdoor-air damper if air greater than 130 deg F (54 deg C) enters unit. Provide additional contacts for alarm interface to fire alarm control panel.
    c. Low-Discharge Temperature: Stop fan and close outdoor-air damper if supply air temperature is less than 40 deg F (4 deg C).

3. Scheduled Operation: Occupied and unoccupied periods on 365-day clock.
4. Unoccupied Period:

    a. Heating Setback: 10 deg F (5.6 deg C).
    b. Cooling Setback: System off.
    c. Override Operation: Two hours.

5. Supply Fan Operation:

    a. Occupied Periods: Run fan continuously.
    b. Unoccupied Periods: Cycle fan to maintain setback temperature.

6. Refrigerant Circuit Operation:

    a. Occupied Periods: Cycle compressors to match compressor output to cooling load to maintain discharge temperature.
    b. Unoccupied Periods: Compressors off.

7. Gas Furnace Operation:

    a. Occupied Periods: Modulate burner to maintain discharge temperature.
    b. Unoccupied Periods: Cycle burner to maintain setback temperature.

C. Outdoor Airflow Monitoring: Provide an outdoor airflow measuring station to maintain a minimum outdoor airflow rate by controlling the outdoor and return air dampers as described in Section 230900 “Instrumentation and Control for HVAC”.

D. Interface Requirements for HVAC Instrumentation and Control System:

1. Interface relay for scheduled operation.
2. Interface relay to provide indication of fault at the central workstation and diagnostic code storage.
3. Provide BACnet compatible interface for central HVAC control workstation for the following:

    a. Adjusting set points.
    b. Monitoring supply fan start, stop, and operation.
    c. Inquiring data to include outdoor-air damper position, supply- air temperature and outdoor air temperature.
    d. Monitoring occupied and unoccupied operations.

2.13 ROOF CURBS

A. Refer to Section 230500 “Common Work Results for HVAC” and Section 230548 “Vibration Controls for HVAC Piping and Equipment” for roof curb requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of RTUs.

B. Examine roughing-in for RTUs to verify actual locations of piping and duct connections before equipment installation.

C. Examine roofs for suitable conditions where RTUs will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Roof Curb: Install on roof structure or concrete base, level and secure, according to ARI Guideline B. Install RTUs on curbs and coordinate roof penetrations and flashing with roof construction. Secure RTUs to upper curb rail, and secure curb base to roof framing or concrete base with anchor bolts.

3.3 CONNECTIONS

A. Install condensate drain, minimum connection size, with trap and indirect connection to nearest roof drain or area drain.

B. Install piping adjacent to RTUs to allow service and maintenance.

1. Gas Piping: Comply with applicable requirements in Section 231123 "Facility Natural-Gas Piping." Connect gas piping to burner, full size of gas train inlet, and connect with union and shutoff valve with sufficient clearance for burner removal and service.

C. Duct installation requirements are specified in other HVAC Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:

1. Install ducts to termination at top of roof curb.
2. Remove roof decking only as required for passage of ducts. Do not cut out decking under entire roof curb.
3. Connect supply ducts to RTUs with flexible duct connectors specified in Section 233300 "Air Duct Accessories."
4. Install return-air duct continuously through roof structure.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.

B. Tests and Inspections:

1. After installing RTUs and after electrical circuitry has been energized, test units for compliance with requirements.
2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

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

3.5 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

B. Complete installation and startup checks according to manufacturer's written instructions and do the following:

1. Inspect for visible damage to unit casing.
2. Inspect for visible damage to furnace combustion chamber.
3. Inspect for visible damage to compressor, coils, and fans.
4. Inspect internal insulation.
5. Verify that labels are clearly visible.
6. Verify that clearances have been provided for servicing.
7. Verify that controls are connected and operable.
8. Verify that filters are installed.
9. Clean condenser coil and inspect for construction debris.
10. Clean furnace flue and inspect for construction debris.
11. Connect and purge gas line.
12. Remove packing from vibration isolators.
13. Verify lubrication on fan and motor bearings.
14. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
15. Adjust fan belts to proper alignment and tension.
16. Start unit according to manufacturer's written instructions.

a. Start refrigeration system.
b. Do not operate below recommended low-ambient temperature.
c. Complete startup sheets and attach copy with Contractor's startup report.

17. Inspect and record performance of interlocks and protective devices; verify sequences.
18. Operate unit for an initial period as recommended or required by manufacturer.
19. Perform the following operations for both minimum and maximum firing. Adjust burner for peak efficiency.

    a. Measure gas pressure on manifold.
    b. Inspect operation of power vents.
    c. Measure combustion-air temperature at inlet to combustion chamber.
    d. Measure flue-gas temperature at furnace discharge.
    e. Perform flue-gas analysis. Measure and record flue-gas carbon dioxide and oxygen concentration.
    f. Measure supply-air temperature and volume when burner is at maximum firing rate and when burner is off. Calculate useful heat to supply air.

20. Calibrate thermostats.
21. Adjust and inspect high-temperature limits.
22. Inspect outdoor-air dampers for proper stroke and interlock with return-air dampers.
23. Start refrigeration system and measure and record the following when ambient is a minimum of 15 deg F (8 deg C) above return-air temperature:

    a. Coil leaving-air, dry- and wet-bulb temperatures.
    b. Coil entering-air, dry- and wet-bulb temperatures.
    c. Outdoor-air, dry-bulb temperature.
    d. Outdoor-air-coil, discharge-air, dry-bulb temperature.

24. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
25. Measure and record the following minimum and maximum airflows. Plot fan volumes on fan curve.

    a. Supply-air volume.
    b. Return-air volume.
    c. Relief-air volume.
    d. Outdoor-air intake volume.

26. Simulate maximum cooling demand and inspect the following:

    a. Compressor refrigerant suction and hot-gas pressures.
    b. Short circuiting of air through condenser coil or from condenser fans to outdoor-air intake.

27. Verify operation of remote panel including pilot-light operation and failure modes. Inspect the following:

    a. High-temperature limit on gas-fired heat exchanger.
    b. Low-temperature safety operation.
    c. Filter high-pressure differential alarm.
    d. Economizer to minimum outdoor-air changeover.
    e. Relief-air fan operation.
    f. Smoke and firestat alarms.

28. After startup and performance testing and prior to Substantial Completion, replace existing filters with new filters.

3.6 CLEANING AND ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to site during other-than-normal occupancy hours for this purpose.

B. After completing system installation and testing, adjusting, and balancing RTU and air-distribution systems, clean filter housings and install new filters.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain RTUs. Refer to Section 017900 "Demonstration and Training."

END OF SECTION 237413

SECTION 260001 – ELECTRICAL CODES & FEES

PART 1 GENERAL

1.1 DESCRIPTION

A. General: Comply with Codes in accordance with the Contract Documents.

1.2 CODES

A. The electrical installation shall be in compliance with the requirements of O.S.H.A., N.E.C., Local Codes and the rules, regulations and requirements of the power company supplying power to the building.

B. The electrical installation shall comply fully with all county and state laws, ordinances and regulations applicable to electrical installations.

C. All equipment shall be equal to or exceed the minimum requirements of N.E.M.A., I.E.E.E. and U.L.

1.3 FEES

A. All local fees and permits and services of inspection authorizes shall be obtained and paid for by the Contractor. Contractor shall pay for all subcontracted services.

1.4 CERTIFICATE OF INSPECTION

A. Certificate of Inspection and approval shall be procured and paid for by this Contractor for an independent electrical inspection and delivered to the Owner before final payment is made.

END OF SECTION

SECTION 260500 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 SUBMITTALS

A. Product Data: For sleeve seals.

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

2.2 SLEEVE SEALS

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

2.3 GROUT

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

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.
B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
E. Cut sleeves to length for mounting flush with both surfaces of walls.
F. Extend sleeves installed in floors 2 inches above finished floor level.
G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.
H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
    1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. 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

SECTION 260503 – WIRING CONNECTIONS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes electrical connections to equipment.

1.2 REFERENCES

A. National Electrical Manufacturers Association:
   1. NEMA WD 1 - General Requirements for Wiring Devices.
   2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.3 SUBMITTALS

A. Product Data: Submit wiring device manufacturer’s catalog information showing dimensions, configurations, and construction.

B. Manufacturer's installation instructions.

1.4 CLOSEOUT SUBMITTALS.

A. Project Record Documents: Record actual locations, sizes, and configurations of equipment connections.

1.5 COORDINATION

A. Obtain and review shop drawings, product data, manufacturer’s wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.

B. Determine connection locations and requirements.

C. Sequence rough-in of electrical connections to coordinate with installation of equipment.

D. Sequence electrical connections to coordinate with start-up of equipment.

PART 2 PRODUCTS

2.1 CORD AND PLUGS

A. Manufacturers:
   1. Hubbell.
   2. Leviton.
   3. Substitutions: Section 01 60 00 - Product Requirements.

B. Attachment Plug Construction: Conform to NEMA WD 1.

C. Configuration: NEMA WD 6; match receptacle configuration at outlet furnished for equipment.

D. Cord Construction: Type SO extra hard usage multi-conductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.

E. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify equipment is ready for electrical connection, for wiring, and to be energized.

3.2 INSTALLATION

A. Make electrical connections.

B. Make conduit connections to equipment using flexible conduit. Use liquid-tight flexible conduit with watertight connectors in damp or wet locations.

C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

D. Install receptacle outlet to accommodate connection with attachment plug.

E. Install cord and cap for field-supplied attachment plug.

F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

H. Install terminal block jumpers to complete equipment wiring requirements.

I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

3.3 ADJUSTING

A. Cooperate with utilization equipment installers and field service personnel during checkout and starting of equipment to allow testing and balancing and other startup operations. Provide personnel to operate electrical system and checkout wiring connection components and configurations.

3.4 EQUIPMENT CONNECTION SCHEDULE

A. As noted on Electrical Schedule Drawings.

END OF SECTION

SECTION 260519 - BUILDING WIRE AND CABLE

PART 1 GENERAL

1.1 SUMMARY

A. Section includes building wire and cable; service entrance cable; armored cable; metal clad cable; and wiring connectors and connections.

1.2 REFERENCES

A. International Electrical Testing Association:
   1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.3 SYSTEM DESCRIPTION

A. Product Requirements: Provide products as follows:
   1. Solid conductor for feeders and branch circuits 10 AWG and smaller.
   2. Stranded conductors for control circuits.
   3. Conductor not smaller than 12 AWG for power and lighting circuits.
   4. Conductor not smaller than 16 AWG for control circuits.
   5. 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.
   6. 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet.

B. Wiring Methods: Provide the following wiring methods:
   1. Concealed Dry Interior Locations: Use only building wire, Type TW, THHN/THWN insulation in raceway.
   2. Exposed Dry Interior Locations: Use only building wire, Type THHN/THWN insulation, in raceway.
   3. Above Accessible Ceilings: Use only building wire THHN/THWN insulation, metal clad cable.
   4. Wet or Damp Interior Locations: Use only building wire, Type THHN/THWN insulation, in raceway.
   5. Exterior Locations: Use only building wire, Type THHN/THWN insulation, in raceway.
   6. Underground Locations: Use only building wire, Type THHN/THWN insulation, in raceway.

1.4 DESIGN REQUIREMENTS

A. Conductor sizes are based on copper unless indicated as aluminum or "AL".

1.5 SUBMITTALS

A. Product Data: Submit for building wire and each cable assembly type.

B. Test Reports: Indicate procedures and values obtained.

1.6 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of components and circuits.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.8 FIELD MEASUREMENTS

A. Verify field measurements are as indicated on Drawings.

1.9 COORDINATION

A. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.

B. Wire and cable routing indicated is approximate unless dimensioned. Include wire and cable lengths within 10 ft of length shown.

PART 2 PRODUCTS

2.1 BUILDING WIRE

A. Manufacturers:
1. General Cable Co.
2. American Insulated Wire Corporation.
3. Carol Cable Company.
4. Rome Cable.

B. Product Description: Single conductor insulated wire.

C. Conductor: Copper.

D. Insulation: 600 volt rating; THWN/THHN thermoplastic material rated 75 degrees C.

2.2 METAL CLAD CABLE

A. Manufacturers:
1. General Cable Co.
2. American Insulated Wire Corporation.
3. Carol Cable Company.
4. Rome Cable.

B. Conductor: Copper.

C. Insulation
1. Voltage Rating: 600 volts.
2. Insulation Temperature Rating: 75 degrees C.
3. Insulation Material: Thermoplastic.

D. Armor Material: Steel.

E. Armor Design: Interlocked metal tape.

F. Jacket: None.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify interior of building has been protected from weather.

B. Verify mechanical work likely to damage wire and cable has been completed.

C. Verify raceway installation is complete and supported.

3.2 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

3.3 INSTALLATION

A. Route wire and cable to meet Project conditions.

B. Neatly train and lace wiring inside boxes, equipment, and panelboards.

C. Identify and color code wire and cable. Identify each conductor with its circuit number or other designation indicated.

D. Special Techniques--Building Wire in Raceway:
1. Pull conductors into raceway at same time.
2. Install building wire 4 AWG and larger with pulling equipment.

E. Special Techniques - Cable:
1. Protect exposed cable from damage.
2. Support cables above accessible ceiling, using spring metal clips or metal cable ties to support cables from structure. Do not rest cable on ceiling panels.
3. Use suitable cable fittings and connectors.

F. Special Techniques - Wiring Connections:

G. Clean conductor surfaces before installing lugs and connectors.

H. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

I. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.

J. Install split bolt connectors for copper conductor splices and taps, 6 AWG and larger.

K. Install solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.

L. Install insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

M. Install solid conductor for feeders and branch circuits 10 AWG and smaller.

N. Install stranded conductors for branch circuits 10 AWG and smaller. However, when stranded conductors are used in lieu of solid, then install crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under screws.

3.4 WIRE COLOR

A. General
1. For wire sizes 10 AWG and smaller, install wire colors in accordance with the following:
a. Black, red, and blue for circuits at 120/208 volts single or three phase.
2. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices and boxes. Colors are as follows:
a. Black, red, and blue for circuits at 120/208 volts single or three phase.

B. Neutral Conductors: White. When two or more neutrals are located in one conduit, individually identify each with proper circuit number.

C. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.

D. Feeder Circuit Conductors: Uniquely color code each phase.

E. Ground Conductors:
1. For 6 AWG and smaller: Green.
2. For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

3.5 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

END OF SECTION

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Wire.
   2. Mechanical connectors.
   3. Exothermic connections.

1.2 REFERENCES

A. Institute of Electrical and Electronics Engineers:
   1. IEEE 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
   2. IEEE 1100 - Recommended Practice for Powering and Grounding Electronic Equipment.

B. International Electrical Testing Association:
   1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

C. National Fire Protection Association:
   1. NFPA 70 - National Electrical Code.
   2. NFPA 99 - Standard for Health Care Facilities.

1.3 DESIGN REQUIREMENTS

A. Construct and test grounding systems in accordance with IEEE 1100.

1.4 PERFORMANCE REQUIREMENTS

A. Grounding System Resistance: 5 ohms maximum.

1.5 SUBMITTALS

A. Product Data: Submit data on grounding electrodes and connections.

B. Test Reports: Indicate overall resistance to ground and resistance of each electrode.

C. Manufacturer's Installation Instructions: Submit for active electrodes.

D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.6 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of components and grounding electrodes.

1.7 QUALITY ASSURANCE

A. Provide grounding materials conforming to requirements of NEC, IEEE 142, and UL labeled.

B. Maintain one copy of document on site.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing work of this section with minimum three years documented experience approved by manufacturer.

1.9 PRE-INSTALLATION MEETINGS

A. Convene minimum one week prior to commencing work of this section.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

B. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

C. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.

1.11 COORDINATION

A. Complete grounding and bonding of building reinforcing steel prior concrete placement.

PART 2 PRODUCTS

2.1 WIRE

A. Material: Stranded copper.

B. Grounding Electrode Conductor: Copper conductor bare.

C. Bonding Conductor: Copper conductor bare.

2.2 MECHANICAL CONNECTORS

A. Manufacturers:
   1. Erico, Inc.
   2. ILSCO Corporation.
   3. O-Z Gedney Co.
   4. Thomas & Betts, Electrical.
   5. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: Bronze connectors, suitable for grounding and bonding applications, in configurations required for particular installation.

2.3 EXOTHERMIC CONNECTIONS

A. Manufacturers:
   1. Copperweld, Inc.
   2. ILSCO Corporation.
   3. O-Z Gedney Co.
   4. Thomas & Betts, Electrical.

B. Product Description: Exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify final backfill and compaction has been completed before driving rod electrodes.

3.2 PREPARATION

A. Remove paint, rust, mill oils, surface contaminants at connection points.

3.3 EXISTING WORK

A. Modify existing grounding system to maintain continuity to accommodate renovations.

B. Extend existing grounding system using materials and methods compatible with existing electrical installations, or as specified.

3.4 INSTALLATION

A. Install in accordance with IEEE 142 and 1100.

B. Install grounding and bonding conductors concealed from view.

C. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

D. Permanently ground entire light and power system in accordance with NEC, including service equipment, distribution panels, lighting panelboards, switch and starter enclosures, motor frames, grounding type receptacles, and other exposed non-current carrying metal parts of electrical equipment.

E. Install branch circuits feeding isolated ground receptacles with separate insulated grounding conductor, connected only at isolated ground receptacle, ground terminals, and at ground bus of serving panel.

F. Accomplish grounding of electrical system by using insulated grounding conductor installed with feeders and branch circuit conductors in conduits. Size grounding conductors in accordance with NEC. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes or metal enclosures of service equipment. Ground conduits by means of grounding bushings on terminations at panelboards with installed number 12 conductor to grounding bus.

G. Grounding electrical system using continuous metal raceway system enclosing circuit conductors in accordance with NEC.

H. Permanently attach equipment and grounding conductors prior to energizing equipment.

3.5 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Grounding and Bonding: Perform inspections and tests listed in NETA ATS, Section 7.13.

C. Perform ground resistance testing in accordance with IEEE 142.

D. Perform leakage current tests in accordance with NFPA 99.

E. Perform continuity testing in accordance with IEEE 142.

F. When improper grounding is found on receptacles, check receptacles in entire project and correct. Perform retest.

END OF SECTION

SECTION 260529 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Hangers and supports for electrical equipment and systems.

1.2 PERFORMANCE REQUIREMENTS

A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
C. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.3 SUBMITTALS

A. Product Data: For steel slotted support systems.

1.4 QUALITY ASSURANCE

A. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Allied Tube & Conduit.
      b. Cooper B-Line, Inc.; a division of Cooper Industries.
      c. ERICO International Corporation.
      d. GS Metals Corp.
      e. Thomas & Betts Corporation.
      f. Unistrut; Tyco International, Ltd.
      g. Wesanco, Inc.
   2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
   3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
   4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
   5. Channel Dimensions: Selected for applicable load criteria.
B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
C. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
   1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
      a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
         1) Hilti Inc.
         2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
         3) MKT Fastening, LLC.
         4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
   2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
      a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
         1) Cooper B-Line, Inc.; a division of Cooper Industries.
         2) Empire Tool and Manufacturing Co., Inc.
         3) Hilti Inc.
         4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
         5) MKT Fastening, LLC.
   3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
   4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
   5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
   6. Toggle Bolts: All-steel springhead type.
   7. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
   1. Secure raceways and cables to these supports with two-bolt conduit clamps.
D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.
C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

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

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

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

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

3.4 CONCRETE BASES

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

B. Use 3000-psi , 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03 Section "Cast-in-Place Concrete."

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

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

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

END OF SECTION

SECTION 260533 – RACEWAY AND BOXES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes conduit and tubing, surface raceways, wireways, outlet boxes, pull and junction boxes, and handholes.

B. Related Sections:

1.2 REFERENCES

A. American National Standards Institute:

1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
2. ANSI C80.3 - Specification for Electrical Metallic Tubing, Zinc Coated.

B. National Electrical Manufacturers Association:

1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
2. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
3. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

1.3 SYSTEM DESCRIPTION

A. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.

B. Outdoor Locations, Above Grade: Provide rigid aluminum. Provide cast aluminum outlet, pull, and junction boxes.

C. Interior Wet and Damp Locations: Provide rigid galvanized steel. Provide cast metal or nonmetallic outlet, junction, and pull boxes. Provide flush mounting outlet box in finished areas.

D. Concealed Dry Locations: Provide electrical metallic tubing. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.

E. Exposed Dry Locations: Provide rigid galvanized steel or electrical metallic tubing. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.

1.4 DESIGN REQUIREMENTS

A. Minimum Raceway Size: 3/4 inch unless otherwise specified.

1.5 SUBMITTALS

A. Product Data: Submit for the following:

1. Metal Conduit
2. Flexible metal conduit.
3. Liquidtight flexible metal conduit.
4. Raceway fittings.
5. Conduit bodies.
6. Pull and junction boxes.

B. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.6 CLOSEOUT SUBMITTALS

A. Division 1 - Execution Requirements: Closeout procedures.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Division 1 - Product Requirements: Product storage and handling requirements.

B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

1.8 COORDINATION

A. Division 1 - Administrative Requirements: Coordination and project conditions.

B. Coordinate installation of outlet boxes for equipment.

C. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

PART 2 PRODUCTS

2.1 METAL CONDUIT

A. Rigid Steel Conduit: ANSI C80.1.

B. Intermediate Metal Conduit (IMC): Rigid steel.

C. Rigid Aluminum Conduit.

D. Fittings and Conduit Bodies: NEMA FB 1; threaded type.

2.2 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Product Description: Interlocked steel construction with PVC jacket.

B. Fittings: NEMA FB 1.

2.3 ELECTRICAL METALLIC TUBING (EMT)

A. Product Description: ANSI C80.3; galvanized tubing.

B. Fittings and Conduit Bodies: NEMA FB 1; steel, compression type up to and including 2 inch diameter.

2.4 PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

B. Surface Mounted Cast Metal Box: NEMA 250, Type 4; flat-flanged, surface mounted junction box:

1. Material: Galvanized cast iron.
2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

PART 3 EXECUTION

3.1 EXAMINATION

A. Division 1 - Administrative Requirements: Coordination and project conditions.

B. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

3.2 INSTALLATION

A. All wiring shall be concealed.

B. Ground and bond raceway and boxes.

C. Fasten raceway and box supports to structure and finishes.

D. Identify raceway and boxes.

E. Arrange raceway and boxes to maintain headroom and present neat appearance.

3.3 INSTALLATION - RACEWAY

A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.

B. Arrange raceway supports to prevent misalignment during wiring installation.

C. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

D. Group related raceway; support using conduit rack. Construct rack using steel channel.

E. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports

F. Do not attach raceway to ceiling support wires or other piping systems.

G. Route exposed raceway parallel and perpendicular to walls.

H. Route raceway installed above accessible ceilings parallel and perpendicular to walls.

I. Maintain clearance between raceway and piping for maintenance purposes.

J. Maintain 12 inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.

K. Cut conduit square using saw or pipe cutter; de-burr cut ends.

L. Bring conduit to shoulder of fittings; fasten securely.

M. Install conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations.

N. Install no more than equivalent of three 90 degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams. Install hydraulic one-shot bender to fabricate or factory elbows for bends in metal conduit larger than 2 inch size.

O. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.

P. Install fittings to accommodate expansion and deflection where raceway crosses, control expansion joints.

Q. Install suitable pull string or cord in each empty raceway except sleeves and nipples.

R. Install suitable caps to protect installed conduit against entrance of dirt and moisture.

S. Install all conductors in EMT raceway, except where approved by University.

3.4 INSTALLATION - BOXES

A. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

B. In Accessible Ceiling Areas: Install junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.

C. Do not fasten boxes to ceiling support wires or other piping systems.

D. Support boxes independently of conduit.

3.5 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods in accordance with local codes and standards.

3.6 ADJUSTING

A. Division 1 - Execution Requirements: Testing, adjusting, and balancing.

B. Install knockout closures in unused openings in boxes.

3.7 CLEANING

A. Division 1 - Execution Requirements: Final cleaning.

B. Clean interior of boxes to remove dust, debris, and other material.

C. Clean exposed surfaces and restore finish.

END OF SECTION

SECTION 262416 - PANELBOARDS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes distribution and branch circuit panelboards, electronic grade branch circuit panelboards.

1.2 REFERENCES

A. Institute of Electrical and Electronics Engineers:
   1. IEEE C62.41 - Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.

B. National Electrical Manufacturers Association:
   1. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.
   2. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
   3. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
   4. NEMA PB 1 - Panelboards.
   5. NEMA PB 1.1 - General Instructions for Proper Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less.

C. International Electrical Testing Association:
   1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

D. National Fire Protection Association:
   1. NFPA 70 - National Electrical Code.

E. Underwriters Laboratories Inc.:
   1. UL 67 - Safety for Panelboards.
   2. UL 1283 - Electromagnetic Interference Filters.
   3. UL 1449 - Transient Voltage Surge Suppressors.

1.3 SUBMITTALS

A. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

B. Product Data: Submit catalog data showing specified features of standard products.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of panelboards and record actual circuiting arrangements.

B. Operation and Maintenance Data: Submit spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.6 MAINTENANCE MATERIALS

A. Furnish two of each panelboard key. Panelboards keyed alike to Owner's current keying system.

PART 2 PRODUCTS

2.1 BRANCH CIRCUIT PANELBOARDS

A. Manufacturers:
   1. Cutler Hammer.
   2. GE Electrical.
   3. Siemens.
   4. Square D.

B. Product Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.

C. Panelboard Bus: Copper current carrying components, ratings as indicated on Drawings. Furnish copper ground bus in each panelboard; furnish insulated ground bus as indicated on Drawings.

D. For non-linear load applications subject to harmonics furnish 200 percent rated, plated copper, solid neutral.

E. Minimum Integrated Short Circuit Rating: 10,000 amperes rms symmetrical for 240 volt panelboards.

F. Molded Case Circuit Breakers: NEMA AB 1, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles, listed as Type SWD for lighting circuits, Type HACR for air conditioning equipment circuits, Class A ground fault interrupter circuit breakers as indicated on Drawings. Do not use tandem circuit breakers.

G. Enclosure: NEMA PB 1, Type 1.

H. Cabinet Box: 6 inches deep, 20 inches wide for 240 volt and less panelboards, 20 inches wide for 480 volt panelboards.

I. Cabinet Front: Surface door-in-door type, fastened with hinged door with flush lock, metal directory frame, finished in manufacturer's standard gray enamel.

J. Field-Adjustable Trip Circuit Breaker: Circuit breakers with frame sizes 200 amperes and larger have mechanism for adjusting long time short time continuous current short time long time pickup current setting for automatic operation. Main breaker shall be 100% rated device.

K. Accessories: Conform to NEMA AB 1.
   1. Insulated Grounding Lug: In each enclosure.

2.2 INSULATED CASE CIRCUIT BREAKER

A. Product Description: NEMA AB 1, enclosed, insulated-case circuit breaker.

B. Trip Unit: Electronic sensing, timing, and tripping circuits for adjustable current settings; instantaneous trip; and adjustable short time trip.

C. Accessories: Conform to NEMA AB 1.
1. Insulated Grounding Lug: In each enclosure.

2.3 TRANSIENT VOLTAGE SUPPRESSION DEVICES

A. Product Description: IEEE C62.41, factory-mounted transient voltage surge suppressor, selected to meet requirements for medium exposure and to coordinate with system circuit voltage.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install panelboards in accordance with NEMA PB 1.1.

B. Install panelboards plumb.

C. Install recessed panelboards flush with wall finishes.

D. Height: 6 feet to top of panelboard; install panelboards taller than 6 feet with bottom no more than 4 inches above floor.

E. Install filler plates for unused spaces in panelboards.

F. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes to balance phase loads.

G. Install engraved plastic nameplates.

H. Install spare conduits out of each recessed panelboard to accessible location above ceiling. Minimum spare conduits: 5 empty 1 inch. Identify each as SPARE.

I. Ground and bond panelboard enclosure according to Section 260526. Connect equipment ground bars of panels in accordance with NFPA 70.

3.2 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform circuit breaker inspections and tests listed in NETA ATS, Section 7.6.

C. Perform switch inspections and tests listed in NETA ATS, Section 7.5.

D. Perform controller inspections and tests listed in NETA ATS, Section 7.16.1.

3.3 ADJUSTING

A. Measure steady state load currents at each panelboard feeder; rearrange circuits in panelboard to balance phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

END OF SECTION

SECTION 262726 – WIRING DEVICES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes wall switches; wall dimmers; receptacles; multi-outlet assembly; and device plates and decorative box covers.

1.2 REFERENCES

A. National Electrical Manufacturers Association:
   1. NEMA WD 1 - General Requirements for Wiring Devices.
   2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's catalog information showing dimensions, colors, and configurations.

B. Samples: Submit two samples of each wiring device and wall plate illustrating materials, construction, color, and finish.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.5 EXTRA MATERIALS

A. Furnish two of each style, size, and finish wall plate.

1.6 COORDINATION

A. Receptacles for Owner-Furnished Equipment: Match plug configurations

B. Cord and Plug Sets: Match equipment requirements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Wiring Devices:
   1. Hubbell Incorporated – Wiring Device-Kellams
   2. Leviton Manufacturing Co. Inc
   3. Pass & Seymor/Legrand – Wiring Devices Division

2.2 WALL SWITCHES

A. Product Description: NEMA WD 1, Heavy-Duty, AC only general-use snap switch.

B. Body and Handle: Ivory plastic with toggle handle.

C. Indicator Light: Lighted handle type switch.

D. Locator Light: Lighted handle type switch; red color handle.

E. Ratings:
1. Voltage: 120-277 volts, AC.
2. Current: 20 amperes.

F. Ratings: Match branch circuit and load characteristics.

2.3 RECEPTACLES

A. Product Description: NEMA WD 1, General-duty general use receptacle.

B. Device Body: Ivory plastic.

C. Configuration: NEMA WD 6, type as indicated on Drawings.

D. Convenience Receptacle: Type 5-20.

E. GFCI Receptacle: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.

2.4 CORD AND PLUG SETS

A. Product Description: Match voltage and current ratings and number of conductors to requirement of equipment being connected.
1. Cord: Rubber-insulated, stranded-copper conductors, with type SOW-A jacket; with green-insulated grounding conductor and equipment-rating ampacity plus a minimum 30-percent.
2. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.5 WALL PLATES

A. Decorative Cover Plate: Smooth lined plastic, color as selected by Architect.

B. Weatherproof Cover Plate: Gasketed cast metal plate with hinged and gasketed device cover.

2.6 MULTIOUTLET ASSEMBLIES

A. Components of Assemblies: Products from a single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.

B. Raceway: Metal, with manufacturer’s standard finish

C. Wire: No.12 AWG.

2.7 FINISHES

A. Color as selected by Architect, unless otherwise indicated or required by NFPA 70.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify outlet boxes are installed at proper height.

B. Verify wall openings are neatly cut and completely covered by wall plates.

C. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION

A. Clean debris from outlet boxes.

3.3 INSTALLATION

A. Install devices and assemblies level, plumb, and square with building lines.

B. Install wall dimmers to achieve indicated rating after de-rating for ganging according to manufacturer's written instructions.

C. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' written instructions.

D. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates. Remove wall plates and protect devices and assemblies during painting.

E. Install switches with OFF position down.

F. Do not share neutral conductor on load side of dimmers.

G. Install receptacles with grounding pole on top.

H. Connect wiring device grounding terminal to outlet box with bonding jumper and branch circuit equipment grounding conductor.

