# PROJECT MANUAL

**Direct Opportunities Center (DOC) AMP-39**

## IFB for Contract No. 600-34-24

GENERAL CONSTRUCTION

**Bids Due**
**December 5, 2024**
**10:00 am**

**Procurement Dept.**
**412 Boulevard of the Allies, 6th Floor**
**Pittsburgh, PA 15219**

**Attn:**
**Procurement Department**

**CONSULTANT:** Gerard Associates Architects LLC

Issued: November 4, 2024

**Caster D. Binion**
Executive Director

Housing Authority of the City of Pittsburgh

Point of Contact:
Brandon.Havranek@hacp.org or
412-643-2890

**For Questions Only:** Brandon.Havranek@hacp.org

HACP Development & Modernization

**PROCUREMENT DEPARTMENT**
412 Boulevards of the Allies, 6th Floor
Pittsburgh, PA 15219
412.456.5020
www.hacp.org

# NOTICE TO PROSPECTIVE BIDDERS

**October 29, 2024**

**INVITATION FOR BIDS (IFB)**

**Direct Opportunities Center Rehabilitation (DOC) AMP-39**

The **HOUSING AUTHORITY OF THE CITY OF PITTSBURGH** will receive separate sealed bids for the following contracts:

**GENERAL CONSTRUCTION**

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

| | | |
|---|---|---|
| **GENERAL CONSTRUCTION** | **$ 245,975.40** | **$ 360,763.92** |

Bid documents will be available on **November 4, 2024**

A Pre-Bid Conference will be held on **November 19, 2024, at 10:00 a.m.** at **1205 Liverpool Street, Pittsburgh, PA 15233.** After the Pre-Bid Conference, a site visit 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 **November 26, 2024, at 12:00 p.m.**

In addition to electronic submission, The Housing Authority of the City of Pittsburgh will only be accepting physical bids dropped off in person from 8:30 AM until the bid opening time of **10:00 a.m.** on **December 5, 2024,** in the lobby of **412 Boulevard of the Allies, Pittsburgh, PA 15219**. Sealed bids may still be mailed via USPS at which time they will be Time and Date Stamped at **412 Boulevard of the Allies, Pittsburgh, PA 15219.** All bids must be received at the above address no later than **10:00 a.m. on December 5, 2024**, regardless of the selected delivery mechanism.

The work must be substantially complete within **165** calendar days of the Notice to Proceed.

Point of contact for the Housing Authority is Brandon Havranek at brandon.havranek@hacp.org.

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 located at **412 Boulevard of the Allies, Pittsburgh, PA 15219**.

HACP Development & Modernization

**PROCUREMENT DEPARTMENT**
412 Boulevards of the Allies, 6th Floor
Pittsburgh, PA 15219
412.456.5020
www.hacp.org

## PRE-BID SITE VISIT

The Pre-Bid Site visit will be held on **11/19/2024** at **10:00am**. Interested bidders may decide to attend.

## PROPOSAL SUBMISSION

The Housing Authority of the City of Pittsburgh will be accepting physical proposals dropped off in person up until **December 5, 2024,** at the closing time of **10:00am**. Bids may also be submitted electronically at the following link (copy+past):

https://www.dropbox.com/request/kPrzfLlJBfCpYrgPfjOe

Bids can still be mailed via USPS at which time they will be Time and Date Stamped at Procurement Department, 412 Boulevard of the Allies, 6th Floor, Pittsburgh, PA 15219. All Bids must be received at the above address no later than December 5, 2024, at 10:00am., regardless of the selected delivery mechanism.

## BID OPENING

**The bid opening will be on December 5, 2024, at 10:00am and will be conducted virtually via Zoom.**

Join Zoom Meeting
https://hacp-org.zoom.us/j/89732932703?pwd=zqayGHUbOzvaaiLe26S7NhV3bc67OT.1

Meeting ID: 897 3293 2703
Passcode: 400600

**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, Resident Employment Manager/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 Renelda Colvin, MBE/WBE Compliance Specialist, by e-mail at Renelda.Colvin@hacp.org or by contacting Renelda at the Procurement Department, Housing Authority of the City of Pittsburgh, 412 Boulevard of the Allies, 6th Floor, Pittsburgh PA 15219, telephone (412) 643-2768. Bids or proposals must demonstrate how the Offerer 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

**Direct Opportunities Center (DOC) AMP-39**

**CONTRACT NO.** 600-34-24

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: _____

**Direct Opportunities Center (DOC) AMP-39**

# IFB CONTRACT NO. 600-34-24

HOUSING AUTHORITY OF THE CITY OF
PITTSBURGH DEVELOPMENT & MODERNIZATION
DEPARTMENT 412 Boulevard of the Allies, 6th Floor
Pittsburgh, PA 15219
Phone: (412) 456-5020
Fax: (412) 456-5591

Issued: November 4, 2024

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

**Direct Opportunities Center (DOC) AMP-39**

HACP Contract No. 600-34-24

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| | | |
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| | | |
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HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

**Direct Opportunities Center (DOC) AMP-39**

# HACP CONTRACT NO. 600-34-24

## INVITATION FOR BIDS
## LIST OF DOCUMENTS

The HOUSING AUTHORITY OF THE CITY OF PITTSBURGH will receive separate sealed bids for Direct Opportunities Center (DOC) AMP-39, for the following contracts:

GENERAL CONSTRUCTION

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

**THE PROJECT MANUAL**, **dated** November 4, 2024 consisting of:

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

**THE PROJECT DRAWINGS**, as prepared by **Gerard Associates Architects LLC**, **dated February 15, 2021.**

**THE BID PACKAGE**, **dated** November 4, 2024 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**

**Dereen M. Neice**
**Senior 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

**Direct Opportunities Center (DOC) AMP-39**

# HACP CONTRACT NO. 600-34-24

## NOTICE OF PRE-BID CONFERENCE

**A Pre-Bid Conference will be held on** November 19, 2024

- A Pre-Bid Conference will be held on November 19, 2024 **at** 10:00 am, at the _____ _____. 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

**Direct Opportunities Center (DOC) AMP-39**

# HACP CONTRACT NO. 600-34-24

## PROJECT SCHEDULE

| **NO LATER THAN** | |
|---|---|
| November 4, 2024 | Invitation for Bids issued |
| November 19, 2024<br>10:00 am | Pre-Bid Conference (Followed by Site Visit) |
| November 29, 2024<br>12:00 pm | Last day to submit written questions |
| December 5, 2024<br>10:00 am | Bids due |
| December 10, 2024<br>(estimated) | Notice of Award |
| January 3, 2025<br>(estimated) | Execution of Contracts |
| January 3, 2025<br>(estimated) | Pre-Construction Conference |
| January 3, 2025<br>(estimated) | Construction Start |
| 165 calendar days<br>from effective date<br>of Notice to Proceed | All work required under this contract shall be complete |

HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

**Direct Opportunities Center (DOC) AMP-39**

# HACP CONTRACT NO. 600-34-24

## *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<br>Document 00311 - Form of Bid for General Construction |
| THE FORM OF AGREEMENT | Document 00500 - Form of Agreement<br>Document 00590 - Contracting Officer Certification |
| CONDITIONS OF THE CONTRACT | Document HUD - 5370 General Conditions<br>HACP Document - Supplemental General Conditions<br>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 LLC construction documents drawings, **dated** February 15, 2021 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

**Direct Opportunities Center (DOC) AMP-39**

HACP Contract No. 600-34-24

# FORM OF BID

# GENERAL CONSTRUCTION

Contract No.: 600-34-24

TO: HOUSING AUTHORITY
CITY OF PITTSBURGH
*(Hereinafter called the "Authority")*
412 Boulevard of the Allies, 6th Floor 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 November 4, 2024 containing Bidding Requirements, Contract Forms, Conditions of the Contract, and Specifications
   - Project Drawings, dated February 15, 2021
   - 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

# 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

Direct Opportunities Center (DOC) AMP-39

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

_____ _____
*(Address)*

_____ 600-34-24
*(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).

## SECTION 3 OF THE HOUSING AND URBAN DEVELOPMENT ACT OF 1968:

The work to be performed under this contract is subject to the requirements of Section 3 of the Housing and Urban Development Act 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.

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

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

The contractor agrees to include this Section 3 clause in every subcontract subject to compliance with regulations in /24 CFR Part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this Section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 2 CFR Part 200 /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 2 CFR Part 200 /24 CFR Part 135.

The contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the contractor is selected but before the contract is executed, and (2) with persons other than those to whom the regulations of 2 CFR Part 200 /24 CFR part 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 2 CFR Part 200 /24 CFR Part 135.

Noncompliance with HUD's regulation in 2 CFR Part 200 /24 CFR Part 135 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD assisted contracts.

With respect to work performed in connection with Section 3 covered Indian housing assistance, Section 7(b) of the Indian Self-Determination, and Education Assistance Act (25 U.S.C. 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). If you have any questions regarding the Section 3 Requirements or would like to discuss goals and planning for Section 3 Requirements please contract **Lloyd Wilson Jr., Resident Employment Program Manager/Section 3 Coordinator**, by email at lloyd.wilson@hacp.org or by contacting him at Housing Authority of the City of Pittsburgh, Bedford Hope Center 2305 Bedford Avenue, Pittsburgh, PA 15219, telephone **(412) 643-2761**. Please complete Attachment 16 and include it in your bid.

## RESIDENT HIRING REQUIREMENTS / RESIDENT HIRING SCALE

# 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 Part 75 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/Section 3 Program for resident referrals at 412-643-2761, Ext 2761.**

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

## [ ] 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 low-or very low-income persons or Over 75 percent of the labor hours performed for the business over the prior three-month period are performed by Section 3 workers. 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 hour's 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, 412 Boulevard of the Allies, 7th 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

| 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) | | | |
| | | | | | | | |
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**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

**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 |
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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**
412 Boulevard of the Allies, 6th Floor
Pittsburgh, PA 15219
(412) 456-5020
www.hacp.org

# NOTICE TO ALL PROSPECTIVE BIDDERS

**REQUEST FOR MANPOWER PLAN**
**Direct Opportunities Center (DOC) AMP-39**

**HACP CONTRACT NO.** 600-34-24

**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:** _____

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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 |
|---|---|---|---|---|
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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:_____

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# NOTICE TO ALL PROSPECTIVE BIDDERS

**Previous Related Experience**
**for**

## Direct Opportunities Center (DOC) AMP-39

**HACP CONTRACT NO.** 600-34-24

**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** | | | |
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**Previous Related Experience**
**for**
## Direct Opportunities Center (DOC) AMP-39

**HACP CONTRACT NO.** 600-34-24

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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 2** | | | |
|---|---|---|---|
| **Project:** | | | |
| **Contact:** | | | |
| **Contact Telephone Number:** | | | |
| **Contract Amount:** | | | |
| **Change Orders** | | | |
| **Number** | **Total $ Value per Change** | **Description of Change** | **Reason for Change** |
| **1** | | | |
| **2** | | | |
| **3** | | | |
| **4** | | | |
| **5** | | | |
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**Previous Related Experience**
**for**

## Direct Opportunities Center (DOC) AMP-39

**HACP CONTRACT NO.** 600-34-24

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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**
**for**
## Direct Opportunities Center (DOC) AMP-39

**HACP CONTRACT NO.** 600-34-24

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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** |
| **1** | | | |
| **2** | | | |
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**Previous Related Experience**
**for**
**Direct Opportunities Center (DOC) AMP-39**

**HACP CONTRACT NO.** 600-34-24

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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 5** | | | |
|---|---|---|---|
| **Project:** | | | |
| **Contact:** | | | |
| **Contact Telephone Number:** | | | |
| **Contract Amount:** | | | |
| **Change Orders** | | | |
| **Number** | **Total $ Value per Change** | **Description of Change** | **Reason for Change** |
| **1** | | | |
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**Previous Related Experience**
**for**
**Direct Opportunities Center (DOC) AMP-39**

**HACP CONTRACT NO.** 600-34-24

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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
# for
# Direct Opportunities Center (DOC) AMP-39

**HACP CONTRACT NO.** 600-34-24

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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)

OMB Approval No. 2502-0118
(Exp. 11/30/2022)

**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(s) 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 complete organization chart for all organizations showing ownership %**

| Name and address ( Last, First, Middle Initial) of controlling participant(s) proposing to participate | **8 Role of Each Principal in Project** | **9. SSN or IRS Employer Number (TIN)** |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

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) certify that the information provided on this form and in any accompanying documentation is true and accurate. I/we acknowledge that making, presenting, or submitting a false, fictitious, or fraudulent statement, representation, or certification may result in criminal, civil, and/or administrative sanctions, including fines, penalties, and imprisonment. The controlling participants(s) further certify to the truth and accuracy of the following:

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 covered projects as per 24 CFR, part 200 §200.214 and multifamily Housing programs of FmHA, State and local Housing Finance Agencies, if applicable. **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 the regulations published at 24 C.F.R. part 200, subpart H, § 200.210-200.222 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. Incomplete form will be returned to the applicant.

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/USDA FmHA with a certified report of all previous participation in relevant HUD/USDA programs by those parties submitting the application. The information requested in this form is used by HUD/USDA to determine if you meet the standards established to ensure that all controlling participants in HUD/USDA projects will honor their legal, financial and contractual obligations and are of acceptable risks from the underwriting standpoint of an insurer, lender or governmental agency. HUD requires that you certify and submit your record of previous participation, in relevant projects, by completing and signing this form, before your 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 part 200 §200.212, and as further clarified by the Processing Guide (HUD notice H 2016-15) referenced in 24 CFR §200.210(b) and 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.

The Department of Housing and Urban Development (HUD) is authorized to collect this information by law 42 U.S.C. 3535(d) 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 three 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**
412 Boulevard of the Allies, 6th Floor
Pittsburgh, PA 15219
(412) 456-5020
www.hacp.org

# SPECIAL PROVISIONS

**NOTICE TO ALL PROSPECTIVE BIDDERS**
**Direct Opportunities Center (DOC) AMP-39**

Documents Required for Payment
HACP Contract No.: 600-34-24

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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)*

Direct Opportunities Center (DOC) AMP-39
*(Project Name)*

600-34-24;
*(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 Architects LLC drawings for Direct Opportunities Center (DOC) AMP-39 _____ dated February 15, 2021 and Project Manual dated November 4, 2024 regarding:

CONTRACT NO. 600-34-24

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 165 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 November 4, 2024.
c. Project Drawings issued by Gerard Associates Architects LLC dated February 15, 2021.

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. 600-34-24 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. 600-34-24 this contract shall be binding on both parties.

| | |
|---|---|
| _____ *(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 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. 600-34-24 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)*

Dereen Neice, Chief Contracting Officer

*Principal*

{

_____
*(Signature and Date)*

Jim Foley, Director of Construction and Modernization

*Approved as to Contents and Costs*

{

_____
*(Signature and Date)*

Assistant General 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 165 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 $_____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 clause.

(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**
412 Boulevard of the Allies, 6th Floor
Pittsburgh, PA 15219
(412) 456-5020
www.hacp.org

## Direct Opportunities Center (DOC) AMP-39

## HACP Contract No. 600-34-24

# 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

==========

_____
Vendor Name(Insert vendor company name above)

Date: _____ Signature: _____

Title: _____

THE HOUSING AUTHORITY OF THE CITY OF PITTSBURGH

**Direct Opportunities Center (DOC) AMP-39**

# HACP Contract No. 600-34-24

# 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: PA20230001 07/28/2023

Superseded General Decision Number: PA20220001

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: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

| | |
|---|---|
| If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022: | . Executive Order 14026 generally applies to the contract.<br>. The contractor must pay all covered workers at least $16.20 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 2023. |
| If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022: | . Executive Order 13658 generally applies to the contract.<br>. The contractor must pay all covered workers at least $12.15 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2023. |

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at http://www.dol.gov/whd/govcontracts.

| Modification Number | Publication Date |
|---|---|
| 0 | 01/06/2023 |
| 1 | 01/13/2023 |
| 2 | 04/28/2023 |
| 3 | 06/02/2023 |
| 4 | 06/16/2023 |
| 5 | 06/23/2023 |
| 6 | 07/21/2023 |
| 7 | 07/28/2023 |

ASBE0002-001 08/01/2022

| | Rates | Fringes |
|---|---|---|
| Asbestos Workers/Insulator<br>Includes the application of all insulating materials, protective coverings, coatings and finishings to all types of mechanical systems | $ 44.50 | 28.43 |

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BOIL0154-001 01/01/2021

| | Rates | Fringes |
|---|---|---|
| BOILERMAKER | $ 43.90 | 29.55 |

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BRPA0009-029 12/01/2022

| | Rates | Fringes |
|---|---|---|
| BRICKLAYER | $ 36.99 | 24.67 |

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BRPA0009-060 12/01/2022

| | Rates | Fringes |
|---|---|---|
| MASON - STONE | $ 38.56 | 23.36 |

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BRPA0009-061 12/01/2022

| | Rates | Fringes |
|---|---|---|
| TILE SETTER | $ 35.64 | 21.63 |

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* CARP0142-001 06/01/2023

| | Rates | Fringes |
|---|---|---|
| Carpenter/Lather | $ 38.92 | 20.06 |

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CARP0274-003 01/01/2023

| | Rates | Fringes |
|---|---|---|
| PILEDRIVERMAN | $ 39.13 | 21.17 |

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* CARP1759-001 06/01/2023

| | Rates | Fringes |
|---|---|---|
| FLOOR LAYER: Carpet | $ 35.94 | 19.02 |

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ELEC0005-007 12/23/2022

| | Rates | Fringes |
|---|---|---|
| ELECTRICIAN | $ 46.86 | 29.66 |

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ELEC0126-006 05/31/2021

| | Rates | Fringes |
|---|---|---|
| LINE CONSTRUCTION | | |
| Cable Splicer | $ 50.33 | 32.25%+11.00 |
| Groundmen | $ 30.20 | 32.25%+11.00 |
| Lineman | $ 50.33 | 32.25%+11.00 |
| Truck Driver | $ 32.71 | 32.25%+11.00 |
| Winch Truck Operator | $ 35.23 | 32.25%+11.00 |

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ELEV0006-001 01/01/2023

| | Rates | Fringes |
|---|---|---|
| ELEVATOR MECHANIC | $ 56.14 | 37.335+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 06/01/2021

| | Rates | Fringes |
|---|---|---|
| Power equipment operators: | | |
| CLASS 1 | $ 37.09 | 23.35 |
| CLASS 2 | $ 31.02 | 23.35 |

CLASS 3.....$ 28.23 23.35

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 06/01/2023

| | Rates | Fringes |
|---|---|---|
| IRONWORKER | $ 38.89 | 34.54 |

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LABO0613-002 01/01/2019

| | Rates | Fringes |
|---|---|---|
| Laborers: | | |
| GROUP 1 | $ 22.37 | 17.60 |
| GROUP 2 | $ 22.52 | 17.60 |
| GROUP 3 | $ 22.65 | 17.60 |
| GROUP 4 | $ 23.12 | 17.60 |

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

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LABO0952-004 01/01/2022

| | Rates | Fringes |
|---|---|---|
| Landscaping | | |
| GROUP 1 | $ 22.12 | 18.28 |
| GROUP 2 | $ 22.54 | 18.28 |
| GROUP 3 | $ 22.84 | 18.28 |

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 06/01/2021

| | Rates | Fringes |
|---|---|---|
| PAINTER | | |
| Brush & Roller | $ 29.15 | 21.61 |

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PAIN0057-005 06/01/2022

| | Rates | Fringes |
|---|---|---|

DRYWALL FINISHER/TAPER.....$ 31.02 22.44

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PAIN0751-001 09/01/2022

| | Rates | Fringes |
|---|---|---|
| GLAZIER | $ 34.05 | 28.33 |

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PLAS0526-007 06/01/2021

| | Rates | Fringes |
|---|---|---|
| CEMENT MASON/CONCRETE FINISHER | $ 31.77 | 21.89 |

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PLUM0027-002 06/01/2021

| | Rates | Fringes |
|---|---|---|
| PLUMBER | $ 44.45 | 24.57 |

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* PLUM0449-001 06/01/2023

| | Rates | Fringes |
|---|---|---|
| PIPEFITTER | $ 46.10 | 27.97 |

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ROOF0037-001 06/01/2023

| | Rates | Fringes |
|---|---|---|
| ROOFER | $ 37.00 | 19.92 |

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SFPA0542-001 07/01/2022

| | Rates | Fringes |
|---|---|---|
| SPRINKLER FITTER | $ 40.50 | 24.64 |

---

SHEE0012-002 07/01/2022

| | Rates | Fringes |
|---|---|---|
| SHEET METAL WORKER | $ 39.50 | 30.79 |

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TEAM0040-007 05/01/2023

| | Rates | Fringes |
|---|---|---|
| Truck drivers: | | |
| GROUP 1 | $ 33.18 | 22.21 |
| GROUP 2 | $ 33.64 | 22.52 |

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. Tandem - Tri-Axle - Semi-Tractor Trailer (combination) (3 axles or more including steering axle)

GROUP 2 - 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 https://www.dol.gov/agencies/whd/government-contracts.

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)).

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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.

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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 National Office because National Office has 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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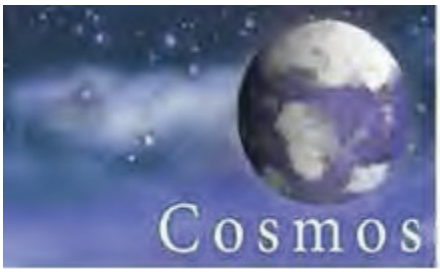
END OF GENERAL DECISIO"

# PART 4: TECHNICAL SPECIFICATIONS

**Direct Opportunities Center (DOC) AMP-39**

# IFB CONTRACT NO. 600-34-24



700 River Avenue, Suite 412
Pittsburgh, PA 15212-5936
Phone: (412) 321-3951
Fax: (412) 321-3954
E-mail: info@cosmostechnologiesinc.com
Website: www.cosmostechnologiesinc.com

Cosmos Technologies Inc.

# Asbestos/Lead Survey Report for
# 1205 Liverpool Street, Pittsburgh, PA 15223

Prepared for

Gerard Associates Architects LLC

January 21, 2020

## Summary

Cosmos Technologies, Inc. conducted a renovation asbestos and lead based paint survey of 1205 Liverpool Street, Pittsburgh, PA 15223 on January 07, 2021. This site is a three-storied building with a basement.

The areas inspected for asbestos included the roof, floor tiles, mastics, ceiling tiles, wall plaster, and insulations in the building. Cosmos representative, Ms. Rucha Ragalwar conducted the asbestos survey of the site on January 07, 2021. Ms. Ragalwar is a Pennsylvania Department of Labor and Industry (PADOLI) certified Asbestos Management Planner (Certification No. PTA 20- 14-55292).

The areas inspected for lead based paint included walls, stairways, and doors. Water samples and roofing materials were not sampled. Paint chip samples were collected and analyzed for lead. Cosmos representative Mr. Bill Stewart conducted the lead-based paint surveys of the sites on January 07, 2021. Mr. Stewart is a Pennsylvania Department of Labor and Industry (PADOLI) certified Lead Risk Assessor (Certification No. 002452).

Forty-nine (49) suspect asbestos-containing material samples were collected from seventeen (17) homogenous areas and submitted for analysis by polarized light microscopy (PLM). A homogeneous area is described as one or more areas of material that are similar in appearance and texture and that have the same apparent installation date, appearance, and function. None of the samples collected were found positive for asbestos.

Lead-based Paint, as defined by the EPA is paint with a lead concentration of greater than or equal to 0.5% lead by weight. Of the six (6) samples collected at 1205 Liverpool Street property, none were found to contain significant levels of lead.

The analytical test results are shown in Table 1 and 2 below. Copies of the laboratory analytical reports and corresponding chain-of-custody forms are attached as Attachment A and B. A photo log for the asbestos and lead analyses is also provided as Attachment C.

Bulk samples were analyzed for asbestos by Batta Laboratories, LLC. located at Delaware Industrial Park, 6 Garfield Way, Newark, DE 19713 using polarized-light microscopy (PLM) and dispersion staining (Method Reference: 40 CFR Part 763, Volume 47, No. 103, May 27, 1982 pg. 23376). Lead samples were analyzed by Batta Laboratories, LLC. using the test method: EPA 3050B/7000B. This laboratory participates in the National Voluntary Laboratory Accreditation Program (NVLAP #101032), a quality assurance program for PLM analysis, and is accredited by the National Institute of Standards and Technology (NIST) as well as accreditation requirements under 15 CFR Part 25.

**Table 1. ACM Sampling Results Table**

| 1205 Liverpool Street<br>Pittsburgh, PA 15223<br>Sampled January 7, 2021 | | | | | |
|---|---|---|---|---|---|
| **HA** | **Sample** | **Description** | **Location** | **Type** | **ACM** |
| | RRL-001 | Tar Paper | Roof | Misc. | ND |
| | RRL-001 (Layer 1) | Insulation | Roof | Misc. | ND |
| | RRL-002 | Rubber | Roof | Misc. | ND |
| | RRL-002 (layer 1) | Insulation | Roof | Misc. | ND |
| | RRU-001 | Black Rubber | Roof | Misc. | ND |
| | RRU-001 (layer 1) | Gold Adhesive | Roof | Misc. | ND |
| | CT3-001 | White Ceiling Tile | 3rd Floor | Misc. | ND |
| | CT3-002 | White Ceiling Tile | 3rd Floor | Misc. | ND |
| | WP3-001 | White Plaster | 3rd Floor | Misc. | ND |
| | WP3-001 (layer 1) | White Caulking | 3rd Floor | Misc. | ND |
| | WP3-002 | Grey Plaster | 3rd Floor | Misc. | ND |
| | WP3-002 (layer 1) | White Caulking | 3rd Floor | Misc. | ND |
| | CB3-001 | Grey Covebase | 3rd Floor | Misc. | ND |
| | CB3-001(layer 1) | Gold Adhesive | 3rd Floor | Misc. | ND |
| | CB3-002 | Grey Covebase | 3rd Floor | Misc. | ND |
| | CB3-002 (layer 1) | Gold Adhesive | 3rd Floor | Misc. | ND |
| | CB3-002 (layer 2) | White Joint Compound | 3rd Floor | Misc. | ND |

| | | | | | |
|---|---|---|---|---|---|
| | CT2-001 | Ceiling Tile | 2nd Floor | Misc. | ND |
| | WP2-001 | Drywall | 2nd Floor | Misc. | ND |
| | WP2-001 (layer 1) | White Joint Compound | 2nd Floor | Misc. | ND |
| | WP2-002 | Drywall | 2nd Floor | Misc. | ND |
| | WP2-002 (layer 1) | White Joint Compound | 2nd Floor | Misc. | ND |
| | WP2-003 | White Plaster | 2nd Floor | Misc. | ND |
| | CB2-001 | Grey Covebase | 2nd Floor | Misc. | ND |
| | CB2-002 | Grey Covebase | 2nd Floor | Misc. | ND |
| | CB2-002 (layer 1) | Gold Adhesive | 2nd Floor | Misc. | ND |
| | CB2-002 (layer 2) | White Joint Compound | 2nd Floor | Misc. | ND |
| | CT1-001 | Drywall | 1st Floor | Misc. | ND |
| | WP1-001 | White Plaster | 1st Floor | Misc. | ND |
| | WP1-002 | White Plaster | 1st Floor | Misc. | ND |
| | WP1-003 | White Plaster | 1st Floor | Misc. | ND |
| | CB1-001 | Grey Covebase | 1st Floor | Misc. | ND |
| | CB1-001 (layer 1) | Gold Adhesive | 1st Floor | Misc. | ND |
| | CB1-002 | Grey Covebase | 1st Floor | Misc. | ND |
| | CB1-002 (layer 1) | Gold Adhesive | 1st Floor | Misc. | ND |
| | CB1-002 (layer 2) | White Joint Compound | 1st Floor | Misc. | ND |
| | CB1-003 | Grey Covebase | 1st Floor | Misc. | ND |
| | CTB-001 | White Sheetrock | Basement | Misc. | ND |

| | | | | | |
|---|---|---|---|---|---|
| | CTB-002 | White Sheetrock | Basement | Misc. | ND |
| | CPB-001 | White Plaster | Basement | Misc. | ND |
| | CPB-002 | White Plaster | Basement | Misc. | ND |
| | CBB-001 | Grey Covebase | Basement | Misc. | ND |
| | CBB-002 | Grey Covebase | Basement | Misc. | ND |
| | PIB-001 | Pink Pipe Insulation | Basement | Misc. | ND |
| | WPB-001 | Drywall | Basement | Misc. | ND |
| | WPB-001 (layer 1) | Joint Compound | Basement | Misc. | ND |
| | WPB-002 | Drywall | Basement | Misc. | ND |
| | WPB-002 (layer 1) | Joint Compound | Basement | Misc. | ND |
| | EGC-001 | Grey Caulking | Exterior | Misc. | ND |

**Table 2. Lead Sampling Results Table**

| Sample # (Sampled Jan 07, 2021) | Location - 1205 Liverpool Street, Pittsburgh, PA 15223 | Pass/Fail |
|---|---|---|
| 001 | A White Wall 3rd Floor | Pass |
| 002 | B White Wall 3rd Floor | Pass |
| 003 | A White Wall 2nd Floor | Pass |
| 004 | A White Wall 1st Floor | Pass |
| 005 | D White Painted Block on 1st, 2nd, and 3rd floor | Pass |
| 006 | B White Wall Basement | Pass |

# ATTACHMENT A

# ASBESTOS ANALYSES AND CHAIN OF CUSTODY

Dedicated to a Cleaner Environment Since 1982

NY ELAP LAB# 11993 for PCM, PLM, TEM & Lead

batta LABORATORIES

BATTA LABORATORIES, LLC

A Certified MBE Company

Delaware Industrial Park, 6 Garfield Way
Newark, DE19713-5817
Tel. (302)737-3376 Fax (302) 737-5764

Web: http://www.battaenv.com E-mail: battaenv@battaenv.com

EPA Lab ID #DE004

NVLAP Lab Code: 101032-0

**Dept. Code: PLM**

Rev. #: 0
Batch#: N/A
COC#: N/A

# CERTIFICATE OF PLM ANALYSIS



Test Method: EPA/600/R-93/116 in conjunction with Batta SOP

Report Date: 01/14/21

**Sampling Data**

Date Sampled: 01/07/21
BLI Project #: R108717
Sampled By: CLIENT
Project Name: COSMOS TECHNOLOGIES - 1205 PITTBURGH, PA
Date Analyzed: 01/12/21

| Sample ID | | Client-supplied Data | | | Analytical Data | | Reported Results | |
|---|---|---|---|---|---|---|---|---|
| Lab Sample# | Client Sample# | Sample Description | Material Type | Friable? | Texture/ Gross | Color | Non-asbestiform Components | Asbestiform Components |
| 1177036 | RRL-001 | Roof | Tar Paper | n/a | Soft<br>Homogeneous | Black | 75% Cellulose<br>25% Non-fibrous Material | No Asbestos Found |
| 1177500 | RRL-001 (Layer 1) | Roof | Insulation | n/a | Fibrous<br>Homogeneous | Tan | 99% Cellulose<br>1% Non-fibrous Material | No Asbestos Found |
| 1177037 | RRL-002 | Roof | Rubber | n/a | Soft<br>Homogeneous | Black | 100% Non-fibrous Material | No Asbestos Found |
| 1177501 | RRL-002 (Layer 1) | Roof | Insulation | n/a | Fibrous<br>Homogeneous | Tan | 99% Cellulose<br>1% Non-fibrous Material | No Asbestos Found |
| 1177038 | RRU-001 | Roof | Rubber | n/a | Soft<br>Homogeneous | Black | 100% Non-fibrous Material | No Asbestos Found |

**Note 1** *Due to limitations of the EPA PLM method, floor tiles may yield false negative (<1%) results by this method. As such, the EPA recommends further analysis by electron microscopy. Batta recommends the NY 198.4 over the Chatfield method.*

**Note 2** Unless otherwise specified, Tr=Trace and correlates to <0.25% (based on a 400-point EPA point count).

**Note 3** Materials containing vermiculite are not good candidates for analysis using standard EPA 600 PLM protocol. Results may be low-biased due to inherent limitations caused by the material. The EPA recommends that vermiculite attic insulation (VAI) be prepped and analyzed using EPA 600/R-04/004, known as "The Cincinnati Method".

ANALYST: MEC

REVIEWED BY: RLP

QA/QC Officer/Signatory

***Document Security Note:*** *Due to the unsecure nature of electronic files, it is the responsibility of the client (herein defined as the recipients of this or these electronic files) to verify the authenticity and accuracy of data included in the attached electronic file(s). Batta Laboratories, LLC is not liable for any discrepancies, alternations, reproduction (including copying and pasting), redistribution or any other actions that may alter or change the accuracy or the nature of the originally transmitted files. It is recommended that the recipient of these documents verify the data in electronic format with the corresponding hard copy data report.*

*This report does not constitute endorsement by NVLAP and/or any other US government agencies.

*The test data pertain only to the items tested. No assumptions or conclusions should be made to materials or samples not analyzed. Furthermore, Batta Laboratories, LLC assumes no responsibility for the accuracy of results influenced by the use of improper collection techniques or equipment.

*Organically-bound, nonfriable material may interfere with the accurate and reproducible quantification of asbestos. In these cases, the EPA recommends further analysis by a matrix-reduction method. Batta recommends the NY ELAP Item 198.6/198.4 over the Chatfield method. When point count techniques are utilized on organically-bound, nonfriable materials without the EPA-recommended matrix reduction steps, Batta Laboratories assumes no responsibility regarding the accuracy or precision associated with these results. In these cases, Batta employs a modified version of the EPA point count method.

*WRTA refers to a group of fibrous Amphiboles typically associated with 'Libby Amphibole'. Within this classification are: winchite, richterite, tremolite, and actinolite.

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NY ELAP LAB# 11993 for PCM, PLM, TEM & Lead

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Tel. (302)737-3376 Fax (302) 737-5764

Web: http://www.battaenv.com E-mail: battaenv@battaenv.com

EPA Lab ID #DE004

NVLAP Lab Code: 101032-0

**Dept. Code: PLM**

Rev. #: 0
Batch#: N/A
COC#: N/A

# CERTIFICATE OF PLM ANALYSIS



Test Method: EPA/600/R-93/116 in conjunction with Batta SOP

Report Date: 01/14/21

**Sampling Data**

BLI Project #: R108717
Project Name: COSMOS TECHNOLOGIES - 1205 PITTBURGH, PA

Date Sampled: 01/07/21
Sampled By: CLIENT
Date Analyzed: 01/12/21

| Sample ID | | Client-supplied Data | | | Analytical Data | | Reported Results | |
|---|---|---|---|---|---|---|---|---|
| Lab Sample# | Client Sample# | Sample Description | Material Type | Friable? | Texture/ Gross | Color | Non-asbestiform Components | Asbestiform Components |
| 1177502 | RRU-001 (Layer 1) | Roof | Adhesive | n/a | Soft<br>Homogeneous | Gold | 100% Non-fibrous Material | No Asbestos Found |
| 1177039 | CT3-001 | 3rd Floor | Ceiling Tile | n/a | Fibrous<br>Homogeneous | Grey White Tan | 40% Cellulose 40% Mineral Wool 20% Non-fibrous Material | No Asbestos Found |
| 1177040 | CT3-002 | 3rd Floor | Ceiling Tile | n/a | Fibrous<br>Homogeneous | Grey White Tan | 40% Cellulose 40% Mineral Wool 20% Non-fibrous Material | No Asbestos Found |
| 1177041 | WP3-001 | 3rd Floor | Plaster | n/a | Granular<br>Homogeneous | White | 100% Non-fibrous Material | No Asbestos Found |
| 1177503 | WP3-001 (Layer 1) | 3rd Floor | Caulk-like | n/a | Firm<br>Homogeneous | White | 100% Non-fibrous Material | No Asbestos Found |

**Note 1** *Due to limitations of the EPA PLM method, floor tiles may yield false negative (<1%) results by this method. As such, the EPA recommends further analysis by electron microscopy. Batta recommends the NY 198.4 over the Chatfield method.*

**Note 2** Unless otherwise specified, Tr=Trace and correlates to <0.25% (based on a 400-point EPA point count).

**Note 3** Materials containing vermiculite are not good candidates for analysis using standard EPA 600 PLM protocol. Results may be low-biased due to inherent limitations caused by the material. The EPA recommends that vermiculite attic insulation (VAI) be prepped and analyzed using EPA 600/R-04/004, known as "The Cincinnati Method".

ANALYST: MEC

REVIEWED BY: RM

QA/QC Officer/Signatory

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*Organically-bound, nonfriable material may interfere with the accurate and reproducible quantification of asbestos. In these cases, the EPA recommends further analysis by a matrix-reduction method. Batta recommends the NY ELAP Item 198.6/198.4 over the Chatfield method. When point count techniques are utilized on organically-bound, nonfriable materials without the EPA-recommended matrix reduction steps, Batta Laboratories assumes no responsibility regarding the accuracy or precision associated with these results. In these cases, Batta employs a modified version of the EPA point count method.

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Web: http://www.battaenv.com E-mail: battaenv@battaenv.com

EPA Lab ID #DE004

NVLAP Lab Code: 101032-0

**Dept. Code: PLM**

Rev. #: 0
Batch#: N/A
COC#: N/A

# CERTIFICATE OF PLM ANALYSIS



Test Method: EPA/600/R-93/116 in conjunction with Batta SOP

Report Date: 01/14/21

**Sampling Data**

Date Sampled: 01/07/21
BLI Project #: R108717
Sampled By: CLIENT
Project Name: COSMOS TECHNOLOGIES - 1205 PITTBURGH, PA
Date Analyzed: 01/12/21

| Sample ID | | Client-supplied Data | | | Analytical Data | | Reported Results | |
|---|---|---|---|---|---|---|---|---|
| Lab Sample# | Client Sample# | Sample Description | Material Type | Friable? | Texture/ Gross | Color | Non-asbestiform Components | Asbestiform Components |
| 1177042 | WP3-002 | 3rd Floor | Plaster | n/a | Granular<br>Homogeneous | Grey | 100% Non-fibrous Material | No Asbestos Found |
| 1177504 | WP3-002 (Layer 1) | 3rd Floor | Caulk-like | n/a | Firm<br>Homogeneous | White | 100% Non-fibrous Material | No Asbestos Found |
| 1177043 | CB3-001 | 3rd Floor | Covebase | n/a | Soft<br>Homogeneous | Grey | 100% Non-fibrous Material | No Asbestos Found |
| 1177505 | CB3-001 (Layer 1) | 3rd Floor | Adhesive | n/a | Soft<br>Homogeneous | Gold | 100% Non-fibrous Material | No Asbestos Found |
| 1177044 | CB3-002 | 3rd Floor | Covebase | n/a | Soft<br>Homogeneous | Grey | 100% Non-fibrous Material | No Asbestos Found |

**Note 1** *Due to limitations of the EPA PLM method, floor tiles may yield false negative (<1%) results by this method. As such, the EPA recommends further analysis by electron microscopy. Batta recommends the NY 198.4 over the Chatfield method.*

**Note 2** Unless otherwise specified, Tr=Trace and correlates to <0.25% (based on a 400-point EPA point count).

**Note 3** Materials containing vermiculite are not good candidates for analysis using standard EPA 600 PLM protocol. Results may be low-biased due to inherent limitations caused by the material. The EPA recommends that vermiculite attic insulation (VAI) be prepped and analyzed using EPA 600/R-04/004, known as "The Cincinnati Method".

ANALYST: MEC

REVIEWED BY: RM

QA/QC Officer/Signatory

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*Organically-bound, nonfriable material may interfere with the accurate and reproducible quantification of asbestos. In these cases, the EPA recommends further analysis by a matrix-reduction method. Batta recommends the NY ELAP Item 198.6/198.4 over the Chatfield method. When point count techniques are utilized on organically-bound, nonfriable materials without the EPA-recommended matrix reduction steps, Batta Laboratories assumes no responsibility regarding the accuracy or precision associated with these results. In these cases, Batta employs a modified version of the EPA point count method.

*WRTA refers to a group of fibrous Amphiboles typically associated with 'Libby Amphibole'. Within this classification are: winchite, richterite, tremolite, and actinolite.

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Web: http://www.battaenv.com E-mail: battaenv@battaenv.com

EPA Lab ID #DE004

NVLAP Lab Code: 101032-0

**Dept. Code: PLM**

Rev. #: 0
Batch#: N/A
COC#: N/A

# CERTIFICATE OF PLM ANALYSIS



Test Method: EPA/600/R-93/116 in conjunction with Batta SOP

Report Date: 01/15/21

**Sampling Data**

BLI Project #: R108717
Project Name: COSMOS TECHNOLOGIES - 1205 PITTBURGH, PA

Date Sampled: 01/07/21
Sampled By: CLIENT
Date Analyzed: 01/12/21

| Sample ID | | Client-supplied Data | | | Analytical Data | | Reported Results | |
|---|---|---|---|---|---|---|---|---|
| Lab Sample# | Client Sample# | Sample Description | Material Type | Friable? | Texture/ Gross | Color | Non-asbestiform Components | Asbestiform Components |
| 1177506 | CB3-002 (Layer 1) | 3rd Floor | Adhesive | n/a | Soft<br>Homogeneous | Gold | 100% Non-fibrous Material | No Asbestos Found |
| 1177507 | CB3-002 (Layer 2) | 3rd Floor | Joint Compound | n/a | Granular<br>Homogeneous | White | 100% Non-fibrous Material | No Asbestos Found |
| 1177045 | CT2-001 | 2nd Floor | Ceiling Tile | n/a | Fibrous<br>Homogeneous | Grey White Tan | 40% Cellulose 40% Mineral Wool 20% Non-fibrous Material | No Asbestos Found |
| 1177046 | WP2-001 | 2nd Floor | Drywall | n/a | Granular Fibrous<br>Heterogeneous | White Tan | 15% Cellulose <1% Fiber Glass 85% Non-fibrous Material | No Asbestos Found |
| 1177508 | WP2-001 (Layer 1) | 2nd Floor | Joint Compound | n/a | Granular<br>Homogeneous | White | 100% Non-fibrous Material | No Asbestos Found |

**Note 1** *Due to limitations of the EPA PLM method, floor tiles may yield false negative (<1%) results by this method. As such, the EPA recommends further analysis by electron microscopy. Batta recommends the NY 198.4 over the Chatfield method.*

**Note 2** Unless otherwise specified, Tr=Trace and correlates to <0.25% (based on a 400-point EPA point count).

**Note 3** Materials containing vermiculite are not good candidates for analysis using standard EPA 600 PLM protocol. Results may be low-biased due to inherent limitations caused by the material. The EPA recommends that vermiculite attic insulation (VAI) be prepped and analyzed using EPA 600/R-04/004, known as "The Cincinnati Method".