I. Install decorative plates on switch, receptacle, and blank outlets in finished areas.

J. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

3.4 INTERFACE WITH OTHER PRODUCTS

A. Coordinate locations of outlet boxes to obtain mounting heights as specified and as indicated on drawings.

B. Install wall switch 48 inches above finished floor.

C. Install convenience receptacle 18 inches above finished floor.

D. Install convenience receptacle 6 inches above counter, unless otherwise noted.

E. Install dimmer 48 inches above finished floor.

3.5 FIELD QUALITY CONTROL

A. Inspect each wiring device for defects.

B. Operate each wall switch with circuit energized and verify proper operation.

C. Verify each receptacle device is energized.

D. Test each receptacle device for proper polarity.

E. Test each GFCI receptacle device for proper operation.

3.6 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

3.7 CLEANING

A. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

SECTION 263100 - PHOTOVOLTAIC SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. The requirements of this Section are related to Photovoltaic / Solar Electrical Power Generation System.

1.2 RELATED WORK

A. Section 010000, GENERAL REQUIREMENTS: General construction practices.

B. Section 013300, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES: Submittals.

C. Section 073100 FIBERGLASS-REINFORCED SHINGLES

D. Section 260100, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical installation requirements.

E. Section 260200, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for grounding.

G. Section 260700, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS: Requirements for boxes, conduits, and raceways.

H. Section 262921, DISCONNECT SWITCHES: Requirements for disconnects.

1.3 DEFINTIONS

A. PV: Photovoltaic (Solar Electric Power Generation)

B. BOS: Balance of System (all other components after the modules, inverter, and racking support)

C. Imp: Rated Current at STC

D. Isc: Short circuit current at STC

E. MinT: Minimum Temperature; lowest recorded temperature for specified site according to ASHRAE standards.

F. Mono C-Si: Mono-Crystalline Silicon

G. PMax: Maximum Power at STC

H. PTC: USA Standard Conditions for PV

I. STC: Standard Test Conditions as defined in EIC 61215

J. Voc: Open circuit voltage at STC

K. Vmp: Rated Voltage at STC

1.4 QUALITY ASSURANCE

A. Electrical Contractor shall demonstrate that they have successfully installed at least five photovoltaic projects that equal or exceed the size of the proposed project. References shall be provided for each of these referenced projects.

B. The entire assembly shall be listed by a NRTL (Nationally Recognized Testing Laboratory) and labeled by a qualified testing agency acceptable to the authorities having jurisdiction for electrical and fire safety, Class C according to UL 1703.

1.5 WARRANTIES

A. Solar photovoltaic module warranty:

1. Furnish five year manufacturer's warranty against defects in materials and workmanship.
2. Furnish manufacturer's warranty with respect to power output that continues for a total of 25 years: the first 10 years at 90% minimum rated power output and the balance of 15 years at 80% minimum rated power output.
3. PV modules shall be UL approved.

B. Inverter warranty:

1. Inverter shall have a 10-year Warranty. Electrical Contractor to provide alternate price adder for extended warranty terms of 15 and 20 years.

C. Solar Racking / Support System:

1. PV Mounts/Anchors. PV equipment mounts/anchors with integrated flashing shall have a 20-year warranty.
2. Racking. Rails, clamps and other roof mounting components shall have a 20-year warranty.

D. Balance of System:

1. Other components of the PV System such as disconnects, cable, wire, conduit, fittings, etc. shall carry the standard warranty as supplied by the equipment manufacturer.

E. System Warranty:

1. Electrical Contractor shall warrant the system for proper operation and against defects in material and workmanship for a time period of one (1) year from the date on utility company Certificate of Completion.

1.6 CLOSEOUTS

A. Operation and Maintenance Photovoltaic Systems Package:

1. Safety precautions
2. Operator restart
3. Startup, shutdown, and post-shutdown procedures
4. Normal operations
5. Emergency operations
6. Environmental conditions
7. Preventive maintenance plan and schedule

8. Troubleshooting guides and diagnostic techniques
9. Wiring and control diagrams
10. Maintenance and repair procedures
11. Removal and replacement instructions
12. Spare parts and supply list
13. O&M submittal data
14. Parts & System identification
15. Testing equipment and special tool information
16. Warranty information
17. Testing and performance data
18. Contractor information

1.7 SUBMITTALS

A. Interconnection Forms:

1. Submit one (1) copy of the appropriate utility interconnection application. Electrical Contractor shall input all required data for the system they are providing.
2. Once Owner/Customer Generator signatures have been collected, EC shall submit paperwork to appropriate utility company with any required fees.
3. Upon completion of the installation, Contractor shall submit one (1) copy of the Certificate of Completion (Coc) with all required signatures of inspection.

B. Product Data: Submit specified products as follows:

1. Include manufacturer's product data sheets.
2. Manufacturer's installation instructions.
3. Catalog pages illustrating products to be incorporated into the project.
4. String Sizing Report from the Inverter manufacturer showing the number of modules per string, number of strings per inverter, Vmp MaxT, Voc MinT, DC-to-AC ratio, Pmax at STC, and Pmax at PTC. As well as Inverter maximum voltage, minimum voltage and strike/start voltage.

C. Shop Drawings

1. Layout and Orientation of modules
2. Penetration Plan with mounting detail diagram. Coordinate with existing roof structural system, in conjunction with General Contractor.
3. Electrical connection and grounding plan details
4. Conduit & wire pathways and intended routes for coordination.
5. Details of array (sub-arrays) including overall dimensions, weight loads per sqft. point loads (lbs.), wind uplift loads, and clearance around the array.
6. PV Racking. Provide maximum span lengths, maximum cantilever and mid-clamp spacing.
7. Location of BOS items: junction boxes, combiners, disconnects, etc.

D. Contractor shall make all necessary field measurements and investigations to assure that the equipment and assemblies will meet contract requirements.

E. Contractor shall provide one (1) full-sized sample of the PV Mount/Anchor for the roofing installer to verify compliance with roofing manufacturer's warranty.

1.8 APPLICABLE CODES / PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM):

E772-11 ..... Standard Terminology of Solar Energy Conversion

E1038-10 ..... Standard Test Method for Determining Resistance of Photovoltaic Modules to Hail by Impact with Propelled Ice Balls

C. Institute of Electrical and Electronics Engineers (IEEE):

1526-03 ..... Recommended Practice for Testing the Performance of Stand-Alone Photovoltaic Systems

1547-03 ..... Standard for Interconnecting Distributed Resources with Electric Power Systems

D. International Code Council (ICC):

IBC-12 ..... International Building Code

IFC-12 ..... International Fire Code

PART 2 – PRODUCTS

2.1 GENERAL

A. Provide materials to fabricate solar energy systems in accordance with this section. As photovoltaic systems designs are interdependent, any changes to the Basis-of-Design as a result of manufacturers/systems changes shall be made at no additional cost to the Owner and shall be the responsibility of the Contractor. Substitution requests for primary system items (modules & inverter) shall be pre-approved.

B. System Components:

1. Grounding
2. PV Source Circuit Junction / Combiner Boxes
3. PV Source Circuit Wiring
4. Array Racking / PV Structural Support System
5. Grid-Interactive Inverters
6. PV Solar Modules
7. Metering / Monitoring

2.2 GROUNDING

A. Array frame shall be grounded in accordance with NFPA 70 NEC 250 and manufacturer instructions per UL 1703.

1. Devices (lugs) used for grounding arrays shall be suitable for use in wet locations (direct burial, tin plated, copper) and attachment hardware shall be stainless steel with star washers. Bonding washers (WEEB), or clamps with integrated bonding washers may be used in accordance with manufacturer's instructions.

2. Mounting rails (racking), shall be grounded with the approved WEEB lugs, and piercing washing between modules to maintain grounding path.

3. Bonding Jumpers between rails (racking), shall be installed per manufacturer's requirements.

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

a. Burndy/Wiley

b. Ilsco

B. Inverter ground according to manufacturer instructions per UL 1741.

1. If Isolation transformers are utilized, inverter DC grounding shall be made in accordance with NEC 690.47C (2011).

2.3 PV SOURCE CIRCUIT JUNCTION / COMBINER BOXES

A. Junction (Pass-through) Boxes

1. Shall be contained in a N3R/N4/N4X enclosure per UL 50.

2. Shall have no breakers, fuses or other components requiring servicing and shall be visibly marked in accordance with NEC 690.35(F).

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

a. Soladeck (Basis-of-Design)

b. SolarBOS (requires separate weatherproof flashing)

c. Cooper (requires separate weatherproof flashing)

B. Combiner Boxes

1. Shall be contained in a N3R/N4/N4x enclosure and shall be rated UL 1741.

2. Combiner boxes shall be disconnecting combiner boxes, with weatherproof, lockable and accessible handle on deadfront of enclosure.

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

a. SolarBOS

b. Cooper

2.4 DC (DIRECT-CURRENT) SOURCE CIRCUIT WIRING

A. Wire Construction:

1. Wire size (AWG): as indicated on drawings. Whips and Jumpers between modules and Homeruns to junction/combiner box shall not be smaller than 10AWG
2. Sunlight Resistant, Wet or Dry Use, rated for Direct Burial
3. Bare or Tinned Stranded Copper Conductors with XLP Insulation rated to -40ºC to 90ºC.
4. RHH/RHW-2/USE-2 600V rated or PV-Wire 1000V rated
5. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or equal:
   a. Southwire (E316464)
   b. General Cable (Sun Gen)
   c. Service Wire (ServiceSolar)

B. Connectors / Terminations:

1. PV Connectors shall be polarized, non-interchangeable, guarded, latching or locking, have "first-to-make/last-to-break" contact for grounded conductor, require a specific crimp tool to terminate and require a tool to open once latched.
   a. Positive and Negative Connectors shall match module manufacturer's supplied ends.
   b. Crimp tool shall be certified by the Connector manufacturer as suitable for their product.
   c. Whips and Jumper assemblies (wiring harnesses with connectors on both sides) shall be pre-made and terminated by the factory, not field wired.

C. DC Source Wire Management

1. Stainless steel clips or pvc-coated stainless steel cable ties shall be used to secure exposed DC source circuits. Plastic UV rated cable ties are not acceptable.
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or equal: Heyco, Cooper, or Nine Fasteners.
2. Weatherproof cordgrips, mastheads or strain-reliefs shall be used when penetrating junction / combiner boxes or entering a conduit or conduit body with multiple DC source circuits. These connectors shall be multi-hole gland configured for the specific conductors used with integral sealing ring.
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or equal: Heyco, Cooper or Nine Fasteners.
3. Rooftop conduit supports on sloped roofs shall utilize the same PV Mount/Anchor utilized in section 2.5(C)

2.5 ARRAY RACKING

A. Shall be in accordance with UL 2703, shall comply with all local codes and authorities having jurisdiction, as shown on the drawings.

B. Racking System Components:

1. PV Mount / Anchor (by General Contractor)
2. Mounting Rail & Clamps
3. Hardware

4. Sealants

C. Mounting Rail shall be extruded 6000-series aluminum with minimum 34,000 psi yield strength.

1. Other components of the rail, including but not limited to clamps, L-feet, brackets, splices, and end caps shall be provided from the same manufacturer as the rail. All components shall have specified torque values from the manufacturer and shall comply with ASCE 7-10.

2. Manufacturers whose rail has optional end caps as part of their design; these end caps shall be furnished and installed by the Contractor.

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

a. Ironridge XR100

b. Unirac Solarmount HD

c. AET Rayport-P 2.5”

D. Hardware shall be all stainless steel.

1. Contractor to supply tamper-proof hex nuts on mid clamps and end clamps to secure modules in place.

E. All sealants used with flashings shall be protected from over-compression and should not be exposed to sunlight or the elements. All sealants should be appropriate for long-term (20 yrs +) performance.

2.6 GRID-INTERACTIVE INVERTER

A. Shall be in accordance with UL 1741, shall comply with IEEE 519 and IEEE 1547, as shown on the drawings, and shall be as specified. Basis of Design: Solectria PVI14-TL.

B. Inverter Electrical Characteristics:

1. Maximum DV voltage: 600 Vdc

3. PV Start/Strike Voltage: 300V Vdc

4. MPPT Voltage Range: 300 to 540 Vdc

5. Maximum Input Current: 25 A dc. Per MPPT

6. Number of String Inputs: 4

7. Number of Independent MPPT Circuits: 2

8. Maximum PV Power (per MPPT): 9.5kW

9. Nominal Output Voltage : 208VAC 3PH

10. Maximum Output Current: 39 A ac

11. Integral DC and AC Disconnect

12. NEMA Enclosure Rating: NEMA 4

C. Refer to construction drawings for exact locations.

D. Shall include maximum power point tracking (MPPT) features.

E. Shall have integral communications protocol: Ethernet

1. Contractor shall provide a 5-year monitoring agreement from Inverter Manufacturer.

2.7 SOLAR PHOTOVOLTAIC (PV) MODULES

A. Solar modules shall be monocrystalline designed with Minimum Performance Parameters as per IBC 1509.7.4, IRC M2302.3, listed to UL 1703, IEC 61215 and 61730, ISO 9000 or 9001; per NFPA 70 NEC 110.3, 690.4(D). Basis of Design: Suniva OPT-325-72-4-100

B. Solar Module Physical Characteristics:

1. Nominal Size: 39” x 77.6”
2. Weight: 50.7lbs.
3. Glass: Tempered with anti-reflective coating
4. Backing Material: White Tedlar Film
5. Frame: Clear Anodized Aluminum Frame

C. Solar Module Electrical Characteristics:

1. Voltage at Max. Power Point (Vmp): 37.10V
2. Current at Max. Power Point (Imp): 8.76A
3. Open Circuit Voltage (Voc): 46.40V
4. Short Circuit Current (Isc): 9.12A
5. Rated Power at STC (Pmax): 325W

D. Refer to construction drawings for exact locations.

2.8 METERING / MONITORING

A. Revenue Grade Meters shall be listed and certified UL916 and ANSI C12.1 (+/- 1% Accuracy) with the following electrical characteristics:

1. Meter shall provide kilowatt hour rate of production.
2. Meter shall have integral display.

B. Monitoring shall provide offsite remote Ethernet monitoring through Inverter manufacturer’s integral data acquisition system.

1. Provide 5-year monitoring agreement from Inverter Manufacturer.

PART 3 – EXECUTION

3.1 GENERAL

A. Install the solar photovoltaic system in accordance with NEC NFPA 70, this section, the instructions of the manufacturer per ICC IBC 1507.17.2 and the local authority having jurisdiction.

B. DC voltage from the photovoltaic array is always present at DC junction boxes, DC disconnects and the DC terminals of the inverter during daylight hours. All qualified persons working on or around this system must be aware that solar modules are always energized when exposed to sunlight and that the line and load lugs may be energized in the open position. EC & their subcontractors are responsible to inform their employees of the dangers involved in photovoltaic systems. CM will require a roster of employees with signatures stating that they have been

properly informed and understand the inherent dangers of working with photovoltaics prior to beginning work.

C. Examine substrate areas and conditions for compliance with requirements for installation. If preparation of mounting surfaces is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding. Do not begin installation until mounting surfaces have been properly prepared.

D. Contractor shall consider the weathering of equipment over the 25 year life of the system, and eliminate the possibility of degradation of equipment due to water entry and UV exposure.

3.2 INSTALLATION

A. Conduit Installation

1. Electrical metallic tubing (EMT) shall be used for interior work.
2. Rigid metal conduit (RMC) shall be used for exposed on roof and penetrating roof substrates.
3. Intermediate metal conduit (IMC) may be used in lieu of rigid metal conduit (RMC).
4. Liquid-tight flexible metal conduit (LFMC) shall be used in exterior and wet locations for connections to equipment, in short lengths (maximum 6 feet).
5. Provide conduit expansion fittings in all conduits crossing expansion joints or every 100’ minimum where exposed on roofs.
6. Provide conduit bushings where terminating conduits.
7. Conduits installed on roofs shall be on supports, minimum 3-1/2” high.
8. Provide separate conduits for communications wiring.
9. Provide all necessary waterproofing and fireproofing of building penetrations.
10. Provide all necessary and required supports for conduit systems.
11. All exposed steel RMC, IMC and EMT shall be run parallel or perpendicular to all structural building components. PV source and output circuits must be routed along building structural members (beams, rafters, trusses, and columns) where the location of those structural members can be determined by observation.
12. PV source circuit conduits run inside the building shall not be installed within 10” of underside the roof decking.
13. Seal conduit with duct seal or approved equal at exterior enclosure entry points to minimize condensation.
14. All strut, fabricated conduit supports, and hardware shall be hot-dipped galvanized or stainless steel.

B. Wiring Installation

1. The Contractor is required to use permanently color coded insulation. Phasing tape on conductors smaller than #6 AWG is not permissible. The contractor accepts all risks and liability if these instructions are not followed.
2. Ungrounded DC conductors are marked black and red. Grounded conductors are marked white or gray and grounding conductors shall be green, green/yellow, or bare. (USE-2 sunlight resistant cable is exempt from this requirement.)

3. Contractor shall employ acceptable wire management practices. At no point shall PV Source Circuit conductors come in contact with composite asphalt roof surfaces.

4. Extended distances of PV Source Circuits shall be sized in compliance with NEC temperature ratings and voltage drop tables.

5. Equipment Grounding Conductor (EGC) shall not come in direct contact with aluminum module frames to prevent galvanic corrosion.

6. All DC wiring shall be secured in accordance with the following:

   a. Minimum bending radius of the cable shall be in accordance with NEC 300.34, regardless of nominal voltage.
   b. Conductors shall be secured within 12” of its origins and subsequently secured not less than every 36”.

7. Plastic or Nylon cable ties are not permitted to secure DC wiring to Mounting Rail or Modules.

8. Conductors shall be clearly labeled with vinyl weatherproof labels sized 1” x 1-1/4”, black text on white background denoting polarity and circuit number. Labels to be affixed at the following locations: PV Module series circuit, Junction Box, and Inverter.

C. Array Racking Installation

1. PV Mount / Anchors shall be installed by General Contractor and secured in accordance with the penetration plan, staggered on different rafters/trusses to spread loads in order to keep loads at or below structural limits for a single rafter.

2. Lag Bolts from PV Mount / Anchor shall be centered on rafter/truss with pilot bit, allowing for 3” depth into wood member. Trusses should be inspected after completion to verify compliance with this section.

3. Mounting Rails with distances in excess of 60’ shall employ a thermal expansion gap. A bonding strap will still be required to maintain proper grounding.

D. PV Module Installation

1. Photovoltaic modules are not to be drilled or altered in any way. Any modifications to PV modules will void manufacturer's warranty. Contractor shall replace at their cost, any and all modules improperly altered.

3.3 FIELD QUALITY CONTROL

A. The Solar Array Equipment and all components shall be designed, manufactured, installed and tested in accordance with the latest editions of the following codes and standards:

1. National Fire Protection Association (NFPA) 70, National Electrical Code (NEC)

2. National Electrical Manufacturers Association (NEMA)

3. Institute of Electrical and Electronics Engineers (IEEE);IEEE 1547 (Standard for Interconnecting Distributed Resources with Electric Power Systems)

4. Underwriters Laboratory (UL) listed and labeled.

5. American National Standards Institute (ANSI)

B. Field Testing:

1. Module String Voltage Test: Prior to connecting wiring to the combiner box, use a digital multimeter to ensure each series string's Voc and polarity are correct. Tests shall be performed in accordance with IEC 62446.

2. String Short Circuit Current Test: Prior to connecting wiring to the Inverter, use a String Checker and Pyranometer to ensure each series string's Isc and output are within 2% of nominal.

C. Field Inspections

1. When the installation of the Array Racking is reported in writing by the contractor to be complete and ready for acceptance, an inspection shall be made by the Contractor in the presence of the Engineer to ascertain whether it complies with the contract documents, prior to the installation of PV modules.

2. When then installation of the entire PV system is reported in writing by the contractor to be complete and ready for acceptance, an inspection shall be made by the Contractor in the presence of the Engineer to ascertain whether it complies with the contract documents. A commissioning report will be generated from this inspection.

3.4 TRAINING

A. Provide a training session for owner's representative(s) at the jobsite location.

1. The Contractor shall provide a qualified representative thoroughly familiar with the completed installation, to instruct the Owners operating personnel in the proper operation of all systems included under this contract, and the proper care of all equipment and apparatus. These services shall be furnished for a period of one (1) 4-hour day training session, after the operation of the systems have been taken over by the Owner.

2. Contractor shall instruct owner on how to apply for Solar Renewable Energy Credits (SREC) and provide all required backup material.

3. The training program shall consist of instructions on the Inverter, software, maintenance and servicing of the system, and other major components.

---END OF SECTION 263100---

SECTION 263200 – SPECIAL SYSTEMS

PART 1 - GENERAL

1.1 IP Intercom Stations

A. Manufacture: Basis for Specification is 2N® Helios IP intercoms. Equivalent Manufacturers are acceptable.
   1. General:
      a. Intercom – electronic device providing audio and video communication including access control and security.
      b. Pure IP based solution.
      c. Standalone functionality – intercom shall be able to perform tasks of access control device even without network connection. Intercom shall not require any remote service running on PC server etc. to perform its tasks once it is configured.
      d. Intercom shall be able to adapt time and date settings from public NTP server.
   2. Configuration
      a. Remote configuration using state of the art web interface with online status monitoring.
      b. Remote group configuration and upgrade of all intercoms from one place, including online connection monitoring.
      c. Intercom shall support creating of back up of configuration for later use.
      d. Intercom shall not allow identical numeric codes for different use scenarios
   3. Communication
      a. Two way full duplex audio communication with echo cancellation.
      b. Separately adjustable audio volume level for call, key, error messages, paging.
      c. Intercom shall support adaptive gain control.
      d. Intercom shall be able to be registered to SIP registrar. Outgoing calls shall be performed either by calling on predefined IP address, or using SIP proxy which can be, but not must be, the same as SIP registrar.
      e. Intercom shall support audio communication using G.711 codec.
      f. User as entry in phonebook shall have up to three separate numbers which can be dialed in sequence or as ring group.
      g. Device, which is called from intercom, can be identified as extension number or direct IP address. Combinations of all options shall be supported in phonebook entry.
      h. Intercom shall be interoperable/certified with major brands of PBX and gateways manufacturers.
      i. Administrator shall be able to remotely reboot the intercom as well as trigger factory reset.
   4. Access control
      a. User of remote station, such as IP telephone, must be able to control the electrical output of the intercom using DTMF codes from keypad of his device.
      b. Intercom shall be able to log events such as codes, phone calls, RFID cards etc., and provide them using HTTP/XML interface for monitoring. Administrator shall be able to set whether the particular messages are sent by the intercom immediately after any event occurs, or if the client registers for event logging and then asks for full report since last registration, all events at once. Client shall be able to select which messages are reported from event log.
      c. Each user can have unique access code for each of electric outputs of the intercom.

5. Network security
   a. Configuration of the intercom should be secured using HTTPS protocol.
   b. Intercom shall be able to operate in DHCP on or static IP address mode
   c. Intercom shall require the administrator to change default password for a new one. Intercom refuses password which is not long and complicated enough.
   d. Intercom shall be resistant against dictionary attacks by blocking of the login page for 30 seconds after three faulty passwords were submitted.
6. Physical security
   a. Intercom shall control the door lock in a way which cannot be surpassed when attacker gains access to cabling from the intercom, or gets inside the intercom.
7. Additional Standards
   a. Signaling protocol
      1) SIP 2.0 (RFC - 3261)
   b. Buttons
      1) Quick dial buttons
      2) Transparent, white backlit buttons with easily replaceable name tags
         a) Number of buttons 1 to 146
      3) Numeric keypad optional
   c. Audio
      1) Microphone 1 integrated microphones
      2) Loudspeaker 2W
   d. Audio stream Codecs G.711, G.729
   e. Camera
      1) Resolution – JPEG 1280 x 960 px
      2) Resolution – video call 640 x 480 px
      3) View angle 120° (H), 90° (V), 145° (D)
      4) IR Night Vision
   f. Video stream
      1) Codecs H.263+, H.263, H.264, MJPEG, MPEG-4
   g. RFID card reader
      1) Supported cards
         a) Mifare Classic 1k & 4k
         b) DESFire EV1
         c) Mini, Plus S&X
         d) SmartMX, Ultralight
         e) Ultralight C
         f) SLE44R35
         g) My-d move (SLE66Rxx)
         h) PayPass,
         i) Legic Advant Calypso,
         j) CEPAS
         k) Moneo
         l) PicoPass
         m) HID iCLASS
   h. Interface
      1) Power Supply12V±15%/2A DC
      2) PoE 802.3af (Class 0 - 12.95W)
      3) LAN 10/100BASE-TX with Auto-MDIX, RJ-45
      4) Relay outputs NC/NO contacts, max 30V/1A AC/DC
      5) Active output 8V – 12V DC/400mA
   i. Dimensions

1) Wall-mounted 1 module 107x130x28 mm
2) Wall-mounted 2 modules 107x234x28 mm
3) Wall-mounted 3 modules 107x361x28 mm
4) In-wall 1 module 130x153x5 mm
5) In-wall 2 modules 130x257x5 mm
6) In-wall 3 modules 130x361x5 mm

j. Extended Modules
1) Keypad
2) 5 Button
3) Info Panel
4) Blind Module
5) RFID Reader Module
6) Tamper Switch
7) Wiegand Module
8) I/Module

k. Frames
1) Flush and Surface Installation
a) 1 Module
b) 2 Module
c) 3 Module

l. Boxes
1) Flush Installation
a) 1 Module
b) 2 Module
c) 3 Module

m. Additional Accessories
1) IP Relay
2) USB RFID Reader
3) RFID Reader
4) RFID FOB
5) RFID Card EM4100
6) RFID Card Mifare
7) Door Contact
8) 2Wire Convertor
9) Request to Exit
10) Extension Cable

B. Manufacture: 2N® Helios IP Force or Equal
1. General
a. Intercom shall be compact unit, anti-vandal design with protecting frame and black surface.
2. Mechanical requirements
a. Robust construction and easy to install.
b. Two separate microphones for back up and noise cancellation.
c. Backlit, easy to exchange nametags which are push buttons at the same time.
d. Mechanical keypad for entering of phonebook positions, phone numbers, entering of access codes, or triggering special functions.
e. Camera shall be hidden and protected by the chassis of the intercom.
f. Intercom shall be equipped with tamper switch which enables connection of a separate wiring to alarm system. Opening, removing or disconnecting of the intercom shall be recognizable even if the intercom is out of operation. Intercom

shall be able to react on tamper switch activation with sound alarm, call triggering, sending of an email and sending of HTTP message.

3. Configuration
   a. Intercom shall support auto provisioning / triggered or automatic prescheduled updates and upgrades.
   b. Intercom shall support DHCP option 66 function to obtain auto provisioning server address.
   c. Automatic upgrade of firmware or update of configuration shall support TFTP or HTTP protocol.
   d. Specific configuration file for particular unit, model, or general shall be supported.
4. Communication
   a. Audio and video communication.
   b. Audio communication using G.711 or G.729 codecs.
   c. Following Ethernet protocols have to be supported DHCP, HTTP, HTTPS, TFTP, SMTP, 802.1x, NTP, RTP, RTSP, ONVIF, Syslog
   d. Intercom shall be able to send pictures separately from audio to 2N® Helios IP Eye application.
   e. Audible and visible information for user about current status of the intercom using pictograms and human voice instructions.
   f. Separate visible indicator of armed or alarm status.
   g. Intercom shall be interoperable with public announcement systems as both destination of announcement as well as source of announcement.
      1) Intercom shall support multicast audio dissemination, both as source and destination.
   h. Group of intercoms shall be able to perform basic public announcement tasks.
   i. On predefined situations, intercom shall be able to send an email with pictures from camera and predefined message text. Intercom shall be able to address every user in phonebook, or use a default general email address.
   j. Intercom shall be able to address 1999 separate users, three numbers for each user.
5. Access control
   a. Intercom shall be able to provide access control according to identification of visitors by numeric code entered on keypad, RFID card swiped at card reader or combination of both (Double verification).
   b. Intercom shall be able to detect door opening and trigger an alarm when the door has been opened unauthorized, or if the door is left open for too long.
   c. Intercom shall be able to communicate with external access control system using Wiegand interface or HTTP messages.
   d. Electrical outputs shall be remotely operable by external access control system.
   e. Intercom shall support connection of “Push to exit” button.
   f. Electrical outputs shall be either opened for predefined time, or closed manually.
   g. Ten anonymous visitor cards shall be supported.
   h. Each user of intercom included in phonebook shall have at least one access RFID card.
6. Network security
   a. Intercom shall be able to use user certificates to encrypt communication.
   b. Intercom shall support 802.1x for network authentication.
7. Physical security
   a. Particular intercoms in the network shall be able to intercommunicate and perform group actions such as emergency lockdown, door release, disabling of access cards.

b. Intercom shall be ONVIF profile S certified to provide proper interoperability with video monitoring and recording systems. Streaming of the video from the intercom shall not interfere with other operation of the unit. Up to four independent clients shall be able to be accommodated.
c. Intercom shall be able to test proper operation of its speaker and microphone and inform about result of such test. Test shall be manually triggered, or prescheduled.
d. Intercom shall be able to block predefined actions, such as user accessibility, RFID card or access code functionality to specific time on a weekly basis.

8. Additional Requirements
   a. Power Supply
      1) 802.3af (PoE) 48 V / 380 mA DC/Adaptor 230 V10%,
      2) 50/60 Hz / 12V DC
      3) DC power supply 12 V / 2A DC
   b. VoIP
      1) Signalization SIP
   c. Number of voice channels
      1) 2
   d. Audio Codecs
      1) G.711, G.729
   e. Video Codecs
      1) H.264, 64 – 2048 kbit/s
      2) H.263
      3) H.263+
   f. Interfaces
      1) Ethernet
         a) Connector RJ-45
         b) Ethernet speed 10/100 BASE-T
   g. Relay outputs
      1) Maximal voltage 30 V DC
      2) Maximal current 1 A DC
   h. Active output 9V – 13V DC/700m
   i. Audio & Video
      1) Audio
      2) 2 integrated microphones
      3) 10W D-Class amplifier
      4) Full duplex (AEC)
   j. Video
      1) Camera 640 (H) x 480 (V)
      2) View angle 135° (H), 109° (V)
      3) IR Night Vision
   k. Dimensions
      1) 217x109x83 mm (H x W x D)
      2) 242x136x83 mm (H x W x D) with a frame
   l. Weight max. 2000 g
   m. Operating temperatures from –40 to +55 ºC
   n. Cover level IP65, selected models IP69k
   o. Mounting Boxes
      1) Flush Mount Box
      2) Plaster Mount
   p. RFID card reader
      1) Supported cards

a) Mifare Classic 1k & 4k
b) DESFire EV1
c) Mini, Plus S&X
d) SmartMX, Ultralight
e) Ultralight C
f) SLE44R35
g) My-d move (SLE66Rxx)
h) PayPass,
i) Legic Advant Calypso,

9. Additional Accessories
   a. 2N®Helios IP Security Relay
   b. 2N®Helios IP Network Scanner
   c. 2N®Helios IP Manager
   d. 2N®Helios IP Mobile
   e. 2Wire convertor

C. Manufacture: 2N® Helios IP Safety or Equal
   1. General
      a. Intercom shall be compact unit, ant vandal design with protecting frame and orange surface.
   2. Mechanical requirements
      a. Robust construction and easy to install.
      b. No accessories for outdoor use shall be necessary.
      c. Coverage rating IP69K.
      d. Loudspeaker amplifier power 10W.
      e. Two separate microphones for back up and noise cancellation.
      f. Flush installation less than 10mm above surface.
      g. Blue backlit round button.
      h. Intercom shall be equipped with tamper switch which enables connection of a separate wiring to alarm system. Opening, removing or disconnecting of the intercom shall be recognizable even if the intercom is out of operation. Intercom shall be able to react on tamper switch activation with sound alarm, call triggering, sending of an email and sending of HTTP message.
   3. Configuration
      a. Intercom shall support auto provisioning / triggered or automatic prescheduled updates and upgrades.
      b. Intercom shall support DHCP option 66 function to obtain auto provisioning server address.
      c. Automatic upgrade of firmware or update of configuration shall support TFTP or HTTP protocol.
      d. Specific configuration file for particular unit, model, or general shall be supported.
   4. Communication
      a. Following Ethernet protocols have to be supported DHCP, HTTP, HTTPS, TFTP, SMTP, 802.1x, NTP, RTP, RTSP, ONVIF, Syslog
      b. Audible information for user about current status of the intercom using human voice instructions.
      c. Intercom shall be interoperable with public announcement systems as both destination of announcement as well as source of announcement.
      d. Intercom shall support multicast audio dissemination, both as source and destination.
      e. Group of intercoms shall be able to perform basic public announcement tasks.

f. On predefined situations, intercom shall be able to send an email with pictures from camera and predefined message text. Intercom shall be able to address every user in phonebook, or use a default general email address.
g. Intercom shall be able to address 1999 separate users, three numbers for each user.