ANALYST: MEC

REVIEWED BY: RM

QA/QC Officer/Signatory

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NY ELAP LAB# 11993 for PCM, PLM, TEM & Lead

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Delaware Industrial Park, 6 Garfield Way
Newark, DE19713-5817
Tel. (302)737-3376 Fax (302) 737-5764

Web: http://www.battaenv.com E-mail: battaenv@battaenv.com

EPA Lab ID #DE004

NVLAP Lab Code: 101032-0

**Dept. Code: PLM**

Rev. #: 0
Batch#: N/A
COC#: N/A

# CERTIFICATE OF PLM ANALYSIS



Test Method: EPA/600/R-93/116 in conjunction with Batta SOP

Report Date: 01/14/21

**Sampling Data**

Date Sampled: 01/07/21
BLI Project #: R108717
Sampled By: CLIENT
Project Name: COSMOS TECHNOLOGIES - 1205 PITTBURGH, PA
Date Analyzed: 01/12/21

| Sample ID | | Client-supplied Data | | | Analytical Data | | Reported Results | |
|---|---|---|---|---|---|---|---|---|
| Lab Sample# | Client Sample# | Sample Description | Material Type | Friable? | Texture/ Gross | Color | Non-asbestiform Components | Asbestiform Components |
| 1177047 | WP2-002 | 2nd Floor | Drywall | n/a | Granular Fibrous Heterogeneous | White Tan | 60% Cellulose <1% Fiber Glass 40% Non-fibrous Material | No Asbestos Found |
| 1177509 | WP2-002 (Layer 1) | 2nd Floor | Joint Compound | n/a | Granular Homogeneous | White | 100% Non-fibrous Material | No Asbestos Found |
| 1177048 | WP2-003 | 2nd Floor | Plaster | n/a | Granular Homogeneous | White | 100% Non-fibrous Material | No Asbestos Found |
| 1177049 | CB2-001 | 2nd Floor | Covebase | n/a | Soft Homogeneous | Grey | 100% Non-fibrous Material | No Asbestos Found |
| 1177050 | CB2-002 | 2nd Floor | Covebase | n/a | Soft Homogeneous | Grey | 100% Non-fibrous Material | No Asbestos Found |

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BLI Project #: R108717
Sampled By: CLIENT
Project Name: COSMOS TECHNOLOGIES - 1205 PITTBURGH, PA
Date Analyzed: 01/12/21

| Sample ID | | Client-supplied Data | | | Analytical Data | | Reported Results | |
|---|---|---|---|---|---|---|---|---|
| Lab Sample# | Client Sample# | Sample Description | Material Type | Friable? | Texture/ Gross | Color | Non-asbestiform Components | Asbestiform Components |
| 1177510 | CB2-002 (Layer 1) | 2nd Floor | Adhesive | n/a | Soft<br>Homogeneous | Gold | 100% Non-fibrous Material | No Asbestos Found |
| 1177511 | CB2-002 (Layer 2) | 2nd Floor | Joint Compound | n/a | Granular<br>Homogeneous | White | 100% Non-fibrous Material | No Asbestos Found |
| 1177051 | CT1-001 | 1st Floor | Ceiling Tile | n/a | Fibrous<br>Homogeneous | Grey white | 40% Cellulose 40% Mineral Wool 20% Non-fibrous Material | No Asbestos Found |
| 1177052 | WP1-001 | 1st Floor | Plaster | n/a | Granular<br>Homogeneous | White | 100% Non-fibrous Material | No Asbestos Found |
| 1177053 | WP1-002 | 1st Floor | Plaster | n/a | Granular Firm<br>Homogeneous | White | 100% Non-fibrous Material | No Asbestos Found |

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BLI Project #: R108717
Project Name: COSMOS TECHNOLOGIES - 1205 PITTBURGH, PA

Date Sampled: 01/07/21
Sampled By: CLIENT
Date Analyzed: 01/12/21

| Sample ID | | Client-supplied Data | | | Analytical Data | | Reported Results | |
|---|---|---|---|---|---|---|---|---|
| Lab Sample# | Client Sample# | Sample Description | Material Type | Friable? | Texture/ Gross | Color | Non-asbestiform Components | Asbestiform Components |
| 1177054 | WP1-003 | 1st Floor | Plaster | n/a | Granular Fibrous Homogeneous | White Tan | 5% Cellulose 95% Non-fibrous Material | No Asbestos Found |
| 1177055 | CB1-001 | 1st Floor | Covebase | n/a | Soft Homogeneous | Grey | 100% Non-fibrous Material | No Asbestos Found |
| 1177512 | CB1-001 (Layer 1) | 1st Floor | Adhesive | n/a | Soft Homogeneous | Gold | 100% Non-fibrous Material | No Asbestos Found |
| 1177056 | CB1-002 | 1st Floor | Covebase | n/a | Soft Homogeneous | Grey | 100% Non-fibrous Material | No Asbestos Found |
| 1177513 | CB1-002 (Layer 1) | 1st Floor | Adhesive | n/a | Soft Homogeneous | Gold | 100% Non-fibrous Material | No Asbestos Found |

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| Sample ID | | Client-supplied Data | | | Analytical Data | | Reported Results | |
|---|---|---|---|---|---|---|---|---|
| Lab Sample# | Client Sample# | Sample Description | Material Type | Friable? | Texture/ Gross | Color | Non-asbestiform Components | Asbestiform Components |
| 1177514 | CB1-002 (Layer 2) | 1st Floor | Joint Compound | n/a | Granular<br>Homogeneous | White | 100% Non-fibrous Material | No Asbestos Found |
| 1177057 | CB1-003 | 1st Floor | Covebase | n/a | Soft<br>Homogeneous | Grey | 100% Non-fibrous Material | No Asbestos Found |
| 1177058 | CTB-001 | Basement | Sheetrock | n/a | Granular Fibrous<br>Heterogeneous | White Tan | 1% Cellulose <1%<br>Fiber Glass 99%<br>Non-fibrous Material | No Asbestos Found |
| 1177059 | CTB-002 | Basement | Sheetrock | n/a | Granular Fibrous<br>Heterogeneous | White Tan | 1% Cellulose <1%<br>Fiber Glass 99%<br>Non-fibrous Material | No Asbestos Found |
| 1177060 | CPB-001 | Basement | Plaster | n/a | Granular<br>Homogeneous | White | 100% Non-fibrous Material | No Asbestos Found |

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| Sample ID | | Client-supplied Data | | | Analytical Data | | Reported Results | |
|---|---|---|---|---|---|---|---|---|
| Lab Sample# | Client Sample# | Sample Description | Material Type | Friable? | Texture/ Gross | Color | Non-asbestiform Components | Asbestiform Components |
| 1177061 | CPB-002 | Basement | Plaster | n/a | Granular<br>Homogeneous | White | 100% Non-fibrous Material | No Asbestos Found |
| 1177062 | CBB-001 | Basement | Covebase | n/a | Soft<br>Homogeneous | Grey | 100% Non-fibrous Material | No Asbestos Found |
| 1177063 | CBB-002 | Basement | Covebase | n/a | Soft<br>Homogeneous | Grey | 100% Non-fibrous Material | No Asbestos Found |
| 1177064 | PIB-001 | Basement | Pipe Insulation | n/a | Fibrous<br>Homogeneous | Pink | 98% Mineral Wool<br>2% Non-fibrous Material | No Asbestos Found |
| 1177065 | WPB-001 | Basement | Drywall | n/a | Granular Fibrous<br>Heterogeneous | White<br>Tan | 5% Cellulose <1%<br>Fiber Glass 95%<br>Non-fibrous Material | No Asbestos Found |

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|---|---|---|---|---|---|---|---|---|
| Lab Sample# | Client Sample# | Sample Description | Material Type | Friable? | Texture/ Gross | Color | Non-asbestiform Components | Asbestiform Components |
| 1177515 | WPB-001 (Layer 1) | Basement | Joint Compound | n/a | Granular<br>Homogeneous | White | 100% Non-fibrous Material | No Asbestos Found |
| 1177066 | WPB-002 | Basement | Drywall | n/a | Granular Fibrous<br>Heterogeneous | White<br>Tan | 5% Cellulose <1%<br>Fiber Glass 95%<br>Non-fibrous Material | No Asbestos Found |
| 1177516 | WPB-002 (Layer 1) | Basement | Joint Compound | n/a | Granular<br>Homogeneous | White | 100% Non-fibrous Material | No Asbestos Found |
| 1177067 | EGC-001 | Exterior | Caulk | n/a | Soft Cementitious<br>Heterogeneous | Grey Black | 100% Non-fibrous Material | No Asbestos Found |

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Corporate Headquarters
6 Garfield Way
Newark, DE. 19713

Ph: (855) 86-BATTA
Fx: (302) 737-5764
Ema BattaLaboratories@battaenv.com
Wel https://battaenv.com

NVLAP® Lab Code: 101032-0

AIHA LAP, LL: 100448
NY ELAP: 11993
EPA Lab: DE004
MD Lab ID: 263



# CHAIN OF CUSTODY

BL Project # : R108717

## Customer Billing Information:

Name: COSMOS TECHNOLOGIES, INC.
Billing Address 1: 700 RIVER AVENUE
Billing Address 2: SUITE 100
Phone: 412-321-3951
Email: hdoughas@cosmostechnologiesinc.com
Results To: rragalwar@cosmostechnologiesinc.com

## Shipping Information

- ☐ Picked up by BATTA
- ☐ Delivered by customer
- ☐ Shipped by customer

## Turnaround Times (check one, refer to notes*)

- ☐ 3 Hours / Rush (*Note 1)
- ☐ 6-12 Hours (*Note 2)
- ☐ 24 Hours (*Note 3)
- ☐ 48 Hours (*Note 4)
- ☐ 72 Hours (*Note 5)
- ☒ 5-10 Days (*Note 6)
- ☐ 5 Days (For Wholesale Clients Only)

## Method of Payment

- ☐ Cash
- ☐ Visa/MasterCard/Discover
- ☐ Money Order
- ☐ Purchase Order #
- ☐ Check #
- ☐ Other
- ☐ Unit Price/Quote
- ☐ Total Payment
- ☐ Reference #:

*** Notes Regarding Turnaround Times (TATs)**

**Specific TATs depend on the test requested. TATs may not be available for all types of analysis.**

1. Client must make arrangements with lab to guarantee 3 Hour/RUSH TAT - Call 1 (855)-862-
2. Unless a specific time is requested, results are guaranteed by 5pm on the same business da
3. Unless a specific time is requested, results are guaranteed by 5pm on the following busines
4. Unless a specific time is requested, results are guaranteed by 5pm on the 2nd business day.
5. Unless a specific time is requested, results are guaranteed by 5pm on the 3rd business day.
6. Unless a specific time is requested, results are guaranteed by 5 pm of the 10th business day.

ASBESTOS

## Client Project Information

**Project Name:** 1205

**Project Location:** PITTSBURGH, PA

**If solid waste, will results be used for disposal in NJ?** Yes ☐ No ☐

**Were the samples collected in New York state?** Yes ☐ No ☐

**Project #:**

**Sampled By:** Rucha Ragalwar

## Sample Information

| Lab Use Only | Field Sample ID# | Sample Location & Description | Sampling Date & Time | Sampling Info for Air /Surface Samples: Start Time | Stop Time | Flow Rate | Volume/Area | Sample Type | Test Method | Laboratory Use Only: Results | Date of Analysis | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1177036 | RRL-001 | Black Rubber | 1/7/2021 | | | | | | PLM | | | |
| 037 | RRL-002 | Roofing | | | | | | | | | | |
| 038 | RRV-001 | | | | | | | | | | | |
| | | | | | | | | | | | | |
| 039 | CT3-001 | 3rd Flr Ceiling | 11 am | | | | | | | | | |
| 040 | CT3-002 | Tiles | | | | | | | | | | |
| | | | | | | | | | | | | |
| 041 | WP3-001 | 3rd Flr wall | | | | | | | | | | |
| 042 | WP3-002 | Plaster | | | | | | | | | | |
| | | | | | | | | | | | | |

**Special Instructions From Client:** Separate layers as required.

**Sample Relinquished By:** X Rucha Ragalwar — Date: 1/7/21 — Time: 11 am

**Sample Received By:** JES — Date: 1/11/21 — Time: 1020

### Laboratory Use Only

| Logged-in by: | Log-in Date: | Date: | |
|---|---|---|---|
| JES | 1/11/21 | 1505 | Field Samples Acceptable ☑ Yes ☐ No ☐ On Ice<br>Sample #:<br>Sample Condition: |

**For drinking water samples:** for results to be valid, lab must receive samples on ice and within 48 hours of collection. For air samples collected by NIOSH 7400 and 7402: in accordance with these NIOSH methods, two field blanks. (or 10% of the number of field samples submitted, whichever is greater) must be submitted and be analyzed with field samples.

**For solid waste samples:** Before solid waste materials such as soil, ash, sludge, dredge spoils, etc. are disposed in New Jersey, they must undergo analysis following TCLP protocol. BATTA Labs is not responsible for waste disposal misrepresentations on this document. Document Control Item AM5

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Corporate Headquarters
6 Garfield Way
Newark, DE. 19713

Ph: (855) 86-BATTA
Fx: (302) 737-5764
Email: BattaLaboratories@battaenv.com
Web: https://battaenv.com

NVLAP Lab Code: 101032-0

AIHA LAP, LL: 100448
NY ELAP: 11993
EPA Lab: DE004
MD Lab ID: 263



# CHAIN OF CUSTODY

BL Project # : 108717

| Customer Billing Information: | Shipping Information | Turnaround Times (check one, refer to notes*) | Method of Payment |
|---|---|---|---|
| Name: | ☐ Picked up by BATTA<br>☐ Delivered by customer<br>☐ Shipped by customer | ☐ 3 Hours / Rush (*Note 1)<br>☐ 6-12 Hours (*Note 2)<br>☐ 24 Hours (*Note 3)<br>☐ 48 Hours (*Note 4)<br>☐ 72 Hours (*Note 5)<br>☐ 5-10 Days (*Note 6)<br>☐ 5 Days (For Wholesale Clients Only) | ☐ Cash<br>☐ Visa/MasterCard/Discover<br>☐ Money Order<br>☐ Purchase Order #<br>☐ Check #<br>☐ Other<br>☐ Unit Price/Quote<br>☐ Total Payment<br>☐ Reference #: |
| Billing Address 1: | | | |
| Billing Address 2: | | | |
| Phone: | | | |
| Email: | | | |
| Results To: | | | |

*** Notes Regarding Turnaround Times (TATs)**

**Specific TATs depend on the test requested. TATs may not be available for all types of analysis.**

1. Client must make arrangements with lab to guarantee 3 Hour/RUSH TAT - Call 1 (855)-862-2882
2. Unless a specific time is requested, results are guaranteed by 5pm on the same business day.
3. Unless a specific time is requested, results are guaranteed by 5pm on the following business day.
4. Unless a specific time is requested, results are guaranteed by 5pm on the 2nd business day.
5. Unless a specific time is requested, results are guaranteed by 5pm on the 3rd business day.
6. Unless a specific time is requested, results are guaranteed by 5 pm of the 10th business day.

## Client Project Information

| Project Name: | Project Location: | If solid waste, will results be used for disposal in NJ? Yes ☐ No ☐<br>Were the samples collected in New York state? Yes ☐ No ☐ | Project #: | Sampled By: |
|---|---|---|---|---|
| | | | | |

## Sample Information

| Lab Use Only | Field Sample ID# | Sample Location & Description | Sampling Date & Time | Sampling Info for Air /Surface Samples: Start Time | Stop Time | Flow Rate | Volume/Area | Sample Type | Test Method | Laboratory Use Only: Results | Date of Analysis | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 117043 | CB3-001 | Dark Grey Cove | | | | | | | | | | |
| 044 | CB3-002 | Base 3rd Flr. | | | | | | | | | | |
| | | | | | | | | | | | | |
| 045 | CT2-001 | 2nd Flr ceiling Tile | | | | | | | | | | |
| 046 | WP2-001 | 2nd Flr Wall | | | | | | | | | | |
| 047 | WP2-002 | Plaster/Dry Wall | | | | | | | | | | |
| 048 | WP2-003 | | | | | | | | | | | |
| 049 | CB2-001 | Cove base 2nd | | | | | | | | | | |
| 050 | CB2-002 | Flr | | | | | | | | | | |
| | | | | | | | | | | | | |

**Special Instructions From Client:**

| Sample Relinquished By: X | Date: | Time: |
|---|---|---|
| Sample Received By: JES | Date: 1/11/21 | Time: 1020 |

**Laboratory Use Only**

| Logged-in by: | Log-in Date: | Date: | Field Samples Acceptable ☑ Yes ☐ No ☐ On Ice |
|---|---|---|---|
| JES | 1/11/21 | 1505 | Sample #:<br>Sample Condition: |

**For drinking water samples:** for results to be valid, lab must receive samples on ice and within 48 hours of collection. For air samples collected by NIOSH 7400 and 7402: in accordance with these NIOSH methods, two field blanks. (or 10% of the number of field samples submitted, whichever is greater) must be submitted and be analyzed with field samples.

**For solid waste samples:** Before solid waste materials such as soil, ash, sludge, dredge spoils, etc. are disposed in New Jersey, they must undergo analysis following TCLP protocol. BATTA Labs is not responsible for waste disposal misrepresentations on this document. Document Control Item AM5

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Fx: (302) 737-5764
Email: BattaLaboratories@battaenv.com
Web: https://battaenv.com

NVLAP Lab Code: 101032-0

AIHA LAP, LL: 100448
NY ELAP: 11993
EPA Lab: DE004
MD Lab ID: 263



# CHAIN OF CUSTODY

BL Project # : B108717

| Customer Billing Information: | Shipping Information | Turnaround Times (check one, refer to notes*) | Method of Payment |
|---|---|---|---|
| Name: | ☐ Picked up by BATTA | ☐ 3 Hours / Rush (*Note 1) | ☐ Cash |
| Billing Address 1: | ☐ Delivered by customer | ☐ 6-12 Hours (*Note 2) | ☐ Visa/MasterCard/Discover |
| Billing Address 2: | ☐ Shipped by customer | ☐ 24 Hours (*Note 3) | ☐ Money Order |
| Phone: | | ☐ 48 Hours (*Note 4) | ☐ Purchase Order # |
| Email: | | ☐ 72 Hours (*Note 5) | ☐ Check # |
| Results To: | | ☐ 5-10 Days (*Note 6) | ☐ Other |
| | | ☐ 5 Days (For Wholesale Clients Only) | ☐ Unit Price/Quote |
| | | | ☐ Total Payment |
| | | | ☐ Reference #: |

*** Notes Regarding Turnaround Times (TATs)**

**Specific TATs depend on the test requested. TATs may not be available for all types of analysis.**

1. Client must make arrangements with lab to guarantee 3 Hour/RUSH TAT - Call 1 (855)-862-2[illegible]
2. Unless a specific time is requested, results are guaranteed by 5pm on the same business day.
3. Unless a specific time is requested, results are guaranteed by 5pm on the following business day.
4. Unless a specific time is requested, results are guaranteed by 5pm on the 2nd business day.
5. Unless a specific time is requested, results are guaranteed by 5pm on the 3rd business day.
6. Unless a specific time is requested, results are guaranteed by 5 pm of the 10th business day.

## Client Project Information

| Project Name: | Project Location: | If solid waste, will results be used for disposal in NJ? Yes ☐ No ☐ | Project #: | Sampled By: |
|---|---|---|---|---|
| | | Were the samples collected in New York state? Yes ☐ No ☐ | | |

## Sample Information

| Lab Use Only | Field Sample ID# | Sample Location & Description | Sampling Date & Time | Sampling Info for Air /Surface Samples: Start Time | Stop Time | Flow Rate | Volume/Area | Sample Type | Test Method | Laboratory Use Only: Results | Date of Analysis | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1177051 | CT1-001 | 1st Flr Ceiling Tile | | | | | | | | | | |
| 052 | WP1-001 | 1st Flr Wall Plaster | | | | | | | | | | |
| 053 | WP1-002 | | | | | | | | | | | |
| 054 | WP1-003 | | | | | | | | | | | |
| 055 | CB1-001 | 1st Flr Cove Base | | | | | | | | | | |
| 056 | CB1-002 | | | | | | | | | | | |
| 057 | CB1-003 | | | | | | | | | | | |

**Special Instructions From Client:**

| Sample Relinquished By: X | Date: | Time: |
|---|---|---|
| Sample Received By: JES | Date: 1/11/24 | Time: 1020 |

**Laboratory Use Only**

| Logged-in by: | Log-in Date: | Date: | Field Samples Acceptable ☑ Yes ☐ No ☐ On Ice |
|---|---|---|---|
| JES | 1/11/24 | 1505 | Sample #: |
| | | | Sample Condition: |

**For drinking water samples:** for results to be valid, lab must receive samples on ice and within 48 hours of collection. For air samples collected by NIOSH 7400 and 7402: in accordance with these NIOSH methods, two field blanks. (or 10% of the number of field samples submitted, whichever is greater) must be submitted and be analyzed with field samples.

**For solid waste samples:** Before solid waste materials such as soil, ash, sludge, dredge spoils, etc. are disposed in New Jersey, they must undergo analysis following TCLP protocol. BATTA Labs is not responsible for waste disposal misrepresentations on this document. Document Control Item AM5

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Web: https://battaenv.com

NVLAP Lab Code: 101032-0

AIHA LAP, LL: 100448
NY ELAP: 11993
EPA Lab: DE004
MD Lab ID: 263



# CHAIN OF CUSTODY

BL Project # : R108717

| Customer Billing Information: | Shipping Information | Turnaround Times (check one, refer to notes*) | Method of Payment |
|---|---|---|---|
| Name: | ☐ Picked up by BATTA | ☐ 3 Hours / Rush (*Note 1) | ☐ Cash |
| Billing Address 1: | ☐ Delivered by customer | ☐ 6-12 Hours (*Note 2) | ☐ Visa/MasterCard/Discover |
| Billing Address 2: | ☐ Shipped by customer | ☐ 24 Hours (*Note 3) | ☐ Money Order |
| Phone: | | ☐ 48 Hours (*Note 4) | ☐ Purchase Order # |
| Email: | | ☐ 72 Hours (*Note 5) | ☐ Check # |
| Results To: | | ☐ 5-10 Days (*Note 6) | ☐ Other |
| | | ☐ 5 Days (For Wholesale Clients Only) | ☐ Unit Price/Quote |
| | | | ☐ Total Payment |
| | | | ☐ Reference #: |

*** Notes Regarding Turnaround Times (TATs)**

**Specific TATs depend on the test requested. TATs may not be available for all types of analysis.**

1. Client must make arrangements with lab to guarantee 3 Hour/RUSH TAT - Call 1 (855)-862-2882
2. Unless a specific time is requested, results are guaranteed by 5pm on the same business day.
3. Unless a specific time is requested, results are guaranteed by 5pm on the following business day.
4. Unless a specific time is requested, results are guaranteed by 5pm on the 2nd business day.
5. Unless a specific time is requested, results are guaranteed by 5pm on the 3rd business day.
6. Unless a specific time is requested, results are guaranteed by 5 pm of the 10th business day.

## Client Project Information

| Project Name: | Project Location: | If solid waste, will results be used for disposal in NJ? Yes ☐ No ☐<br>Were the samples collected in New York state? Yes ☐ No ☐ | Project #: | Sampled By: |
|---|---|---|---|---|
| | | | | |

## Sample Information

| Lab Use Only | Field Sample ID# | Sample Location & Description | Sampling Date & Time | Sampling Info for Air /Surface Samples | | | | Sample Type | Test Method | Laboratory Use Only | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Start Time | Stop Time | Flow Rate | Volume/Area | | | Results | Date of Analysis | Analyst |
| 1177 058 | CTB-001 | Basement Ceiling Tiles | | | | | | | | | | |
| 059 | CTB-002 | | | | | | | | | | | |
| | | | | | | | | | | | | |
| 060 | CPB-001 | Basement Ceiling Plaster | | | | | | | | | | |
| 061 | CPB-002 | | | | | | | | | | | |
| | | | | | | | | | | | | |
| 062 | CBB-001 | Basement Ceiling Cove Base | | | | | | | | | | |
| 063 | CBB-002 | | | | | | | | | | | |
| | | | | | | | | | | | | |
| 064 | PIB-001 | Pipe Insulation Basement | | | | | | | | | | |

**Special Instructions From Client:**

| Sample Relinquished By: X | Date: | Time: |
|---|---|---|
| Sample Received By: JES | Date: 1/11/21 | Time: 1020 |

**Laboratory Use Only**

| Logged-in by: | Log-in Date: | Date: | Field Samples Acceptable ☑ Yes ☐ No ☐ On Ice |
|---|---|---|---|
| JES | 1/11/21 | 1505 | Sample #: |
| | | | Sample Condition: |

**For drinking water samples:** for results to be valid, lab must receive samples on ice and within 48 hours of collection. For air samples collected by NIOSH 7400 and 7402: in accordance with these NIOSH methods, two field blanks. (or 10% of the number of field samples submitted, whichever is greater) must be submitted and be analyzed with field samples.

**For solid waste samples:** Before solid waste materials such as soil, ash, sludge, dredge spoils, etc. are disposed in New Jersey, they must undergo analysis following TCLP protocol. BATTA Labs is not responsible for waste disposal misrepresentations on this document. Document Control Item AM5

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Web: https://battaenv.com

NVLAP® Lab Code: 101032-0

AIHA LAP, LL: 100448
NY ELAP: 11993
EPA Lab: DE004
MD Lab ID: 263



# CHAIN OF CUSTODY

BL Project # : R10871?

| Customer Billing Information: | Shipping Information | Turnaround Times (check one, refer to notes*) | Method of Payment |
|---|---|---|---|
| Name: | ☐ Picked up by BATTA | ☐ 3 Hours / Rush (*Note 1) | ☐ Cash |
| Billing Address 1: | ☐ Delivered by customer | ☐ 6-12 Hours (*Note 2) | ☐ Visa/MasterCard/Discover |
| Billing Address 2: | ☐ Shipped by customer | ☐ 24 Hours (*Note 3) | ☐ Money Order |
| Phone: | | ☐ 48 Hours (*Note 4) | ☐ Purchase Order # |
| Email: | | ☐ 72 Hours (*Note 5) | ☐ Check # |
| Results To: | | ☐ 5-10 Days (*Note 6) | ☐ Other |
| | | ☐ 5 Days (For Wholesale Clients Only) | ☐ Unit Price/Quote |
| | | | ☐ Total Payment |
| | | | ☐ Reference #: |

*** Notes Regarding Turnaround Times (TATs)**

**Specific TATs depend on the test requested. TATs may not be available for all types of analysis.**

1. Client must make arrangements with lab to guarantee 3 Hour/RUSH TAT - Call 1 (855)-862-[illegible]
2. Unless a specific time is requested, results are guaranteed by 5pm on the same business day.
3. Unless a specific time is requested, results are guaranteed by 5pm on the following business [illegible].
4. Unless a specific time is requested, results are guaranteed by 5pm on the 2nd business day.
5. Unless a specific time is requested, results are guaranteed by 5pm on the 3rd business day.
6. Unless a specific time is requested, results are guaranteed by 5 pm of the 10th business day.

## Client Project Information

| Project Name: | Project Location: | If solid waste, will results be used for disposal in NJ? Yes ☐ No ☐<br>Were the samples collected in New York state? Yes ☐ No ☐ | Project #: | Sampled By: |
|---|---|---|---|---|

## Sample Information

| Lab Use Only | Field Sample ID# | Sample Location & Description | Sampling Date & Time | Sampling Info for Air /Surface Samples | | | | Sample Type | Test Method | Laboratory Use Only | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Start Time | Stop Time | Flow Rate | Volume/Area | | | Results | Date of Analysis | Analyst |
| 1177-065 | WPB-001 | Wall Plaster - | | | | | | | | | | |
| 066 | WPB-002 | Basement | | | | | | | | | | |
| | | | | | | | | | | | | |
| 067 | EIC-001 | Exterior Grey Window Caulking | | | | | | | | | | |
| | | | | | | | | | | | | |
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| | | | | | | | | | | | | |
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| | | | | | | | | | | | | |

**Special Instructions From Client:**

| Sample Relinquished By: X | Date: | Time: |
|---|---|---|
| Sample Received By: JES | Date: 1/11/24 | Time: 1020 |

**Laboratory Use Only**

| Logged-in by: | Log-in Date: | Date: | Field Samples Acceptable ☑ Yes ☐ No ☐ On Ice |
|---|---|---|---|
| JES | 1/12/24 | 1505 | Sample #: |
| | | | Sample Condition: |

**For drinking water samples:** for results to be valid, lab must receive samples on ice and within 48 hours of collection. For air samples collected by NIOSH 7400 and 7402: in accordance with these NIOSH methods, two field blanks. (or 10% of the number of field samples submitted, whichever is greater) must be submitted and be analyzed with field samples.

**For solid waste samples:** Before solid waste materials such as soil, ash, sludge, dredge spoils, etc. are disposed in New Jersey, they must undergo analysis following TCLP protocol. BATTA Labs is not responsible for waste disposal misrepresentations on this document. Document Control Item AM5

# ATTACHMENT B

# LEAD BASED PAINT ANALYSES AND CHAIN OF CUSTODY

Dedicated to a Cleaner
Environment Since 1982

NY ELAP# 11993
PCM, PLM, TEM & LEAD

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Newark, DE - Columbia, MD -
Philadelphia, PA
Web: http://www.battaenv.com
E-mail: battaenv@battaenv.com

EPA Lab ID #DE004

NVLAP
Lab Code: 101032-D

# REPORT OF ANALYSIS

**Report#:** RP21011302
**Project Number:** 21011104
**Project Name:** Cosmos Technologies
**Project Location:** 1205 Liverpool St., Pittsburgh, PA
**Date Received:** 01/11/2021
**Date Analyzed:** 01/13/2021
**Analyte Requested:** Lead
**Date Sampled:** 01/07/2021
**Sampled By:** Client
**Date Report Issued:** 01/13/2021

| Lab Sample # | Field Sample # | Sample Description | Parameters | Results (mg/kg) | Result(% Weight) | Method | Reporting Limit (mg/kg) | Reporting Limit %Weight |
|---|---|---|---|---|---|---|---|---|
| 21011104.01 | 01 | 3rd Floor - White on Wall | Lead | <130* | <0.013* | Test Method: EPA 3050B/7000B | | 0.012 |
| 21011104.02 | 02 | 3rd Floor - White Paint on Wall | Lead | 130 | 0.013 | Test Method: EPA 3050B/7000B | | 0.0083 |
| 21011104.03 | 03 | 2nd Floor - White Paint on Wall | Lead | <170* | <0.017* | Test Method: EPA 3050B/7000B | | 0.017 |
| 21011104.04 | 04 | 1st Floor - Wall White Paint | Lead | <88* | <0.0088* | Test Method: EPA 3050B/7000B | | 0.0088 |
| 21011104.05 | 05 | White Painted Block - 1,2,3 Floors | Lead | <58 | <0.0058 | Test Method: EPA 3050B/7000B | | 0.0058 |
| 21011104.06 | 06 | White Wall Paint - Basement | Lead | <59 | <0.0059 | Test Method: EPA 3050B/7000B | | 0.0059 |

* Material submitted was below the minimum amount required.
Note: 1. EPA guidelines require identification of paint samples as "lead based paint" when concentrations are found to be greater than 0.5% by weight; 2. Quality control results in this report are acceptable; 3. Results relate only to the items tested (on a dry weight basis); Batta Laboratories, LLC is not responsible for sample collection, nor interpretations made by others; 4. This report does not constitute endorsement by AIHA-LAP, LLC., NVLAP and/or any other U.S. governmental agencies; 5. Lab results/calculations are reported in 2 significant figures. Clients data/measurements are reported as they were submitted. Samples received in acceptable condition unless otherwise noted. 6. The designation of "CL" as the Analyst on this report denotes that there are samples listed above which were submitted to an accredited partner lab for analysis. 8. This report must not be reproduced without the written approval of BATTA Laboratories.

Batta Lab strives on customer feedback to improve the quality of our services. Please e-mail your feedback to feedback@battaenv.com.

**Analyst:** Angela Yohn

**QA/QC BY:** RVS
N.C. Batta/R Shumate (QA/QC Officer)

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Corporate Headquarters
6 Garfield Way
Newark, DE. 19713

Ph: (855) 86-BATTA
Fx: (302) 737-5764
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NVLAP® Lab Code: 101032-0

AIHA LAP, LL: 100448
NY ELAP: 11993
EPA Lab: DE004
MD Lab ID: 263

Page ____ of ____

# CHAIN OF CUSTODY

BL Project # : R108717

## Customer Billing Information

Name: COSMOS TECHNOLOGIES, INC
Billing Address 1: 700 RIVER AVENUE
Billing Address 2: SUITE 100
Phone: 412-321-3951
Email: hdouglas@cosmostechnologiesinc.com
Results To: kagaluas@cosmostechnologiesinc.com

## Shipping Information

- ☐ Picked up by BATTA
- ☐ Delivered by customer
- ☐ Shipped by customer

## Turnaround Times (check one, refer to notes *)

- ☐ 3 Hours / Rush (*Note 1)
- ☐ 6-12 Hours (*Note 2)
- ☐ 24 Hours (*Note 3)
- ☐ 48 Hours (*Note 4)
- ☐ 72 Hours (*Note 5)
- ☒ 5-10 Days (*Note 6)
- ☐ 5 Days (For Wholesale Clients Only)

## Method of Payment

- ☐ Cash
- ☐ Visa/MasterCard/Discover
- ☐ Money Order
- ☐ Purchase Order #
- ☐ Check #
- ☐ Other
- ☐ Unit Price/Quote
- ☐ Total Payment
- ☐ Reference #:

LBP

### * Notes Regarding Turnaround Times (TATs)

**Specific TATs depend on the test requested. TATs may not be available for all types of analysis.**

1. Client must make arrangements with lab to guarantee 3 Hour/RUSH TAT - Call 1 (855)-862-28[illegible]2
2. Unless a specific time is requested, results are guaranteed by 5pm on the same business day.
3. Unless a specific time is requested, results are guaranteed by 5pm on the following business day.
4. Unless a specific time is requested, results are guaranteed by 5pm on the 2nd business day.
5. Unless a specific time is requested, results are guaranteed by 5pm on the 3rd business day.
6. Unless a specific time is requested, results are guaranteed by 5 pm of the 10th business day.

## Client Project Information

**Project Name:** 1205 LIVERPOOL ST

**Project Location:** PITTSBURGH, PA

**If solid waste, will results be used for disposal in NJ?** Yes ☐ No ☐

**Were the samples collected in New York state?** Yes ☐ No ☐

**Project #:**

**Sampled By:**

## Sample Information

| Lab Use Only (W01104) | Field Sample ID# | Sample Location & Description | Sampling Date & Time | Sampling Info for Air /Surface Samples: Start Time | Stop Time | Flow Rate | Volume/Area | Sample Type | Test Method | Laboratory Use Only: Results | Date of Analysis | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01 LBP OCL→ | | 3RD FLOOR WHITE ON WALL | AM 1/7/2021 | | | | | LBP CHIP | | | | |
| 02 | LBP-002 | 3RD FLOOR WHITE PAINT ON WALL | | | | | | | | | | |
| 03 | LBP-003 | 2ND FLOOR WHITE PAINT ON WALL | | | | | | | | | | |
| 04 | LBP-004 | 1ST FLOOR WALL WHITE PAINT | | | | | | | | | | |
| 05 | LBP-005 | WHITE PAINTED BRICK (2,3 FLOOR) | | | | | | | | | | |
| 06 | LBP-006 | WHITE WALL PAINT | BASEMENT | | | | | | | | | |

**Special Instructions From Client:**

| | Date: | Time: |
|---|---|---|
| **Sample Relinquished By:** X | | |
| **Sample Received By:** JES | Date: 1/11/21 | Time: 1020 |

### Laboratory Use Only

| Logged-in by: | Log-in Date: | Date: | |
|---|---|---|---|
| JES | 1/11/21 | 1430 | Field Samples Acceptable ☑ Yes ☐ No ☐ On Ice |
| | | | Sample #: |
| | | | Sample Condition: |

**For drinking water samples:** for results to be valid, lab must receive samples on ice and within 48 hours of collection. For air samples collected by NIOSH 7400 and 7402: in accordance with these NIOSH methods, [illegible] field blanks. (or 10% of the number of field samples submitted, whichever is greater) must be submitted and be analyzed with field samples.

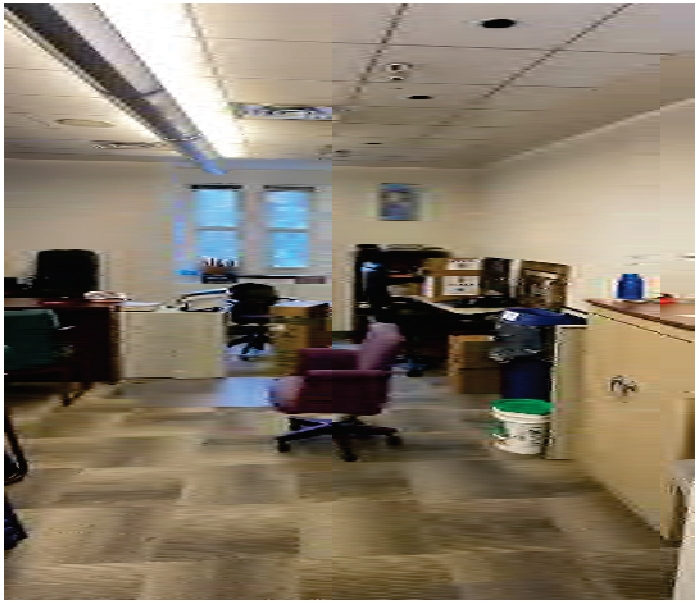
**For solid waste samples:** Before solid waste materials such as soil, ash, sludge, dredge spoils, etc. are disposed in New Jersey, they must undergo analysis following TCLP protocol. BATTA Labs is not responsible for waste disposal misrepresentations on this document. Document Control Item AM5

# ATTACHMENT C

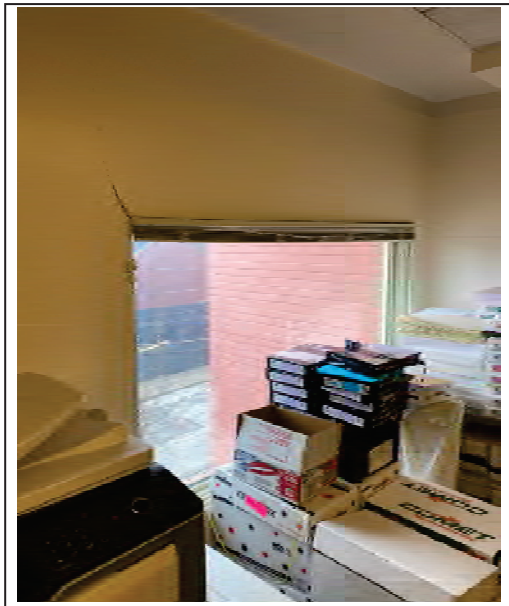
# LEAD BASED PAINT AND ASBESTOS SAMPLING PHOTO LOG



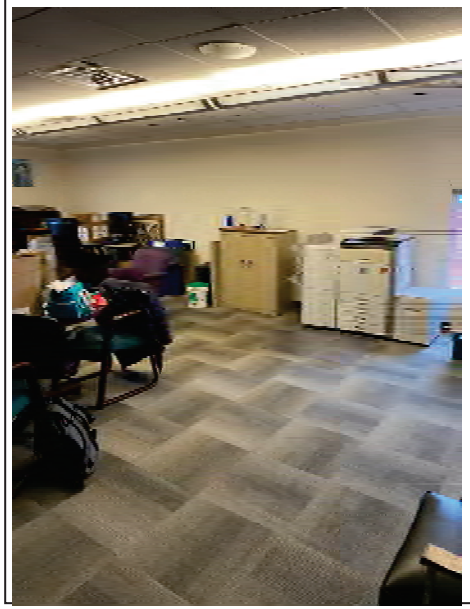
Photograph No. 1 –
3rd floor ceiling tiles



Photograph No. 2 –
3rd floor



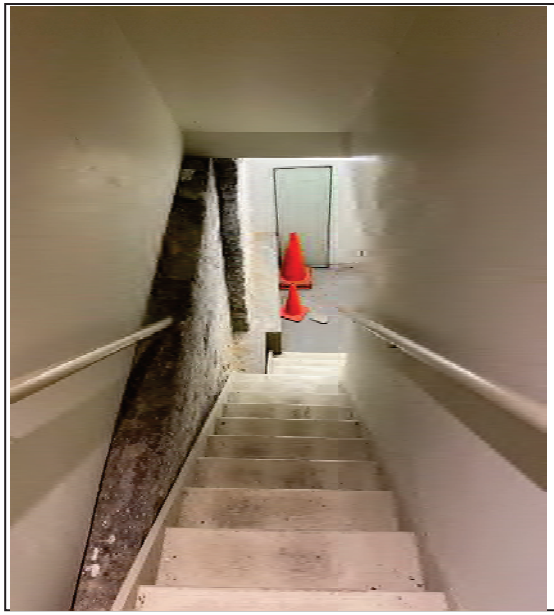
Photograph No. 3 –
3rd floor window



Photograph No. 4 –
3rd floor



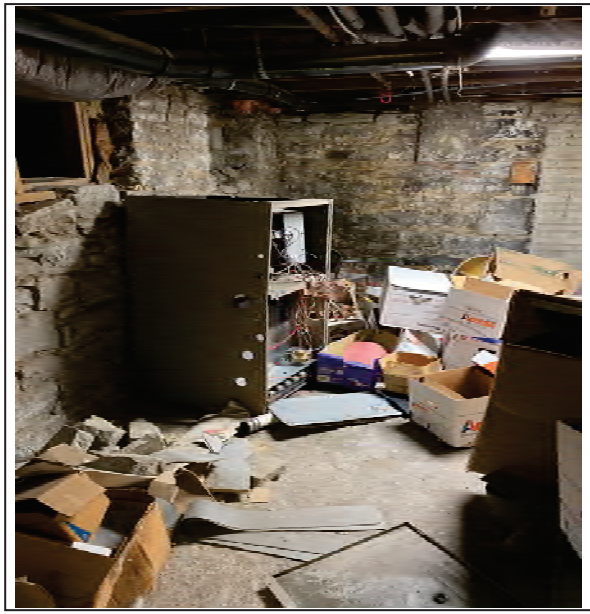
Photograph No. 5 –
Wood under carpet



Photograph No. 6 –
Stairway to the basement



Photograph No. 7 –
Basement



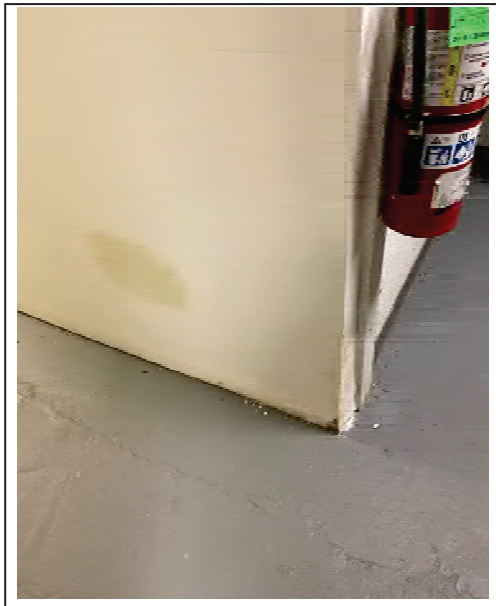
Photograph No. 8 –
Basement



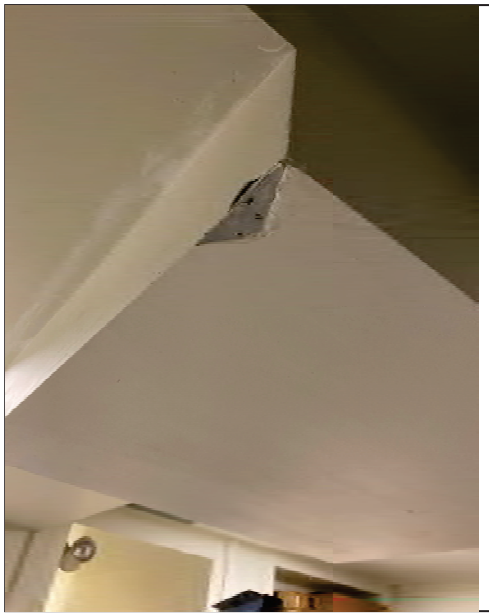
Photograph No. 9–
Pipe insulations



Photograph No. 10–
Wall plaster in basement



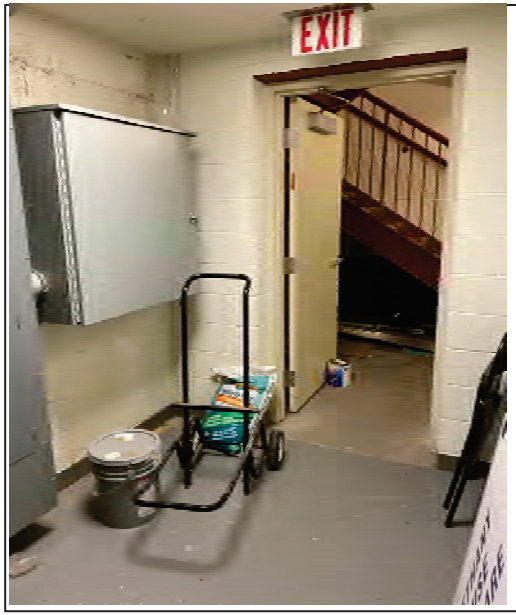
Photograph No. 11 –
Wall plaster in basement



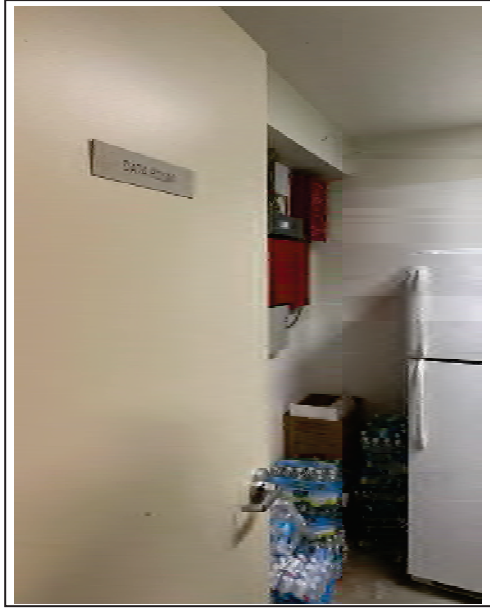
Photograph No. 12 –
Ceiling plaster in basement



Photograph No. 13 –
Pipe insulations



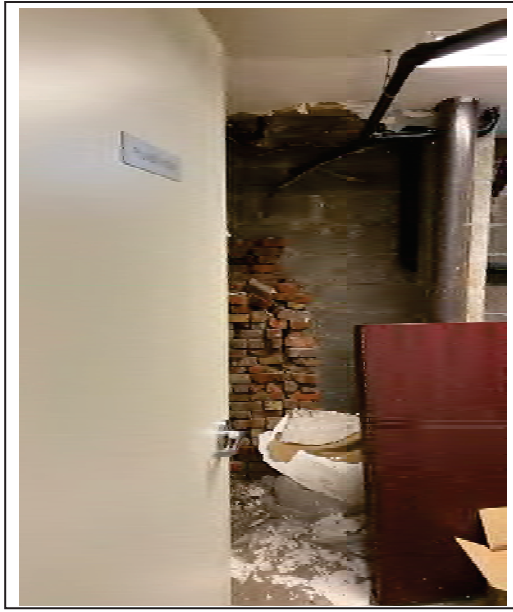

Photograph No. 14 –
Basement exit



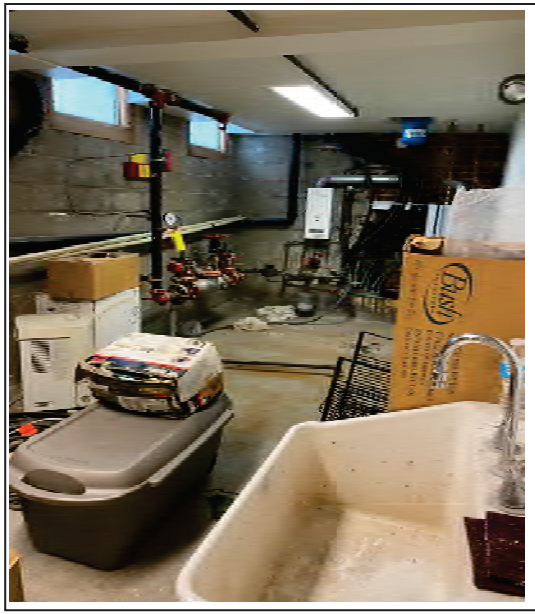
Photograph No. 15 –
Data room



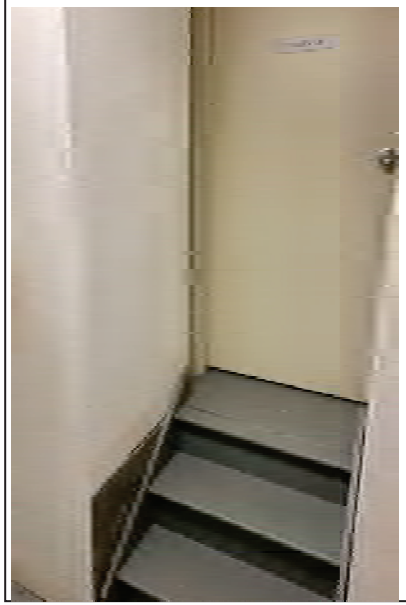
Photograph No. 16 –
Wall paint and plaster