5. Access control
   a. Intercom shall be able to detect door opening and trigger an alarm when the door has been opened unauthorized, or if the door is left open for too long.
   b. Intercom shall be able to communicate with external access control system using Wiegand interface or HTTP messages.
   c. Electrical outputs shall be remotely operable by external access control system.
   d. Intercom shall support connection of “Push to exit” button.
   e. Electrical outputs shall be either opened for predefined time, or closed manually.
6. Network security
   a. Intercom shall be able to use user certificates to encrypt communication.
   b. Intercom shall support 802.1x for network authentication.
7. Physical security
   a. Particular intercoms in the network shall be able to intercommunicate and perform group actions such as emergency lockdown, door release, disabling of access cards.
   b. Intercom shall be able to test proper operation of its speaker and microphone and inform about result of such test. Test shall be manually triggered, or prescheduled.
   c. Intercom shall be able to block predefined actions, such as user accessibility or access code functionality to specific time on a weekly basis.
8. Additional Requirements
   a. Power Supply
      1) 802.3af (PoE) 48 V / 380 mA DC/Adaptor 230 V10%,
      2) 50/60 Hz / 12V DC
      3) DC power supply 12 V / 2A DC
   b. VoIP
      1) Signalization SIP
   c. Number of voice channels
      1) 2
   d. Audio Codecs
      1) G.711, G.729
   e. Video Codecs
      1) H.264, 64 – 2048 kbit/s
      2) H.263
      3) H.263+
   f. Interfaces
      1) Ethernet
         a) Connector RJ-45
         b) Ethernet speed 10/100 BASE-T
   g. Relay outputs
      1) Maximal voltage 30 V DC
      2) Maximal current 1 A DC
   h. Active output 9V – 13V DC/700m
   i. Audio
      1) 2 integrated microphones
      2) 10W D-Class amplifier
      3) Full duplex (AEC)

j. Dimensions
   1) 217x109x83 mm (H x W x D)
   2) 242x136x83 mm (H x W x D) with a frame
k. Weight max. 2000 g
l. Operating temperatures from –40 to +55 ºC
m. Cover level IP65, selected models IP69
n. Mounting Boxes
   1) Flush Mount Box
   2) Plaster Mount
   3) Frame

9. Additional Accessories
   a. 2N®Helios IP Security Relay
   b. 2N®Helios IP Network Scanner
   c. 2N®Helios IP Manager
   d. 2N®Helios IP Mobile
   e. 2Wire convertor

D. Manufacture: 2N® Helios Uni or Equal
1. General
   a. Intercom shall be compact unit, ant vandal design with protecting frame and stainless steel design.
2. Mechanical requirements
   a. Robust construction and easy to install.
   b. Flush installation less than 10mm above surface.
   c. Easy to exchange backlit nametags which also serve as push buttons.
   d. Intercom shall be equipped with tamper switch which enables connection of a separate wiring to alarm system. Opening, removing or disconnecting of the intercom shall be recognizable even if the intercom is out of operation.
3. Communication
   a. Audio communication using G.711 codecs.
   b. Following Ethernet protocols have to be supported DHCP, HTTP, HTTPS, NTP, RTP, Syslog
   c. Visual information for user about current status of the intercom using pictograms.
   d. Intercom shall be interoperable with public announcement systems as both destination of announcement as well as source of announcement.
   e. Intercom shall support multicast audio dissemination, both as source and destination.
   f. Intercom shall be able to address 2 separate users, three numbers for each user.
4. Access control
   a. One independent electric outputs for door lock etc., either active 10V DC or NO/NC relay up to 30V@1A AC/DC.
   b. Electrical outputs shall be remotely operable by external access control system.
   c. Electrical outputs shall be either opened for predefined time, or closed manually.
5. Physical security
   a. Intercom shall be able to block predefined actions, such as user accessibility or access code functionality to specific time on a weekly basis.
6. Additional Requirements
   a. Power supply
      1) 802.3af (PoE) 48 V / 380 mA DC or Adapter
      2) 230 V ± 10%, 50/60 Hz / 12V DC
      3) DC power supply 12 V / 2A DC

b. Signaling protocol
   1) SIP
c. Number of voice channels 2
d. Audio codices G.711 PCM, 64 kbps

7. Additional Accessories
   a. 2N®Helios IP Security Relay
   b. 2N®Helios IP Network Scanner
   c. 2N®Helios IP Manager
   d. 2N®Helios IP Mobile
   e. 2Wire convertor

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 263200

SECTION 266000 – COMMUNICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including general and supplementary conditions and Division 1 Specification Sections, apply to work specified in this section.

1.2 TELEPHONE/DATA SYSTEMS

1. General

A. Provide a system of conduit and wiring for use by the Owner's Telephone and Data Vendors, sized as indicated on the Plan and the Riser on the drawings.

2. Installation

A. Provide new distribution conduits, as shown or required.

B. Terminate all raceways at the new and existing building's telephone/data racks. Use insulating bushings on the conduit ends secured to a suitable metal channel using Minerallic type clamps. Provide a #6 AWG bare copper ground wire to ground the bushings and channel to the building ground system.

C. For branch telephone/data conduits, use a minimum 1 inch trade size.

D. For flush outlets, use a 4 inch square, 2-1/8" deep box.

E. For surface telephone or data outlets, use a single gang box.

F. Where "sleeves only" are indicated between floors, use the type of sleeve which is self-sealing in the event of a fire.

G. In each outlet box, provide and install 8-conductor, modular jacks with integral cover plate, as shown on the drawing as shown on the drawing.

H. From each outlet jack to the closest indicated data rack, extend an 8-conductor, category 6, 24 gauge, copper twisted pair cable with outer plastic jacket.

I. Make connections to all branch telephone/data outlet jacks.

J. Make connections at all source locations (telephone boards) and data rack patch panels.

K. Test all telephone/data cables prior to rack connections.

L. All low voltage cables shall be tagged at all termination points and in all junction boxes. Labels shall show the following information: system name, source and load termination points and system voltage.

M. Provide suitable telephone terminal strips on these plywood boards for wiring connections. Terminate telephone and data branches in new patch panels in the new rack.

N. See the drawings for additional wiring requirements.

O. Note that all telephone instruments and central telephone control equipment will be furnished and installed by the Owner. Central data switches will be furnished and installed by the Owner.

1.3 LAN SYSTEM

1. General

A. The General Conditions of Contracts of Construction, referred to in the Contract Documents as the General Conditions, together with the following specifications of the LAN System Provisions which amend, modify and supplement various articles and provisions of the General Conditions, are made part of the Contract and shall apply to all work under the Contract.

B. This specification calls out actions to be taken, tasks to be performed by and responsibilities of the certified Communications Cabling Contractor in order to provide a complete communications cabling system. Unless otherwise noted all following sections which describe such actions, tasks and responsibilities refer to the Contractor.

C. Comply with all applicable governmental regulations and with all Federal, State, City and other applicable codes and ordinances.

D. Contractors bidding this project must be or must hire a Sub-Contractor who is an A T & T certified installer, or approved single system certified equal installer.

E. Provide all items and work indicated on the Drawings and all items and work called for in this specification in accordance with the conditions of the General Contract. This includes all labor, materials, incidentals, equipment, appliances, services, hoisting, scaffolding, supports, tools, test equipment, supervision, consumable items, fees, licenses, insurance, etc., necessary to provide a complete cabling system.

F. Bring any discrepancies found between the Specifications and the Drawings immediately to the attention of the Engineer. Installation and details indicated on Drawings shall govern if they differ from Specifications.

2. Terms and Abbreviations

A. The following abbreviations shall rule within the Drawings and Specifications:

1.	NEC	National Electrical Code
2.	ANSI	American National Standards Institute
3.	NFPA	National Fire Protection Association
4.	IEEE	Institute of Electrical and Electronic Engineers
5.	NEMA	National Electrical Manufacturers Association
6.	U.L.	Underwriters' Laboratories, Inc.
7.	ASTM	American Society of Testing Materials
8.	EIA	Electronic Industries Association
9.	FCC	Federal Communications Commission

3. Work Included

A. The work covered by this Specification includes the construction described, including: All labor necessary to perform and complete such construction; all materials and equipment incorporated in or to be incorporated in such construction; all services, facilities, tools and equipment necessary or used to perform and complete such construction.

B. The scope of this work includes, but is not limited to, providing the following: All unshielded twisted pair copper communications backbone wiring (UTP) extending between the communications closets and branch outlets.

1. All telecommunications backbone tie cables between IC's, MC's and specific equipment locations as shown on the drawings.

2. All horizontal telecommunications cabling between individual work area outlet locations and their associated telecommunications closets/racks/enclosures.

3. All termination blocks, equipment racks, cross connect supports and guide rings required to terminate or cross connect communications cables in communications closets and/or at designated equipment locations.

4. All connectors, terminating devices, faceplates, etc. required to terminate and mount communications cables.

5. All cable supports, (J-Hooks) including all necessary drilling, placement of support rods and placement of mounting hardware wherever cables are installed within the ceiling plenum outside of cable trays.

6. All cable supports within the communications closets.

7. Labeling and documentation of installation of all cables, racks, frames, outlets and hardware installed under this contract.

8. Testing and test documentation for all cabling as described below.

9. Preparation and submission of shop drawings, “as-built” drawings, testing reports and cable documentation as described below.

10. Fire-stopping of all openings in fire-rated walls and floors created by or on behalf of the Contractor.

11. Provision of factory assembled patch cords for attachment of horizontal wiring system components to Owner-provided equipment in the communications closets/racks/enclosures.

12. Raceways and conduits specified under other electrical specifications.

13. Cutting, patching and painting.

4. Related Work

A. See other sections of this specification for related work.

5. Site Visit

A. Verify all dimensions in the field and document the cable lengths and materials to be furnished and installed.

B. Provide and install all non-specified miscellaneous hardware, i.e., nuts, bolts, tie wraps, J-hooks, wire rings, supporting hardware, etc.

C. This is an existing facility. Pay particular attention to the accessibility of ceiling spaces and the location of existing hardware and equipment.

D. Existing site conditions, existing contract documents and the construction schedule must be carefully reviewed to determine the timing and order of execution of the work.

E. Contractor shall make a walk-through of the facility, prior to bid.

6. Submittals

A. All submittals shall be made in accordance with Division 01.

7. Warranty

A. Submit a single warranty stating that all portions of work are in accordance with Contract requirements.

B. This warranty shall cover all work against all malfunctions and faulty and improper material and workmanship for a period of at least five (5) years from date of final acceptance. Where warranty or warranties for longer terms are specified, such longer terms shall apply. This warranty shall apply to all work provided by the Contractor, his employees, all sub-contractors and any and all work performed on the Contractor's behalf or by his direction to provide the communications system described in the plans and in this specification.

C. Within 24 hours after notification by the Owner, correct any deficiencies which occur to the Owner's satisfaction during the warranty period at no additional cost. Obtain similar warranty from sub-contractors, manufacturers, suppliers and sub-trade specialists.

D. The Electrical Contractor shall be on call during setup of the network to provide assistance to the Owner.

8. Special Conditions

A. The requirements and recommendations of all standards, specifications and codes referred to herein, including telecommunications drawings, shall be considered a part of these specifications.

B. Except as modified herein, the requirements and recommendations of the latest editions of the following documents are made part of these specifications:

1. National Electrical Code, latest adopted edition.
2. EIA/TIA - 568 "Commercial Building Telecommunications Wiring Standard".
3. EIA/TIA - 569 "Commercial Building Standard for Telecommunications Pathways and Spaces."
4. EIA/TIA - 606 "Administration Standard for the Telecommunications Infrastructure of Commercial Buildings".
5. EIA/TIA TSB-36 "Additional Cable Specifications for UTP Cables".
6. EIA/TIA TSB-40A "Additional Transmission Specifications for UTP Connecting Hardware".
7. EIA/TIA PN-2327 (EIA/TIA-607) "Commercial Building Grounding and Bonding Requirements for Telecommunications".

PART 2 - PRODUCTS

1. General

A. If products, materials and/or systems are specified or indicated on the drawings, use those products or materials. If products and materials are not listed in either of the above, use first class products and materials, subject to approval of shop drawings and submittals.

B. All materials furnished shall bear the U.L. Label, provided that a standard has been established for the material in question.

2. Intra-Building Unshielded Twisted Pair Cable – Category-6

A. Intra-building Non-Plenum Station Cable - Electrical Specifications: Four (4) 24 AWG twisted unshielded pairs, nominal velocity of propagation: .72; maximum DC resistance: 9.4 ohms/100m; maximum DC resistance unbalance: <3%; mutual capacitance @ 1 KHZ: 4.9 nF/100m; Category-6 compliant.

B. Cable Construction: Solid copper, Teflon-insulated conductors, overall LS PVC outer jacket, color of outer jacket as listed below.

C. Gray Outer Jacket: manufacturer: Systimax SCS - Type: 1061.

D. All patch cables shall be Allen Tel, Category-6 Cables and shall be color-coded per Owners requirements. Coordinate color code with the Owner's Representative. Coordinate length of cable at the site.

3. LAN System Components

A. Furnish and install the following components:

(1) Graybar #AT66PNL-24; ALLEN TEL 24-Port, Category-6 Patch Panel
(As Required)Graybar #AT-1605-8C; 5 Ft. Yellow Category-6 UTP Patch Cable
(As Required) Graybar # Fiber Patch Cord; duplex; 2 meters. Verify type required.
(As required) Graybar #AT70-1-52; 1-Outlet Executive Faceplates
(As required) Graybar #AT66-09 Category-6 RJ45 Inserts
(1) Power Strip with six (6) 20 Amp receptacles, 6'-0" cord and plug, surge suppression protected. Wiremold or approved equal.

B. Contact Graybar (Telephone: 412-323-5200) for items listed above.

C. Other approved suppliers are Wesco and South Hills Black Box or others as approved by the Engineer.

D. The following items will be purchased and installed by the Owner. The Owner will configure the units after installation.

1. 1 Fast Ether Managed 24-Port Switch, configured by the Owner

2. Management Units and UPS System Units

E. Note that all patch cables for hub areas as well as all remote jack locations shall be included in the bid price whether or not listed above. Verify patch cable lengths required prior to ordering of cables. Verify quantities prior to Bid.

PART 3 - EXECUTION

1. General

A. Installation: Follow manufacturer's instructions for installing, connecting and adjusting all equipment and communications cabling. Where no instructions are included or available, follow industry standards.

2. EMI/RFI Avoidance

A. To avoid electromagnetic interference (EMI) cables shall be routed in such a way as to maintain the following minimum distance from possible sources of EMI:

1. Five (5) inches from power lines of 2 KVA or less, unless installed in conduits or grounded flexible armor below access floors.

2. Three (3) inches from fluorescent fixtures with remotely installed ballasts.

3. Twelve (12) inches from power lines of between 2 to 5 KVA.

4. Thirty-six (36) inches from power lines of 5 KVA or greater.

5. Twelve (12) inches from high voltage lighting, including fluorescent lighting.

6. Forty (40) inches from transformers or motors.

B. Maintain a minimum 12-inch separation between telecommunication cables running exposed in ceiling or floor voids and parallel electrical cables/conduits.

C. Telecommunication cables which must cross electrical cables/conduits shall do so only at 90 degree angles.

3. Staffing

A. On-site personnel shall be skilled and experienced in the installation of the equipment and cabling described herein. These shall include the personnel of any sub-contractors approved for use in the project.

B. Telephone and data industry cable installation standards, EIA/TIA standards and manufacturer's instructions shall be used for in-process quality control and final acceptance of the installation.

4. Cable Endings

A. Label each cable as noted above. Leave at least 9" of slack at each terminal box or behind each faceplate and at least 24" of coiled slack behind each systems furniture outlet box after jack installation is completed to allow for easy dismounting and extension of outlet covers and wire terminations.

B. Terminations at work locations not mounted into fixed terminal boxes or face plates shall be made leaving slack cable as indicated on the drawings to allow the attached equipment to be moved for maintenance.

5. Fire Stop – Penetration Sealant

A. Provide fire-resistant materials of a type and composition necessary to restore fire ratings to all wall, floor or ceiling penetrations utilized for the installation of the communications wiring system. All materials must be U.L. classified and meet NEC and local code.

6. Cable Testing

A. Test all data cables installed under these specifications.

B. Pre-Installation Testing

1. Visually inspect all cables, cable reels and shipping cartons to detect any damage incurred during shipping and transport. Return visibly damaged items to the manufacturer.

2. When post-manufacture test data has been provided by the manufacturer on the reel or shipping carton, submit copies to the Engineer prior to installing cables.

3. Mark reels as tested/inspected and submit associated test results to Engineer.

4. The testing of all data cables shall be done in the presence of the Owner's representative. Contact the Owner one (1) week in advance of the test start date.

5. The Owner's representative and the contractor's testing personnel shall sign each document for test results for each cable.

6. The testing shall be performed to assure certification of the operation of the Category-6 Cables at 155 mbps data rate.

7. The equipment used for testing shall be LAN Tech Pro or Penta scanner as required to test for 155 mbps.

8. The following measurements shall be documented for every cable:

1.	Cable footage	5.	Capacitance
2.	Wire Mapping	6.	Attenuation
3.	Impedance	7.	N.E.X.T. (nearest end cross-talk)
4.	Resistance	8.	Active ACR (attenuation to cross-talk ratio)

9. The Contractor shall submit a documentation sheet and have it approved prior to doing the work.

10. All test sheets shall be signed by the Contractor's personnel performing the testing and the Owner's representative. Tests without proper signatures will be rejected.

C. Post Installation Testing

1. Conduct cable testing as described below upon completion of installation. Test only fully completed systems. Partial testing is not acceptable, except by prior written approval from the Engineer.

2. A representative of the Owner must be present for some or all of the testing. The Electrical Contractor shall contact him to inform him of the testing date and time.

D. Paired and Multi-Conductor Metallic Cables

1. Perform an end-to-end test for continuity, ground fault, proper cross connection, shorts and crossed pairs for each cable pair/conductor.

2. Cable pair testing shall be done from the work area outlet, through all connectors, patches and cross connects to the MC.

3. Horizontal cable pairs not cross-connected to the backbone shall be tested from the work area outlet to their furthest termination point.

4. All other cables shall be tested from end-to-end. Testing shall include all attached "breakout" cables (e.g. multi-leg hydras), if used.

5. For 4-pair UTP cabling, in addition to the end-to-end test for continuity, ground fault, proper cross connection, shorts and crossed pairs for each cable pair/conductor, test for length, capacitance, attenuation, noise, resistance and NEXT with injected standard signals. Utilize automated test equipment (see below) for all 4-pair UTP cable testing to allow for single pass testing of all measured parameters.

6. For 4 and 25 pair, EIA-RS232, AUI, proprietary and V.35 cables: replace the entire cable if a bad pair or conductor is found. For higher pair-count cables, replace is more than 5% of pairs are bad. 4-pair cable shall not be failed on the basis of NEXT data collected from automated test equipment.

E. Remove all defective cables from the cable pathways. Do not abandon cables in place.

F. Owners and the Engineer reserves the right to observe the conduct of any or all portions of the testing process.

G. The Engineer or the Owner reserves the right to conduct, using Contractor equipment and labor, a random re-test of up to five (5) percent of the cable installation to confirm documented test results.

H. All test results and corrective procedures shall be documented, notarized and the original and three (3) copies shall be submitted to the Owner within ten (10) working days of test completion.

I. Prior to testing, submit to the Owner, for review and approval, copies of test report forms proposed for use.

1. Each test report form shall contain the following general information: Date of preparation, date of test, project name, contractors name, media type, length of cable, make, model and serial number of test equipment used, date of last calibration and names of test crew.

2. Paired and multi-conductor metallic cable test reports: as a minimum, also provide: cable number, cable type, pair or conductor count, individual pair or conductor numbers, number of cross connects and/or patches in each pair, results of each test for each pair or conductor, total number of serviceable pairs or conductors in cable.

3. 4-Pair UTP cables: provide test reports created by automated cable tester for each tested cable.

J. In addition to the tests specified above, be prepared to be present while the Owner installs and conducts performance tests of the transport electronics connected to the cabling system. Be prepared to conduct on-the-spot cable tests and effect cable plant repairs, as necessary. Successful equipment performance tests do not relieve the Contractor from the specified testing, repair and documentation requirements.

K. Recommended Test Equipment

Metallic Cable Pair Tester: Independent Technologies, TEST-ALL IV or 25, Siemon Company, Multi-Test MT-5000 or equivalent.

4-Pair UTP Automated Cable Tester: Wavetek LANTech 100, Microtest Pentascanner Siemon MT CAT5 or approved equivalent.

7. Acceptance

A. The Engineer shall review and or observe the installation and testing of the wiring system. The Engineer reserves the right to randomly request testing of the cables/wires installed.

B. Once the testing has been completed and all as-built and testing documentation is delivered to the Engineer and the Owners; and the Engineer and the Owner is satisfied that all work is in accordance with the Contract Documents, the Owner shall notify the Contractor in writing of the acceptance of the work performed. The date of this acceptance shall constitute the start date of the warranty.

C. A diagram of all cabling for this project shall be provided to the Owner.

8. Cable Connector Protection

A. All installed connectors shall be protected and insulated by one of the following methods:

1. Any installed connector exposed to construction activities shall be protected with a clear, heat sealed 3 mil plastic bag sealed shut with waterproof tape or tie wrap after installation. The bag must be removable for testing. Any protective bags removed for testing or other installation activities must be replaced immediately after such activities are completed.

2. Any connector which is normally shipped with an insulating protective cover over the connector pins shall be left with the cover in place after the connector has been installed on the cable. The protective cover shall be taped in place if easily dislodged.

3. Any connector normally shipped with a protective cover, but found to have that cover missing upon delivery, shall not be used without authorization by the Engineer. If installation is authorized, the connector shall be protected as per above.

4. Connectors which are designated on the plans as "Reserved for Future Use" or "SPARE" shall be protected with heat-shrinkable tubing which shall cover all exposed metal parts of the connector and shall also serve to protect the connector pins against all contamination. Tubing shall be shrunk only enough to achieve the required protection, so as to simplify its later removal when the circuit is activated. Protective tubing shall not obscure the cable tag.

9. Cable Identification System

A. Terminations (jacks, face plates, wall outlets, etc.) at the user locations shall be labeled with (at min.) machine-generated black uppercase lettering on a permanent adhesive label stock, covered with a permanent water resistant sealer. Labeling stock and/or lettering must be used that provides a high contrast with the color of the terminating equipment and face plates.

B. All lateral cabling shall be labeled with machine-generated black uppercase lettering on a permanent adhesive label stock, covered with a permanent water resistant sealer.

C. Labels shall be placed on both ends of the cable and at least 4 inches from the point at which the cable jacket is opened to expose individual copper pairs or from the connector to the terminal block. All labels shall be visually and physically accessible at work locations and when cables are mounted to frames, blocks, racks, etc. where the proper mounting procedure allows ready access to individual cables. When cables are mounted to punchdown wiring blocks with integrated labeling capacity, the wiring labels shall be affixed to cables as above and the blocks shall be labeled using machine-generated black uppercase lettering on a permanent adhesive stock, duplicating the information on the cable identification label.

D. Provide all cable tags. Label each tag with the appropriate cable number as shown on the drawings and as indicated on the cable schedules which may be provided by the Engineer.

E. Cable identification numbers shown on the plans are presented in an abbreviated format. All cable ID's shall (at min.) indicate their floor, originating closet ID and cable ID.

F. After pulling and terminating cables, place the appropriate cable tag as noted above. Temporary tags are acceptable for use during construction. All temporary tags must be removed and replaced with permanent machine-generated tags prior to acceptance.

G. If at any time during the job, the permanent cable tag becomes illegible or is defaced or removed, immediately replace it with a duplicate preprinted cable tag.

H. Provide cable outlet number labels at each systems' furniture work location with fully concealed outlets on an exterior pillar of the work location, in addition to the other labeling provided.

10. Cable Pulling

A. Pulling tension on 4-pair UTP cable shall not exceed 25 lbs.

11. Cable Installation

A. Place the communications cables/wires in accordance with the drawings, specifications and cable placement schedules provided by the Engineer and manufacturer's recommendations.

B. There shall be no splices or mechanical couplers installed between cable points of origin and termination.

C. Most work locations shall be equipped with at least one set of standard lateral communication cables to consist of two 4-Pair EIA/TIA-568 Category-6 unshielded twisted pair cables for voice and data applications mounted in a 2-position faceplate or frame.

D. All 4-pair UTP lateral cables shall be terminated on 4-pair M100 jacks utilizing an EIA-568-B wiring configuration. The jacks shall then be inserted into appropriate face plates for wall mounted receptacles, furniture mounted fittings, surface mount boxes, adaptor plates or afterset inserts.

E. Install each lateral station cable as an uninterrupted conductor section from the appropriate telecommunications closet to the designated and appropriate user-end termination point, as indicated on the drawings and the cable schedules. There shall be no splices or mechanical couplers installed between the cable points of origin and termination.

F. All cabling shall be wire-tied at the point of termination to eliminate hanging weight on the punched/terminated pairs.

G. Terminate all wiring in the components specified on the drawings.

H. Provide excess free conductor end length at termination points, adequate to make up splices and terminations, permitting neatly training conductors.

I. Support vertical cables as required by Code. Use lock type cable support bushings having internal wedges and retaining collars. Locate support points in readily accessible pull boxes sized to code requirements.

J. Care should be taken not to stretch or kink the cable during installation. No more than 25 lbs. of pulling tension shall be exerted on 4-pair cables.

K. Under no circumstances shall the cables be allowed to rest on the drop ceiling tiles, ceiling grids or sprinkler components.

L. Fluorescent light fixtures or other elector-magnetic noise emitting elements shall be avoided when selecting cable paths.

M. Under no circumstances shall any workstation cable be spliced for any reason.

N. The twists in each cable pair should be maintained as close as possible to the point of termination on the information outlet and the MDF (i.e., untwist no more than ½" for Category-6 cable). The maximum allowable bend radius for Category-6 installations must be considered and followed for all cable routing and installation.

END OF SECTION 266000

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH
PA-1-02 / TASK ORDER #19 AND #30
RENOVATIONS AND UPGRADES, INCLUDING SOLAR PANELS ADDITION

FOR:

BEDFORD HOPE CENTER

2305 BEDFORD AVENUE
PITTSBURGH PA 15219

1448

■ DECEMBER 05, 2016 — ORIGINAL ISSUE
△1 ■ MARCH 16, 2018 — REVISED FOR RE-BID/CONSTRUCTION

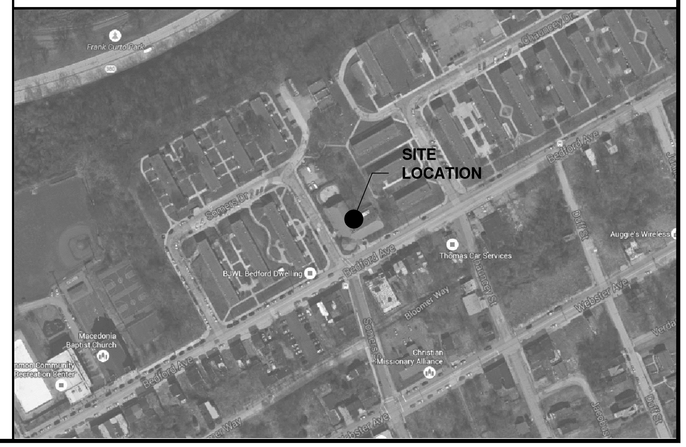
GERARD
ASSOCIATES ARCHITECTS

445 FORT PITT BLVD. SUITE # 410
FORT PITT COMMONS BUILDING
PITTSBURGH, PENNSYLVANIA 15219-1333
PHONE: 412-566-1531 FAX: 412-566-1532

DRAWING LIST

NO.	DRAWING NAME	DATE
COVERSHEET		03/16/18
G-001	GENERAL SYMBOLS, ABBREVIATIONS & STANDARDS	03/16/18
G-002	EGRESS PLAN & CODE ANALYSIS	03/16/18
ARCHITECTURAL		
A-101	GROUND FLOOR PLAN	03/16/18
A-102	FIRST FLOOR PLAN	03/16/18
A-103	ROOF PLAN - NEW ROOFING	03/16/18
A-103A	ROOF DETAILS	03/16/18
A-104	ROOF PLAN - PV ANCHORS	03/16/18
A-201	ELEVATIONS	03/16/18
A-301	ENLARGED PLANS AND DETAILS	03/16/18
A-302	ENLARGED PLANS AND DETAILS	03/16/18
A-401	REFLECTED CEILING PLAN - GROUND FLOOR	03/16/18
A-402	REFLECTED CEILING PLAN - FIRST FLOOR	03/16/18
A-601	DOOR AND FINISH SCHEDULE	03/16/18
A-701	FLOOR FINISH PLAN - GROUND FLOOR	03/16/18
A-702	FLOOR FINISH PLAN - FIRST FLOOR	03/16/18
MECHANICAL		
H-101	HVAC FLOOR PLAN	03/16/18
H-102	HVAC ROOF PLAN	03/16/18
H-103	HVAC CONTROLS	03/16/18
H-104	HVAC DETAILS	03/16/18
ELECTRICAL		
E-101	SYMBOLS AND NOTES	03/16/18
E-102	ELECTRICAL SITE PLAN	03/16/18
E-103	GROUND FLOOR PLAN	03/16/18
E-104	FIRST FLOOR PLAN	03/16/18
E-105	SOLAR PANELS: ELECTRICAL DIAGRAM AND SCHEDULES	03/16/18
E-106	SOLAR PANELS: ROOF PLAN	03/16/18

SITE LOCATION MAP



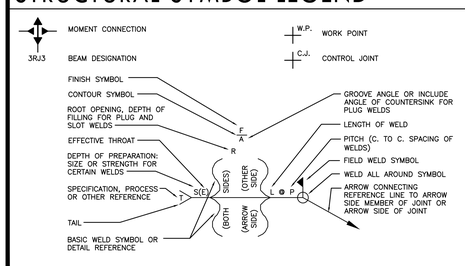
ARCHITECTURAL SYMBOL LEGEND

MATERIALS	DRAWING SYMBOLS
CONCRETE MASONRY	X / AX — SECTION/DETAIL NUMBER, DRAWING NUMBER
REINFORCED CONCRETE MASONRY	XXX — ROOM NUMBERS REFERENCED ON SCHEDULES
CONCRETE	X / 1 — DOOR NUMBERS REFERENCED ON SCHEDULES
BRICK	X — WINDOW TYPE
CAST STONE	# — PARTITION TYPE
EXISTING CONSTRUCTION TO REMAIN	
EXISTING CONSTRUCTION TO BE DEMOLISHED	
METAL STUD CONSTRUCTION	
FIRE RATED METAL STUD CONSTRUCTION	
GYPSUM BOARD	
BATT INSULATION	
RIGID INSULATION	
STEEL	
ALUMINUM	
GLASS	
FINISHED WOOD	
ROUGH WOOD	
SMOKE RATED CONSTRUCTION	