Photograph No. 17–
Basement ceiling



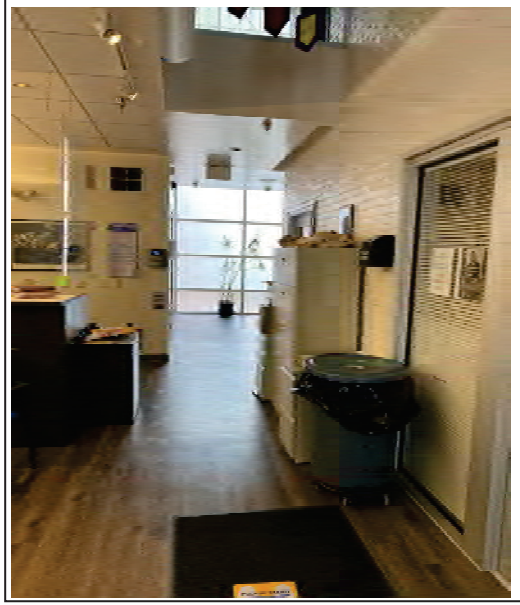
Photograph No. 18 –
Basement electrical room



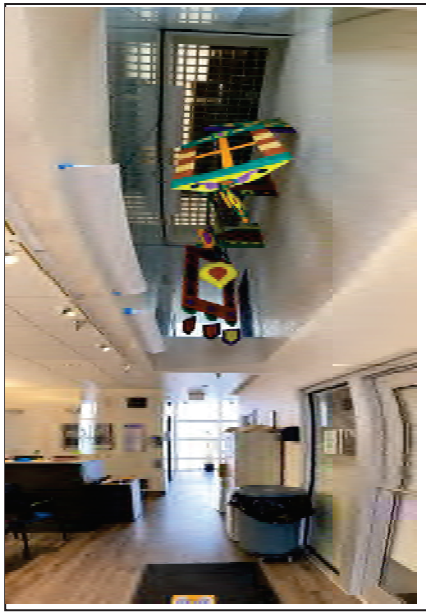
Photograph No. 19 –
Wall plaster and covebase in basement




Photograph No. 20–
Entrance door



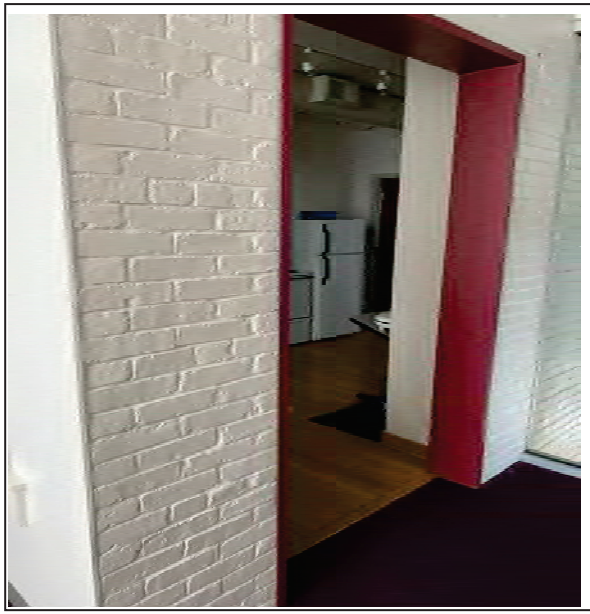
Photograph No. 21 –
1st floor entrance view



Photograph No. 22 –
Vertical view



Photograph No. 23 –
1st floor office



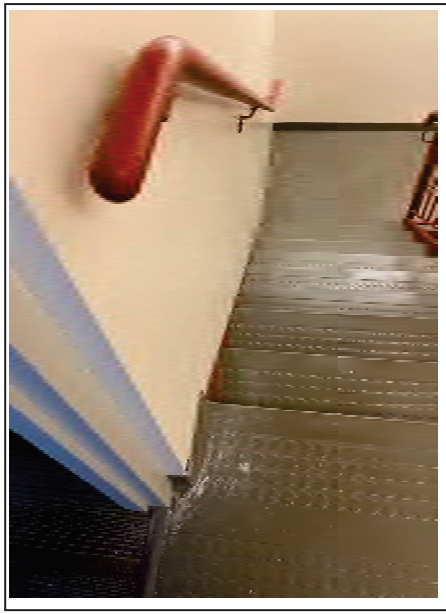
Photograph No. 24 –
Kitchen area



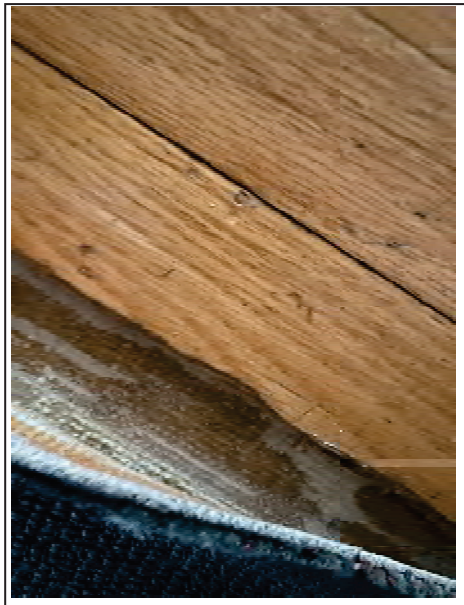
Photograph No. 25–
2nd floor office



Photograph No. 26 –
Damaged wall plaster and paint



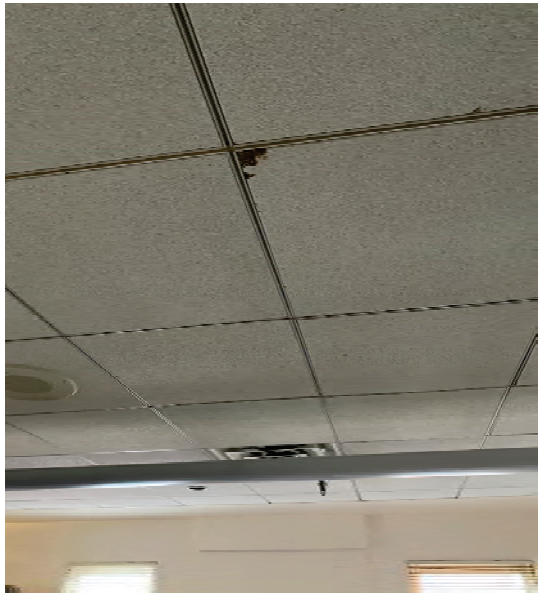
Photograph No. 27 –
Stairway wall plaster and covebase



Photograph No. 28–
Wood under carpet



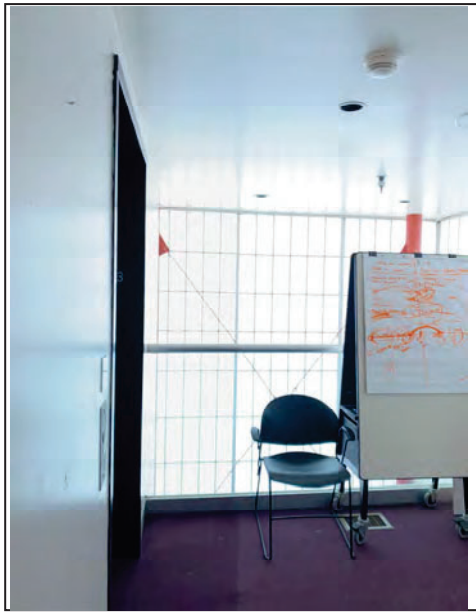
Photograph No. 29–
Covebase sample



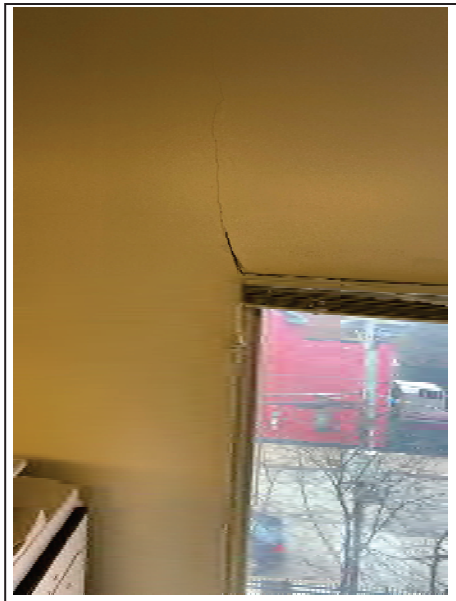
Photograph No. 30 –
Ceiling tiles



Photograph No. 31 –
3rd floor entire view



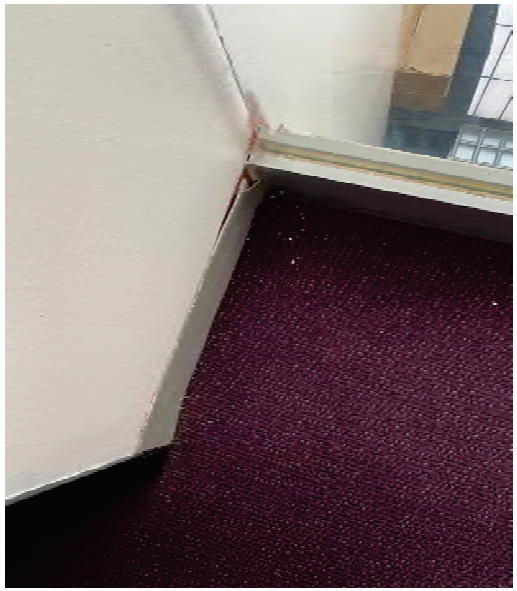
Photograph No. 32 –
Elevator exit



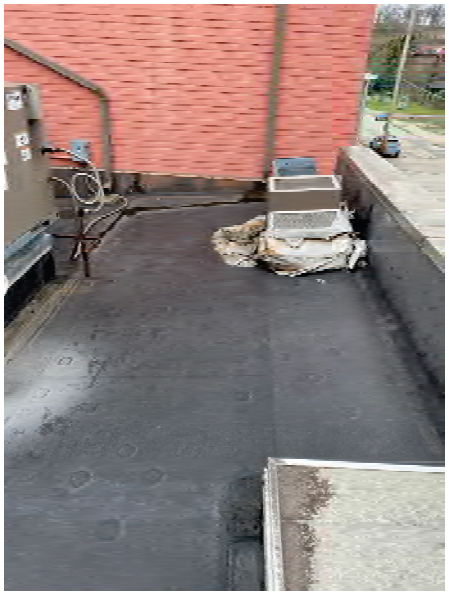
Photograph No. 33 –
3rd floor window sampled



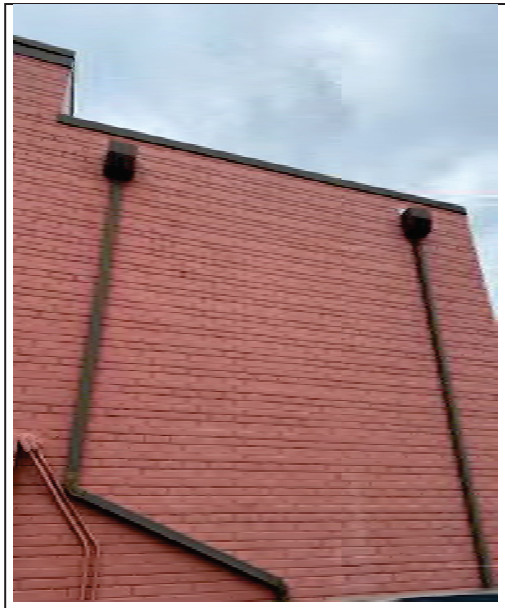
Photograph No. 34 –
Ceiling tiles



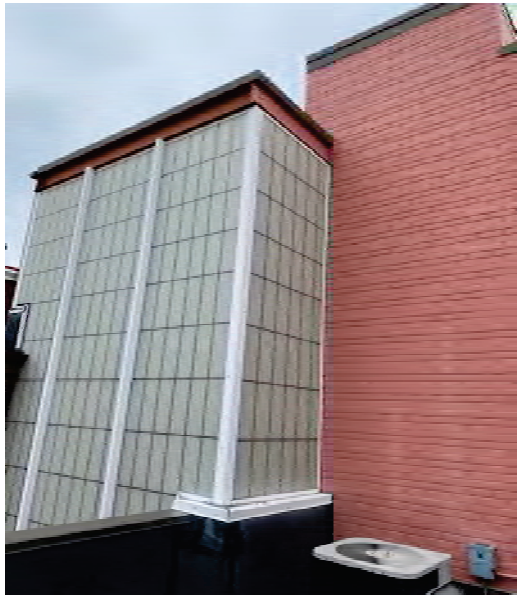
Photograph No. 35 –
Covebase



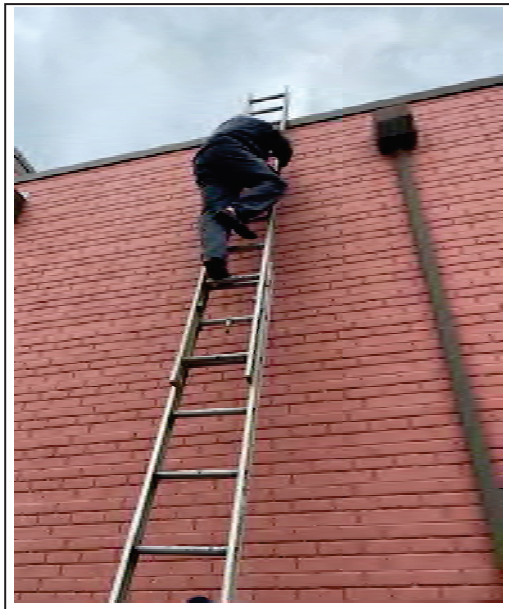
Photograph No. 36 –
Lower level roof sampled



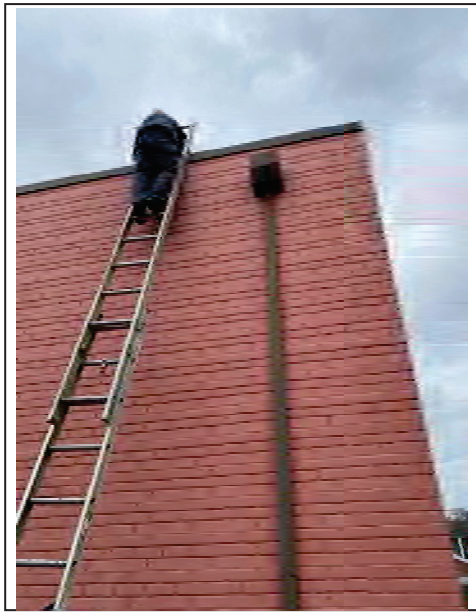
Photograph No. 37–
Upper level roof



Photograph No. 38 –
View of the building



Photograph No. 39 –
Upper level roof sampled



Photograph No. 40 –
Upper level roof sampled



Photograph No. 41 –
Lower level roof sampled



Photograph No. 42 –
Lower level roof sampled

Allen & Shariff
DESIGN | BUILD | MANAGE

# Building Mechanical Load Analysis Report

for

# HACP Northern Communities Family Self Sufficiency Center at 1205 Liverpool Street, Pittsburgh, PA 15213

18 December 2020

FINAL

700 River Avenue • Suite 600 • Pittsburgh, PA 15212 • phone 412-322-9280 • fax 412-322-9281 • www.AllenShariff.com

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Appendix A – Carrier HAP 5.11 Building and System Input Summary……..A1-A25

Appendix B – Carrier HAP 5.11 Design Day Heating and Cooling Calculations Output Summary……..B1-B8

## PURPOSE

The purpose of this report is to determine the suitability of the existing building split system furnace & condensing unit mechanical equipment for the HACP Northern Communities Family Self Sufficiency Center building in Pittsburgh, PA area. The report will describe the peak design day loads in both the heating and cooling season for all floors of the building, and will also determine the suitability of the two existing 2nd split system furnace & condensing units to continue to serve the building and shall recommend general replacement or refurbishment for building renovation, if necessary.

Allen and Shariff (A&S) visited the facilities on 15 September 2020 & 03 December 2020 with the purpose to survey and gather information on the existing systems at the above location. The investigation was limited to a visual inspection of the equipment in the mechanical room within the building and on the exterior of the building. No testing or measurements were performed. A&S utilized limited architectural and MEP existing drawings from 1998 to determine building floor space areas, wall exposures, window sizes and roof slope for the purposes of conducting the design day load calculation.

## EXISTING BUILDING DESCRIPTION

The building is located within the community of Manchester at 1205 Liverpool Street, Pittsburgh PA. The building is three stories high (with subterranean basement space) with the exception of a single story slab on grade annex building and is approximately 7,741 square feet in size. The building is primarily used for office space and as a community resource for residents of the North Side of Pittsburgh.

The building floor areas and approximate floor to floor heights are as follows:

| Floor | Floor Area (sq.ft.) | Floor to Floor Height (ft.) |
|---|---|---|
| Basement | 1722 | 9'-0" |
| First Floor | 2391 (Annex: 413) | 11'-0" (Annex: 16'-0") |
| Second Floor | 1929 | 10'-3" |
| Third Floor | 1699 | 11'-0" |

The exact building envelope and insulation properties were unknown at the time of this report, as the full original building architectural drawings were not available or able to be located. The 1998 renovation drawings did not indicate the exterior wall and roof construction insulation values but did note that certain exterior walls were insulated with fiberglass batt insulation or rigid board insulation. As a result of the lack of documented information regarding the existing building envelope, several informed assumptions have been made about the building envelope in order to conduct a realistic peak design day load analysis.

Due to the age of the building, the building envelope is likely minimally insulated at the exterior walls and roof. The building's original record drawings were not available at the time of the existing conditions assessment. It was noted by Gerard Associates Architects LLC that the existing fenestration is double pane with no low-e (low emissivity) film or coating. Gerard Associates noted that an effort to insulate the roof deck to a current code compliant R-20 insulation is being considered for this project.

The following building envelope assumptions were used to model the building's peak design day heating and cooling loads:

**Walls with Fiberglass Batt Insulation–** 4" Brick Masonry, 4" Fiberglass Batt Insulation, Air Space, 5/8" Gypsum Wall Board

Total R-value insulation: **R-15.74**

**Walls with Fiberglass Board Insulation–** 8" Concrete Block, 1" Fiberglass Board Insulation, Air Space, 5/8" Gypsum Wall Board

Total R-value insulation: **R-10.54**

**Walls with No Insulation–** 8” Concrete Block, Air Space, 5/8” Gypsum Wall Board

Total R-value insulation: **R-3.60**

**Roof –** 5/8” Gypsum Wall Board, 5” Fiberglass Batt Insulation, Air Space, ½” Plywood, Asphalt Roll, Asphalt Shingles

Total R-value insulation: **R-19.36**

**Windows –** Double Pane Glazing (No low-e coating or argon gas)

Total Window Assembly U-value: **0.45**
Total Window Assembly Solar Heat Gain Coefficient: **0.40**

## EXISTING MECHANICAL HVAC SYSTEM DESCRIPTIONS

The building is served by two split system furnace and condensing units, a single rooftop mounted constant volume rooftop unit, and four window air conditioners.

The 3 ton cooling constant volume rooftop unit serves the single story Annex space in the back of the building only and has been installed within the last 5 years. Air is distributed via ceiling supply diffusers and returned back to the unit via ceiling return grilles.

The two ducted natural gas furnace units are equipped with DX cooling coils are located in the basement of the building and are connected to two condensing units located on the Annex roof by suction and liquid R-22 refrigerant piping. Both furnaces are ducted vertically through the building and each serves either the western or eastern sections of the building on the first, second, and third floors. The furnace serving the western side of the building provides limited air distribution to some occupiable basement spaces on the western side of the building, which the furnace serving the eastern side does not condition the eastern portion of the basement space. The thermostats for each furnace are located on the first floor of the building at interior walls.

The 12,000 BTU/hr window air conditioning units are installed in two 3$^{rd}$ floor windows (one at the north façade and one at the south façade) and in two 2$^{nd}$ floor windows (one at the north façade and one at the east façade) as a means of attempting to maintain space temperature in conjunction with the conditioning provided by the split system furnace and air conditioners. These units are controlled manually via operator control of on/off function, fan speed and level of cooling.

## BUILDING SPLIT SYSTEM FURNACE & AIR CONDITIONER #1 SPECIFIC INFORMATION

| | |
|---|---|
| Split System Unit #1 Manufacturer: | Goodman |
| Split System Furnace #1 Model: | Unknown |
| Split System Air Conditioner #1 Model: | GSC130603CB |
| Split System #1 Type: | Direct Vent Natural Gas Furnace and Condensing Unit |
| Split System #1 Quantity: | 1 |
| Split System #1 Cooling Efficiency | 13.0 Seasonal Energy Efficiency Ratio (SEER) or 11.0 Energy Efficiency Ratio (EER) |
| Split System #1 Heating Efficiency | 80% Annual Fuel Utilization Efficiency (AFUE) |
| Split System #1 Stages: | 1 Heating, 1 Cooling |
| Split System #1 Refrigerant Type: | R-22 |
| Furnace Unit #1 Nominal Tonnage: | Unknown (~80.0 MBH) – Heating |
| Condensing Unit #1 Nominal Tonnage: | 5 Tons, 60.0 MBH - Cooling |
| Auxiliary Electric Resistance Heat: | None |



*Figure 1: Split System #1 Furnace – Basement Floor*



*Figure 2: Split System #1 Air Condensing Unit – Annex Roof*

There is no fresh air that was able to be identified currently being delivered to the furnace, and there is no indication of a ducted fresh air component for the air handling system. As mechanical ventilation is a code required component of mechanical systems, the design day heating and cooling load analysis shall be calculated under the assumption that mechanical ventilation is present during building occupancy.

## BUILDING SPLIT SYSTEM FURNACE & AIR CONDITIONER #2 SPECIFIC INFORMATION

| | |
|---|---|
| Split System Unit #2 Manufacturer: | Goodman (condensing unit) & Ducane (furnace) |
| Split System Furnace #2 Model: | Unknown |
| Split System Air Conditioner #2 Model: | CK60-3C |
| Split System #2 Type: | Direct Vent Natural Gas Furnace and Condensing Unit |
| Split System #2 Quantity: | 1 |
| Split System #2 Cooling Efficiency | 13.0 Seasonal Energy Efficiency Ratio (SEER) |
| Split System #2 Heating Efficiency | 80% Annual Fuel Utilization Efficiency (AFUE) |
| Split System #2 Stages: | 1 Heating, 1 Cooling |
| Split System #2 Refrigerant Type: | R-22 |
| Furnace Unit #2 Nominal Tonnage: | Unknown (~80.0 MBH) – Heating |
| Condensing Unit #2 Nominal Tonnage: | 5 Tons, 60.0 MBH - Cooling |
| Auxiliary Electric Resistance Heat: | None |



*Figure 3: Split System #2 Furnace – Basement Floor*



*Figure 4: Split System #2 Air Condensing Unit – Annex Roof*

There is no fresh air that was able to be identified currently being delivered to the furnace, and there is no indication of a ducted fresh air component for the air handling system. As mechanical ventilation is a code required component of mechanical systems, the design day heating and cooling load analysis shall be calculated under the assumption that mechanical ventilation is present during building occupancy.

## BUILDING PEAK DESIGN DAY HEATING AND COOLING LOAD INPUTS

The peak design day heating and cooling load analysis for the building was calculated using the Carrier Hourly Analysis Program (HAP) Version 5.11. Each space on the second floor was modelled within the program to accurately represent the load demand for the floor. A number of key space inputs that directly affected the results of the load analysis are as follows:

**Building Orientation –** The front of the building faces north, with the roof mainly flat except for a slight pitch up towards the north façade.

**Outdoor Conditions –** A peak design day heating and cooling load analysis requires the simulation of the building's most demanding days of the year for both the heating and cooling season. The building is located in Pittsburgh, PA, which possesses the following cataloged weather data for the most severe summer and winter outdoor conditions required to be designed for, as determined by ASHRAE.

***Winter Dry Bulb Temperature*** **– 2.0 Degrees Fahrenheit**
***Winter Wet Bulb Temperature*** **– 0.3 Degrees Fahrenheit**

***Summer Dry Bulb Temperature*** **– 89.0 Degrees Fahrenheit**
***Summer Wet Bulb Temperature*** **– 72.0 Degrees Fahrenheit**

**Building Envelope –** Insulation values and construction types from the 'Existing Building Description' were used for walls, windows, and roof assemblies.

The average height of the floors is roughly **10.3 feet** floor to floor. The roof insulation is anticipated to be located horizontally across the top of the 3rd floor ceiling below the roof deck and at the second floor low roof above the Men's Restroom.

**Lighting Load –** The average lighting load within each office space was modelled to be **1.5 Watts per square foot (W/sq.ft.)** based on a typical office application with existing fluorescent lighting. The average lighting load within each ancillary or storage space was modelled to be **1.0 Watts per square foot (W/sq.ft.)** based on

a typical storage application with existing fluorescent lighting.

**Electrical Equipment –** The average electrical equipment load is comprised of receptacle plug, mechanical equipment, and other miscellaneous electrical loads within each space. The anticipated electrical load differs according to the space use. The following values were assumed based on the typical electrical equipment loads for each space type.

***Offices* – 2.0 W/sq.ft.**
***Conference Rooms* – 1.5 W/sq.ft.**
***Restrooms* – 0.5 W/sq.ft.**
***IT Server Room* – 2.0 W/sq.ft.**
***Mechanical Room* – 1.5 W/sq.ft.**
***Elevator Equipment Room* – 4.0 W/sq.ft.**

**Occupancy/Schedule –** HACP provided occupancy information for the second floor, as well as the scheduled hours of typical occupancy. For a peak design day load analysis, the occupancy represented in the program is set to the maximum expected occupancy for the building, which is **15 individuals**. The scheduled occupancy is as follows:

***8:00am to 5pm* – 15 occupants**

**Temperature Setpoint –** The two split system furnace & condensing units are each controlled by a wall mounted thermostat with adjustable temperature setpoints for cooling and heating. Although the thermostat space temperature setpoints are able to be adjusted, the following setpoints are represented in the software program based on typical American Society of Heating, Refrigerating, and Air Condition Engineers (ASHRAE) temperature setpoints for an office building.

***Cooling Space Setpoint* – 75 Degrees Fahrenheit**
***Heating Space Setpoint* – 70 Degrees Fahrenheit**

**Split System Inputs –** The two split system furnace & condensing units have been modeled in the software program to have a duct leakage rate of **5%** and leaving air temperatures in the heating and cooling mode of the following values:

***Cooling Dry Bulb Temperature* – 55.0 Degrees Fahrenheit**
***Cooling Wet Bulb Temperature* – 54.0 Degrees Fahrenheit**

***Heating Dry Bulb Temperature* – 95.0 Degrees Fahrenheit**

As relative humidity is a concern, especially in the months that require cooling, the cooling mode leaving air temperature is set such that the split system can perform basic dehumidification of the mixed return/outdoor air entering the unit based on the split system's latent cooling capacity.

The entire space load input summary can be found in Appendix A of this report.

## BUILDING PEAK DESIGN DAY HEATING AND COOLING LOAD RESULTS

The inputs described in the section above were integrated into the spaces and system categories within Carrier HAP, and a peak design day heating and cooling load analysis was conducted. The following values reflect the cooling and heating capacities required to adequately condition the building during the most demanding day of the year for both the cooling and heating season:

**Total Cooling Capacity Required – 213.0 MBH ~ 17.8 tons**
**Total Heating Capacity Required – 233.0 MBH**

As noted in the 'Existing HVAC System Description' Section on Page 5, the installed split system furnaces and condensing units, constant volume rooftop unit, and window air conditioners serving the building are capable of the following cooling and heating capacities:

**Split System #1 Cooling Capacity – 60.0 MBH ~ 5.0 tons**
**Split System #1 Heating Capacity – 80.0 MBH**

**Split System #2 Cooling Capacity – 60.0 MBH ~ 5.0 tons**
**Split System #2 Heating Capacity – 80.0 MBH**

**Rooftop Unit Cooling Capacity – 36.0 MBH ~ 3.0 tons**
**Rooftop Unit Heating Capacity – 75.0 MBH**

**Window A/C Unit #1 Cooling Capacity – 12.0 MBH ~ 1.0 tons**

**Window A/C Unit #2 Cooling Capacity – 12.0 MBH ~ 1.0 tons**

**Window A/C Unit #3 Cooling Capacity – 12.0 MBH ~ 1.0 tons**
**Window A/C Unit #4 Cooling Capacity – 12.0 MBH ~ 1.0 tons**

The combined cooling capacity of the mechanical equipment is 16.0 tons, while the peak building cooling load is 17.8 tons. With the removal of the window air conditioning units, which are not intended to be a permanent means of conditioning for the third floor space, the cooling capacity of the mechanical equipment is 13 tons. The building mechanical system is only capable of meeting 73% of the peak cooling load of the building, and therefore additional cooling equipment is required. The constant volume rooftop unit is sized adequately to meet the loads of the space in which it serves, and as such it has been determined that the split system furnaces serving the main building floors are not adequately sized to condition the spaces they serve effectively.

The installed mechanical heating equipment appears to be capable of meeting the peak design day load in the heating season, as the combined natural gas heating equipment is able to meet the peak design day heating load even with the introduction of mechanical ventilation.

The entire space load heating and cooling calculation results can be found in Appendix B of this report.

## RECOMMENDATIONS

The split system furnaces and condensing units installed on site are not rated to meet the peak design day cooling capacity determined by the Carrier HAP 5.11 software and are well beyond their useful life, and as such should be replaced. Although this analysis provides a peak cooling capacity required only during the most extreme outdoor summer conditions for the region as determined by ASHRAE, it should be noted that the existing systems are unlikely to be able to adequately condition the main building spaces during a considerable portion of the year, even during relatively temperate conditions.

The difference between the peak required cooling capacity and the capacity of the existing split systems is significant, and the under-sized mechanical equipment likely runs for longer periods of time than it should in order to try and meet the desired space temperature. There are certainly times of the year in which the existing unit is incapable of providing the required cooling to adequately condition the second floor space from both a sensible cooling and latent cooling standpoint, resulting in a space that features humid air and a space temperature that is above the desired setpoint of 75 degrees Fahrenheit.

As the existing split system furnaces are feature a 5 ton cooling capacity, the limit of small commercial/residential type split system units. Increasing the cooling capacity to a 6 ton or 7.5 ton capacity would result in an outdoor condensing unit that is significantly larger in physical size and weight, as well as require an increased electrical feed for the unit. To avoid additional structural reinforcement to account for larger condensing units, it is recommended that an additional split system furnace and condensing unit be installed and the existing split system furnaces and condensing units to be replaced in kind.

It is recommended that a new 5 ton split system furnace and condensing unit be designed and installed to serve the entirety of the third floor space. The replaced in kind split system furnace and condensing units shall serve the basement, first floor, and second floors of the building. The redistribution of conditioning zones and the addition of the split system furnace and air conditioner shall achieve the desired space temperature setpoint and relative humidity for all outdoor design conditions anticipated during a calendar year by ASHRAE.

## CONCLUSIONS

In the interest of occupant comfort and health, it is recommended that a new 5 ton nominal cooling split system furnace and condensing unit be designed and installed for the third floor space and the existing split systems be replaced in kind in order to achieve the desired space temperature setpoint and relative humidity for all outdoor design conditions anticipated during a calendar year by ASHRAE. The installation of the three split system furnace and condensing units should include the code required mechanical outdoor ventilation ducted directly to the air handling unit component of the system and economizer function as required by the 2015 IECC.

## 000 Mechanical Room

### 1. General Details:

Floor Area ..... **197.0** ft²
Avg. Ceiling Height ..... **9.0** ft
Building Weight ..... **70.0** lb/ft²

### 1.1. OA Ventilation Requirements:

Space Usage **OFFICE: Occupiable storage room for dry materials**
OA Requirement 1 ..... **5.0** CFM/person
OA Requirement 2 ..... **0.06** CFM/ft²
Space Usage Defaults ..... **ASHRAE Std 62.1-2013**

### 2. Internals:

### 2.1. Overhead Lighting:

Fixture Type ..... **Recessed (Unvented)**
Wattage ..... **1.00** W/ft²
Ballast Multiplier ..... **1.00**
Schedule ..... **Lighting**

### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft²
Schedule ..... **None**

### 2.3. Electrical Equipment:

Wattage ..... **1.00** W/ft²
Schedule ..... **Equipment**

### 2.4. People:

Occupancy ..... **0.0** Person
Activity Level ..... **Office Work**
Sensible ..... **245.0** BTU/hr/person
Latent ..... **205.0** BTU/hr/person
Schedule ..... **None**

### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr
Schedule ..... **None**
Latent ..... **0** BTU/hr
Schedule ..... **None**

### 3. Walls, Windows, Doors:

| Exp. | Wall Gross Area (ft²) | Window 1 Qty. | Window 2 Qty. | Door 1 Qty. |
|---|---|---|---|---|
| W | 28.5 | 0 | 0 | 0 |
| N | 65.0 | 17 | 0 | 0 |

### 3.1. Construction Types for Exposure W

Wall Type ..... **Old Building Wall**

### 3.2. Construction Types for Exposure N

Wall Type ..... **Old Building Wall**
1st Window Type ..... **1x1**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... **0.10** CFM/ft²
Design Heating ..... **0.20** CFM/ft²
Energy Analysis ..... **0.00** CFM
Infiltration occurs only when the fan is off.

### 6. Floors:

Type ..... **Slab Floor Below Grade**
Floor Area ..... **103.0** ft²
Exposed Perimeter ..... **30.7** ft
Total Floor U-Value ..... **0.500** BTU/(hr·ft²·°F)
Floor Depth ..... **6.0** ft
Basement Wall U-Value ..... **0.250** BTU/(hr·ft²·°F)
Wall Insulation R-Value ..... **0.00** (hr·ft²·°F)/BTU
Wall Insulation Depth ..... **0.0** ft

### 7. Partitions:

**(No partition data).**

## 001a Electrical Panel

### 1. General Details:

Floor Area ..... **287.0** ft²
Avg. Ceiling Height ..... **9.0** ft
Building Weight ..... **70.0** lb/ft²

### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Corridor**
OA Requirement 1 ..... **0.0** CFM/person
OA Requirement 2 ..... **0.06** CFM/ft²
Space Usage Defaults ..... **ASHRAE Std 62.1-2013**

### 2. Internals:

### 2.1. Overhead Lighting:

Fixture Type ..... **Recessed (Unvented)**
Wattage ..... **1.00** W/ft²
Ballast Multiplier ..... **1.00**
Schedule ..... **Lighting**

### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft²
Schedule ..... **None**

### 2.3. Electrical Equipment:

Wattage ..... **1.00** W/ft²
Schedule ..... **Equipment**

### 2.4. People:

Occupancy ..... **0.0** Person
Activity Level ..... **Office Work**
Sensible ..... **245.0** BTU/hr/person
Latent ..... **205.0** BTU/hr/person
Schedule ..... **None**

### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr
Schedule ..... **None**
Latent ..... **0** BTU/hr
Schedule ..... **None**

### 3. Walls, Windows, Doors:

| Exp. | Wall Gross Area (ft²) | Window 1 Qty. | Window 2 Qty. | Door 1 Qty. |
|---|---|---|---|---|
| W | 34.0 | 0 | 0 | 0 |

### 3.1. Construction Types for Exposure W

Wall Type ..... **Old Building Wall**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... **0.10** CFM/ft²
Design Heating ..... **0.20** CFM/ft²
Energy Analysis ..... **0.00** CFM
Infiltration occurs only when the fan is off.

### 6. Floors:

Type ..... **Slab Floor Below Grade**
Floor Area ..... **287.0** ft²
Exposed Perimeter ..... **11.3** ft
Total Floor U-Value ..... **0.500** BTU/(hr·ft²·°F)
Floor Depth ..... **6.0** ft
Basement Wall U-Value ..... **0.250** BTU/(hr·ft²·°F)
Wall Insulation R-Value ..... **0.00** (hr·ft²·°F)/BTU
Wall Insulation Depth ..... **0.0** ft

### 7. Partitions:

**(No partition data).**

## 002 Data Tele

### 1. General Details:

Floor Area ..... **103.0** ft²
Avg. Ceiling Height ..... **9.0** ft
Building Weight ..... **70.0** lb/ft²

### 1.1. OA Ventilation Requirements:

Space Usage **OFFICE: Occupiable storage room for dry materials**
OA Requirement 1 ..... **5.0** CFM/person
OA Requirement 2 ..... **0.06** CFM/ft²
Space Usage Defaults ..... **ASHRAE Std 62.1-2013**

### 2. Internals:

### 2.1. Overhead Lighting:

Fixture Type ..... **Recessed (Unvented)**
Wattage ..... **1.00** W/ft²
Ballast Multiplier ..... **1.00**
Schedule ..... **Lighting**

### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft²
Schedule ..... **None**

### 2.3. Electrical Equipment:

Wattage ..... **1.00** W/ft²
Schedule ..... **Equipment**

### 2.4. People:

Occupancy ..... **1.0** Person
Activity Level ..... **Office Work**
Sensible ..... **245.0** BTU/hr/person
Latent ..... **205.0** BTU/hr/person
Schedule ..... **Occupancy**

### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr
Schedule ..... **None**
Latent ..... **0** BTU/hr
Schedule ..... **None**

### 3. Walls, Windows, Doors:

| Exp. | Wall Gross Area (ft²) | Window 1 Qty. | Window 2 Qty. | Door 1 Qty. |
|---|---|---|---|---|
| W | 28.5 | 0 | 0 | 0 |

### 3.1. Construction Types for Exposure W

Wall Type ..... **Old Building Wall**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... **0.10** CFM/ft²
Design Heating ..... **0.20** CFM/ft²
Energy Analysis ..... **0.00** CFM
Infiltration occurs only when the fan is off.

### 6. Floors:

Type ..... **Slab Floor Below Grade**
Floor Area ..... **103.0** ft²
Exposed Perimeter ..... **9.5** ft
Total Floor U-Value ..... **0.500** BTU/(hr·ft²·°F)
Floor Depth ..... **6.0** ft
Basement Wall U-Value ..... **0.250** BTU/(hr·ft²·°F)
Wall Insulation R-Value ..... **0.00** (hr·ft²·°F)/BTU
Wall Insulation Depth ..... **0.0** ft

### 7. Partitions:

**(No partition data).**

## 005 Elev Mech Room

### 1. General Details:

| | | |
|---|---|---|
| Floor Area | **40.0** | ft² |
| Avg. Ceiling Height | **9.0** | ft |
| Building Weight | **70.0** | lb/ft² |

### 1.1. OA Ventilation Requirements:

| | | |
|---|---|---|
| Space Usage | **OFFICE: Occupiable storage room for dry materials** | |
| OA Requirement 1 | **5.0** | CFM/person |
| OA Requirement 2 | **0.06** | CFM/ft² |
| Space Usage Defaults | **ASHRAE Std 62.1-2013** | |

### 2. Internals:

### 2.1. Overhead Lighting:

| | | |
|---|---|---|
| Fixture Type | **Recessed (Unvented)** | |
| Wattage | **1.00** | W/ft² |
| Ballast Multiplier | **1.00** | |
| Schedule | **Lighting** | |

### 2.2. Task Lighting:

| | | |
|---|---|---|
| Wattage | **0.00** | W/ft² |
| Schedule | **None** | |

### 2.3. Electrical Equipment:

| | | |
|---|---|---|
| Wattage | **4.00** | W/ft² |
| Schedule | **Equipment** | |

### 2.4. People:

| | | |
|---|---|---|
| Occupancy | **1.0** | Person |
| Activity Level | **Office Work** | |
| Sensible | **245.0** | BTU/hr/person |
| Latent | **205.0** | BTU/hr/person |
| Schedule | **Occupancy** | |

### 2.5. Miscellaneous Loads:

| | | |
|---|---|---|
| Sensible | **0** | BTU/hr |
| Schedule | **None** | |
| Latent | **0** | BTU/hr |
| Schedule | **None** | |

### 3. Walls, Windows, Doors:

**(No Wall, Window, Door data).**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

| | | |
|---|---|---|
| Design Cooling | **0.00** | CFM |
| Design Heating | **0.00** | CFM |
| Energy Analysis | **0.00** | CFM |

Infiltration occurs only when the fan is off.

### 6. Floors:

| | | |
|---|---|---|
| Type | **Slab Floor Below Grade** | |
| Floor Area | **40.0** | ft² |
| Exposed Perimeter | **0.0** | ft |
| Total Floor U-Value | **0.500** | BTU/(hr·ft²·°F) |
| Floor Depth | **6.0** | ft |
| Basement Wall U-Value | **0.250** | BTU/(hr·ft²·°F) |
| Wall Insulation R-Value | **0.00** | (hr·ft²·°F)/BTU |
| Wall Insulation Depth | **0.0** | ft |

### 7. Partitions:

**(No partition data).**

## 007 Storage

### 1. General Details:

Floor Area ..... **150.0** ft²
Avg. Ceiling Height ..... **9.0** ft
Building Weight ..... **70.0** lb/ft²

### 1.1. OA Ventilation Requirements:

Space Usage **OFFICE: Occupiable storage room for dry materials**
OA Requirement 1 ..... **5.0** CFM/person
OA Requirement 2 ..... **0.06** CFM/ft²
Space Usage Defaults ..... **ASHRAE Std 62.1-2013**

### 2. Internals:

### 2.1. Overhead Lighting:

Fixture Type ..... **Recessed (Unvented)**
Wattage ..... **1.00** W/ft²
Ballast Multiplier ..... **1.00**
Schedule ..... **Lighting**

### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft²
Schedule ..... **None**

### 2.3. Electrical Equipment:

Wattage ..... **0.50** W/ft²
Schedule ..... **Equipment**

### 2.4. People:

Occupancy ..... **0.0** Person
Activity Level ..... **Office Work**
Sensible ..... **245.0** BTU/hr/person
Latent ..... **205.0** BTU/hr/person
Schedule ..... **None**

### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr
Schedule ..... **None**
Latent ..... **0** BTU/hr
Schedule ..... **None**

### 3. Walls, Windows, Doors:

| Exp. | Wall Gross Area (ft²) | Window 1 Qty. | Window 2 Qty. | Door 1 Qty. |
|---|---|---|---|---|
| S | 30.0 | 0 | 0 | 0 |

### 3.1. Construction Types for Exposure S

Wall Type ..... **Old Building Wall**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... **0.10** CFM/ft²
Design Heating ..... **0.20** CFM/ft²
Energy Analysis ..... **0.00** CFM
Infiltration occurs only when the fan is off.

### 6. Floors:

Type ..... **Slab Floor Below Grade**
Floor Area ..... **150.0** ft²
Exposed Perimeter ..... **10.0** ft
Total Floor U-Value ..... **0.500** BTU/(hr·ft²·°F)
Floor Depth ..... **6.0** ft
Basement Wall U-Value ..... **0.250** BTU/(hr·ft²·°F)
Wall Insulation R-Value ..... **0.00** (hr·ft²·°F)/BTU
Wall Insulation Depth ..... **0.0** ft

### 7. Partitions:

**(No partition data).**

## 008 Storage

### 1. General Details:

| | | |
|---|---|---|
| Floor Area | **141.0** | ft² |
| Avg. Ceiling Height | **9.0** | ft |
| Building Weight | **70.0** | lb/ft² |

### 1.1. OA Ventilation Requirements:

| | | |
|---|---|---|
| Space Usage | **OFFICE: Occupiable storage room for dry materials** | |
| OA Requirement 1 | **5.0** | CFM/person |
| OA Requirement 2 | **0.06** | CFM/ft² |
| Space Usage Defaults | **ASHRAE Std 62.1-2013** | |

### 2. Internals:

### 2.1. Overhead Lighting:

| | | |
|---|---|---|
| Fixture Type | **Recessed (Unvented)** | |
| Wattage | **1.00** | W/ft² |
| Ballast Multiplier | **1.00** | |
| Schedule | **Lighting** | |

### 2.2. Task Lighting:

| | | |
|---|---|---|
| Wattage | **0.00** | W/ft² |
| Schedule | **None** | |

### 2.3. Electrical Equipment:

| | | |
|---|---|---|
| Wattage | **0.50** | W/ft² |
| Schedule | **Equipment** | |

### 2.4. People:

| | | |
|---|---|---|
| Occupancy | **0.0** | Person |
| Activity Level | **Office Work** | |
| Sensible | **245.0** | BTU/hr/person |
| Latent | **205.0** | BTU/hr/person |
| Schedule | **None** | |

### 2.5. Miscellaneous Loads:

| | | |
|---|---|---|
| Sensible | **0** | BTU/hr |
| Schedule | **None** | |
| Latent | **0** | BTU/hr |
| Schedule | **None** | |

### 3. Walls, Windows, Doors:

**(No Wall, Window, Door data).**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

| | | |
|---|---|---|
| Design Cooling | **0.00** | CFM |
| Design Heating | **0.00** | CFM |
| Energy Analysis | **0.00** | CFM |

Infiltration occurs only when the fan is off.