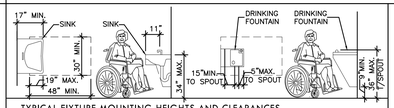
ABBREVIATIONS

A.C.	AQUATIC CONTRACTOR	H.B.	HOSE BIB
A.F.F.	ABOVE FINISHED FLOOR	H.C.	HEATING CONTRACTOR
ADD'L	ADDITIONAL	HOR	HORIZONTAL
ADJ	ADJACENT	HVAC	HEATING/VENTILATION/AIR CONDITIONING
ALT	ALTERNATE	IBC	INTERNATIONAL BUILDING CODE
ALUM	ALUMINUM	INSUL	INSULATION
APPROX	APPROXIMATE	INV	INVERT
AVG	AVERAGE	JT	JOINT
B.L.	BUILDING LINE	L&I	PA DEPARTMENT OF LABOR AND INDUSTRY
B.M.	BENCH MARK	LAV	LAVATORY
B.O.C.A.	BUILDING OFFICIALS AND CODE ADMINISTRATORS	M.C.	MECHANICAL CONTRACTOR
B/	BOTTOM OF	M.H.	MANHOLE
BITUM	BITUMINOUS	M.O.	MASONRY OPENING
BLDG	BUILDING	MTD	MOUNTED
BLK'G	BLOCKING	MTL	METAL
BSM'T	BASEMENT	N.T.S.	NOT TO SCALE
C.B.	CATCH BASIN	NIC	NOT IN CONTRACT
C.L.	CENTER LINE	O.C.	ON CENTER
C.O.	CLEAN OUT	O/A	OVERALL
CER.	CERAMIC	OPG	OPENING
CJ	CONTROL JOINT	P.C.	PLUMBING CONTRACTOR
CLG	CEILING	P.LAM	PLASTIC LAMINATE
CMU	CONCRETE MASONRY UNIT	PL	PLATE
COL	COLUMN	PMB	PRE-ENGINEERED METAL BUILDING
CONC	CONCRETE	PNL	PANEL
CONT	CONTINUOUS	PSF	POUNDS PER SQUARE FOOT
CRS	COURSE	PSI	POUNDS PER SQUARE INCH
CUH	CABINET UNIT HEATER	PTN	PARTITION
D.L.O.	DAY LIGHT OPENING	PVC	POLY VINYL CHLORIDE
D.S.	DOWN SPOUT	R.D.	ROOF DRAIN
DWG'S	DRAWINGS	R.O.	ROUGH OPENING
E.C.	ELECTRICAL CONTRACTOR	REQ'D	REQUIRED
EA	EACH	S.C.	SECURITY CONTRACTOR
EIFS	EXTERIOR INSULATION FINISHING SYSTEM	S.I.	SQUARE INCH
EJ	EXPANSION JOINT	S.O.G.	SLAB ON GRADE
ELEC	ELECTRIC	S.S.	STAINLESS STEEL
ELEV	ELEVATION	S.Y.	SQUARE YARD
EPDM	ETHYLENE PROPYLENE DIENE MONOMER	SF	SQUARE FEET
EQ	EQUAL	SIM	SIMILAR
EWC	ELECTRICAL WATER COOLER	SQ	SQUARE
F.E.	FIRE EXTINGUISHER	STD	STANDARD
F.E.C.	FIRE EXTINGUISHER CABINET	STL	STEEL
F.F.	FINISHED FLOOR	T/	TOP OF
F.P.C.	FIRE PROTECTION CONTRACTOR	TWP	TOWNSHIP
FD	FLOOR DRAIN	TYP	TYPICAL
FDN	FOUNDATION	UNO	UNLESS NOTED OTHERWISE
FLR	FLOOR	VCT	VINYL COMPOSITION TILE
FPHB	FROSTPROOF HOSE BIB	VERT	VERTICAL
FRTW	FIRE RETARDANT TREATED WOOD	VWC	VINYL WALL COVERING
FTG	FOOTING	W/	WITH
G.C.	GENERAL CONTRACTOR	W/O	WITH OUT
GA	GAUGE	WC	WATER CLOSET
GWB	GYPSUM WALL BOARD	WWF	WELDED WIRE FABRIC
PTD	PAPER TOWEL DISPENSER	O.F.I.C.	OWNER FURNISHED, INSTALLED BY CONTRACTOR
SD	SOAP DISPENSER	O.F.I.	OWNER FURNISHED AND INSTALLED
		N.I.C.	NOT IN CONTRACT

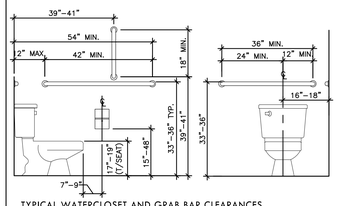
STRUCTURAL SYMBOL LEGEND



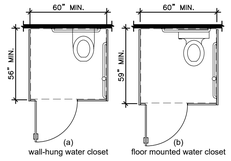
ACCESSIBILITY STANDARDS



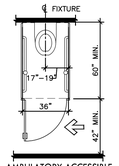
TYPICAL FIXTURE MOUNTING HEIGHTS AND CLEARANCES



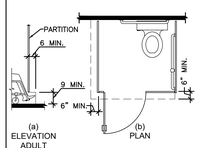
TYPICAL WATERCLOSET AND GRAB BAR CLEARANCES



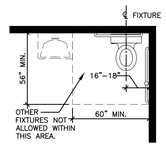
WHEELCHAIR ACCESSIBLE TOILET COMPARTMENTS



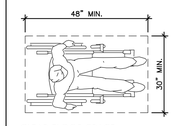
AMBULATORY ACCESSIBLE COMPARTMENT



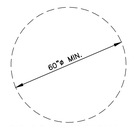
WHEELCHAIR ACCESSIBLE TOE CLEARANCE



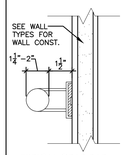
SIZE OF CLEARANCE FOR WATER CLOSET AND WATER CLOSET LOCATION



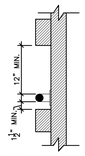
CLEAR FLOOR SPACE



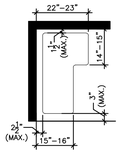
CLEAR TURNING RADIUS



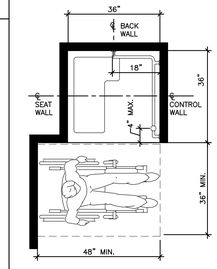
TYPICAL GRAB BAR



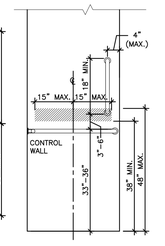
SPACING FOR GRAB BARS



L-SHAPED SHOWER COMPARTMENT SEAT



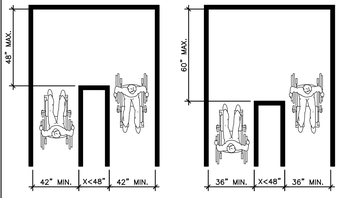
TYPICAL SHOWER COMPARTMENT SIZE & CLEARANCE



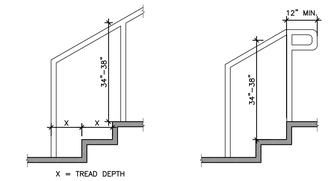
TYPICAL TRANSFER-TYPE SHOWER CONTROLS & HANDSHOWERS LOCATION & GRAB BAR MOUNTING HEIGHTS



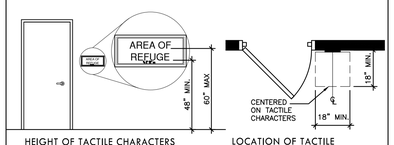
DOOR CLEARANCES



CLEAR WIDTH AT TURN



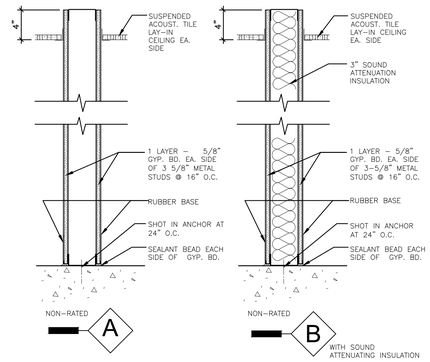
STAIR HANDRAIL EXTENSIONS



HEIGHT OF TACTILE CHARACTERS ABOVE FLOOR OR GROUND

LOCATION OF TACTILE SIGNS AT DOORS

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



ISSUED FOR CONSTRUCTION

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ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE.

REVISIONS

1	03/16/18 REVISED FOR RE-BID/CONSTRUCTION

REGISTERED ARCHITECT COMMONWEALTH OF PENNSYLVANIA

HOUSING AUTHORITY OF THE CITY PITTSBURGH
PA-1-02/TASK ORDER #19/30
RENOVATIONS AND UPGRADES

FOR

BEDFORD HOPE CENTER

2305 BEDFORD AVENUE
PITTSBURGH PA 15219

GERARD ASSOCIATES ARCHITECTS
445 FORT PITT BLVD, SUITE 410
FORT PITT COMMONS BUILDING
PITTSBURGH, PENNSYLVANIA 15219-1333
PHONE: 412-566-1531 FAX: 412-566-1532

DRAWING NAME
GENERAL SYMBOLS, ABBREVIATIONS & STANDARDS

COMM. NO.	REVISION NO.	DWG NO.
1448	1	G-001
ISSUE DATE 12/05/16		

BUILDING CODE INFORMATION

EXISTING STRUCTURE :
2-STORY MASONRY AND WOOD CONSTRUCTION. FOR COMMUNITY SERVICE FACILITY, INCLUDING MANAGEMENT OFFICES FOR BEDFORD DWELLINGS; DAYCARE CENTER, COUNSELING OFFICES, ETC. WITH 10 OUTDOOR PARKING STALLS, INCLUDING 2 HANDICAPPED STALLS, AND 48" HIGH OPEN STEEL FENCE.

TOTAL BUILDING SQ FT:
5,182 SF (GROUND FLOOR) + 7,072 SF (FIRST FLOOR) = 12,254 SQ FT (TOTAL)

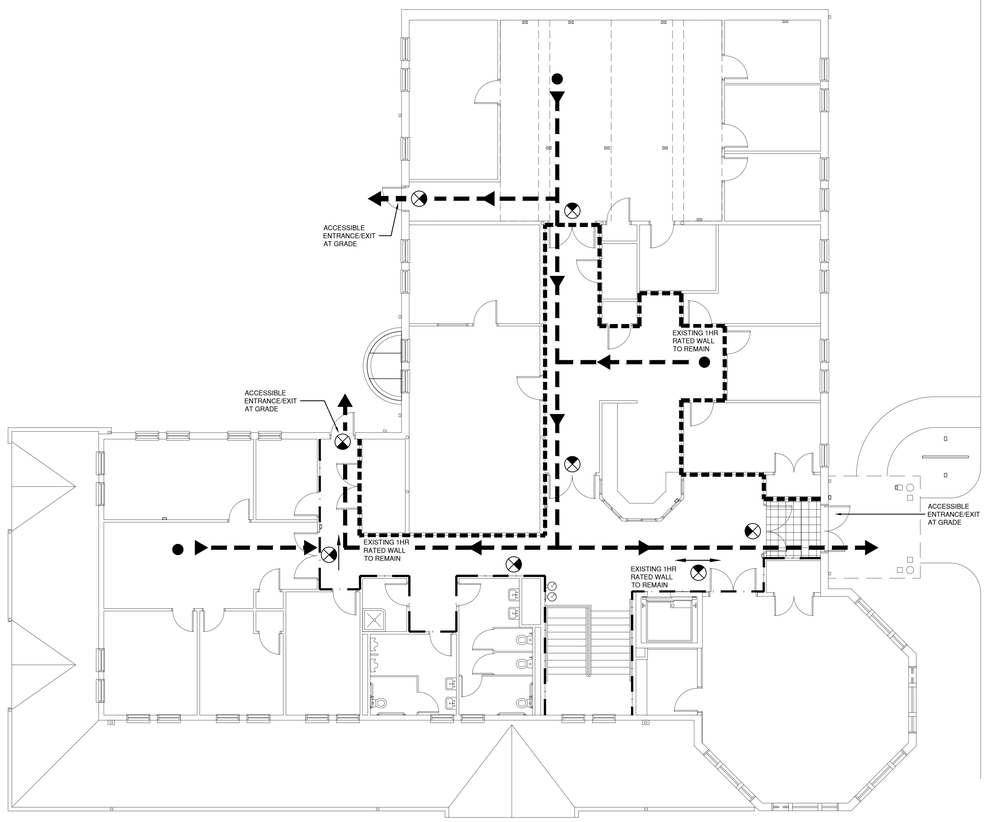
EXISTING OCCUPANCY PERMIT(S):

OVERALL BUILDING
CITY OF PITTSBURGH, CERTIFICATE OF OCCUPANCY NUMBER 81066, 04/17/2001
USE GROUP: A3/B (BOCA 1996)
CONSTRUCTION TYPE: TYPE V

BUILDING EXTERIOR SIGNAGE
CITY OF PITTSBURGH, CERTIFICATE OF OCCUPANCY NUMBER 82578, 01/11/2002
(1) 12 SQ FT DOUBLE FACE BUSINESS ID POST SIGN

CHILDCARE FACILITY
CITY OF PITTSBURGH, CERTIFICATE OF OCCUPANCY NUMBER 11-OCC-01087, 08/30/2011
USED GROUP: I4 (IBC 2009)
1ST FLOOR AS CHILD CARE (GENERAL) FOR 30 CHILDREN, 3 MONTHS TO 5 YEARS OF AGE; MONDAY THROUGH SATURDAY, FROM 6:00AM TO 6:00PM, IN EXISTING 2-STORY STRUCTURE.

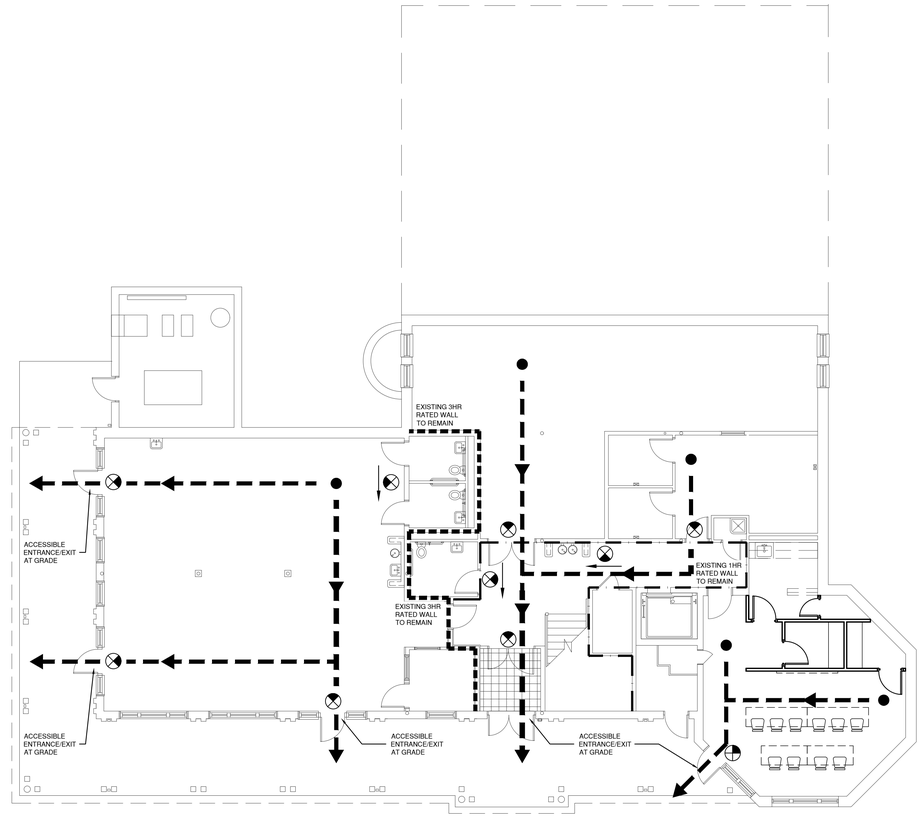
RENOVATION SCOPE OF WORK PROPOSES NO CHANGE TO EXISTING BUILDING STRUCTURE AND OCCUPANCY TYPES.



FIRST FLOOR EGRESS PLAN

1/8" = 1'-0"

ALL EXISTING EMERGENCY LIGHTING, SMOKE AND FIRE ALARM TO REMAIN WITH NO ALTERATION.



GROUND FLOOR EGRESS PLAN

1/8" = 1'-0"

ALL EXISTING EMERGENCY LIGHTING, SMOKE AND FIRE ALARM TO REMAIN WITH NO ALTERATION.

ISSUED FOR CONSTRUCTION

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REVISIONS

1	03/16/18 REVISED FOR RE-BID/CONSTRUCTION

HOUSING AUTHORITY OF
THE CITY PITTSBURGH
PA-1-02/TASK ORDER #19/30
RENOVATIONS AND UPGRADES

FOR

BEDFORD
HOPE CENTER
2305 BEDFORD AVENUE
PITTSBURGH PA 15219

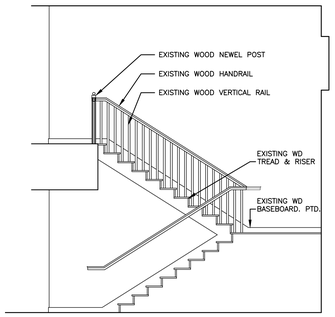
GERARD
ASSOCIATES ARCHITECTS
445 FORT PITT BLVD, SUITE 410
FORT PITT COMMONS BUILDING
PITTSBURGH, PENNSYLVANIA 15219-1333
PHONE: 412-566-1531 FAX: 412-566-1532

DRAWING NAME
EGRESS PLAN &
CODE ANALYSIS

COMM. NO.	REVISION NO.	DWG NO.
1448	1	G-002
ISSUE DATE 12/05/16		

RENOVATION NOTES:

1. REPAINT GYPSUM BOARD WALL AND CEILING SURFACE. PATCH ANY VISIBLE CRACKS AND HOLES WITH JOINT COMPOUND. SAND SMOOTH PRIOR TO FINAL PAINTING.
2. REMOVE ALL EXISTING 2'X4' ACOUSTIC CEILING TILES. REUSE EXISTING CEILING TILE GRID AND REINSTALL ALL NEW ARMSTRONG FINE FISSURED SECOND LOOK 1761 CEILING TILES. SEE DRAWING A-401 AND A-402 FOR REFLECTED CEILING PLAN.
3. REPLACE ALL EXISTING FLOORING, EXCLUDING THE BATHROOMS AND VESTIBULES. EXISTING FLOORING TO BE REMOVED INCLUDE MARMOLEUM, VINYL COMPOSITE TILES AND CARPET. REPLACE WITH NEW FLOORING AS INDICATED ON DRAWING A-701 AND A-702 FINISH FLOOR PLANS.
4. REPAINT ALL EXISTING 3.5" WOOD DOOR & WINDOW CASING AND 4" WOOD BASEBOARD.
5. SAND AND REFINISH EXISTING WOOD STAIRS, HANDRAILS AND POSTS.
6. REMOVE AND REPLACE ALL EXISTING WINDOW SHADES/MINI-BLINDS.
7. CONTRACTOR TO CLEAR ALL PLUMBING LINES AND ENSURE ALL PLUMBING FIXTURES ARE IN WORKING ORDER. (N.I.C. – BY OWNER)



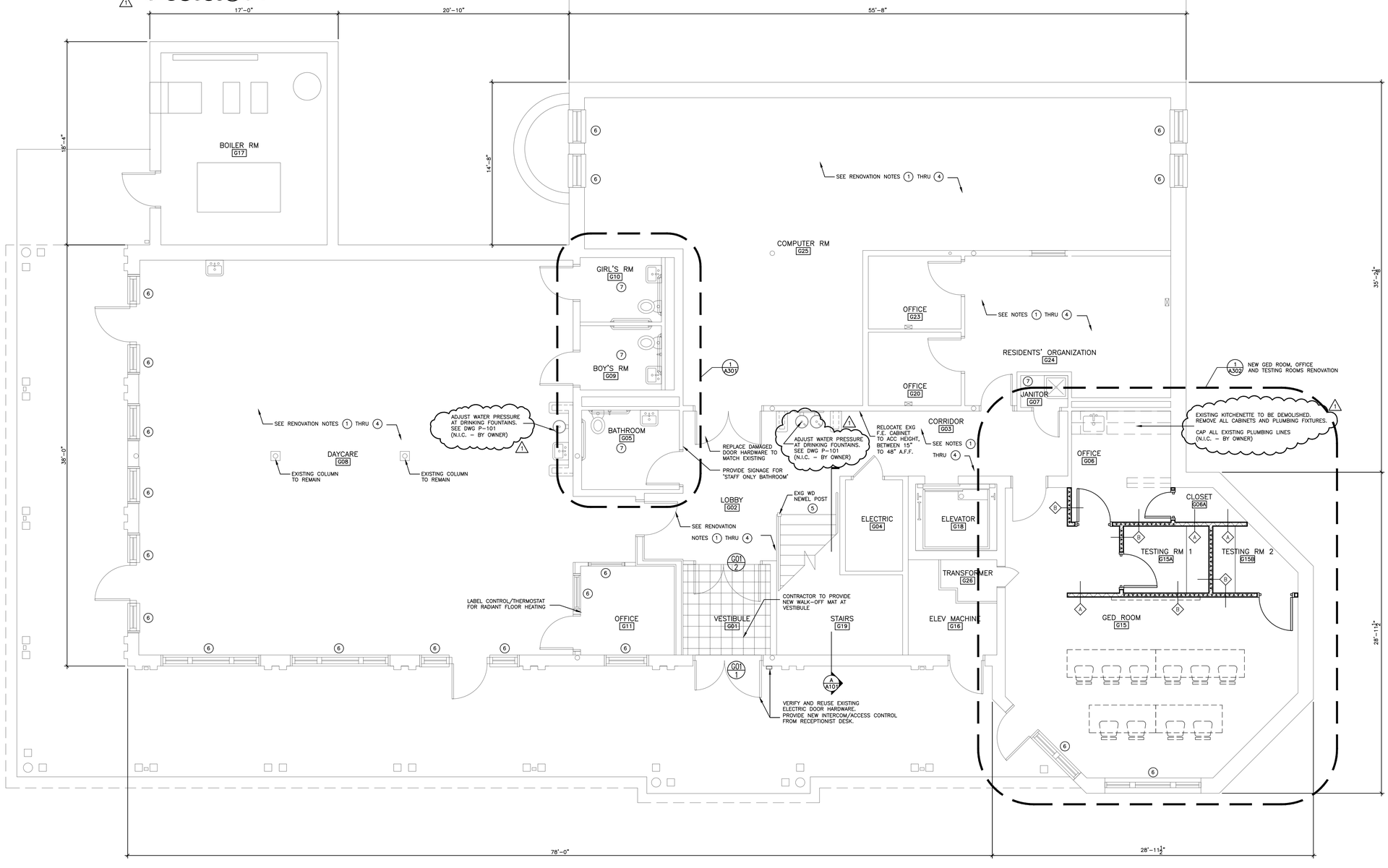
EXISTING STAIRS SECTION (A/A101)

SCALE: 1/4"=1'-0

WALL KEY LEGEND

A — 3-5/8" METAL STUD FRAMED WALL WITH 5/8" GYP WALLBOARD ON BOTH SIDES. SEE PARTITION TYPES ON DWG G-001

B — 3-5/8" METAL STUD FRAMED WALL WITH 5/8" GYP WALLBOARD ON BOTH SIDES. WITH SOUND ATTENUATING INSULATION. SEE PARTITION TYPES ON DWG G-001



GROUND FLOOR PLAN

SCALE: 1/4"=1'-0

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PA-1-02/TASK ORDER #19/30
RENOVATIONS AND UPGRADES

FOR

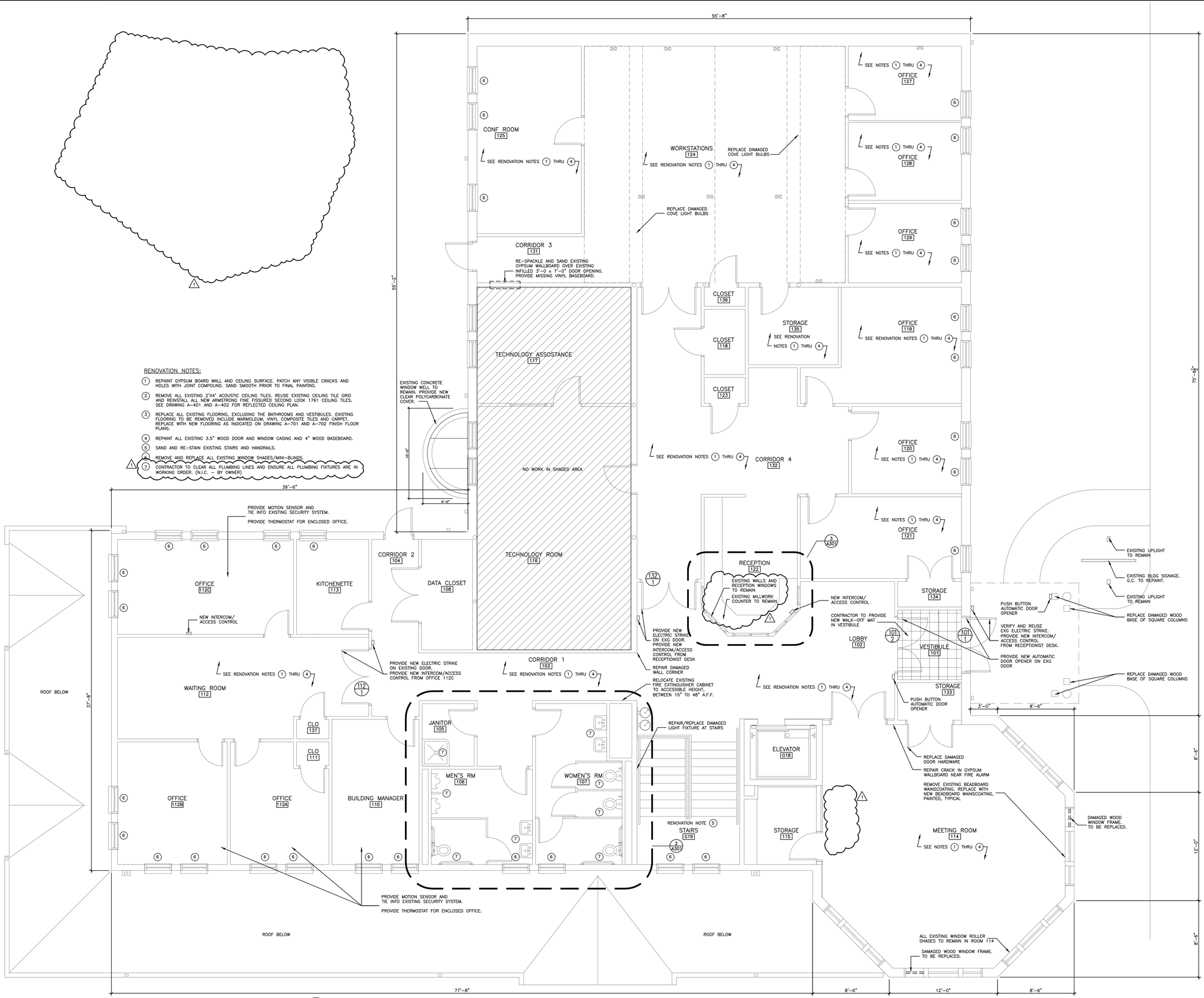
BEDFORD HOPE CENTER
2305 BEDFORD AVENUE
PITTSBURGH PA 15219

GERARD ASSOCIATES ARCHITECTS
445 FORT PITT BLVD, SUITE 410
FORT PITT COMMONS BUILDING
PITTSBURGH, PENNSYLVANIA 15219-1333
PHONE: 412-566-1531 FAX: 412-566-1532

DRAWING NAME

GROUND FLOOR PLAN

COMM. NO.	REVISION NO.	DWG NO.
1448	1	A-101
ISSUE DATE 12/05/16		



RENOVATION NOTES:

1. REPAINT GYPSUM BOARD WALL AND CEILING SURFACE. PATCH ANY VISIBLE CRACKS AND HOLES WITH JOINT COMPOUND. SAND SMOOTH PRIOR TO FINAL PAINTING.
2. REMOVE ALL EXISTING 2'X4' ACOUSTIC CEILING TILES. REUSE EXISTING CEILING TILE GRID AND REINSTALL ALL NEW ARMSTRONG FINE FISSURED SECOND LOOK 1761 CEILING TILES. SEE DRAWING A-401 AND A-402 FOR REFLECTED CEILING PLAN.
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4. REPAINT ALL EXISTING 3.5" WOOD DOOR AND WINDOW CASING AND 4" WOOD BASEBOARD.
5. SAND AND RE-STAIN EXISTING STAIRS AND HANDRAILS.
6. REMOVE AND REPLACE ALL EXISTING WINDOW SHADES/MINI-BLINDS.
7. CONTRACTOR TO CLEAR ALL PLUMBING LINES AND ENSURE ALL PLUMBING FIXTURES ARE IN WORKING ORDER. (N.I.C. - BY OWNER)

FIRST FLOOR PLAN

SCALE: 1/4"=1'-0

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REVISIONS

1	03/16/18 REVISED FOR RE-BID/CONSTRUCTION

REGISTERED ARCHITECT COMMONWEALTH OF PENNSYLVANIA

HOUSING AUTHORITY OF THE CITY PITTSBURGH
PA-1-02/TASK ORDER #19/30
RENOVATIONS AND UPGRADES

FOR

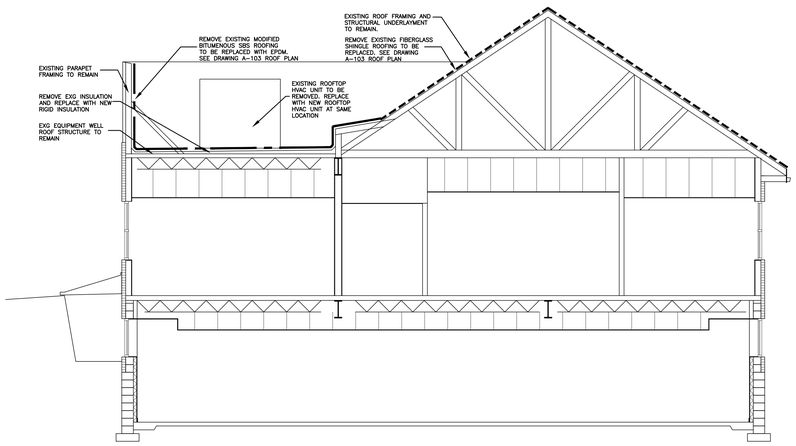
BEDFORD HOPE CENTER
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PITTSBURGH PA 15219

GERARD ASSOCIATES ARCHITECTS
445 FORT PITT BLVD, SUITE 410
FORT PITT COMMONS BUILDING
PITTSBURGH, PENNSYLVANIA 15219-1333
PHONE: 412-566-1531 FAX: 412-566-1532