### 6. Floors:

| | | |
|---|---|---|
| Type | **Slab Floor Below Grade** | |
| Floor Area | **141.0** | ft² |
| Exposed Perimeter | **0.0** | ft |
| Total Floor U-Value | **0.500** | BTU/(hr·ft²·°F) |
| Floor Depth | **6.0** | ft |
| Basement Wall U-Value | **0.250** | BTU/(hr·ft²·°F) |
| Wall Insulation R-Value | **0.00** | (hr·ft²·°F)/BTU |
| Wall Insulation Depth | **0.0** | ft |

### 7. Partitions:

**(No partition data).**

## 010 Corridor

### 1. General Details:

| | | |
|---|---|---|
| Floor Area | **162.0** | ft² |
| Avg. Ceiling Height | **9.0** | ft |
| Building Weight | **70.0** | lb/ft² |

### 1.1. OA Ventilation Requirements:

| | | |
|---|---|---|
| Space Usage | **GENERAL: Corridor** | |
| OA Requirement 1 | **0.0** | CFM/person |
| OA Requirement 2 | **0.06** | CFM/ft² |
| Space Usage Defaults | **ASHRAE Std 62.1-2013** | |

### 2. Internals:

### 2.1. Overhead Lighting:

| | | |
|---|---|---|
| Fixture Type | **Recessed (Unvented)** | |
| Wattage | **1.00** | W/ft² |
| Ballast Multiplier | **1.00** | |
| Schedule | **Lighting** | |

### 2.2. Task Lighting:

| | | |
|---|---|---|
| Wattage | **0.00** | W/ft² |
| Schedule | **None** | |

### 2.3. Electrical Equipment:

| | | |
|---|---|---|
| Wattage | **0.50** | W/ft² |
| Schedule | **Equipment** | |

### 2.4. People:

| | | |
|---|---|---|
| Occupancy | **0.0** | Person |
| Activity Level | **Office Work** | |
| Sensible | **245.0** | BTU/hr/person |
| Latent | **205.0** | BTU/hr/person |
| Schedule | **None** | |

### 2.5. Miscellaneous Loads:

| | | |
|---|---|---|
| Sensible | **0** | BTU/hr |
| Schedule | **None** | |
| Latent | **0** | BTU/hr |
| Schedule | **None** | |

### 3. Walls, Windows, Doors:

**(No Wall, Window, Door data).**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

| | | |
|---|---|---|
| Design Cooling | **0.00** | CFM |
| Design Heating | **0.00** | CFM |
| Energy Analysis | **0.00** | CFM |

Infiltration occurs only when the fan is off.

### 6. Floors:

| | | |
|---|---|---|
| Type | **Slab Floor Below Grade** | |
| Floor Area | **162.0** | ft² |
| Exposed Perimeter | **0.0** | ft |
| Total Floor U-Value | **0.500** | BTU/(hr·ft²·°F) |
| Floor Depth | **6.0** | ft |
| Basement Wall U-Value | **0.250** | BTU/(hr·ft²·°F) |
| Wall Insulation R-Value | **0.00** | (hr·ft²·°F)/BTU |
| Wall Insulation Depth | **0.0** | ft |

### 7. Partitions:

**(No partition data).**

## 011 Storage

### 1. General Details:

Floor Area ..... **203.0** ft²
Avg. Ceiling Height ..... **9.0** ft
Building Weight ..... **70.0** lb/ft²

### 1.1. OA Ventilation Requirements:

Space Usage **OFFICE: Occupiable storage room for dry materials**
OA Requirement 1 ..... **5.0** CFM/person
OA Requirement 2 ..... **0.06** CFM/ft²
Space Usage Defaults ..... **ASHRAE Std 62.1-2013**

### 2. Internals:

### 2.1. Overhead Lighting:

Fixture Type ..... **Recessed (Unvented)**
Wattage ..... **1.00** W/ft²
Ballast Multiplier ..... **1.00**
Schedule ..... **Lighting**

### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft²
Schedule ..... **None**

### 2.3. Electrical Equipment:

Wattage ..... **0.50** W/ft²
Schedule ..... **Equipment**

### 2.4. People:

Occupancy ..... **0.0** Person
Activity Level ..... **Office Work**
Sensible ..... **245.0** BTU/hr/person
Latent ..... **205.0** BTU/hr/person
Schedule ..... **None**

### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr
Schedule ..... **None**
Latent ..... **0** BTU/hr
Schedule ..... **None**

### 3. Walls, Windows, Doors:

| Exp. | Wall Gross Area (ft²) | Window 1 Qty. | Window 2 Qty. | Door 1 Qty. |
|---|---|---|---|---|
| N | 45.0 | 11 | 0 | 0 |

### 3.1. Construction Types for Exposure N

Wall Type ..... **Old Building Wall**
1st Window Type ..... **1x1**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... **0.10** CFM/ft²
Design Heating ..... **0.20** CFM/ft²
Energy Analysis ..... **0.00** CFM
Infiltration occurs only when the fan is off.

### 6. Floors:

Type ..... **Slab Floor Below Grade**
Floor Area ..... **203.0** ft²
Exposed Perimeter ..... **15.0** ft
Total Floor U-Value ..... **0.500** BTU/(hr·ft²·°F)
Floor Depth ..... **6.0** ft
Basement Wall U-Value ..... **0.250** BTU/(hr·ft²·°F)
Wall Insulation R-Value ..... **0.00** (hr·ft²·°F)/BTU
Wall Insulation Depth ..... **0.0** ft

### 7. Partitions:

**(No partition data).**

## 102 Resource Center

### 1. General Details:

Floor Area ..... **645.0** ft²
Avg. Ceiling Height ..... **11.0** ft
Building Weight ..... **70.0** lb/ft²

### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Reception area**
OA Requirement 1 ..... **5.0** CFM/person
OA Requirement 2 ..... **0.06** CFM/ft²
Space Usage Defaults ..... **ASHRAE Std 62.1-2013**

### 2. Internals:

### 2.1. Overhead Lighting:

Fixture Type ..... **Recessed (Unvented)**
Wattage ..... **1.50** W/ft²
Ballast Multiplier ..... **1.00**
Schedule ..... **Lighting**

### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft²
Schedule ..... **None**

### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft²
Schedule ..... **Equipment**

### 2.4. People:

Occupancy ..... **10.0** People
Activity Level ..... **Office Work**
Sensible ..... **245.0** BTU/hr/person
Latent ..... **205.0** BTU/hr/person
Schedule ..... **Occupancy**

### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr
Schedule ..... **None**
Latent ..... **0** BTU/hr
Schedule ..... **None**

### 3. Walls, Windows, Doors:

| Exp. | Wall Gross Area (ft²) | Window 1 Qty. | Window 2 Qty. | Door 1 Qty. |
|---|---|---|---|---|
| W | 20.0 | 0 | 0 | 0 |
| E | 338.0 | 42 | 0 | 1 |
| N | 253.0 | 63 | 0 | 1 |

### 3.1. Construction Types for Exposure W

Wall Type ..... **Face Brick + R-19 Batt**

### 3.2. Construction Types for Exposure E

Wall Type ..... **Annex Building Wall**
1st Window Type ..... **1x1**
Door Type ..... **Door**

### 3.3. Construction Types for Exposure N

Wall Type ..... **Annex Building Wall**
1st Window Type ..... **1x1**
Door Type ..... **Door**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... **0.10** CFM/ft²
Design Heating ..... **0.20** CFM/ft²
Energy Analysis ..... **0.00** CFM
Infiltration occurs only when the fan is off.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

## 105 Elevator Lobby

### 1. General Details:

Floor Area ..... **150.0** ft²
Avg. Ceiling Height ..... **11.0** ft
Building Weight ..... **70.0** lb/ft²

### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Reception area**
OA Requirement 1 ..... **5.0** CFM/person
OA Requirement 2 ..... **0.06** CFM/ft²
Space Usage Defaults ..... **ASHRAE Std 62.1-2013**

### 2. Internals:

### 2.1. Overhead Lighting:

Fixture Type ..... **Recessed (Unvented)**
Wattage ..... **1.00** W/ft²
Ballast Multiplier ..... **1.00**
Schedule ..... **Lighting**

### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft²
Schedule ..... **None**

### 2.3. Electrical Equipment:

Wattage ..... **1.00** W/ft²
Schedule ..... **Equipment**

### 2.4. People:

Occupancy ..... **3.0** People
Activity Level ..... **Office Work**
Sensible ..... **245.0** BTU/hr/person
Latent ..... **205.0** BTU/hr/person
Schedule ..... **Occupancy**

### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr
Schedule ..... **None**
Latent ..... **0** BTU/hr
Schedule ..... **None**

### 3. Walls, Windows, Doors:

| Exp. | Wall Gross Area (ft²) | Window 1 Qty. | Window 2 Qty. | Door 1 Qty. |
|---|---|---|---|---|
| S | 107.0 | 74 | 0 | 1 |

### 3.1. Construction Types for Exposure S

Wall Type ..... **Face Brick + R-19 Batt**
1st Window Type ..... **Glass Block**
Door Type ..... **Door**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... **0.10** CFM/ft²
Design Heating ..... **0.20** CFM/ft²
Energy Analysis ..... **0.00** CFM
Infiltration occurs only when the fan is off.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

## 106 Computer Room

### 1. General Details:

Floor Area ..... **413.0** ft²
Avg. Ceiling Height ..... **16.0** ft
Building Weight ..... **70.0** lb/ft²

### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**
OA Requirement 1 ..... **5.0** CFM/person
OA Requirement 2 ..... **0.06** CFM/ft²
Space Usage Defaults ..... **ASHRAE Std 62.1-2013**

### 2. Internals:

### 2.1. Overhead Lighting:

Fixture Type ..... **Recessed (Unvented)**
Wattage ..... **1.50** W/ft²
Ballast Multiplier ..... **1.00**
Schedule ..... **Lighting**

### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft²
Schedule ..... **None**

### 2.3. Electrical Equipment:

Wattage ..... **2.00** W/ft²
Schedule ..... **Equipment**

### 2.4. People:

Occupancy ..... **5.0** People
Activity Level ..... **Office Work**
Sensible ..... **245.0** BTU/hr/person
Latent ..... **205.0** BTU/hr/person
Schedule ..... **Occupancy**

### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr
Schedule ..... **None**
Latent ..... **0** BTU/hr
Schedule ..... **None**

### 3. Walls, Windows, Doors:

| Exp. | Wall Gross Area (ft²) | Window 1 Qty. | Window 2 Qty. | Door 1 Qty. |
|---|---|---|---|---|
| W | 298.0 | 14 | 0 | 0 |
| E | 232.0 | 24 | 0 | 1 |
| S | 350.0 | 24 | 0 | 0 |

### 3.1. Construction Types for Exposure W

Wall Type ..... **Annex Building Wall**
1st Window Type ..... **1x1**

### 3.2. Construction Types for Exposure E

Wall Type ..... **Annex Building Wall**
1st Window Type ..... **1x1**
Door Type ..... **Door**

### 3.3. Construction Types for Exposure S

Wall Type ..... **Annex Building Wall**
1st Window Type ..... **1x1**

### 4. Roofs, Skylights:

| Exp. | Roof Gross Area (ft²) | Roof Slope (deg.) | Skylight Qty. |
|---|---|---|---|
| H | 413.0 | 0 | 11 |

### 4.1. Construction Types for Exposure H

Roof Type ..... **Built-up Roof + Plywood + R-22 Batt**
Skylight Type ..... **Skylight**

### 5. Infiltration:

Design Cooling ..... **0.10** CFM/ft²
Design Heating ..... **0.20** CFM/ft²
Energy Analysis ..... **0.00** CFM
Infiltration occurs only when the fan is off.

**6. Floors:**

| | | |
|---|---|---|
| Type | **Slab Floor On Grade** | |
| Floor Area | **413.0** | ft² |
| Total Floor U-Value | **0.250** | BTU/(hr·ft²·°F) |
| Exposed Perimeter | **54.5** | ft |
| Edge Insulation R-Value | **0.00** | (hr·ft²·°F)/BTU |

**7. Partitions:**

**(No partition data).**

## 107 Women's Restroom

### 1. General Details:

Floor Area ..... **115.0** ft²
Avg. Ceiling Height ..... **11.0** ft
Building Weight ..... **70.0** lb/ft²

### 1.1. OA Ventilation Requirements:

Space Usage ..... **User-Defined**
OA Requirement 1 ..... **5.0** CFM/person
OA Requirement 2 ..... **0.06** CFM/ft²
Space Usage Defaults ..... **ASHRAE Std 62.1-2013**

### 2. Internals:

### 2.1. Overhead Lighting:

Fixture Type ..... **Recessed (Unvented)**
Wattage ..... **1.00** W/ft²
Ballast Multiplier ..... **1.00**
Schedule ..... **Lighting**

### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft²
Schedule ..... **None**

### 2.3. Electrical Equipment:

Wattage ..... **0.50** W/ft²
Schedule ..... **Equipment**

### 2.4. People:

Occupancy ..... **0.0** Person
Activity Level ..... **Office Work**
Sensible ..... **245.0** BTU/hr/person
Latent ..... **205.0** BTU/hr/person
Schedule ..... **None**

### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr
Schedule ..... **None**
Latent ..... **0** BTU/hr
Schedule ..... **None**

### 3. Walls, Windows, Doors:

| Exp. | Wall Gross Area (ft²) | Window 1 Qty. | Window 2 Qty. | Door 1 Qty. |
|---|---|---|---|---|
| S | 146.0 | 38 | 0 | 0 |

### 3.1. Construction Types for Exposure S

Wall Type ..... **Old Building Wall**
1st Window Type ..... **1x1**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... **0.10** CFM/ft²
Design Heating ..... **0.20** CFM/ft²
Energy Analysis ..... **0.00** CFM
Infiltration occurs only when the fan is off.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

## 108 Kitchenette

### 1. General Details:

Floor Area ..... **72.0** ft²
Avg. Ceiling Height ..... **11.0** ft
Building Weight ..... **70.0** lb/ft²

### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Break room**
OA Requirement 1 ..... **5.0** CFM/person
OA Requirement 2 ..... **0.06** CFM/ft²
Space Usage Defaults ..... **ASHRAE Std 62.1-2013**

### 2. Internals:

### 2.1. Overhead Lighting:

Fixture Type ..... **Recessed (Unvented)**
Wattage ..... **1.00** W/ft²
Ballast Multiplier ..... **1.00**
Schedule ..... **Lighting**

### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft²
Schedule ..... **None**

### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft²
Schedule ..... **Equipment**

### 2.4. People:

Occupancy ..... **2.0** People
Activity Level ..... **Office Work**
Sensible ..... **245.0** BTU/hr/person
Latent ..... **205.0** BTU/hr/person
Schedule ..... **Occupancy**

### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr
Schedule ..... **None**
Latent ..... **0** BTU/hr
Schedule ..... **None**

### 3. Walls, Windows, Doors:

| Exp. | Wall Gross Area (ft²) | Window 1 Qty. | Window 2 Qty. | Door 1 Qty. |
|---|---|---|---|---|
| W | 68.0 | 0 | 0 | 0 |

### 3.1. Construction Types for Exposure W

Wall Type ..... **Face Brick + R-19 Batt**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... **0.10** CFM/ft²
Design Heating ..... **0.20** CFM/ft²
Energy Analysis ..... **0.00** CFM
Infiltration occurs only when the fan is off.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

## 110 Lobby Meeting Room

### 1. General Details:

Floor Area ..... **470.0** ft²
Avg. Ceiling Height ..... **11.0** ft
Building Weight ..... **70.0** lb/ft²

### 1.1. OA Ventilation Requirements:

Space Usage ..... **GENERAL: Conference/meeting**
OA Requirement 1 ..... **5.0** CFM/person
OA Requirement 2 ..... **0.06** CFM/ft²
Space Usage Defaults ..... **ASHRAE Std 62.1-2013**

### 2. Internals:

### 2.1. Overhead Lighting:

Fixture Type ..... **Recessed (Unvented)**
Wattage ..... **1.50** W/ft²
Ballast Multiplier ..... **1.00**
Schedule ..... **Lighting**

### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft²
Schedule ..... **None**

### 2.3. Electrical Equipment:

Wattage ..... **1.50** W/ft²
Schedule ..... **Equipment**

### 2.4. People:

Occupancy ..... **10.0** People
Activity Level ..... **Office Work**
Sensible ..... **245.0** BTU/hr/person
Latent ..... **205.0** BTU/hr/person
Schedule ..... **Occupancy**

### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr
Schedule ..... **None**
Latent ..... **0** BTU/hr
Schedule ..... **None**

### 3. Walls, Windows, Doors:

| Exp. | Wall Gross Area (ft²) | Window 1 Qty. | Window 2 Qty. | Door 1 Qty. |
|---|---|---|---|---|
| N | 205.0 | 73 | 0 | 0 |
| E | 20.0 | 0 | 0 | 0 |

### 3.1. Construction Types for Exposure N

Wall Type ..... **Old Building Wall**
1st Window Type ..... **1x1**

### 3.2. Construction Types for Exposure E

Wall Type ..... **Annex Building Wall**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... **0.10** CFM/ft²
Design Heating ..... **0.20** CFM/ft²
Energy Analysis ..... **0.00** CFM
Infiltration occurs only when the fan is off.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

## 202 Training Room

### 1. General Details:
Floor Area ..... **687.0** ft²
Avg. Ceiling Height ..... **10.3** ft
Building Weight ..... **70.0** lb/ft²

### 1.1. OA Ventilation Requirements:
Space Usage ..... **EDUCATION: Lecture classroom**
OA Requirement 1 ..... **7.5** CFM/person
OA Requirement 2 ..... **0.06** CFM/ft²
Space Usage Defaults ..... **ASHRAE Std 62.1-2013**

### 2. Internals:
### 2.1. Overhead Lighting:
Fixture Type ..... **Recessed (Unvented)**
Wattage ..... **1.50** W/ft²
Ballast Multiplier ..... **1.00**
Schedule ..... **Lighting**

### 2.2. Task Lighting:
Wattage ..... **0.00** W/ft²
Schedule ..... **None**

### 2.3. Electrical Equipment:
Wattage ..... **1.00** W/ft²
Schedule ..... **Equipment**

### 2.4. People:
Occupancy ..... **16.0** People
Activity Level ..... **Office Work**
Sensible ..... **245.0** BTU/hr/person
Latent ..... **205.0** BTU/hr/person
Schedule ..... **Occupancy**

### 2.5. Miscellaneous Loads:
Sensible ..... **0** BTU/hr
Schedule ..... **None**
Latent ..... **0** BTU/hr
Schedule ..... **None**

### 3. Walls, Windows, Doors:

| Exp. | Wall Gross Area (ft²) | Window 1 Qty. | Window 2 Qty. | Door 1 Qty. |
|---|---|---|---|---|
| N | 237.0 | 75 | 0 | 0 |
| E | 318.0 | 60 | 0 | 0 |

### 3.1. Construction Types for Exposure N
Wall Type ..... **Face Brick + R-19 Batt**
1st Window Type ..... **1x1**

### 3.2. Construction Types for Exposure E
Wall Type ..... **Annex Building Wall**
1st Window Type ..... **1x1**

### 4. Roofs, Skylights:
**(No Roof or Skylight data).**

### 5. Infiltration:
Design Cooling ..... **0.10** CFM/ft²
Design Heating ..... **0.20** CFM/ft²
Energy Analysis ..... **0.00** CFM
Infiltration occurs only when the fan is off.

### 6. Floors:
Type ..... **Floor Above Conditioned Space**
**(No additional input required for this floor type).**

### 7. Partitions:
**(No partition data).**

## 205 Elevator Lobby

### 1. General Details:

Floor Area ..... **142.0** ft²
Avg. Ceiling Height ..... **10.3** ft
Building Weight ..... **70.0** lb/ft²

### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Reception area**
OA Requirement 1 ..... **5.0** CFM/person
OA Requirement 2 ..... **0.06** CFM/ft²
Space Usage Defaults ..... **ASHRAE Std 62.1-2013**

### 2. Internals:

### 2.1. Overhead Lighting:

Fixture Type ..... **Recessed (Unvented)**
Wattage ..... **1.00** W/ft²
Ballast Multiplier ..... **1.00**
Schedule ..... **Lighting**

### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft²
Schedule ..... **None**

### 2.3. Electrical Equipment:

Wattage ..... **1.00** W/ft²
Schedule ..... **Equipment**

### 2.4. People:

Occupancy ..... **2.0** People
Activity Level ..... **Office Work**
Sensible ..... **245.0** BTU/hr/person
Latent ..... **205.0** BTU/hr/person
Schedule ..... **Occupancy**

### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr
Schedule ..... **None**
Latent ..... **0** BTU/hr
Schedule ..... **None**

### 3. Walls, Windows, Doors:

| Exp. | Wall Gross Area (ft²) | Window 1 Qty. | Window 2 Qty. | Door 1 Qty. |
|---|---|---|---|---|
| S | 105.0 | 104 | 0 | 0 |
| E | 33.0 | 32 | 0 | 0 |

### 3.1. Construction Types for Exposure S

Wall Type ..... **Face Brick + R-19 Batt**
1st Window Type ..... **Glass Block**

### 3.2. Construction Types for Exposure E

Wall Type ..... **Face Brick + R-19 Batt**
1st Window Type ..... **Glass Block**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... **0.10** CFM/ft²
Design Heating ..... **0.20** CFM/ft²
Energy Analysis ..... **0.00** CFM
Infiltration occurs only when the fan is off.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

## 207 Men's Restroom

### 1. General Details:

Floor Area ..... **122.0** ft²
Avg. Ceiling Height ..... **10.3** ft
Building Weight ..... **70.0** lb/ft²

### 1.1. OA Ventilation Requirements:

Space Usage ..... **User-Defined**
OA Requirement 1 ..... **5.0** CFM/person
OA Requirement 2 ..... **0.06** CFM/ft²
Space Usage Defaults ..... **ASHRAE Std 62.1-2013**

### 2. Internals:

### 2.1. Overhead Lighting:

Fixture Type ..... **Recessed (Unvented)**
Wattage ..... **1.00** W/ft²
Ballast Multiplier ..... **1.00**
Schedule ..... **Lighting**

### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft²
Schedule ..... **None**

### 2.3. Electrical Equipment:

Wattage ..... **0.50** W/ft²
Schedule ..... **Equipment**

### 2.4. People:

Occupancy ..... **0.0** Person
Activity Level ..... **Office Work**
Sensible ..... **245.0** BTU/hr/person
Latent ..... **205.0** BTU/hr/person
Schedule ..... **None**

### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr
Schedule ..... **None**
Latent ..... **0** BTU/hr
Schedule ..... **None**

### 3. Walls, Windows, Doors:

| Exp. | Wall Gross Area (ft²) | Window 1 Qty. | Window 2 Qty. | Door 1 Qty. |
|---|---|---|---|---|
| S | 242.0 | 23 | 0 | 0 |

### 3.1. Construction Types for Exposure S

Wall Type ..... **Old Building Wall**
1st Window Type ..... **1x1**

### 4. Roofs, Skylights:

| Exp. | Roof Gross Area (ft²) | Roof Slope (deg.) | Skylight Qty. |
|---|---|---|---|
| H | 122.0 | 0 | 0 |

### 4.1. Construction Types for Exposure H

Roof Type ..... **Built-up Roof + Plywood + R-22 Batt**

### 5. Infiltration:

Design Cooling ..... **0.10** CFM/ft²
Design Heating ..... **0.20** CFM/ft²
Energy Analysis ..... **0.00** CFM
Infiltration occurs only when the fan is off.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

## 208 Corridor

### 1. General Details:
Floor Area ..... **28.0** ft²
Avg. Ceiling Height ..... **10.3** ft
Building Weight ..... **70.0** lb/ft²

### 1.1. OA Ventilation Requirements:
Space Usage ..... **GENERAL: Corridor**
OA Requirement 1 ..... **0.0** CFM/person
OA Requirement 2 ..... **0.06** CFM/ft²
Space Usage Defaults ..... **ASHRAE Std 62.1-2013**

### 2. Internals:
### 2.1. Overhead Lighting:
Fixture Type ..... **Recessed (Unvented)**
Wattage ..... **1.00** W/ft²
Ballast Multiplier ..... **1.00**
Schedule ..... **Lighting**

### 2.2. Task Lighting:
Wattage ..... **0.00** W/ft²
Schedule ..... **None**

### 2.3. Electrical Equipment:
Wattage ..... **0.50** W/ft²
Schedule ..... **Equipment**

### 2.4. People:
Occupancy ..... **0.0** Person
Activity Level ..... **Office Work**
Sensible ..... **245.0** BTU/hr/person
Latent ..... **205.0** BTU/hr/person
Schedule ..... **None**

### 2.5. Miscellaneous Loads:
Sensible ..... **0** BTU/hr
Schedule ..... **None**
Latent ..... **0** BTU/hr
Schedule ..... **None**

### 3. Walls, Windows, Doors:
**(No Wall, Window, Door data).**

### 4. Roofs, Skylights:
**(No Roof or Skylight data).**

### 5. Infiltration:
Design Cooling ..... **0.00** CFM
Design Heating ..... **0.00** CFM
Energy Analysis ..... **0.00** CFM
Infiltration occurs only when the fan is off.