DRAWING NAME

FIRST FLOOR PLAN

COMM. NO.	REVISION NO.	DWG NO.
1448	1	A-102
ISSUE DATE 12/05/16		



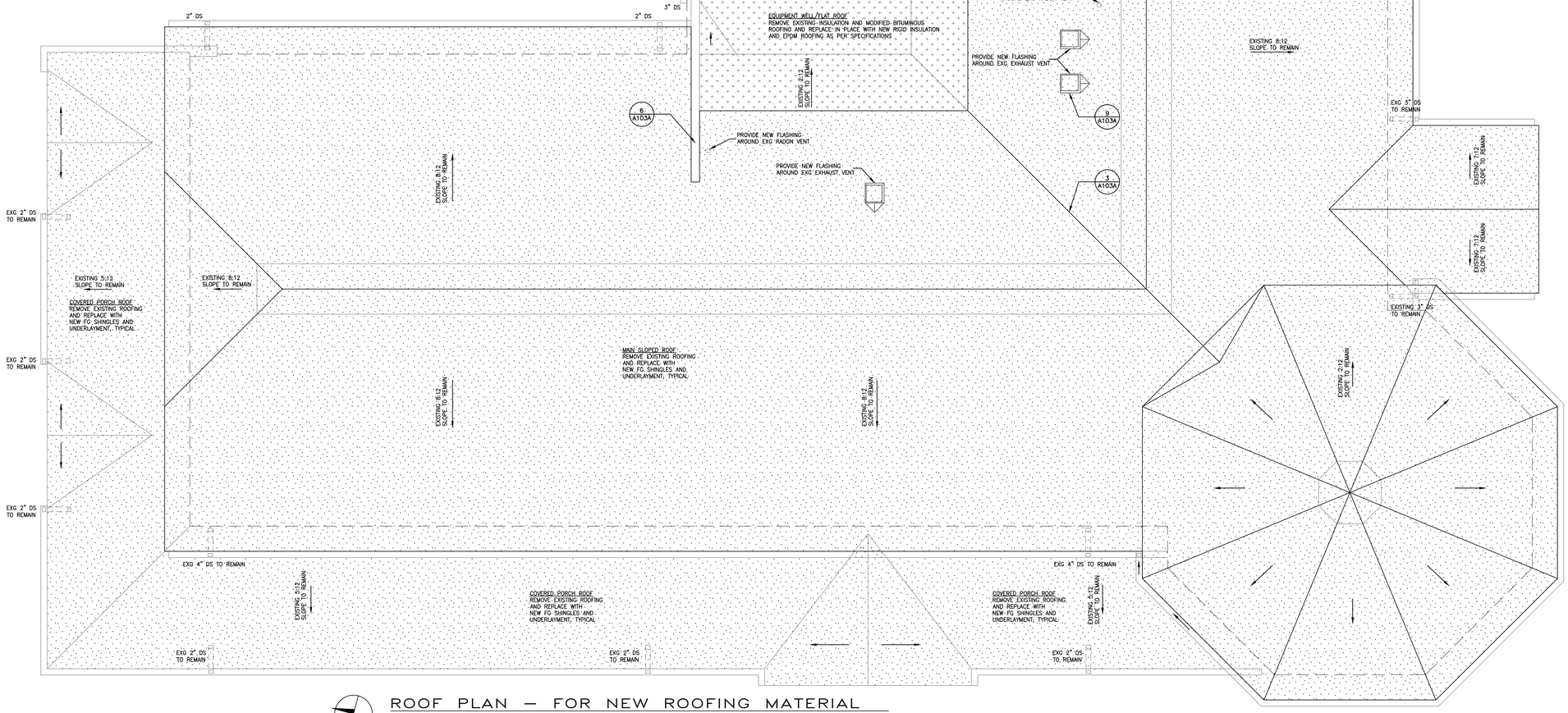
BUILDING SECTION

SCALE: 3/16"=1'-0

1 A103

EXISTING FIBERGLASS SHINGLES, TO BE REPLACED 6,564 SQ FT

EXISTING RIGID INSULATION AND MODIFIED BITUMENOUS SBS MODIFIED ROOFING, TO BE REPLACED IN PLACE WITH NEW RIGID INSULATION AND EPDM ROOFING 1,250 SQ FT



ROOF PLAN – FOR NEW ROOFING MATERIAL

SCALE: 1/4"=1'-0

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PA-1-02/TASK ORDER #19/30
RENOVATIONS AND UPGRADES

FOR

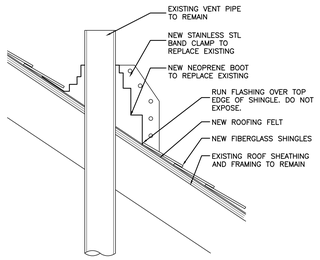
BEDFORD HOPE CENTER

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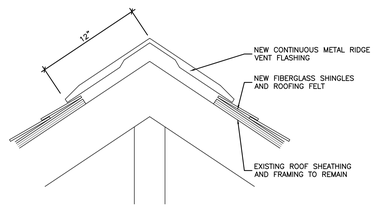
DRAWING NAME
ROOF PLAN - NEW ROOFING

COMM. NO.	REVISION NO.	DWG NO.
1448	1	A-103
ISSUE DATE 12/05/16		



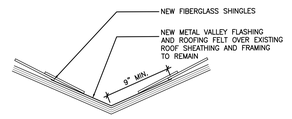
VENT FLASHING DETAIL 1 A103A

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



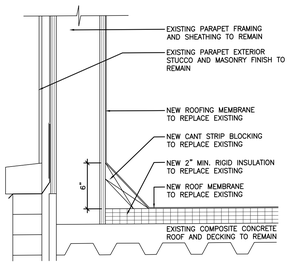
RIDGE FLASHING DETAIL 2 A103A

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



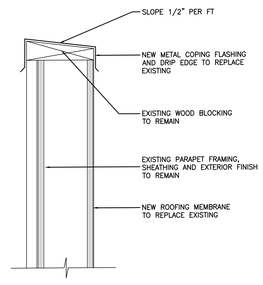
VALLEY FLASHING 3 A103A

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

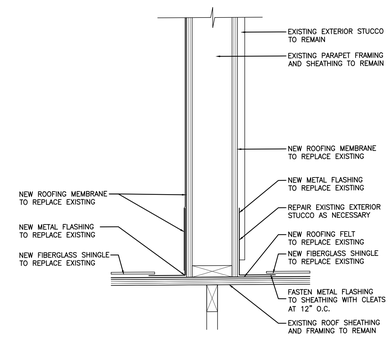


PARAPET BASE 4 A103A

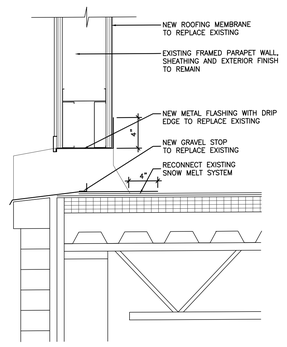
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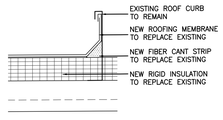
PARAPET - COPING 5 A103A



PARAPET BASE AT ROOF 6 A103A

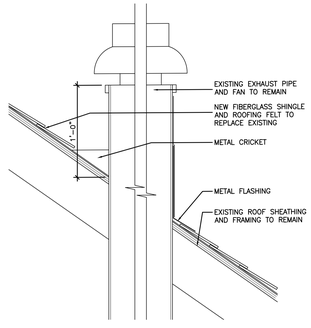


SCUPPER DETAIL 7 A103A



ROOF CURB 8 A103A

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



EXHAUST FAN PENETRATION 9 A103A

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

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PA-1-02/TASK ORDER #19/30
RENOVATIONS AND UPGRADES

FOR

BEDFORD HOPE CENTER

2305 BEDFORD AVENUE
PITTSBURGH PA 15219

GERARD ASSOCIATES ARCHITECTS
445 FORT PITT BLVD, SUITE 410
FORT PITT COMMONS BUILDING
PITTSBURGH, PENNSYLVANIA 15219-1333
PHONE: 412-566-1531 FAX: 412-566-1532

DRAWING NAME

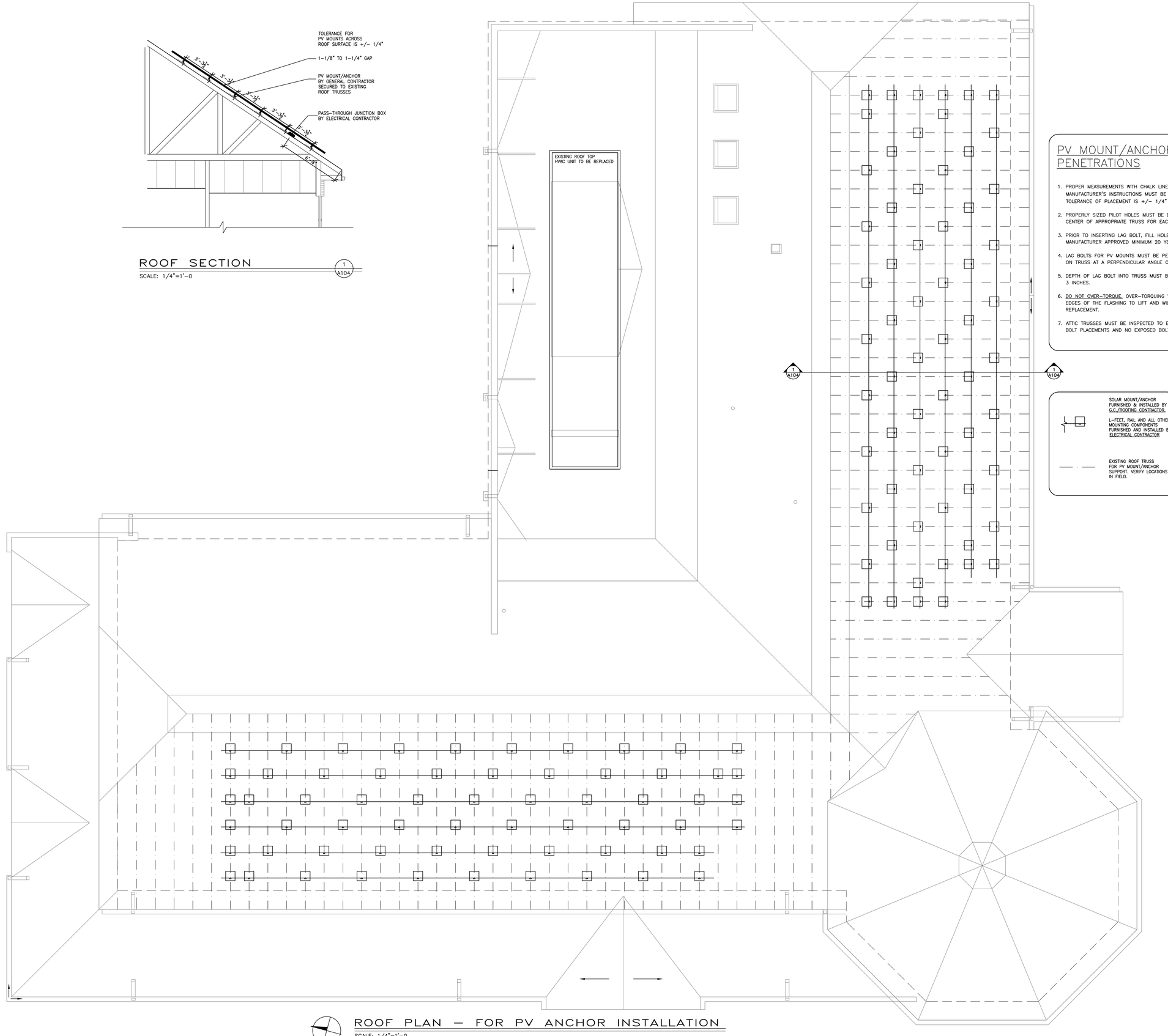
ROOF DETAILS

COMM. NO.	REVISION NO.	DWG NO.
1448	1	A-103A
ISSUE DATE 12/05/16		

ROOF SECTION

SCALE: 1/4"=1'-0

1 / A104



ROOF PLAN – FOR PV ANCHOR INSTALLATION

SCALE: 1/4"=1'-0

PV MOUNT/ANCHOR PENETRATIONS

1. PROPER MEASUREMENTS WITH CHALK LINES PER MANUFACTURER'S INSTRUCTIONS MUST BE ADHERED TO. TOLERANCE OF PLACEMENT IS +/- 1/4"
2. PROPERLY SIZED PILOT HOLES MUST BE DRILLED INTO CENTER OF APPROPRIATE TRUSS FOR EACH PV MOUNT.
3. PRIOR TO INSERTING LAG BOLT, FILL HOLE WITH ROOFING MANUFACTURER APPROVED MINIMUM 20 YEAR SEALANT.
4. LAG BOLTS FOR PV MOUNTS MUST BE PERFECTLY CENTERED ON TRUSS AT A PERPENDICULAR ANGLE OF THE ROOF.
5. DEPTH OF LAG BOLT INTO TRUSS MUST BE AT MINIMUM 3 INCHES.
6. DO NOT OVER-TORQUE. OVER-TORQUING WILL CUASE THE EDGES OF THE FLASHING TO LIFT AND WILL REQUIRE REPLACEMENT.
7. ATTIC TRUSSES MUST BE INSPECTED TO ENSURE PROPER BOLT PLACEMENTS AND NO EXPOSED BOLT THREADS.

SOLAR MOUNT/ANCHOR FURNISHED & INSTALLED BY G.C./ROOFING CONTRACTOR.

L-FEET, RAIL AND ALL OTHER MOUNTING COMPONENTS FURNISHED AND INSTALLED BY ELECTRICAL CONTRACTOR

EXISTING ROOF TRUSS FOR PV MOUNT/ANCHOR SUPPORT. VERIFY LOCATIONS IN FIELD.

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PA-1-02/TASK ORDER #19/30
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PHONE: 412-566-1531 FAX: 412-566-1532

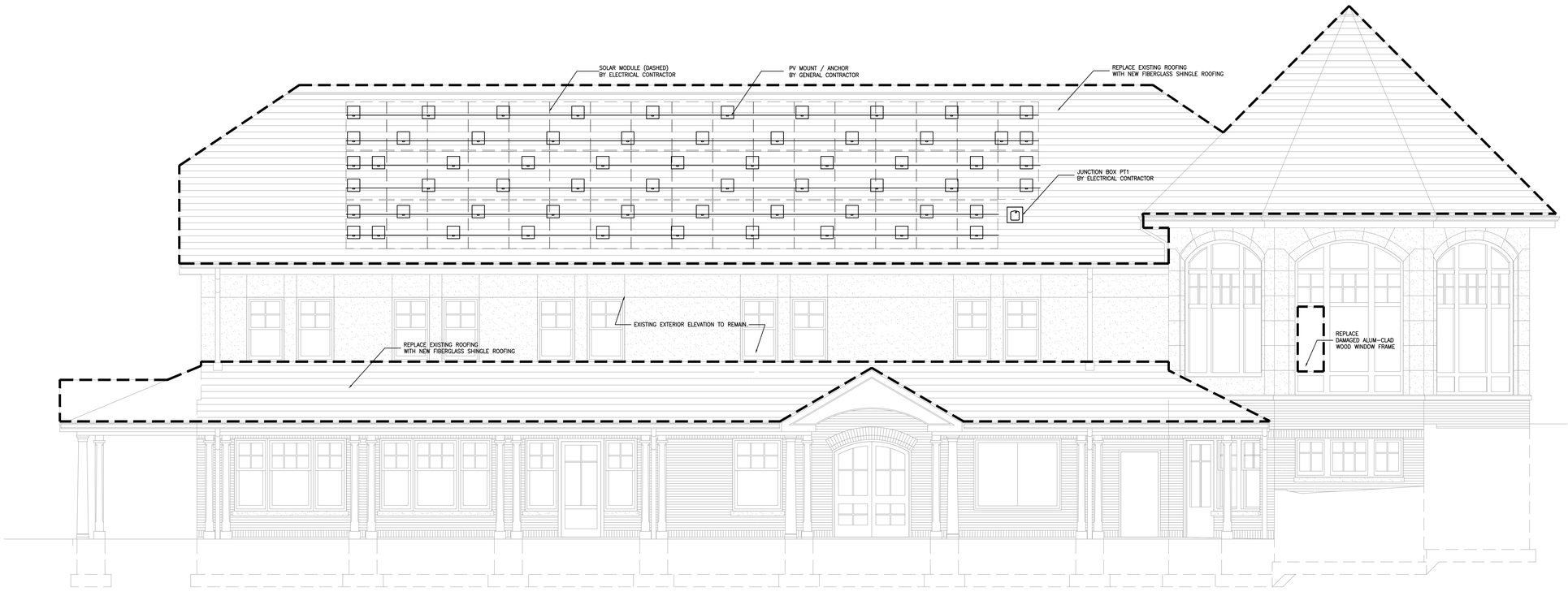
DRAWING NAME
ROOF PLAN - PV ANCHORS

COMM. NO.	REVISION NO.	DWG NO.
1448	1	A-104
ISSUE DATE 12/05/16		



BEDFORD AVENUE ELEVATION

SCALE: 1/4"=1'-0



SOMERS DRIVE ELEVATION

SCALE: 1/4"=1'-0

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PHONE: 412-566-1531 FAX: 412-566-1532

DRAWING NAME

ELEVATIONS

COMM. NO.	REVISION NO.	DWG NO.
1448	1	A-201
ISSUE DATE 12/05/16		

HEAD DETAIL

D / A301

SCALE: 1–1/2"=1'–0

SILL DETAIL

E / A301

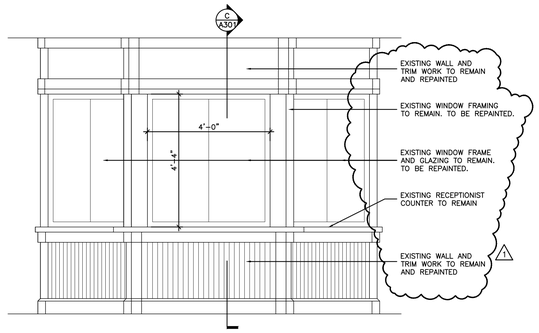
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1 OMITTED

RECEPTION SECTION

C / A301

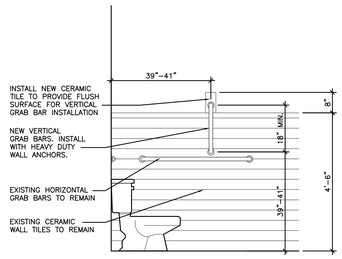
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RECEPTION ELEVATION

B / A301

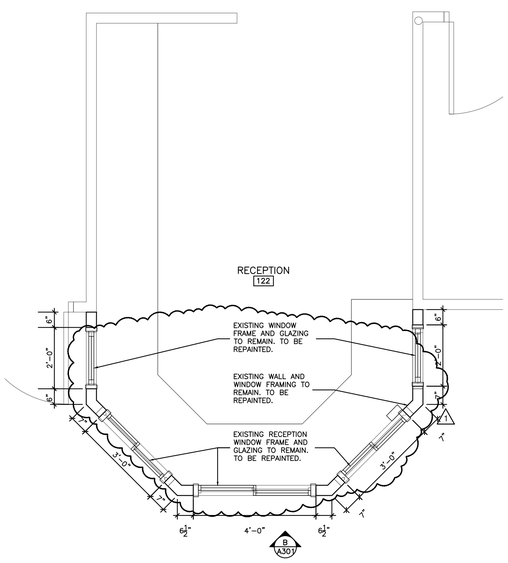
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TYPICAL TOILET GRAB BAR DIM.

A / A301

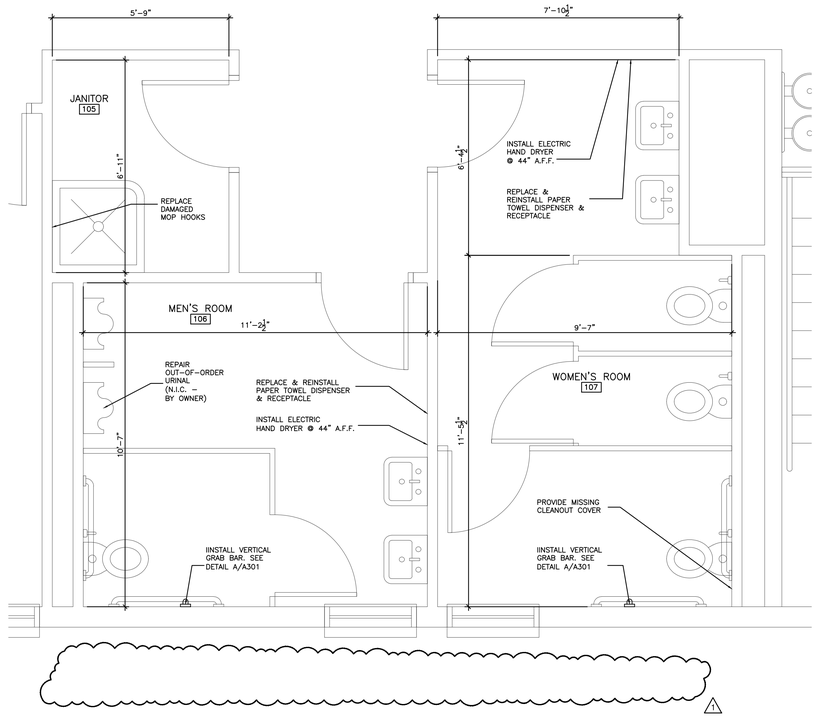
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RECEPTION 122

3 / A301

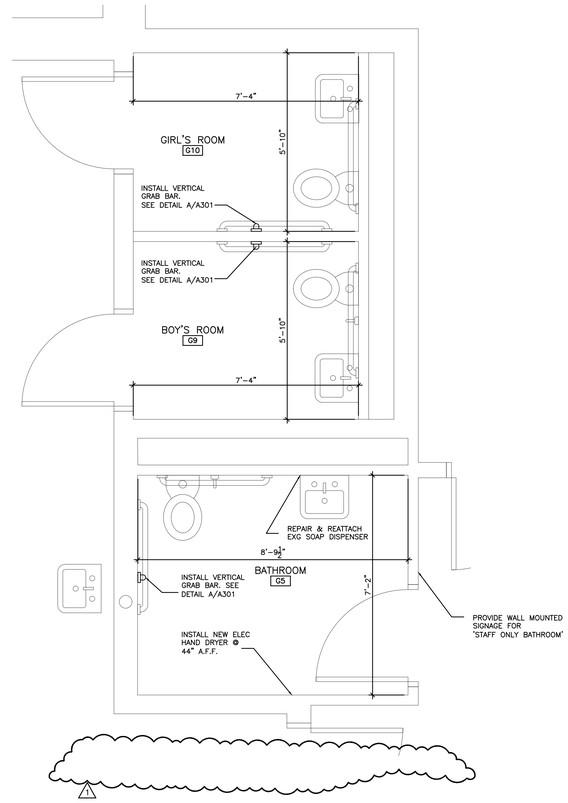
SCALE: 1/2"=1'–0



BATHROOMS 106 & 107

2 / A301

SCALE: 1/2=1'–0



BATHROOMS G5, G9 & G10

1 / A301

SCALE: 1/2"=1'–0

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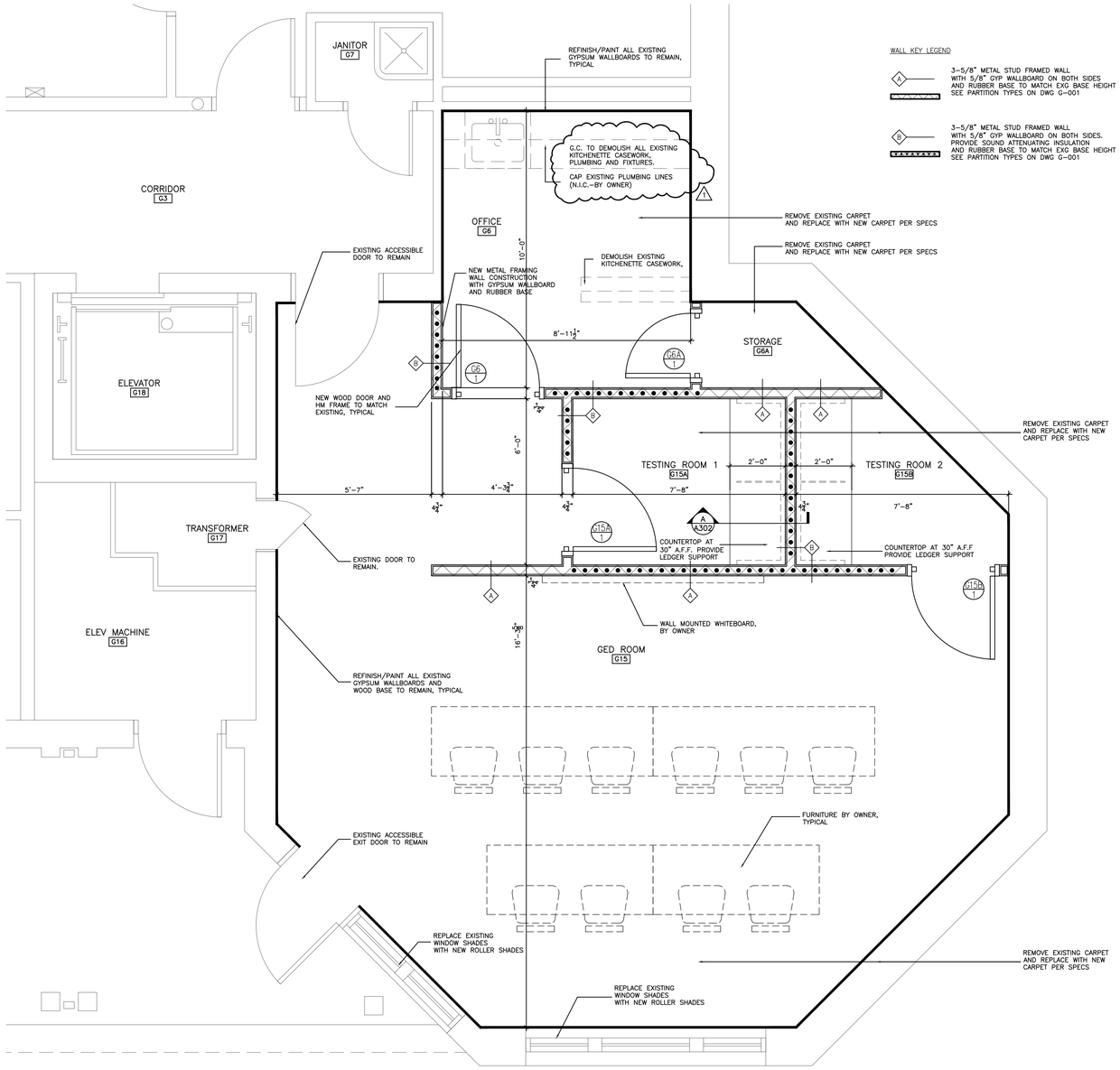
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BEDFORD HOPE CENTER
2305 BEDFORD AVENUE
PITTSBURGH PA 15219

GERARD ASSOCIATES ARCHITECTS
445 FORT PITT BLVD, SUITE 410
FORT PITT COMMONS BUILDING
PITTSBURGH, PENNSYLVANIA 15219-1333
PHONE: 412-566-1531 FAX: 412-566-1532

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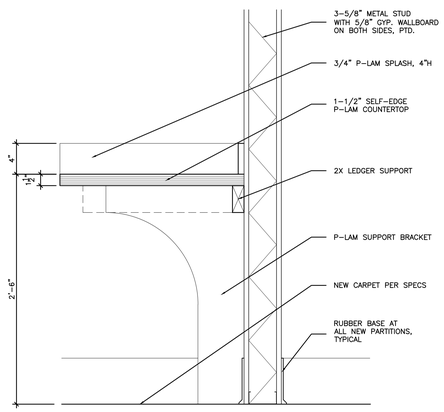
COMM. NO.	REVISION NO.	DWG NO.
1448	1	A-301
ISSUE DATE 12/05/16		



WALL KEY LEGEND

A — 3-5/8" METAL STUD FRAMED WALL WITH 5/8" GYP WALLBOARD ON BOTH SIDES AND RUBBER BASE TO MATCH EXG BASE HEIGHT SEE PARTITION TYPES ON DWG G-001

B — 3-5/8" METAL STUD FRAMED WALL WITH 5/8" GYP WALLBOARD ON BOTH SIDES. PROVIDE SOUND ATTENUATING INSULATION AND RUBBER BASE TO MATCH EXG BASE HEIGHT SEE PARTITION TYPES ON DWG G-001



TESTING ROOM COUNTERTOP — A/A302
SCALE: 1-1/2"=1'-0

NEW GED ROOM — G15 — 1/A302
SCALE: 1/2"=1'-0

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COMM. NO.	REVISION NO.	DWG NO.
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ISSUE DATE 12/05/16		

GENERAL REFLECTED CEILING PLAN NOTES:

1. REPAINT ALL GYPSUM WALLBOARD CEILING SURFACE. PATCH ANY VISIBLE CRACKS AND HOLES WITH JOINT COMPOUND. SAND SMOOTH PRIOR TO FINAL PAINTING.
2. REMOVE ALL EXISTING 2'X4' ACOUSTIC CEILING TILES. REUSE EXISTING CEILING TILE GRID AND REINSTALL ALL NEW ARMSTRONG FINE FISSURED SECOND LOOK 1761 CEILING TILES.
3. ALL EXISTING LIGHT FIXTURES TO REMAIN. CHECK ALL FIXTURE AND REPAIR/REPLACE ANY MALFUNCTIONING FIXTURES AND/OR LAMPS.



REFLECTED CEILING PLAN – GROUND FLOOR

SCALE: 1/4"=1'-0

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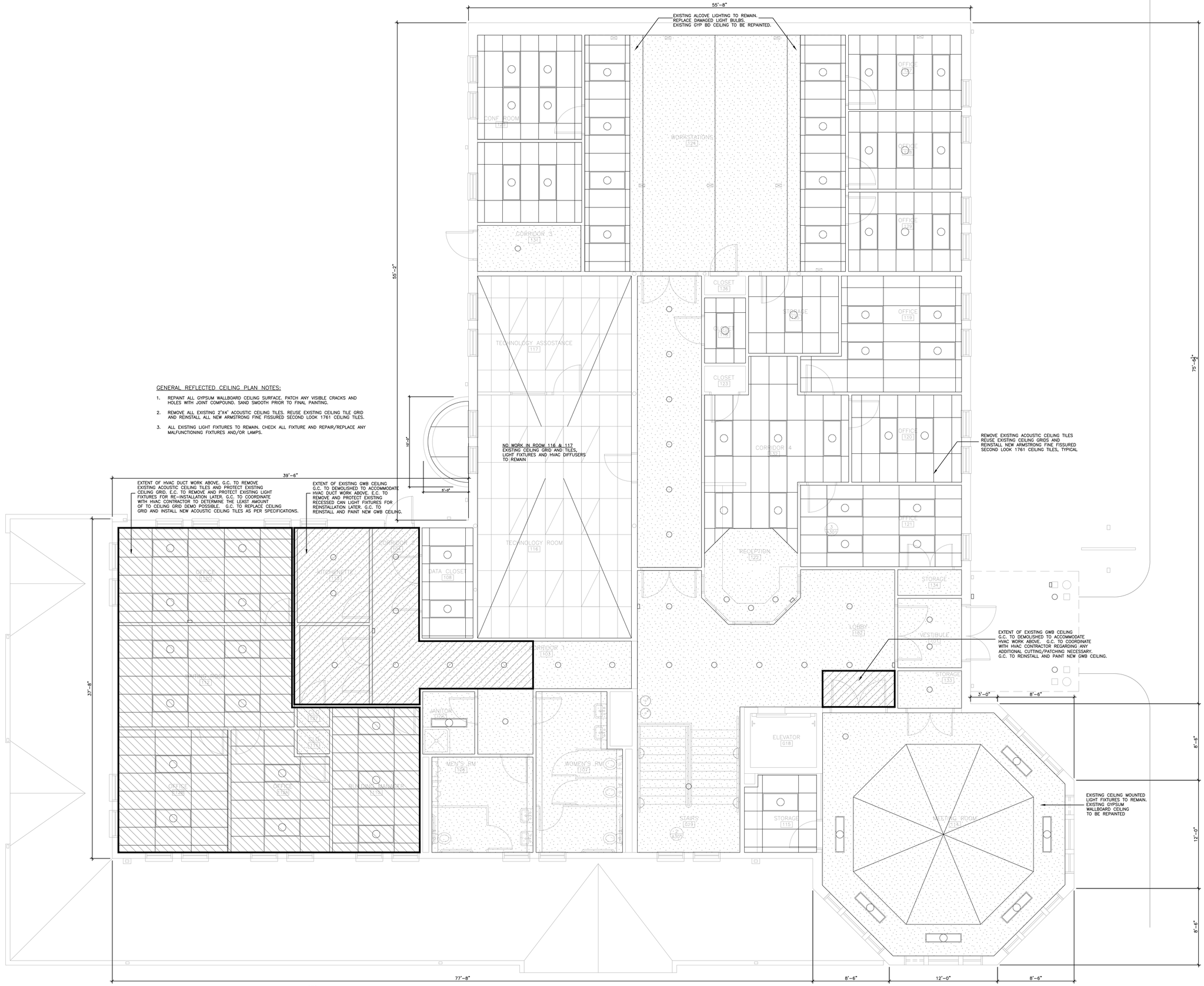
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DRAWING NAME
REFLECTED CEILING PLAN - GROUND FLR

COMM. NO.	REVISION NO.	DWG NO.
1448	1	A-401
ISSUE DATE 12/05/16		



GENERAL REFLECTED CEILING PLAN NOTES:

1. REPAINT ALL GYPSUM WALLBOARD CEILING SURFACE. PATCH ANY VISIBLE CRACKS AND HOLES WITH JOINT COMPOUND. SAND SMOOTH PRIOR TO FINAL PAINTING.
2. REMOVE ALL EXISTING 2'X4' ACOUSTIC CEILING TILES. REUSE EXISTING CEILING TILE GRID AND REINSTALL ALL NEW ARMSTRONG FINE FISSURED SECOND LOOK 1761 CEILING TILES.
3. ALL EXISTING LIGHT FIXTURES TO REMAIN. CHECK ALL FIXTURE AND REPAIR/REPLACE ANY MALFUNCTIONING FIXTURES AND/OR LAMPS.

REFLECTED CEILING PLAN — FIRST FLOOR

SCALE: 1/4"=1'-0

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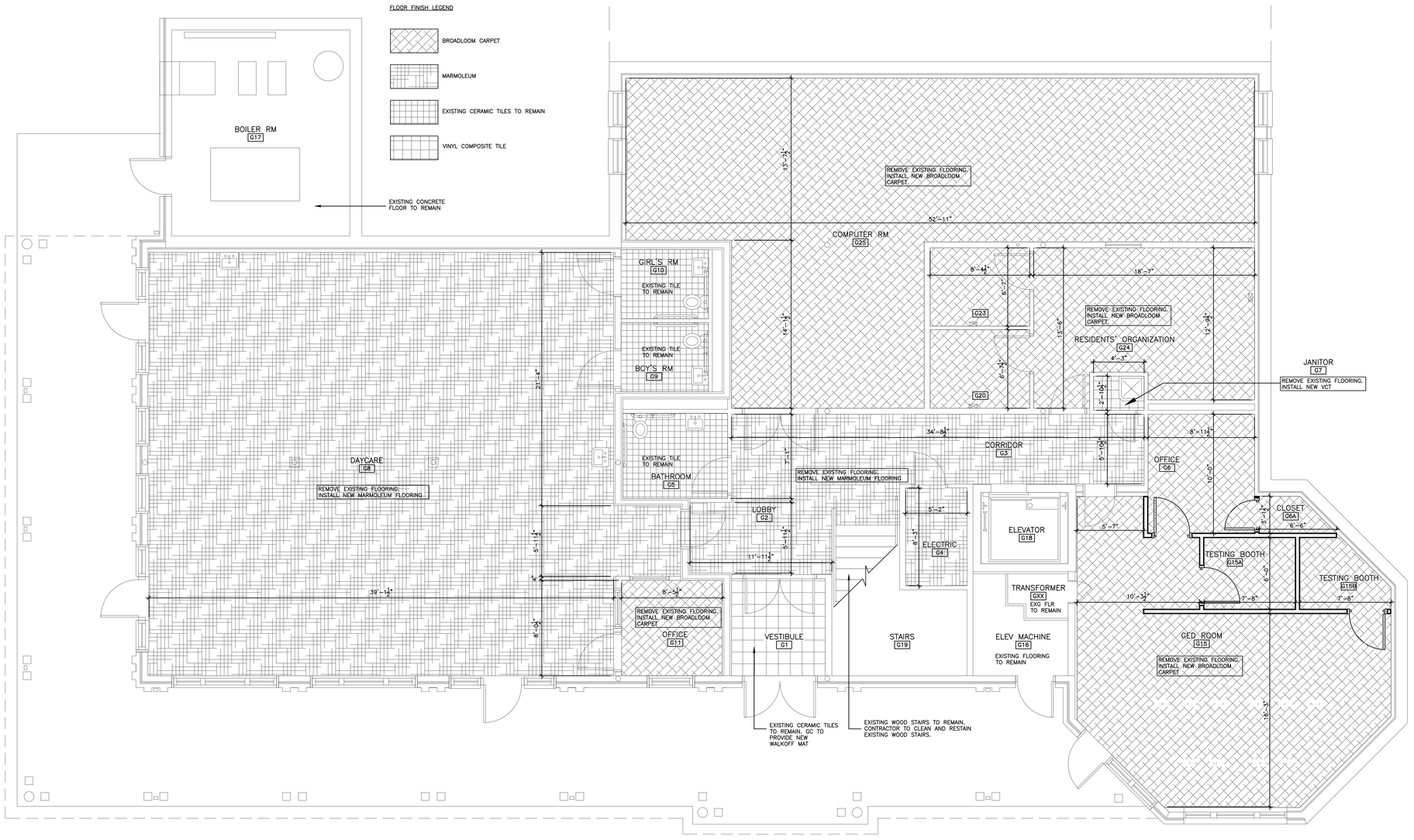
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DRAWING NAME
REFLECTED CEILING
PLAN - FIRST FLOOR

COMM. NO.	REVISION NO.	DWG NO.
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NEW DOOR SCHEDULE

| ROOM NUMBER | MARK | ROOM NAME | DOOR: PAIR | DOOR: SINGLE | DOOR: SIZE S1 3'-0" x 7'-0" x 1 3/4" | DOOR: SIZE S2 2'-4" x 7'-0" x 1 3/4" | DOOR TYPE A | DOOR TYPE B | DOOR TYPE C | DOOR TYPE D | DOOR TYPE E | MATERIAL AL ALUMINUM | MATERIAL HM HOLLOW METAL | MATERIAL WD WOOD | MATERIAL . | GLASS G1 1/4" TEMPERED CLEAR | GLASS G2 1/4" WIRE (SQUARE PATTERN) | GLASS G3 5/8" INSULATED (TEMPERED) | GLASS G4 1" INSULATED (TEMPERED) | DOOR GRILLE | FRAME: GALVANIZED 060 | FRAME TYPE A | FRAME TYPE B | FRAME TYPE C | FRAME TYPE D | FRAME TYPE E | FRAME TYPE E | FRAME TYPE E | FRAME TYPE E | FRAME TYPE E | FRAME TYPE E | FRAME TYPE E | FRAME TYPE E | MATERIAL AL ALUMINUM | MATERIAL HM HOLLOW METAL | MATERIAL WD WOOD | MATERIAL . | GLASS G1 1/4" TEMPERED CLEAR | GLASS G2 1/4" WIRE (SQUARE PATTERN) | GLASS G3 5/8" INSULATED (TEMPERED) | GLASS G4 1" INSULATED (TEMPERED) | DETAILS – HEAD: GALVANIZED 060 | DETAILS – HEAD 1 HEAD DETAIL | DETAILS – HEAD 2 HEAD DETAIL | DETAILS – HEAD 3 HEAD DETAIL | DETAILS – HEAD 4 HEAD DETAIL | DETAILS – HEAD 5 HEAD DETAIL | DETAILS – HEAD 6 HEAD DETAIL | DETAILS – JAMB 1 JAMB DETAIL | DETAILS – JAMB 2 JAMB DETAIL | DETAILS – JAMB 3 JAMB DETAIL | DETAILS – JAMB 4 JAMB DETAIL | DETAILS – JAMB 5 JAMB DETAIL | DETAILS – JAMB 6 JAMB DETAIL | FIRE RATING FR20 20 MINUTE | FIRE RATING FR45 3/4 HOUR | FIRE RATING FR60 1 HOUR | PR. BUTT HINGES PR. SPRING HINGES 1.0 | PR. BUTT HINGES PR. BUTT HINGES 1.5 | PR. BUTT HINGES PR. BUTT HINGES 3.0 | PR. BUTT HINGES PR. BUTT HINGES 2.0 | KEY SIDE | LOCKSET | CYLINDER | EXIT DEVICE | PASSAGE SET F75 | PRIVACY LOCK F76 | OFFICE LOCK F82 | CLASSROOM LOCK F84 | STOREROOM LOCK F86 | DUMMY TRIM DT | CLASSROOM BORED LOCK 01 | CONCEALED VERTICAL ROD 02 | CONCEALED VERTICAL ROD 08 | RIM DEVICE 08 | CLOSER | STOP WALL W | STOP FLOOR F | STOP OVERHEAD O | PR. MANUAL FLUSHBOLTS | PR. AUTOMATIC FLUSHBOLTS | SURFACE BOLT | WEATHERSTRIP/GASKET | AUTOMATIC DOOR BOTTOM | ASTRAGAL | KICKPLATE – 8" HIGH | ELECTRIC STRIKE | PUSH/PULL | THRESHOLD T1 ALUMINUM | THRESHOLD T2 MARBLE | . | . | REMARKS |
|---|---|---



GROUND FLOOR PLAN

SCALE: 1/4"=1'-0

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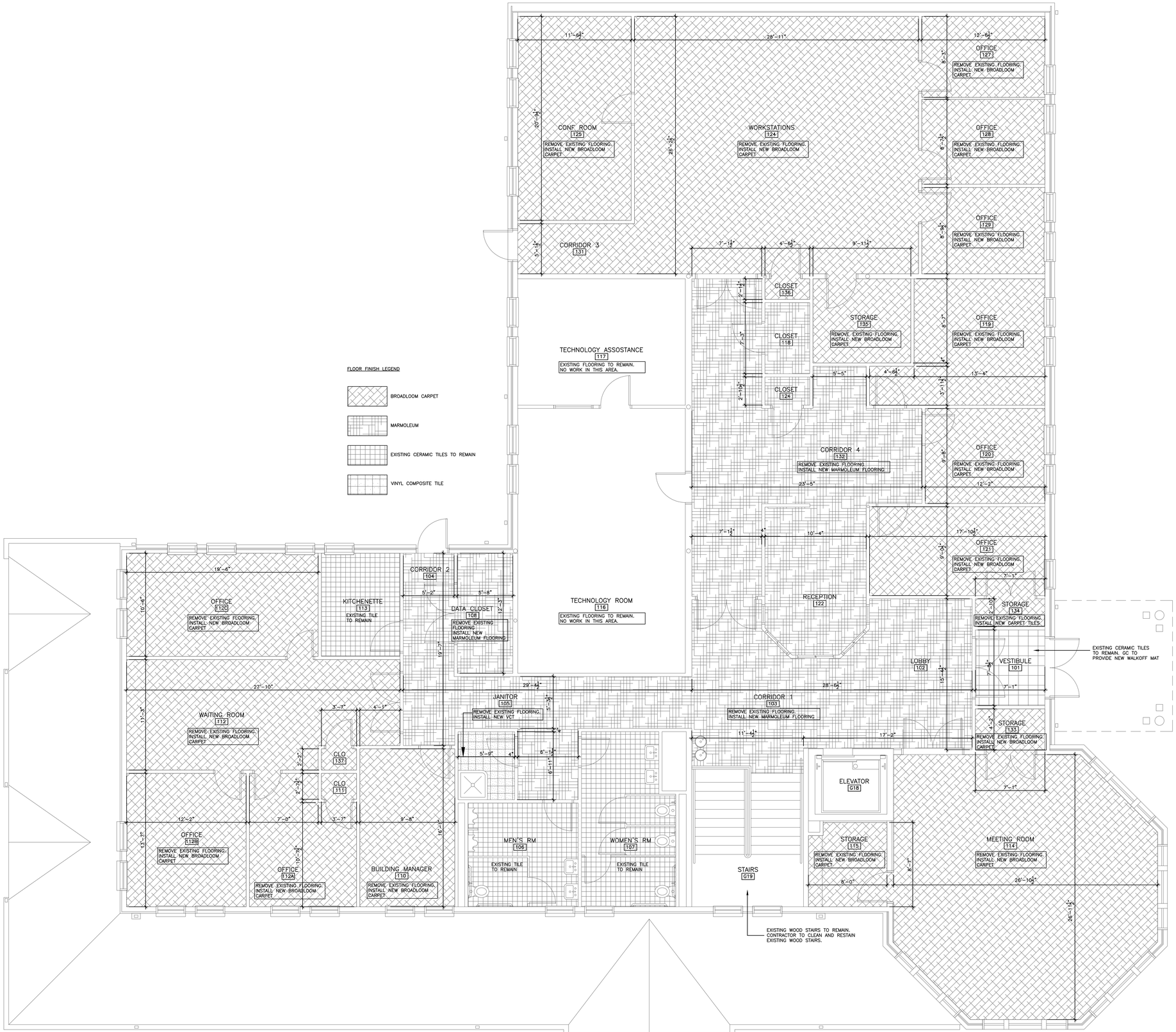
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DRAWING NAME
GROUND FLOOR FLOOR FINISH PLAN

COMM. NO.	REVISION NO.	DWG NO.
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FIRST FLOOR PLAN

SCALE: 1/4"=1'-0

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DRAWING NAME
FIRST FLOOR
FLOOR FINISH PLAN

COMM. NO.	REVISION NO.	DWG NO.
1448	1	A-702
ISSUE DATE 12/05/16		

LEGEND

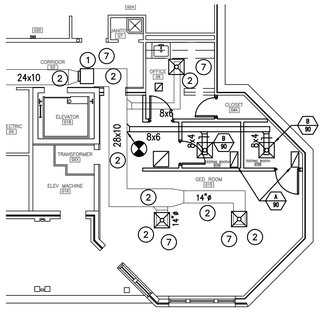
SYMBOL	DESCRIPTION
RETURN OR EXHAUST / SUPPLY	SQUARE OR RECTANGULAR DUCT DOWN W/TURNING VANES UNLESS INDICATED OTHERWISE
RETURN OR / SUPPLY	SQUARE OR RECTANGULAR DUCT UP W/TURNING VANES UNLESS INDICATED OTHERWISE
10~	DENOTES ROUND DUCT SIZE IN INCHES (OUTSIDE WALL DIMENSIONS)
SUPPLY MAIN	CONICAL TEE AND ROUND SUPPLY DUCT TO VAV BOX. SAME SIZE AS VAV BOX INLET CEILING MOUNTED SUPPLY AIR DIFFUSER VAV BOX WITH REHEAT COIL FLEX DUCT SAME SIZE AS SUPPLY AIR DIFFUSER INLET. CONICAL TEE AND ROUND SUPPLY DUCT WITH VOLUME DAMPER. SAME SIZE AS SUPPLY DIFFUSER INLET
20x12	DUCTWORK SIZING – OUTSIDE WALL DIMENSIONS (SQUARE OR RECTANGULAR)
	DUCT TAKEOFF FROM MAIN SUPPLY, EXHAUST OR RETURN
20x12 10x8	TRANSITION
M.O.D. 18x9	DAMPERS (MOTOR OPERATED & MANUAL)
FD	FIRE DAMPER
	DEMOLITION LIMIT
	CONNECT NEW TO EXISTING
HWS	HEATING HOT WATER SUPPLY
HWR	HEATING HOT WATER RETURN
ATC	AUTOMATIC TEMPERATURE CONTROL
T	THERMOSTAT

GENERAL NOTES

1. THE DRAWINGS ARE DIAGRAMMATIC. LAYOUT AND INSTALL DUCTWORK IN ACCORDANCE WITH SMACNA, SPECIFICATIONS, AND THE DETAILS INCLUDED ON THE DRAWINGS. COORDINATE DUCT ROUTING AND ELEVATION WITH ALL TRADES AND THE EXISTING CONDITIONS.
2. ALL DUCT SIZES ARE IN INCHES; 1ST FIGURE = SIDE SHOWN AND 2ND FIGURE = ADJACENT SIDE
3. REFER TO SPECIFICATION FOR DUCT CONSTRUCTION, CLASSIFICATION, ETC. ALL DUCTWORK MUST COMPLY WITH SMACNA.
4. ALL SUPPLY, EXHAUST AND RETURN DUCTWORK SHALL INCLUDE VOLUME DAMPERS FOR BALANCING IN ALL BRANCHES.
5. ALL ELBOWS SHALL BE EITHER SMOOTH RADIUS (RADIUS = 1.5 TIMES DUCT WIDTH) OR MITERED WITH TURNING VANES.
6. ALL DUCT SIZES ARE CLEAR INTERIOR WALL SIZE. FOR INTERNALLY LINED DUCT, THE SHEETMETAL SIZE WILL BE LARGER THAN THE DIMENSION SHOWN.

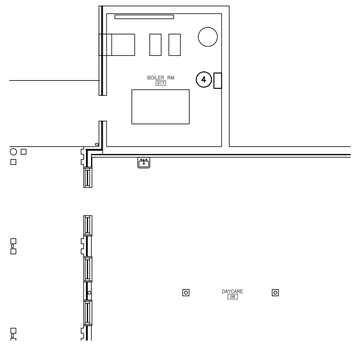
KEYED NOTES:

1. EXISTING VAV BOX TO REMAIN.
2. EXISTING DUCT, PIPING, DIFFUSER OR RETURN AIR GRILLE TO REMAIN.
3. NO NEW WORK IN THIS ROOM.
4. NEW ATC CONTROL PANEL. PROVIDE COMPLETELY NEW HVAC CONTROL SYSTEM INCLUDING CONTROLS FOR ALL VAV BOXES, HOT WATER REHEAT COIL CONTROL VALVES AND ROOFTOP UNIT. REFER TO SPECIFICATIONS.
5. DEMOLISH DUCTWORK, DIFFUSERS, GRILLES AND VAV BOX WITH ASSOCIATED HOT WATER PIPING. CAP HOT WATER PIPING. PATCH WALL AND MAINTAIN FIRE RATING.
6. NEW 3/4" HOT WATER SUPPLY AND RETURN PIPING TO NEW VAV TERMINALS. PROVIDE TEE AND CONNECT TO EXISTING PIPING MAINS.
7. PRIOR TO DEMOLITION, PROVIDE PRECONSTRUCTION TESTING TO MEASURE THE AIRFLOW AND HOT WATER FLOW AT EVERY EXISTING DIFFUSER, REGISTER, GRILLE, AND VAV TERMINAL BOX SHOWN ON THE PLAN. PROVIDE A WRITTEN REPORT TO THE ARCHITECT.
8. PATCH WALL AND MAINTAIN FIRE RATING.
9. PROVIDE FIRE STOPPING AT PENETRATIONS OF FIRE RATED CORRIDOR WALL.



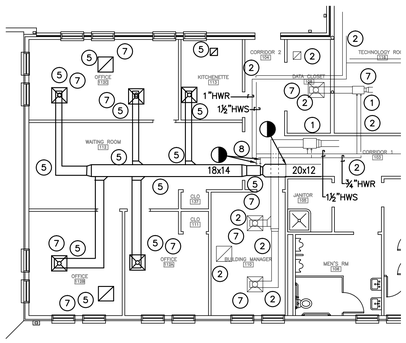
PARTIAL HVAC BASEMENT FLOOR PLAN

SCALE: 1/8" = 1'-0"



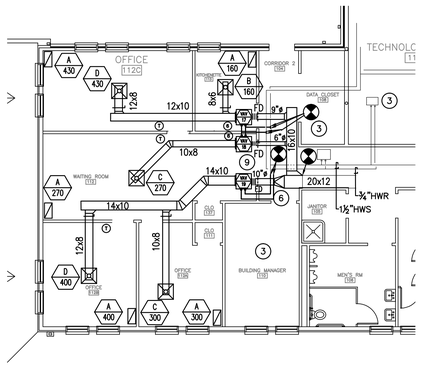
PARTIAL HVAC BASEMENT FLOOR PLAN

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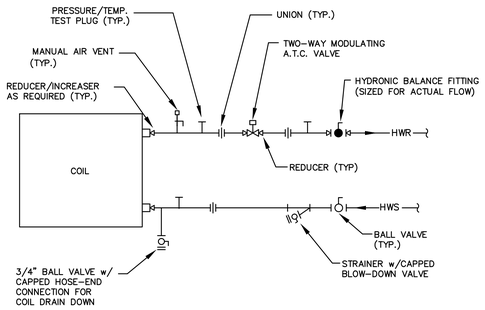
PARTIAL HVAC FIRST FLOOR DEMO PLAN

SCALE: 1/8" = 1'-0"

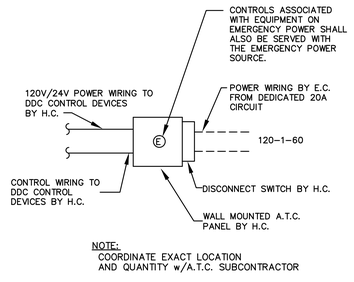


PARTIAL HVAC FIRST FLOOR PLAN

SCALE: 1/8" = 1'-0"



VARIABLE AIR VOLUME BOX HOT WATER COIL PIPING DETAIL



NOTE:
COORDINATE EXACT LOCATION AND QUANTITY w/A.T.C. SUBCONTRACTOR

A.T.C. PANEL WIRING DIAGRAM

NEW VARIABLE AIR VOLUME BOX WITH HOT WATER REHEAT SCHEDULE

UNIT NO.	AREA SERVED	MANUFACTURER	MODEL	INLET SIZE (IN.)	MIN CFM	MAX CFM	MAX PRESS. DROP (IN. W.C.)	HOT WATER HEATING COIL						NOTES
								HEATING CFM	EAT	LAT	MBH	GPM	EWT	LWT	
VAV-17	112C & 113	TITUS	DESV	9"	175	590	0.3	540	65	95	17.6	2.0	190	170	1
VAV-18	112	TITUS	DESV	6"	80	270	0.3	100	65	92	2.9	0.5	190	170	1
VAV-19	112A & 112B	TITUS	DESV	10"	230	700	0.3	540	65	95	17.6	2.0	190	170	1

NOTES:
1. PROVIDE ELECTRONIC CONTROL AS SPECIFIED.

NEW GRILLE, REGISTER AND DIFFUSER SCHEDULE

MARK	DEVICE	TYPE	FACE SIZE	NECK SIZE	PRESSURE DROP (in W.C.)	NC LEVEL	MANUFACTURER	MODEL	NOTES
A	GRILLE	RETURN	24"x12"	22"X10"	0.10	20	TITUS	50F	1
B	DIFFUSER	SQUARE PLAQUE	24"x24"	6" DIAMETER	0.10	20	TITUS	OMNI	2
C	DIFFUSER	SQUARE PLAQUE	24"x24"	8" DIAMETER	0.10	20	TITUS	OMNI	2
D	DIFFUSER	SQUARE PLAQUE	24"x24"	10" DIAMETER	0.10	20	TITUS	OMNI	2

NOTES:
1. EGGCRATE
2. OPPOSED BLADE DAMPER

DIFFUSER SYMBOL: MARK / AIRFLOW (CFM)

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ARCHITECT RA-CA218 THOMAS J. POERIO ENGINEER PE053072-E

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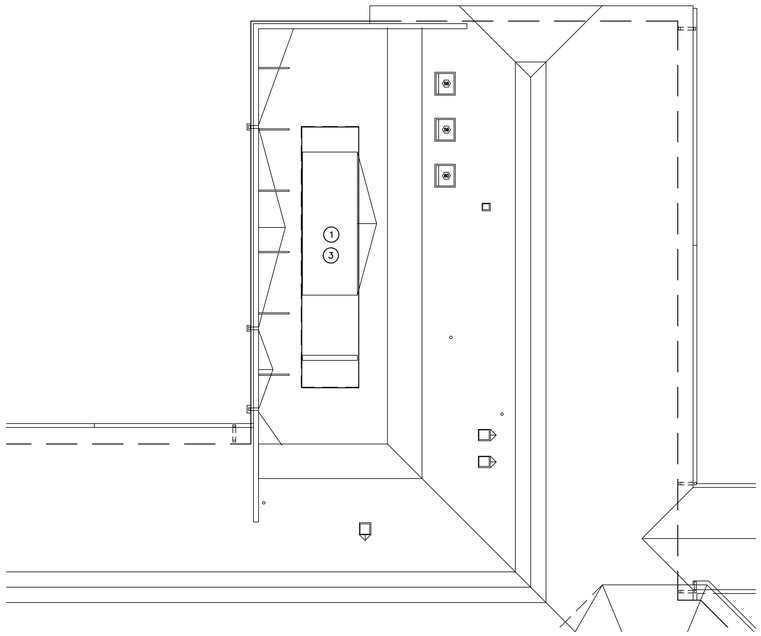
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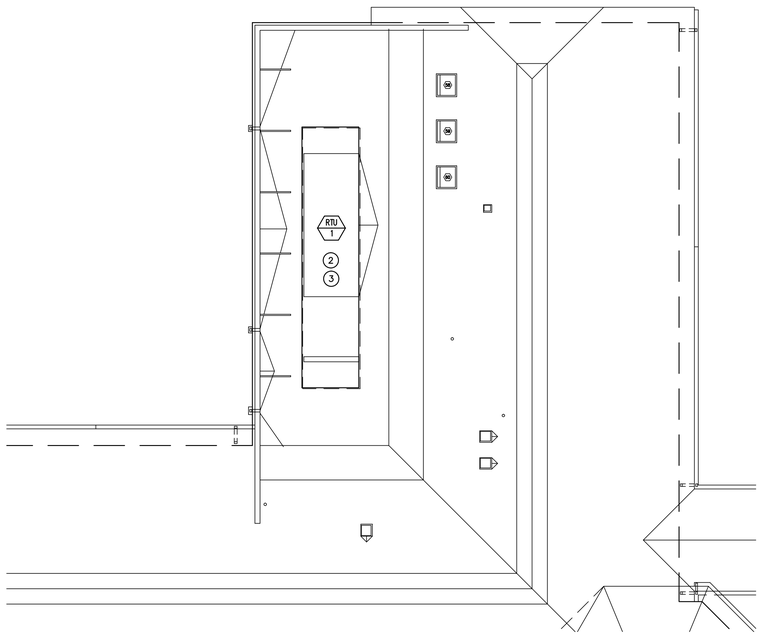
HVAC FLOOR PLAN

COMM. NO.	REVISION NO.	DWG NO.
1448	1	H-101
ISSUE DATE 12/05/16		



PARTIAL HVAC DEMOLITION ROOF PLAN

SCALE: 1/8" = 1'-0"

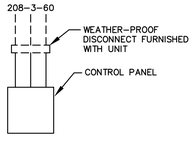


PARTIAL HVAC ROOF PLAN

SCALE: 1/8" = 1'-0"

KEYED NOTES:

1. DISCONNECT AND DEMOLISH EXISTING ROOFTOP UNIT. IF DEMOLITION DISTURBS ANY EXISTING SMOKE DETECTORS, CONTRACTOR SHALL REINSTALL EXISTING SMOKE DETECTORS INCLUDING POWER WIRING AND FIRE ALARM WIRING. EXISTING ROOF CURB SHALL BE REUSED.
2. PROVIDE CONTROL WIRING FROM EXISTING SMOKE DETECTORS TO NEW ROOFTOP UNIT. SMOKE DETECTORS SHALL SHUTDOWN UNIT WHEN SMOKE IS PRESENT. IF THERE ARE NO EXISTING SMOKE DETECTORS, NOTIFY ARCHITECT.
3. POWER FOR ROOFTOP UNIT IS PROVIDED BY 208 V BREAKER IN THE MAIN DISTRIBUTION PANEL, BUT THE NAMEPLATE ON THE EXISTING ROOFTOP UNIT INDICATES 480 V. CONTRACTOR TO VERIFY VOLTAGE PRIOR TO PURCHASE OF NEW UNIT.



ROOFTOP AIR CONDITIONING UNIT
WIRING DIAGRAM

NEW ROOFTOP UNIT SCHEDULE (GAS-FIRED HEATING AND ELECTRIC COOLING)

TAG	MANUFACTURER	MODEL	OUTSIDE AIR CFM	SUPPLY FAN		HEATING CAPACITY			COOLING CAPACITY					ELECTRICAL			OPERATING WEIGHT	NOTES
				CFM	ESP	STAGES	MAXIMUM INPUT (MBH)	MAXIMUM OUTPUT (MBH)	AMBIENT TEMP. (°F)	EAT DB/WB (°F)	LAT DB/WB (°F)	SENSIBLE CAPACITY (MBH)	TOTAL CAPACITY (MBH)	VOLTAGE	MCA	MOCP		
RTU-1	CARRIER	48P3L050	4340	18200	1.5	MODULATING	650	527	95	79/67	59/57	383	580	208/60/3	312	350	9,000	1,2,3,4

NOTES:

1. GAS HEAT TURNDOWN 6:1
2. POWER EXHAUST FAN 18,000 CFM AT 0.75" ESP
3. PROVIDE DISCONNECT SWITCH
4. PROVIDE ADAPTER CURB. THE EXISTING UNIT IS TRANE MODEL SFHFC50.

ISSUED FOR CONSTRUCTION

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ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE.

REVISIONS

1 03/16/18 REVISED FOR RE-BID/CONSTRUCTION

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER THOMAS J. POERIO PE035370-E

HOUSING AUTHORITY OF THE CITY PITTSBURGH
PA-1-02/TASK ORDER #19/30
RENOVATIONS AND UPGRADES

FOR

BEDFORD HOPE CENTER

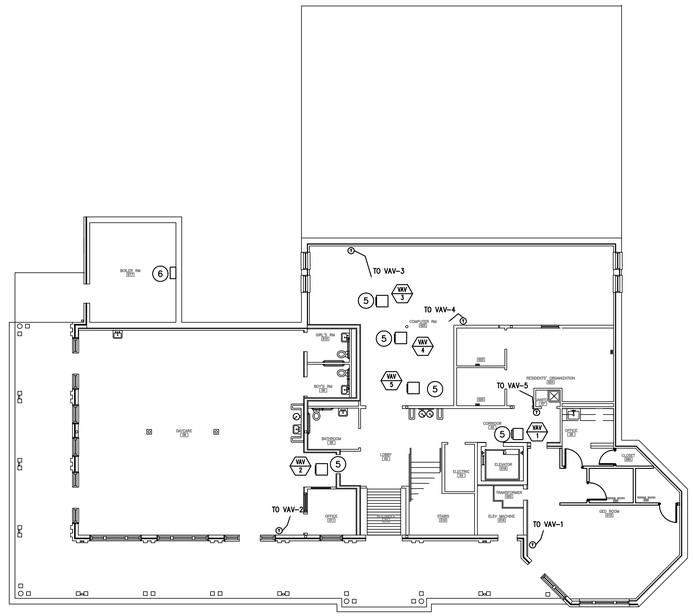
2305 BEDFORD AVENUE
PITTSBURGH PA 15219

GERARD ASSOCIATES ARCHITECTS
410 FT PITT COMMONS, 445 FT PITT BLVD
PITTSBURGH, PENNSYLVANIA 15219-1333
PHONE: 412-566-1531 FAX: 412-566-1532

DRAWING NAME

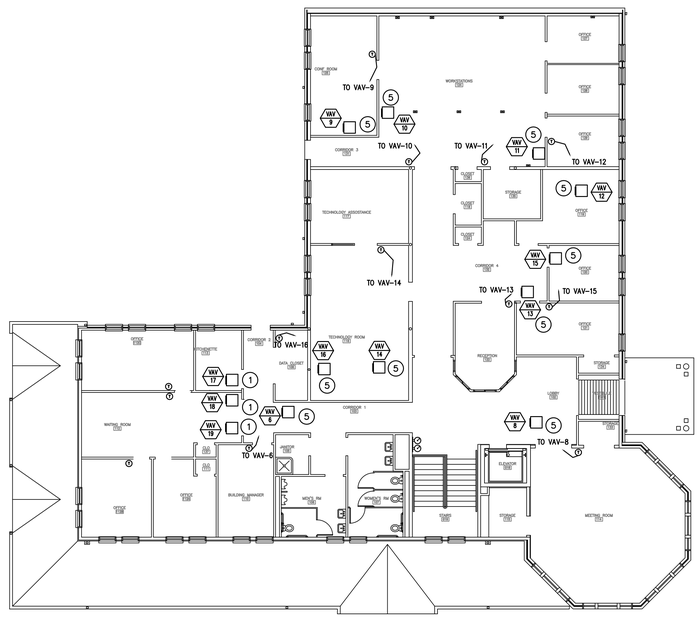
HVAC ROOF PLAN

COMM. NO.	REVISION NO.	DWG NO.
1448	1	H-102
ISSUE DATE 12/05/16		



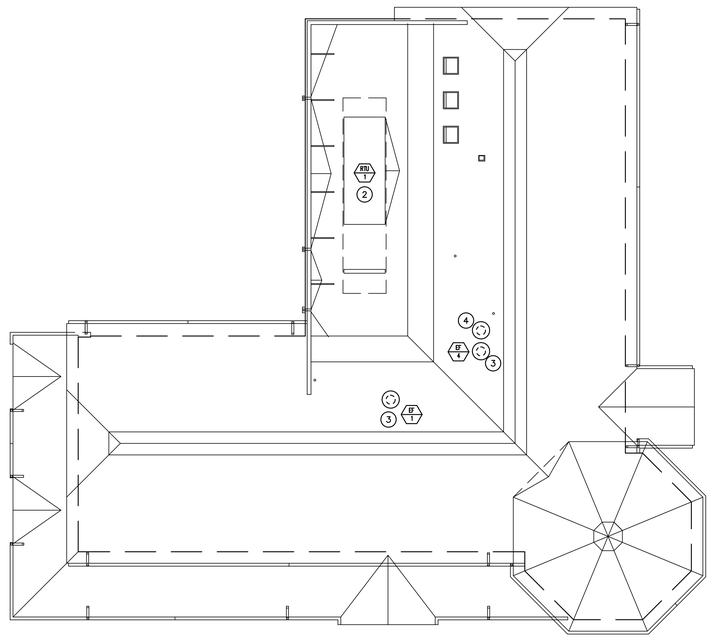
HVAC ATC BASEMENT FLOOR PLAN

SCALE: 3/32" = 1'-0"



HVAC ATC FIRST FLOOR PLAN

SCALE: 3/32" = 1'-0"



HVAC ATC ROOF PLAN

SCALE: 3/32" = 1'-0"

GENERAL NOTES

1. THIS DRAWING INDICATES THE APPROXIMATE LOCATION OF EQUIPMENT THAT IS TO BE CONTROLLED BY THE NEW AUTOMATIC TEMPERATURE CONTROL SYSTEM. REFER TO SPECIFICATION SECTIONS 230900 AND 230993. THE INDICATED LOCATION OF EXISTING EQUIPMENT AND THERMOSTATS IS BASED ON INCOMPLETE INFORMATION. THERE WILL BE NO ADJUSTMENT TO THE CONTRACT AMOUNT FOR EQUIPMENT LOCATIONS THAT DIFFER FROM THAT SHOWN.
2. FOR ALL EXISTING TERMINAL BOXES, CONTRACTOR SHALL MEASURE AND NOTE MINIMUM AIRFLOW, MAXIMUM AIRFLOW, HEATING AIRFLOW, AND HOT WATER FLOW RATE. PRIOR TO THE START OF ANY WORK.

KEYED NOTES:

1. NEW VAV TERMINAL BOX.
2. NEW ROOFTOP UNIT.
3. DEMOLISH EXISTING CONTROL SYSTEM FOR EXHAUST FAN. PROVIDE NEW CONTROLS AS SPECIFIED.
4. EXISTING EXHAUST FAN CONTROLS TO REMAIN.
5. DEMOLISH EXISTING CONTROL SYSTEM FOR VAV TERMINAL BOX INCLUDING ASSOCIATED THERMOSTAT. PROVIDE NEW CONTROLS (INCLUDING THERMOSTAT) AS SPECIFIED. EXISTING WIRING CAN BE REUSED IF IT MEETS THE MOST RECENT EDITION OF THE NATIONAL ELECTRIC CODE AND IT IS IN GOOD CONDITION WITH THE REQUISITE CAPACITY. AIRFLOW RATES (MINIMUM, MAXIMUM AND HEATING) AND HOT WATER FLOW RATE SHALL BE SET TO THE VALUES MEASURED AT THE START OF CONSTRUCTION.
6. NEW ATC CONTROL PANEL.

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1	03/16/18 REVISED FOR RE-BID/CONSTRUCTION

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL THOMAS J. POERIO ENGINEER PE053072-E PENNSYLVANIA

HOUSING AUTHORITY OF
THE CITY PITTSBURGH
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DRAWING NAME

HVAC CONTROLS

COMM. NO.	REVISION NO.	DWG NO.
1448	1	H-103
ISSUE DATE 12/05/16		

DUCTWORK CONSTRUCTION DETAILS

NO SCALE

LARGEST DIMENSION GOVERNS CONSTRUCTION

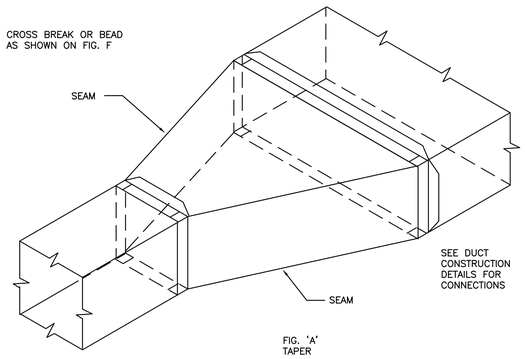


FIG. 'A'
TAPER

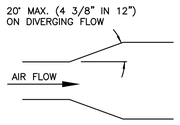


FIG. 'B'

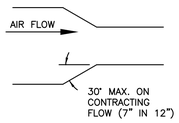
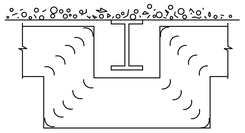


FIG. 'C'



VANES MUST BE PARALLEL
TO DUCT SIDE AT ENTRY & EXIT

FIG. 'D'

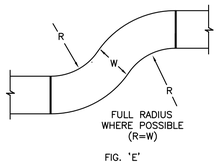
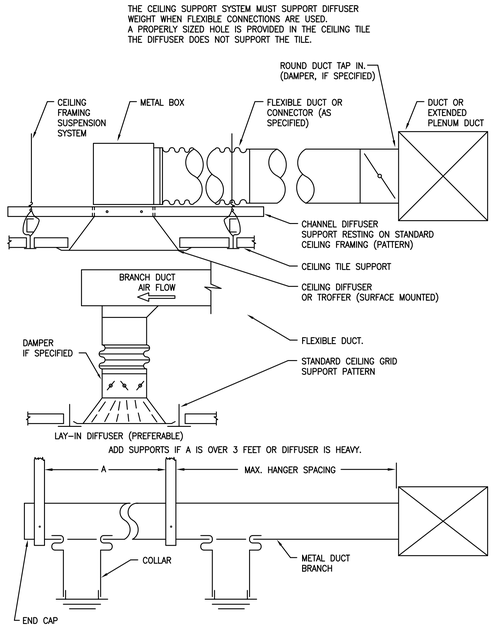


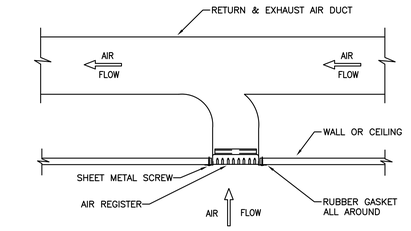
FIG. 'E'

CEILING DIFFUSER INSTALLATION DETAILS

NO SCALE

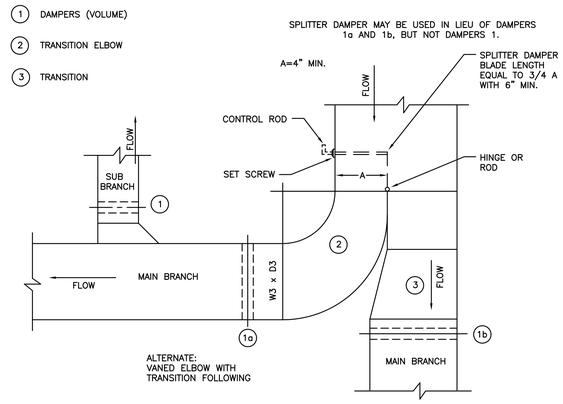


NOTE: UNLESS SHOWN OTHERWISE ON THE PLANS, FLEX DUCT SHOULD NOT HAVE ANY BENDS OR ELBOWS, AND FLEX DUCT SHOULD ONLY BE INSTALLED VERTICALLY.



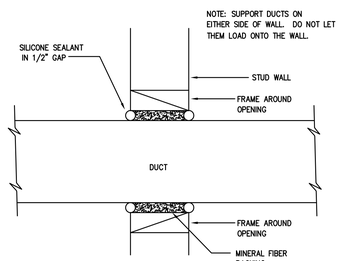
RETURN OR EXHAUST REGISTER INSTALLATION

NO SCALE



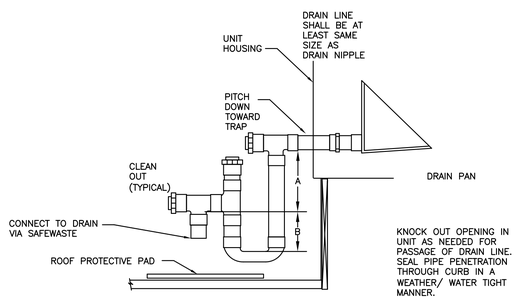
TYPICAL SUPPLY DUCT DETAIL

NO SCALE



DUCT PENETRATION THROUGH NON-FIRE RATED STUD WALL DETAIL

NO SCALE

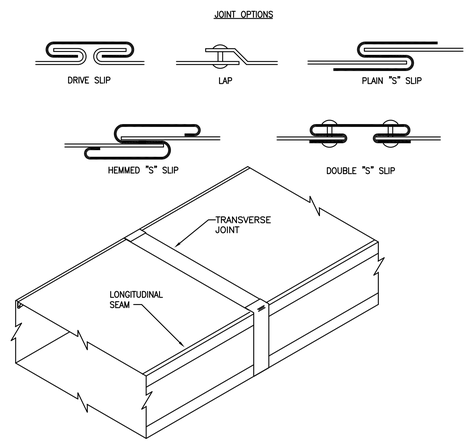


	MINIMUM A DIMENSION	B DIMENSION
DRAW THRU COIL	STATIC PRESSURE IN PAN	1.5 x STATIC PRESSURE IN PAN
BLOW THRU COIL	1" MINIMUM	2.0 x STATIC PRESSURE IN PAN

WHERE ABSOLUTE DESIGN STATIC PRESSURE IN PAN IS USED.

ROOFTOP HVAC CONDENSATE DRAIN TRAP DETAIL

NO SCALE



UNREINFORCED DUCT DETAIL

NO SCALE

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL 7/6/2018 THOMAS J. POERIO ENGINEER PE053072-E

HOUSING AUTHORITY OF
THE CITY PITTSBURGH
PA-1-02/TASK ORDER #19/30
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DRAWING NAME

HVAC DETAILS

COMM. NO.	REVISION NO.	DWG NO.
1448	1	H-104
ISSUE DATE: 12/05/16		

SYMBOLS LIST – (AS APPLICABLE)

- $ — 120/277 VOLT, SINGLE POLE AC WALL SWITCH, QUIET STYLE, 20 AMP
- $_P$ — 120/277 VOLT, SINGLE POLE AC WALL SWITCH, QUIET STYLE, W/PILOT HANDLE, 20 AMP
- $_3$ — 120/277 VOLT, AC WALL SWITCH, QUIET STYLE, 3 WAY, 20 AMP
- $_4$ — 120/277 VOLT, AC WALL SWITCH, QUIET STYLE, 4 WAY, 20 AMP
- $_{GFI}$ — 120/277 VOLT, SINGLE POLE AC WALL SWITCH, QUIET STYLE, AND A 125 VOLT, GROUNDED STYLE, DUPLEX CONVENIENCE OUTLET, UNDER A COMMON 2 GANG PLATE
- A15 — 125 VOLT, AC DUPLEX CONVENIENCE OUTLET, GROUNDED STYLE, 20 AMP. THE NUMBER NEXT TO THE OUTLET INDICATES THE CIRCUIT TO WHICH IT IS CONNECTED (TYPICAL).
- SW — 125 VOLT, AC DUPLEX CONVENIENCE OUTLET, GROUNDED STYLE WITH TOP HALF "SWITCHED", BOTTOM HALF "HOT", 20 AMP
- CH — 125 VOLT, AC DUPLEX CONVENIENCE OUTLET, MOUNTED AT COUNTER HEIGHT, 20 AMP
- GFI — 125 VOLT, AC DUPLEX CONVENIENCE OUTLET, WITH GROUND FAULT INTERRUPTION, 20 AMP
- GFI WP — 125 VOLT, AC DUPLEX CONVENIENCE OUTLET, WITH GROUND FAULT INTERRUPTION AND WEATHERPROOF "WHILE–IN–USE" COVER PLATE, 20 AMP
- SS — 125 VOLT, AC DUPLEX CONVENIENCE OUTLET, WITH INTEGRAL SURGE PROTECTION, 20 AMP
- 50 — 208/240 VOLT POLARIZED RECEPTACLE, AMPACITY INDICATED
- ∅ — PHASE
- J — JUNCTION BOX, SIZED AS PER NEC
- ◀ — 4" TELEPHONE OUTLET BOX AND MODULAR JACK
- ◁ — 4" DATA OUTLET BOX AND MODULAR JACKS FOR DATA SYSTEM
- ◀ — 4" TEL/DATA OUTLET BOX AND MODULAR JACKS FOR TELEPHONE AND DATA SYSTEMS
- PANELBOARD
- SAFETY DISCONNECT SWITCH, FUSED OR NON–FUSED AS SHOWN
- T — TRANSFORMER
- MOTOR
- STARTER OR CONTACTOR
- EXHAUST FAN
- UH — UNIT HEATER
- THERMOSTAT
- 1 PHASE HOMERUN TO PANEL – 120 VOLT – 2 WIRES + GREEN GROUND WIRE
- 1 PHASE HOMERUN TO PANEL – 208 VOLT – 2 WIRES + GREEN GROUND WIRE
- 1 PHASE HOMERUN TO PANEL – 120/208 VOLT – 3 WIRES + GREEN GROUND WIRE
- 3 PHASE HOMERUN TO PANEL – 208 VOLT – 3 WIRES + GREEN GROUND WIRE
- 3 PHASE HOMERUN TO PANEL – 120/208 VOLT – 4 WIRES + GREEN GROUND WIRE
- INDICATES #10 AWG WIRE
- INDICATES GREEN GROUND WIRE
- TV — CABLE TELEVISION SYSTEM OUTLET BOX AND MODULAR RECEPTACLE
- ES — ELECTRIC DOOR STRIKE (BY GC)
- EM BATTERY UNIT
- EM REMOTE HEAD
- TVC — TV CAMERA
- EPH — ELECTRIFIED PANIC HARDWARE (BY GC)
- EX — EXIT SIGN
- $_{OS}$ — 120 VOLT, SINGLE POLE, A/C WALL SWITCH, DUAL TECHNOLOGY MOTION SENSOR
- OS — LOW VOLTAGE DUAL TECHNOLOGY CEILING MOUNTED MOTION SENSOR
- PS — 120 VOLT, POWER PACK TRANSFORMER FOR MOTION SENSORS.
- ICE — INTERCOM STATION (EXTERIOR STATION)
- ICI — INTERCOM STATION (INTERIOR–RECEIVING UNIT)
- M — MICROPHONE JACK
- S — SOUND SPEAKER
- WAP — WIRELESS ACCESS POINT

***** NOTE: THE MANUFACTURERS AND CATALOG NUMBERS LISTED IN FIXTURE SCHEDULE INDICATE THE BASIS OF DESIGN. COMPARABLE PRODUCTS WITH EQUIVALENT PERFORMANCE, AND MEET THE PERFORMANCE CRITERIA IN PROJECT SPECIFICATIONS ARE ACCEPTABLE, SUBJECT TO REVIEW AND APPROVAL BY THE ELECTRICAL ENGINEER.

FIXTURE SCHEDULE (SEE NOTE ABOVE)

LTR.	LOCATION	STYLE	MOUNTING	MANUFACTURER	CATALOG NUMBER	LAMP	VOLTS	REMARKS
A	EXTERIOR	POST TOP LUMINAIRE	EXISTING POLE	LITHONIA	DSXF2 LED4 A530/40K–WFR–MVOLT–IS	80 WATT LED	120	
B	MISCELLANEOUS AREAS	2' X 4' LAY IN LED	RECESSED	FINELITE	HPRLED–A–2X4–DCO–SO–3500K–120V–SC–C1	35.7 WATT	120	
D	EXTERIOR	REMODELER LED DOWN LT	RECESSED	SPECTRUM	SQR TE10 LED GI–40W–40K–WD–E1–OR QRXX–AR 1066 GI–MW–SO–WL	40 WATT LED	120	±11" TRIM (OD)
EM	THROUGHOUT	EM BATTERY UNIT	WALL	LITHONIA	ELT 50–W–H1212	2–12 WATT TH	120/12	50 WATTS CAPACITY
EX	THROUGHOUT	EXIT SIGN	UNIVERSAL	LITHONIA	LQM–S–W–X–R–120/277–ELN	LED	120	INTEGRAL BATTERY
WPRH	EXTERIOR	EM REMOTE	WALL	LITHONIA	ELA–B–NX–H1212	1–12 WATT TH	12	
F	EXTERIOR	LED BRACKET	WALL	LUMINAIRE LIGHTING	YWP 1212–25W–4000–120/277–CP–BRZ–CAB/PC	25 WATT LED	120	
G	EXTERIOR	LED FLOOD LIGHT	WALL	LITHONIA	DSXF2LED–4–A530/40K–WFR–MVOLT–IS–DDBXD AFWMA	80 WATT LED	120	
H	EXTERIOR	REMODELER LED 4' STRIP	RECESSED	SPECTRUM	SQRTE12LED GI–50W–40K–WD–EI CRGRXX–AR12 66 GI–MW–SO–WL	50 WATT LED	120	±13" TRIM (OD)
K	CLOSET	4' STRIP	SURFACE	LITHONIA	Z–1–32–MVOLT–GEB10PS	1F32T8	120	

ASHRAE 90.1 CALCULATION (EXTERIOR)

TRADABLE SPACES			
	TOTAL SQ. FT.	WATTS ALLOWED	
GENERAL AREAS	4466	2231	
	TOTAL LINEAR FT.	WATTS ALLOWED	
GENERAL AREAS	27	660	
		TOTAL WATTS ALLOWED	TOTAL WATTS USED
		2841	1200

LIGHTING POWER DENSITY CALCULATION TABLE (INTERIOR)

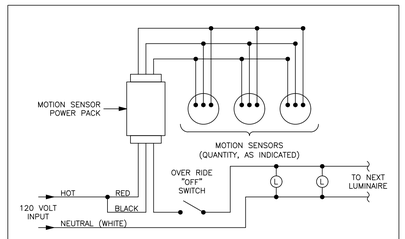
SPACE BY SPACE METHOD	TOTAL SQ. FT.	TOTAL WATTS ALLOWED	TOTAL WATTS USED
GENERAL AREAS	827	1116	461

ABBREVIATIONS – (AS APPLICABLE)

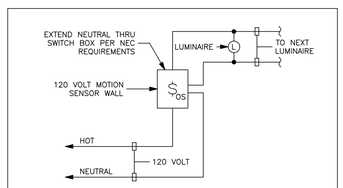
A	AMPERE	MH	METAL HALIDE
AC	ALTERNATING CURRENT	NC	NORMALLY CLOSED
A/C	AIR CONDITIONER	N & E	NORMAL AND EMERGENCY
A.D.A.	AMERICAN DISABILITY ACT	N.E.C.	NATIONAL ELECTRICAL CODE
AFC	ABOVE FINISHED CEILING	NEUT	NEUTRAL
AFF	ABOVE FINISHED FLOOR	NF	NON–FUSED
AFG	ABOVE FINISHED GRADE	NIC	NOT IN CONTRACT
AWG	AMERICAN WIRE GAUGE	NL	NIGHT LIGHT
BKR	BREAKER	NO	NORMALLY OPEN
BX	ARMORED CABLE	OH	OVERHEAD
CCT	CIRCUIT	PB	PUSHBUTTON
C, COND	CONDUIT	PC	PLUMBING CONTRACTOR
CH	COUNTER HEIGHT	PEC	PHOTO–ELECTRIC CELL
CO	CONVENIENCE OUTLET	PR	PRESENT ITEM REMAINS AS IS
CT	CURRENT TRANSFORMER	PRN	REMOVE PRESENT AND REPLACE W/NEW
DC	DIRECT CURRENT	PRR	PRESENT ITEM REMOVED AND RELOCATED
DISC	DISCONNECT	PT	POTENTIAL TRANSFORMER
DL	DAMP LOCATION LABEL	PVC	POLY–VINYL CHLORIDE
DPDT	DOUBLE POLE – DOUBLE THROW	REL	RELOCATED ITEM
DPST	DOUBLE POLE – SINGLE THROW	RP	REMOVE PRESENT ITEM
DX	DELUXE WHITE LAMP	RPC	REMOVE PRESENT ITEM AND CAP OUTLET
EC	ELECTRICAL CONTRACTOR	RPN	REMOVE PRESENT ITEM AND REPLACE W/NEW
ELEV	ELEVATOR	RPP	REMOVE PRESENT ITEM AND PATCH SURFACE
EM, E	EMERGENCY		TO MATCH EXISTING
EWC	ELECTRIC WATER COOLER	RPR	REMOVE PRESENT ITEM AND RELOCATE
EX	EXIT OR EXIT SIGN	SMR	SURFACE METAL RACEWAY
FA	FIRE ALARM	SPDT	SINGLE POLE – DOUBLE THROW
FACP	FIRE ALARM CONTROL PANEL	SPST	SINGLE POLE – SINGLE THROW
FHC	FIRE HOSE CABINET	SU	STUBBED UP (CONDUIT)
FLUOR	FLUORESCENT	SW	SWITCH
GC	GENERAL CONTRACTOR	T	THERMOSTAT
GFI	GROUND FAULT INTERRUPTION	TC	TIME CLOCK
GG,GR/GD	GREEN GROUND WIRE	TEL	TELEPHONE
GRS	GALVANIZED RIGID STEEL	TELCO	TELEPHONE COMPANY
HC	HEATING CONTRACTOR	THHN,THWN	WIRE INSULATION TYPES
HID	HIGH INTENSITY DISCHARGE	TRXR,TX	TRANSFORMER
HPS	HIGH PRESSURE SODIUM	T/S	TRANSFER SWITCH
IC	INTERRUPTING CAPACITY	TV	TELEVISION
IF	INSIDE FROSTED	TYP	TYPICAL
IMC	INTERMEDIATE METALLIC CONDUIT	UG	UNDERGROUND
INC	INCANDESCENT	V	VOLT
JUB	JUNCTION BOX	VP	VANDALPROOF
KW	KILOWATT	W	WATT
LT	LIGHT	WP	WEATHERPROOF
MC	METAL CLAD CABLE	3PDT	THREE POLE – DOUBLE THROW
MDP	MAIN DISTRIBUTION PANEL	3PST	THREE POLE – SINGLE THROW
MERC	MERCURY	4PST	FOUR POLE – SINGLE THROW

MOTION SENSOR MATERIAL LIST

MOTION SENSOR POWER PACK	SENSORSWITCH	#PP–20
MOTION SENSOR (MS)	SENSORSWITCH	#CM–PDT
MOTION SENSOR WALL SWITCH	SENSORSWITCH	#WSD–PDT



OCCUPANCY SENSOR CONTROLLED SMALL AREA LIGHTING (1 CIRCUIT)
NO SCALE SCHEMATIC ONLY PRESENTATION



OCCUPANCY SENSOR CONTROLLED LUMINAIRES (SMALL AREA)
NO SCALE SCHEMATIC ONLY PRESENTATION

BRANCH CIRCUIT WIRING NOTES TO E.C.

ARRANGE BRANCH CIRCUIT WIRING TO AVOID PROBLEMS WITH "HARMONIC CURRENTS" FOR ALL CIRCUITS FEEDING DUPLEX CONVENIENCE OUTLETS IN ALL GENERAL OR OFFICE AREAS, FOR ALL COMPUTER OR RELATED EQUIPMENT CIRCUITS AND FOR ALL LIGHTING CIRCUITS WITH ELECTRONIC BALLASTS, AS FOLLOWS:

A. USE INDIVIDUAL 2–WIRE + GROUND IN ONE BRANCH RACEWAY OR CABLE. INCLUDE A SEPARATE EQUIPMENT GROUND CONDUCTOR.

B. THE EQUIPMENT GROUND CONDUCTOR SHALL BE GREEN.

C. INCREASE THE PHASE AND GROUND CONDUCTORS TO #10 AWG FOR CIRCUIT LENGTHS GREATER THAN 75 FEET FROM THE PANELBOARD TO THE FIRST OUTLET, AS REQUIRED IN THE SPECIFICATIONS.

BRANCH WIRING NOTES TO EC

THE E.C. IS RESPONSIBLE FOR A COMPLETE AND OPERABLE BRANCH WIRING SYSTEM.

PROVIDE THE CORRECT QUANTITY OF CONDUCTORS PLUS GROUND WIRE TO ALL INDICATED ELECTRICAL ITEMS.

IN GENERAL, WIRE QUANTITIES ARE AS FOLLOWS:

A. ALL 120 VOLT HOMERUNS ARE 2–WIRE + GROUND.

B. ALL 208 VOLT, SINGLE PHASE HOMERUNS ARE EITHER 2–WIRE + GROUND OR 3–WIRE + GROUND, AS APPLICABLE.

C. SINGLE POLE SWITCH LEGS ARE 3–WIRE + GROUND. TAPE UP NEUTRAL CONDUCTOR FOR FUTURE USE, PER NEC.

D. 3–WAY SWITCH LEGS ARE 3–WIRE + GROUND.

E. 4–WAY SWITCH LEGS ARE 4–WIRE + GROUND.

F. 208 VOLT, 3 PHASE HOMERUNS ARE 3–WIRE + GROUND.

G. 120 VOLT CONNECTIONS TO EMERGENCY BATTERY UNITS ARE 2–WIRE + GROUND. 120 VOLT CONNECTIONS TO EXIT SIGNS ARE 2–WIRE + GROUND.

H. SWITCH LEGS TO PHOTO–CELLS ARE 3–WIRE + GROUND.

I. WIRING TO SURGE SUPPRESSORS IS 4–WIRE + GROUND (#10 AWG).

J. SINGLE POLE MOTION SENSOR SWITCHES ARE 3–WIRE + GROUND. TAPE UP NEUTRAL CONDUCTOR, IF NOT NEEDED.

K. SEE DETAILS ON DRAWINGS FOR MOTION SENSOR WIRING.

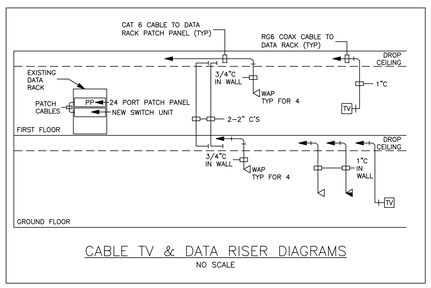
E.C. SHALL REQUEST ASSISTANCE FROM THE ENGINEER DURING BIDDING, IF WIRING TO ANY ITEM IS UNCLEAR.

NOTES

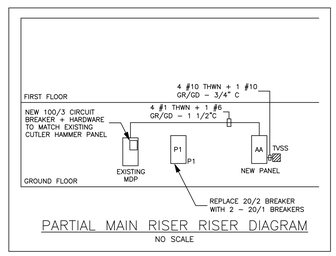
1. ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE.
2. THESE DRAWINGS DO NOT INCLUDE NECESSARY COMPONENTS OR INSTRUCTIONS FOR CONSTRUCTION SAFETY. THE ELECTRICAL ENGINEER ASSUMES NO RESPONSIBILITY FOR ANY WORKMAN'S OR TRANSIENT'S SAFETY, OR FOR THE ADEQUACY OF EQUIPMENT, BUILDING COMPONENTS, SCAFFOLDS, FORMS, OR OTHER WORK AIDS, OR ANY NECESSITY TO WORK ON "LIVE" ELECTRICAL COMPONENTS. FURTHER, NO SUPERINTENDENCE IS INCLUDED OR INTENDED.

LIST OF DRAWINGS

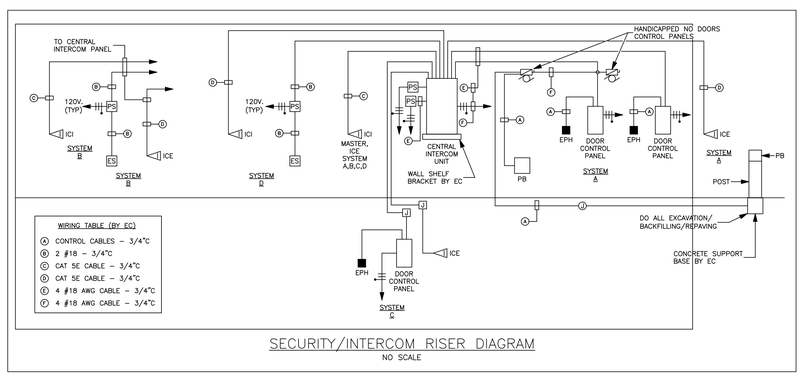
E1: SYMBOLS, ABBREVIATIONS, FIXTURE SCHEDULE, NOTES, DETAILS, AND MISCELLANEOUS RISER DIAGRAMS
E2: SITE PLAN
E3: GROUND FLOOR PLAN
E4: FIRST FLOOR PLAN



CABLE TV & DATA RISER DIAGRAMS
NO SCALE



PARTIAL MAIN RISER RISER DIAGRAM
NO SCALE



SECURITY/INTERCOM RISER DIAGRAM
NO SCALE

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PA-1-02/TASK ORDER #19/30
RENOVATIONS AND UPGRADES

FOR

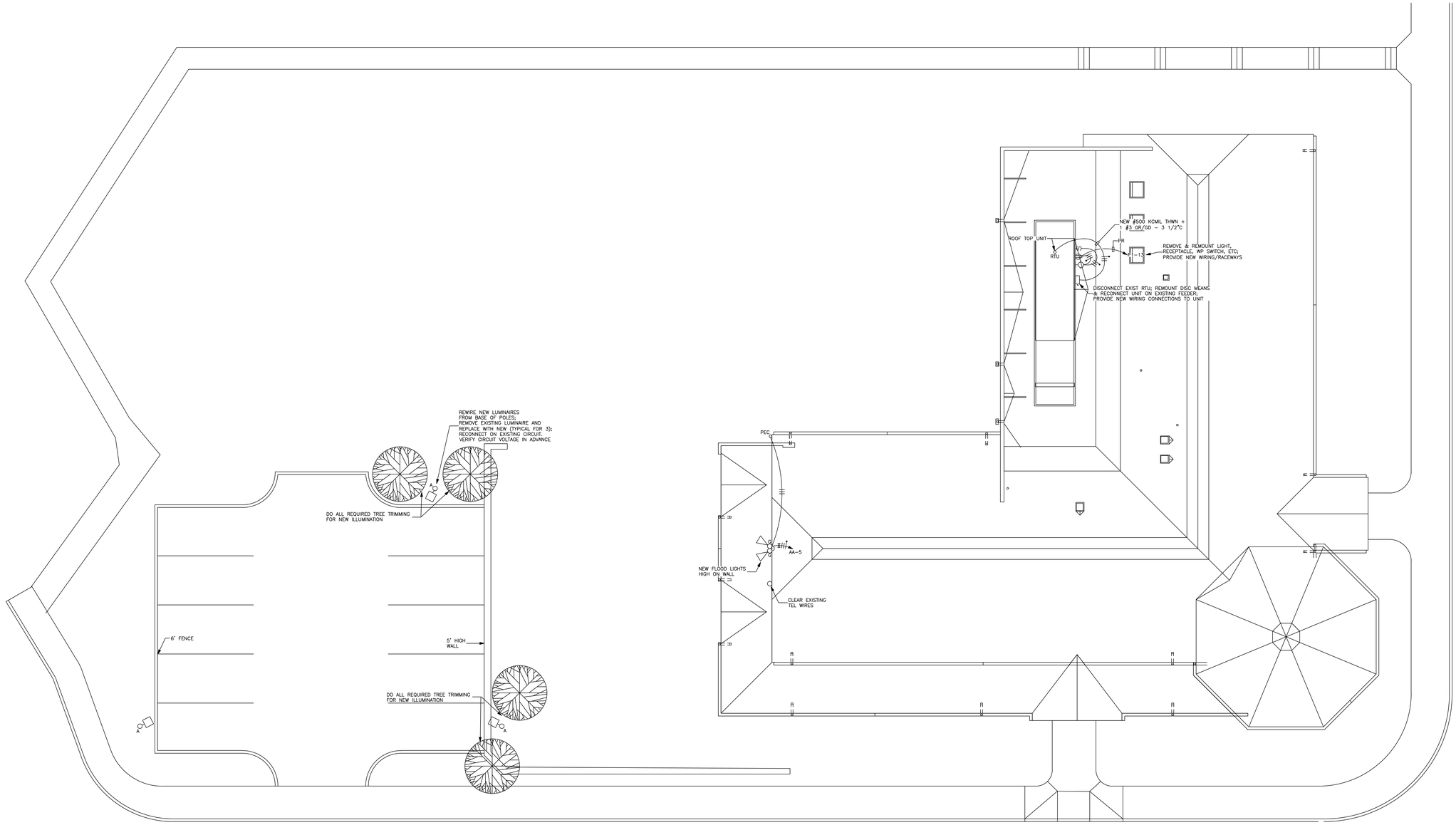
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445 FORT PITT BLVD, SUITE 410
FORT PITT COMMONS BUILDING
PITTSBURGH, PENNSYLVANIA 15219-1333
PHONE: 412-566-1531 FAX: 412-566-1532

DRAWING NAME

SYMBOLS AND NOTES

COMM. NO.	REVISION NO.	DWG NO.
1448	1	E-101
ISSUE DATE 12/05/16		



ELECTRICAL SITE PLAN
SCALE: 1/8" = 1'-0"

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DRAWING NAME

ELECTRICAL SITE PLAN

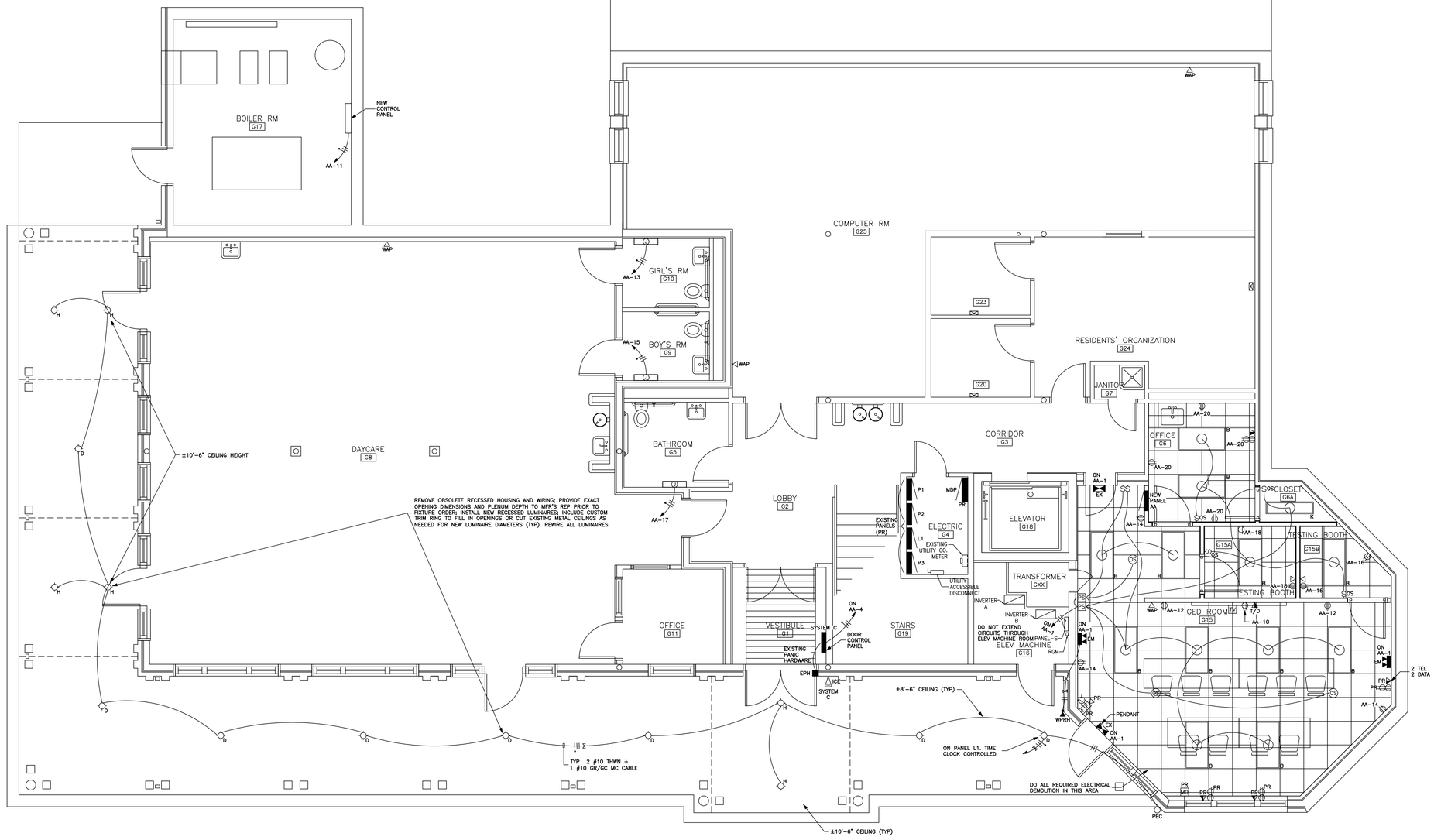
COMM. NO.	REVISION NO.	DWG NO.
1448	1	E-102
ISSUE DATE 12/05/16		

			LUGS				
KVA	DESCRIPTION					DESCRIPTION	KVA
0.8	OFFICE, TESTING, GED RM LTS AND EM LTS	1	*20-1	20-1	2	HC DOOR OPERATOR	1.5
0.5	SOUND SYSTEM	3	20-1	20-1	4	INTERCOM SYSTEM AND DOOR CONTROLS	1.0
0.3	EXTERIOR FLOOD LTS	5	20-1	20-1	6	MEETING ROOM COS	1.0
	SPARE	7	20-1	20-1	8	MEETING ROOM COS	1.0
1.5	HC DOOR OPERATOR	9	20-1	20-1	10	GED ROOM COS	1.0
0.5	BOILER RM CONTROL PANEL	11	20-1	20-1	12	GED ROOM COS	1.0
1.5	BATHROOM HAND DRYER	13	20-1	20-1	14	GED ROOM COS	1.0
1.5	BATHROOM HAND DRYER	15	20-1	20-1	16	TESTING BOOTH COS	1.0
1.5	BATHROOM HAND DRYER	17	20-1	20-1	18	TESTING BOOTH COS	1.0
	SPARE	19	20-1	20-1	20	OFFICE COS	1.0
	SPARE	21	20-1	20-1	22	SPARE	
	SPARE	23	20-1	20-1	24	SPARE	
	SPARE	25	20-1	30	26		
	SPARE	27	20-1		28	TVSS	
	SPARE	29	20-1	3	30		
			NEUTRAL				
			EQ. GR. BUS				

VOLTAGE: 120/208 VOLT 3 PHASE 4 WIRE
125 AMPS LUGS AND BUSES
TOTAL CONNECTED LOAD: 18.6 KVA

PANEL AA

*LOCK-ON DEVICE
RECESSED MOUNTED
WITH HINGED DOOR AND LOCKING LATCH
SERIES RATED WITH MDP
USE CUTLER HAMMER PANEL



GROUND FLOOR PLAN
SCALE: 1/4" = 1'-0"

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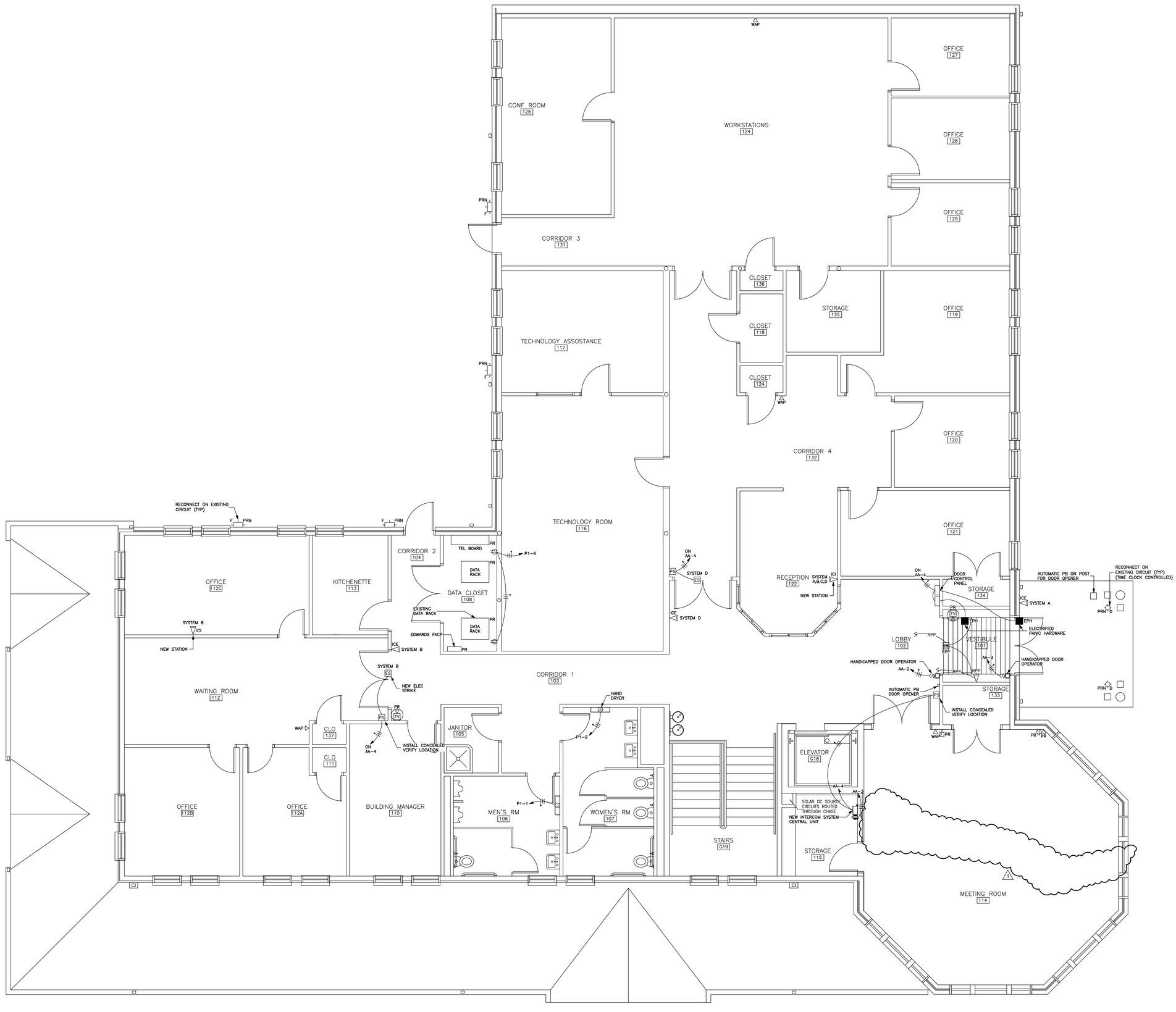
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DRAWING NAME

GROUND FLOOR PLAN

COMM. NO.	REVISION NO.	DWG NO.
1448	1	E-103
ISSUE DATE 12/05/16		



FIRST FLOOR PLAN
SCALE: 1/4" = 1'-0"

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RENOVATIONS AND UPGRADES

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BEDFORD HOPE CENTER

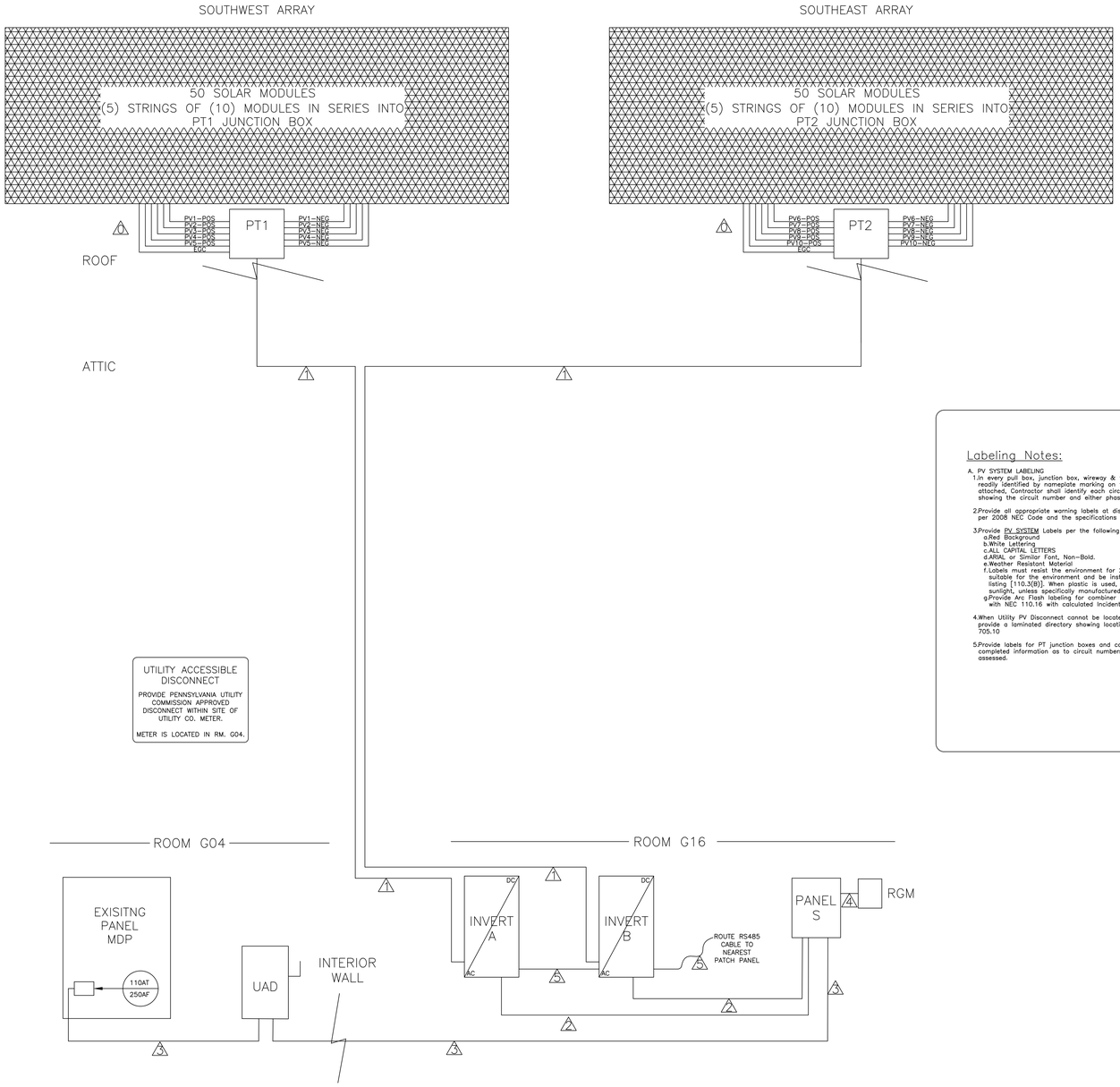
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PHONE: 412-566-1531 FAX: 412-566-1532

DRAWING NAME

FIRST FLOOR PLAN

COMM. NO.	REVISION NO.	DWG NO.
1448	1	E-104
ISSUE DATE 12/05/16		



SYSTEM SUMMARY

SYSTEM TYPE	PV GRID-INTERACTIVE
INVERTER TYPE	TRANFORMERLESS - FLOATING GROUND
TOTAL AC SYSTEM SIZE	32.5kW
SITE LATITUDE	40° 26' 59"
ARRAY AZIMUTH	245° / 150°
INTERCONNECTION VOLTAGE	3ϕ 208 VAC
INTERCONNECTION OCPD	110A
PANEL BUS RATING	800A
INTERCONNECTION TYPE	LOAD SIDE
UTILITY ACCESSIBLE DISCONNECT	YES

SOLAR CLIMATE CONDITIONS

	°C	°F
PITTSBURGH, PA		
STANDARD TEST CONDITIONS (STC)	25	77
LOWEST RECORDED TEMP (MinT)	-30	-22
AVERAGE HIGH TEMP	31	87

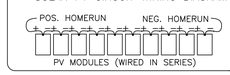
PV MODULE RATINGS

MFG.	SUNIVA
MODEL	OPT325-72-4-100
MAX POWER-POINT CURRENT (I_{mp})	8.67
MAX POWER-POINT VOLTAGE (V_{MP})	37.5
SHORT CIRCUIT CURRENT (I_{SC})	9.42
OPEN CIRCUIT VOLTAGE (V_{OC})	45.8
MAX SERIES FUSE RATING	15.0
MAX POWER (P_{MAX})	325
TEMP COEFFICIENT OF V_{OC}	-.335%/°C

INVERTER RATINGS

MFG.	FRONIUS
MODEL	SYMO15.0-3
MAXIMUM DC VOLTAGE RATING	600V
MAXIMUM DC CURRENT RATING	50A
NOMINAL OUTPUT VOLTAGE	208V
MAXIMUM OUTPUT CURRENT	41.6A
POWER FACTOR AT FULL LOAD	>.99

SOLAR PV CIRCUIT WIRING DIAGRAM



PV SYSTEM LABELS

Labeling Notes:

A. PV SYSTEM LABELING
1. In every pull box, junction box, wireway & trough where wires may not be readily identified by nameplate marking on the equipment to which they are attached, Contractor shall identify each circuit with a permanently affixed label showing the circuit number and either phase or polarity.

2. Provide all appropriate warning labels at disconnects and electrical equipment per 2008 NEC Code and the specifications included in these drawings.

3. Provide PV SYSTEM Labels per the following specification:
   a. Red Background
   b. White Lettering
   c. ALL CAPITAL LETTERS
   d. ARIAL, or Similar Font, Non-Bold.
   e. Weather Resistant Material
   f. Labels must resist the environment for 25 years of system use and be suitable for the environment and be installed so as not to void equipment listing [110.3(B)]. When plastic is used, it should not be placed in direct sunlight, unless specifically manufactured as sunlight resistant.
   g. Provide Arc Flash labeling for combiner box and inverter in accordance with NEC 110.16 with calculated Incident Energy & Hazard Category.

4. When Utility PV Disconnect cannot be located adjacent to utility disconnect, provide a laminated directory showing location of all PV disconnects. 690.56(b) 705.10

5. Provide labels for PT junction boxes and combiner boxes as shown herein with completed information as to circuit numbers and rated output per box as assessed.

LABELS FOR DC PASS-THRU JB

SOLAR PV JUNCTION BOX # PT1	
CIRCUIT NUMBERS	1 - 5
RATED DC VOLTAGE	375VDC
WARNING: THIS IS NOT A DISCONNECT MEANS. NO USER SERVICEABLE PARTS INSIDE	

4"

LABELS FOR DC PASS-THRU JB

SOLAR PV JUNCTION BOX # PT2	
CIRCUIT NUMBERS	6 - 10
RATED DC VOLTAGE	375VDC
WARNING: THIS IS NOT A DISCONNECT MEANS. NO USER SERVICEABLE PARTS INSIDE	

4"

LABEL FOR UAD DISCONNECT

SOLAR PV SYSTEM AC CONNECTION POINT	
AC RATED CURRENT	83A
NOMINAL AC VOLTAGE	208V
WARNING: THIS DISCONNECT FED BY UTILITY & SOLAR	

3"

LABEL FOR DC (INVERTER) DISCONNECTS

PHOTOVOLTAIC POWER SOURCE DISCONNECT	
RATED MPP CURRENT	43.35A
RATED MPP VOLTAGE	375V
MAXIMUM SYSTEM VOLTAGE	542V
MAXIMUM CIRCUIT CURRENT	47.1A
WARNING: ELECTRICAL SHOCK HAZARD. LINE & LOAD TERMINALS MAY BE ENERGIZED IN THE OPEN POSITION	

5" × 5"

LABEL FOR PANEL S

PANEL S
SOLAR DEVICES ONLY
DO NOT ADD CIRCUITS

3" × 3"

LABEL FOR REVENUE GRADE METER

SOLAR ENERGY PRODUCTION METER

3" × 3"

LABEL FOR INTERTIE BREAKER

WARNING
INVERTER OUTPUT CONNECTION.
DO NOT RELOCATE THIS OVERCURRENT DEVICE

SIZE APPROPRIATELY TO FIT ADJACENT TO BREAKER

LABEL FOR ALL JUNCTION BOXES, PASS-THRU & COMBINER BOXES

WARNING - ELECTRICAL SHOCK HAZARD
THE DC CONDUCTORS OF THIS PHOTOVOLTAIC SYSTEM ARE UNGROUNDED MAY BE ENERGIZED

3" × 3"

B. FIRE SERVICE LABELING

1. Fire Service labeling is required on all interior and exterior DC conduit, enclosures, raceways, cable assemblies, junction boxes, combiner boxes, and DC Disconnects.
2. Fire Service labels to be located on DC conduits every ten feet, at turns, and above / below roof penetrations.
3. Provide Fire Service Labels per the following specifications:
   a. Red Background
   b. White Lettering
   c. Minimum 3/8" Letter Height
   d. ALL CAPITAL LETTERS
   e. ARIAL or Similar Font, Non-Bold.
   f. Reflective, Weather Resistant Material (durable adhesive materials meet this requirement)

LABEL FOR DC CONDUIT, RACEWAYS, ENCLOSURES & CABLE ASSEMBLIES

CAUTION: SOLAR CIRCUIT
7" TO 8"

LABEL TO BE PLACED ON UTILITY CO. METER

CAUTION: SOLAR ELECTRIC SYSTEM
9" TO 10"

EQUIPMENT SCHEDULE

NO.	DESCRIPTION	SIZE	MANUF.	PART #	NOTES
	SOLAR MODULES	72-CELL	SUNIVA OR PRE-APPROVED EQUAL	OPT-325-72-4-100	
DC/AC	INVERTER A/B	15kW	FRONIUS OR PRE-APPROVED EQUAL	SYMO 15.0-3 208V	PROVIDE 15 YR. WARRANTY
UAD	UTILITY ACCESIBLE DISCONNECT	100A	CUTLER HAMMER OR EQUAL	DG323URB	NON-FUSED, N3R, LOCKABLE. MAX. HANDLE DEPTH 7.5"
RGM	REVENUE GRADE METER	100A	EMON	208100-KIT	100A SPLIT CORE CT'S
S	ELECTRICAL PANEL S	200A	CUTLER HAMMER OR EQUAL	3BR1224L200	3PH MLO W/ GRD KIT
MDP	EXISTING PANEL MDP	800A	CUTLER HAMMER	PROVIDE 110/3P BRKR	MATCH EXISTING BREAKER TYPE
PT1/2	PASS-THROUGH JUNCTION BOX	6-16AWG	SOLADECK	0783-3R	USE 1450-STYLE TERMINAL BLOCKS
DAS	DATA ACQUISITION SYSTEM		INTEGRAL TO INVERTER		WIRE INVERTERS IN SERIES WITH CAT6 CABLE; ROUTE TO NEAREST PATCH PANEL

CONDUIT & WIRING SCHEDULE

TAG	DESCRIPTION	AWG	# OF CONDUCTORS	GRD AWG	CONDUIT TYPE	CONDUIT SIZE
Δ0	USE-2 RHH/RHW PV WIRE	#10	2 PER STRING	#6 BARE	FREE AIR	
Δ1	THWN-75C	#10	10 + GRD	#10	EMT	1"
Δ2	THWN-75C	#6	4 + GRD	#10	EMT	1"
Δ3	THWN-75C	#1	4 + GRD	#6	EMT	1-1/4"
Δ4	THWN-75C	#12	4 +GRD	#12	EMT	3/4"
Δ5	RS485 CABLE	#24	4-PAIR (CAT6)		EMT	1/2"

PANEL DESIGNATION	S		AIC RATING	10,000	
VOLTAGE / PHASE	120/208V 3P 4W		CIRCUITS	12	
MAIN TYPE	200A MLO		ENCL./ MOUNTING	N-1	
CKT	TRIP	FEED	VA	FEED	TRIP	CKT
1			4996	SPACE		2
3	60	INVERTER 1	4996	SPACE		4
5			4996	SPACE		6
7			4996			8
9	60	INVERTER 2	4996	REVENUE GRADE METER - PROVIDE IN-LINE FUSING	20	10
11			4996			12
		TOTAL	9992	9992	9992	BUS RATING = 200AMPS MIN.

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NEXGEN DESIGN SYSTEMS, INC.

REGISTERED ARCHITECT COMMONWEALTH OF PENNSYLVANIA

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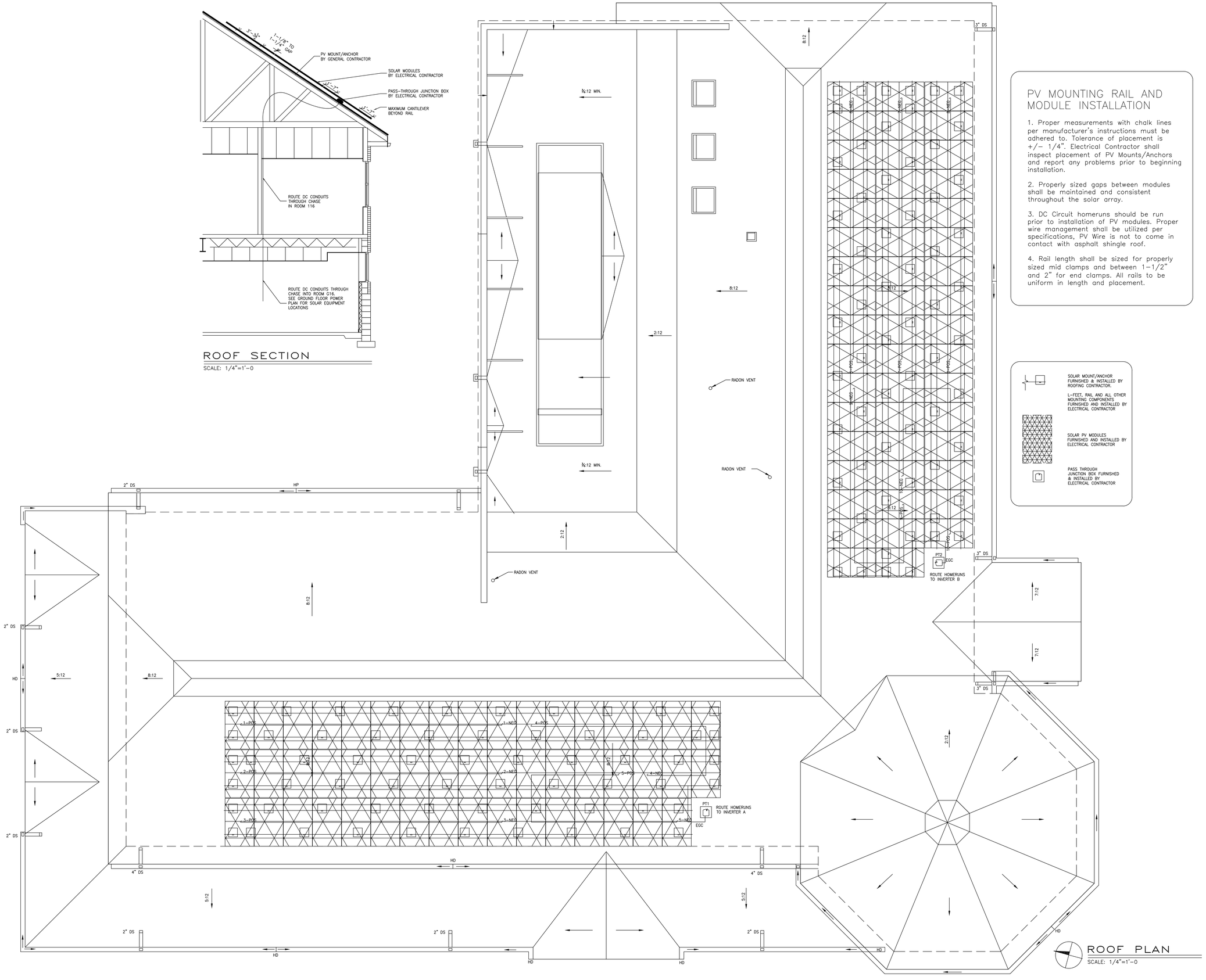
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DRAWING NAME
ELECTRICAL DIAGRAM AND SCHEDULES

COMM. NO.	REVISION NO.	DWG NO.
1448	1	E-105
ISSUE DATE 12/05/16		

ROOF SECTION

SCALE: 1/4"=1'-0



ROOF PLAN

SCALE: 1/4"=1'-0

PV MOUNTING RAIL AND MODULE INSTALLATION

1. Proper measurements with chalk lines per manufacturer's instructions must be adhered to. Tolerance of placement is +/- 1/4". Electrical Contractor shall inspect placement of PV Mounts/Anchors and report any problems prior to beginning installation.

2. Properly sized gaps between modules shall be maintained and consistent throughout the solar array.

3. DC Circuit homeruns should be run prior to installation of PV modules. Proper wire management shall be utilized per specifications, PV Wire is not to come in contact with asphalt shingle roof.

4. Rail length shall be sized for properly sized mid clamps and between 1-1/2" and 2" for end clamps. All rails to be uniform in length and placement.

SOLAR MOUNT/ANCHOR FURNISHED & INSTALLED BY ROOFING CONTRACTOR.

L-FEET, RAIL AND ALL OTHER MOUNTING COMPONENTS FURNISHED AND INSTALLED BY ELECTRICAL CONTRACTOR

SOLAR PV MODULES FURNISHED AND INSTALLED BY ELECTRICAL CONTRACTOR

PASS THROUGH JUNCTION BOX FURNISHED & INSTALLED BY ELECTRICAL CONTRACTOR

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ROOF PLAN

COMM. NO.	REVISION NO.	DWG NO.
1448	1	E-106
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