### 6. Floors:
Type ..... **Floor Above Conditioned Space**
**(No additional input required for this floor type).**

### 7. Partitions:
**(No partition data).**

## 210 Conference Room

### 1. General Details:

| | | |
|---|---|---|
| Floor Area | **157.0** | ft² |
| Avg. Ceiling Height | **10.3** | ft |
| Building Weight | **70.0** | lb/ft² |

### 1.1. OA Ventilation Requirements:

| | | |
|---|---|---|
| Space Usage | **GENERAL: Conference/meeting** | |
| OA Requirement 1 | **5.0** | CFM/person |
| OA Requirement 2 | **0.06** | CFM/ft² |
| Space Usage Defaults | **ASHRAE Std 62.1-2013** | |

### 2. Internals:

### 2.1. Overhead Lighting:

| | | |
|---|---|---|
| Fixture Type | **Recessed (Unvented)** | |
| Wattage | **1.50** | W/ft² |
| Ballast Multiplier | **1.00** | |
| Schedule | **Lighting** | |

### 2.2. Task Lighting:

| | | |
|---|---|---|
| Wattage | **0.00** | W/ft² |
| Schedule | **None** | |

### 2.3. Electrical Equipment:

| | | |
|---|---|---|
| Wattage | **1.50** | W/ft² |
| Schedule | **Equipment** | |

### 2.4. People:

| | | |
|---|---|---|
| Occupancy | **6.0** | People |
| Activity Level | **Office Work** | |
| Sensible | **245.0** | BTU/hr/person |
| Latent | **205.0** | BTU/hr/person |
| Schedule | **Occupancy** | |

### 2.5. Miscellaneous Loads:

| | | |
|---|---|---|
| Sensible | **0** | BTU/hr |
| Schedule | **None** | |
| Latent | **0** | BTU/hr |
| Schedule | **None** | |

### 3. Walls, Windows, Doors:

**(No Wall, Window, Door data).**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

| | | |
|---|---|---|
| Design Cooling | **0.00** | CFM |
| Design Heating | **0.00** | CFM |
| Energy Analysis | **0.00** | CFM |

Infiltration occurs only when the fan is off.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**

**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

## 211 Adminstrative Office

### 1. General Details:

Floor Area ..... **263.0** ft²
Avg. Ceiling Height ..... **10.3** ft
Building Weight ..... **70.0** lb/ft²

### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**
OA Requirement 1 ..... **5.0** CFM/person
OA Requirement 2 ..... **0.06** CFM/ft²
Space Usage Defaults ..... **ASHRAE Std 62.1-2013**

### 2. Internals:

### 2.1. Overhead Lighting:

Fixture Type ..... **Recessed (Unvented)**
Wattage ..... **1.50** W/ft²
Ballast Multiplier ..... **1.00**
Schedule ..... **Lighting**

### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft²
Schedule ..... **None**

### 2.3. Electrical Equipment:

Wattage ..... **2.00** W/ft²
Schedule ..... **Equipment**

### 2.4. People:

Occupancy ..... **4.0** People
Activity Level ..... **Office Work**
Sensible ..... **245.0** BTU/hr/person
Latent ..... **205.0** BTU/hr/person
Schedule ..... **Occupancy**

### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr
Schedule ..... **None**
Latent ..... **0** BTU/hr
Schedule ..... **None**

### 3. Walls, Windows, Doors:

| Exp. | Wall Gross Area (ft²) | Window 1 Qty. | Window 2 Qty. | Door 1 Qty. |
|---|---|---|---|---|
| N | 185.0 | 56 | 0 | 0 |
| E | 20.0 | 0 | 0 | 0 |

### 3.1. Construction Types for Exposure N

Wall Type ..... **Old Building Wall**
1st Window Type ..... **1x1**

### 3.2. Construction Types for Exposure E

Wall Type ..... **Annex Building Wall**

### 4. Roofs, Skylights:

**(No Roof or Skylight data).**

### 5. Infiltration:

Design Cooling ..... **0.10** CFM/ft²
Design Heating ..... **0.20** CFM/ft²
Energy Analysis ..... **0.00** CFM
Infiltration occurs only when the fan is off.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

## 302 Business Incubator

### 1. General Details:

Floor Area ..... **674.0** ft²
Avg. Ceiling Height ..... **11.0** ft
Building Weight ..... **70.0** lb/ft²

### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**
OA Requirement 1 ..... **5.0** CFM/person
OA Requirement 2 ..... **0.06** CFM/ft²
Space Usage Defaults ..... **ASHRAE Std 62.1-2013**

### 2. Internals:

### 2.1. Overhead Lighting:

Fixture Type ..... **Recessed (Unvented)**
Wattage ..... **1.50** W/ft²
Ballast Multiplier ..... **1.00**
Schedule ..... **Lighting**

### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft²
Schedule ..... **None**

### 2.3. Electrical Equipment:

Wattage ..... **2.00** W/ft²
Schedule ..... **Equipment**

### 2.4. People:

Occupancy ..... **10.0** People
Activity Level ..... **Office Work**
Sensible ..... **245.0** BTU/hr/person
Latent ..... **205.0** BTU/hr/person
Schedule ..... **Occupancy**

### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr
Schedule ..... **None**
Latent ..... **0** BTU/hr
Schedule ..... **None**

### 3. Walls, Windows, Doors:

| Exp. | Wall Gross Area (ft²) | Window 1 Qty. | Window 2 Qty. | Door 1 Qty. |
|---|---|---|---|---|
| N | 255.0 | 33 | 0 | 0 |
| E | 341.0 | 36 | 0 | 0 |

### 3.1. Construction Types for Exposure N

Wall Type ..... **Face Brick + R-19 Batt**
1st Window Type ..... **1x1**

### 3.2. Construction Types for Exposure E

Wall Type ..... **Annex Building Wall**
1st Window Type ..... **1x1**

### 4. Roofs, Skylights:

| Exp. | Roof Gross Area (ft²) | Roof Slope (deg.) | Skylight Qty. |
|---|---|---|---|
| H | 674.0 | 0 | 81 |

### 4.1. Construction Types for Exposure H

Roof Type ..... **Built-up Roof + Plywood + R-22 Batt**
Skylight Type ..... **Skylight**

### 5. Infiltration:

Design Cooling ..... **0.10** CFM/ft²
Design Heating ..... **0.20** CFM/ft²
Energy Analysis ..... **0.00** CFM
Infiltration occurs only when the fan is off.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

## 305 Elevator Lobby

### 1. General Details:

Floor Area ..... **142.0** ft²
Avg. Ceiling Height ..... **11.0** ft
Building Weight ..... **70.0** lb/ft²

### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Reception area**
OA Requirement 1 ..... **5.0** CFM/person
OA Requirement 2 ..... **0.06** CFM/ft²
Space Usage Defaults ..... **ASHRAE Std 62.1-2013**

### 2. Internals:

### 2.1. Overhead Lighting:

Fixture Type ..... **Recessed (Unvented)**
Wattage ..... **1.00** W/ft²
Ballast Multiplier ..... **1.00**
Schedule ..... **Lighting**

### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft²
Schedule ..... **None**

### 2.3. Electrical Equipment:

Wattage ..... **1.00** W/ft²
Schedule ..... **Equipment**

### 2.4. People:

Occupancy ..... **2.0** People
Activity Level ..... **Office Work**
Sensible ..... **245.0** BTU/hr/person
Latent ..... **205.0** BTU/hr/person
Schedule ..... **Occupancy**

### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr
Schedule ..... **None**
Latent ..... **0** BTU/hr
Schedule ..... **None**

### 3. Walls, Windows, Doors:

| Exp. | Wall Gross Area (ft²) | Window 1 Qty. | Window 2 Qty. | Door 1 Qty. |
|---|---|---|---|---|
| S | 132.0 | 100 | 0 | 0 |
| E | 50.0 | 46 | 0 | 0 |

### 3.1. Construction Types for Exposure S

Wall Type ..... **Face Brick + R-19 Batt**
1st Window Type ..... **Glass Block**

### 3.2. Construction Types for Exposure E

Wall Type ..... **Face Brick + R-19 Batt**
1st Window Type ..... **Glass Block**

### 4. Roofs, Skylights:

| Exp. | Roof Gross Area (ft²) | Roof Slope (deg.) | Skylight Qty. |
|---|---|---|---|
| H | 142.0 | 0 | 0 |

### 4.1. Construction Types for Exposure H

Roof Type ..... **Built-up Roof + Plywood + R-22 Batt**

### 5. Infiltration:

Design Cooling ..... **0.10** CFM/ft²
Design Heating ..... **0.20** CFM/ft²
Energy Analysis ..... **0.00** CFM
Infiltration occurs only when the fan is off.

### 6. Floors:

Type ..... **Floor Above Conditioned Space**
**(No additional input required for this floor type).**

### 7. Partitions:

**(No partition data).**

## 307 Workroom

### 1. General Details:

Floor Area ..... **430.0** ft²
Avg. Ceiling Height ..... **11.0** ft
Building Weight ..... **70.0** lb/ft²

### 1.1. OA Ventilation Requirements:

Space Usage ..... **OFFICE: Office space**
OA Requirement 1 ..... **5.0** CFM/person
OA Requirement 2 ..... **0.06** CFM/ft²
Space Usage Defaults ..... **ASHRAE Std 62.1-2013**

### 2. Internals:

### 2.1. Overhead Lighting:

Fixture Type ..... **Recessed (Unvented)**
Wattage ..... **1.00** W/ft²
Ballast Multiplier ..... **1.00**
Schedule ..... **Lighting**

### 2.2. Task Lighting:

Wattage ..... **0.00** W/ft²
Schedule ..... **None**

### 2.3. Electrical Equipment:

Wattage ..... **2.00** W/ft²
Schedule ..... **Equipment**

### 2.4. People:

Occupancy ..... **7.0** People
Activity Level ..... **Office Work**
Sensible ..... **245.0** BTU/hr/person
Latent ..... **205.0** BTU/hr/person
Schedule ..... **Occupancy**

### 2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr
Schedule ..... **None**
Latent ..... **0** BTU/hr
Schedule ..... **None**

### 3. Walls, Windows, Doors:

| Exp. | Wall Gross Area (ft²) | Window 1 Qty. | Window 2 Qty. | Door 1 Qty. |
|---|---|---|---|---|
| N | 206.0 | 16 | 0 | 0 |
| E | 20.0 | 0 | 0 | 0 |
| W | 20.0 | 0 | 0 | 0 |
| S | 55.0 | 12 | 0 | 0 |

### 3.1. Construction Types for Exposure N

Wall Type ..... **Face Brick + R-19 Batt**
1st Window Type ..... **1x1**

### 3.2. Construction Types for Exposure E

Wall Type ..... **Face Brick + R-19 Batt**

### 3.3. Construction Types for Exposure W

Wall Type ..... **Face Brick + R-19 Batt**

### 3.4. Construction Types for Exposure S

Wall Type ..... **Old Building Wall**
1st Window Type ..... **1x1**

### 4. Roofs, Skylights:

| Exp. | Roof Gross Area (ft²) | Roof Slope (deg.) | Skylight Qty. |
|---|---|---|---|
| H | 430.0 | 0 | 0 |

### 4.1. Construction Types for Exposure H

Roof Type ..... **Built-up Roof + Plywood + R-22 Batt**

### 5. Infiltration:

Design Cooling ..... **0.10** CFM/ft²
Design Heating ..... **0.20** CFM/ft²
Energy Analysis ..... **0.00** CFM
Infiltration occurs only when the fan is off.

**6. Floors:**

Type ..... **Floor Above Conditioned Space**

**(No additional input required for this floor type).**

**7. Partitions:**

**(No partition data).**

# Air System Sizing Summary for 1205 Liverpool Street

Project Name: 1205 Liverpool Street 12/02/2020
Prepared by: Allen & Shariff Engineering, LLC 04:48PM

## Air System Information

| | | | | | |
|---|---|---|---|---|---|
| Air System Name | **1205 Liverpool Street** | | Number of zones | **1** | |
| Equipment Class | **SPLT AHU** | | Floor Area | **5793.0** | ft² |
| Air System Type | **SZCAV** | | Location | **Pittsburgh IAP, Pennsylvania** | |

## Sizing Calculation Information

| | | | | | |
|---|---|---|---|---|---|
| Calculation Months | **Jan to Dec** | | Zone CFM Sizing | **Sum of space airflow rates** | |
| Sizing Data | **Calculated** | | Space CFM Sizing | **Individual peak space loads** | |

## Central Cooling Coil Sizing Data

| | | | | | |
|---|---|---|---|---|---|
| Total coil load | **17.8** | Tons | Load occurs at | **Aug 1400** | |
| Total coil load | **213.1** | MBH | OA DB / WB | **88.4 / 71.8** | °F |
| Sensible coil load | **179.3** | MBH | Entering DB / WB | **75.6 / 62.5** | °F |
| Coil CFM at Aug 1400 | **8217** | CFM | Leaving DB / WB | **54.5 / 53.3** | °F |
| Max block CFM | **8217** | CFM | Coil ADP | **52.1** | °F |
| Sum of peak zone CFM | **8217** | CFM | Bypass Factor | **0.100** | |
| Sensible heat ratio | **0.841** | | Resulting RH | **47** | % |
| CFM/Ton | **462.8** | | Design supply temp. | **55.0** | °F |
| ft²/Ton | **326.2** | | Zone T-stat Check | **1 of 1** | OK |
| BTU/(hr·ft²) | **36.8** | | Max zone temperature deviation | **0.0** | °F |
| Water flow @ 10.0 °F rise | **N/A** | | | | |

## Central Heating Coil Sizing Data

| | | | | | |
|---|---|---|---|---|---|
| Max coil load | **161.9** | MBH | Load occurs at | **Des Htg** | |
| Coil CFM at Des Htg | **8217** | CFM | BTU/(hr·ft²) | **27.9** | |
| Max coil CFM | **8217** | CFM | Ent. DB / Lvg DB | **63.7 / 82.8** | °F |
| Water flow @ 20.0 °F drop | **N/A** | | | | |

## Supply Fan Sizing Data

| | | | | | |
|---|---|---|---|---|---|
| Actual max CFM | **8217** | CFM | Fan motor BHP | **1.13** | BHP |
| Standard CFM | **7860** | CFM | Fan motor kW | **0.89** | kW |
| Actual max CFM/ft² | **1.42** | CFM/ft² | Fan static | **0.50** | in wg |

## Outdoor Ventilation Air Data

| | | | | | |
|---|---|---|---|---|---|
| Design airflow CFM | **783** | CFM | CFM/person | **9.91** | CFM/person |
| CFM/ft² | **0.14** | CFM/ft² | | | |

# Zone Sizing Summary for 1205 Liverpool Street

Project Name: 1205 Liverpool Street 12/02/2020
Prepared by: Allen & Shariff Engineering, LLC 04:48PM

## Air System Information

Air System Name ..... **1205 Liverpool Street**
Equipment Class ..... **SPLT AHU**
Air System Type ..... **SZCAV**

Number of zones ..... **1**
Floor Area ..... **5793.0** ft²
Location ..... **Pittsburgh IAP, Pennsylvania**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**
Sizing Data ..... **Calculated**

Zone CFM Sizing ..... **Sum of space airflow rates**
Space CFM Sizing ..... **Individual peak space loads**

## Zone Terminal Sizing Data

| Zone Name | Design Supply Airflow (CFM) | Minimum Supply Airflow (CFM) | Zone CFM/ft² | Reheat Coil Load (MBH) | Reheat Coil Water gpm @ 20.0 °F | Zone Htg Unit Coil Load (MBH) | Zone Htg Unit Water gpm @ 20.0 °F | Mixing Box Fan Airflow (CFM) |
|---|---|---|---|---|---|---|---|---|
| Zone 1 | 7806 | 7806 | 1.35 | 0.0 | - | 0.0 | - | 0 |

## Zone Peak Sensible Loads

| Zone Name | Zone Cooling Sensible (MBH) | Time of Peak Sensible Cooling Load | Zone Heating Load (MBH) | Zone Floor Area (ft²) |
|---|---|---|---|---|
| Zone 1 | 140.6 | Aug 1500 | 104.6 | 5793.0 |

## Space Loads and Airflows

| Zone Name / Space Name | Mult. | Cooling Sensible (MBH) | Time of Peak Sensible Load | Air Flow (CFM) | Heating Load (MBH) | Floor Area (ft²) | Space CFM/ft² |
|---|---|---|---|---|---|---|---|
| *Zone 1* | | | | | | | |
| 000 Mechanical Room | 1 | 2.2 | Jul 1700 | 130 | 4.7 | 197.0 | 0.66 |
| 001a Electrical Panel | 1 | 2.4 | Jul 1700 | 120 | 2.0 | 287.0 | 0.42 |
| 002 Data Tele | 1 | 1.2 | Jul 1700 | 63 | 1.5 | 103.0 | 0.61 |
| 005 Elev Mech Room | 1 | 0.9 | Jan 1700 | 48 | 0.0 | 40.0 | 1.21 |
| 007 Storage | 1 | 1.1 | Sep 1700 | 58 | 1.6 | 150.0 | 0.39 |
| 008 Storage | 1 | 0.7 | Jan 1700 | 36 | 0.0 | 141.0 | 0.26 |
| 010 Corridor | 1 | 0.8 | Jan 1700 | 42 | 0.0 | 162.0 | 0.26 |
| 011 Storage | 1 | 1.4 | Jul 1700 | 72 | 2.6 | 203.0 | 0.36 |
| 102 Resource Center | 1 | 14.4 | Jul 1500 | 735 | 9.6 | 645.0 | 1.14 |
| 105 Elevator Lobby | 1 | 10.6 | Oct 1400 | 539 | 4.7 | 150.0 | 3.59 |
| 106 Computer Room | 1 | 14.6 | Jul 1600 | 743 | 14.2 | 413.0 | 1.80 |
| 107 Women's Restroom | 1 | 3.8 | Sep 1500 | 194 | 4.0 | 115.0 | 1.69 |
| 108 Kitchenette | 1 | 1.2 | Jul 1700 | 63 | 0.4 | 72.0 | 0.88 |
| 110 Lobby Meeting Room | 1 | 9.2 | Jul 1700 | 471 | 6.1 | 470.0 | 1.00 |
| 202 Training Room | 1 | 13.9 | Jul 1500 | 708 | 8.1 | 687.0 | 1.03 |
| 205 Elevator Lobby | 1 | 12.3 | Oct 1400 | 624 | 6.8 | 142.0 | 4.40 |
| 207 Men's Restroom | 1 | 4.7 | Sep 1600 | 241 | 6.6 | 122.0 | 1.97 |
| 208 Corridor | 1 | 0.1 | Jan 1700 | 7 | 0.0 | 28.0 | 0.26 |
| 210 Conference Room | 1 | 3.0 | Jan 1700 | 151 | 0.0 | 157.0 | 0.96 |
| 211 Adminstrative Office | 1 | 5.9 | Jul 1700 | 302 | 5.3 | 263.0 | 1.15 |
| 302 Business Incubator | 1 | 26.5 | Jun 1400 | 1348 | 12.9 | 674.0 | 2.00 |
| 305 Elevator Lobby | 1 | 12.7 | Sep 1400 | 648 | 8.1 | 142.0 | 4.56 |
| 307 Workroom | 1 | 9.1 | Aug 1500 | 464 | 5.2 | 430.0 | 1.08 |

# Ventilation Sizing Summary for 1205 Liverpool Street

Project Name: 1205 Liverpool Street
Prepared by: Allen & Shariff Engineering, LLC

12/02/2020
04:48PM

## 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**
Design Ventilation Airflow Rate ..... **783** CFM

## 2. Space Ventilation Analysis

| Zone Name / Space Name | Mult. | Floor Area (ft²) | Maximum Occupants | Maximum Supply Air (CFM) | Required Outdoor Air (CFM/person) | Required Outdoor Air (CFM/ft²) | Required Outdoor Air (CFM) | Required Outdoor Air (% of supply) | Uncorrected Outdoor Air (CFM) |
|---|---|---|---|---|---|---|---|---|---|
| **Zone 1** | | | | | | | | | |
| 000 Mechanical Room | 1 | 197.0 | 0.0 | 129.5 | 5.00 | 0.06 | 0.0 | 0.0 | 11.8 |
| 001a Electrical Panel | 1 | 287.0 | 0.0 | 120.1 | 0.00 | 0.06 | 0.0 | 0.0 | 17.2 |
| 002 Data Tele | 1 | 103.0 | 1.0 | 63.1 | 5.00 | 0.06 | 0.0 | 0.0 | 11.2 |
| 005 Elev Mech Room | 1 | 40.0 | 1.0 | 48.3 | 5.00 | 0.06 | 0.0 | 0.0 | 7.4 |
| 007 Storage | 1 | 150.0 | 0.0 | 58.2 | 5.00 | 0.06 | 0.0 | 0.0 | 9.0 |
| 008 Storage | 1 | 141.0 | 0.0 | 36.5 | 5.00 | 0.06 | 0.0 | 0.0 | 8.5 |
| 010 Corridor | 1 | 162.0 | 0.0 | 41.9 | 0.00 | 0.06 | 0.0 | 0.0 | 9.7 |
| 011 Storage | 1 | 203.0 | 0.0 | 72.3 | 5.00 | 0.06 | 0.0 | 0.0 | 12.2 |
| 102 Resource Center | 1 | 645.0 | 10.0 | 735.2 | 5.00 | 0.06 | 0.0 | 0.0 | 88.7 |
| 105 Elevator Lobby | 1 | 150.0 | 3.0 | 538.6 | 5.00 | 0.06 | 0.0 | 0.0 | 24.0 |
| 106 Computer Room | 1 | 413.0 | 5.0 | 742.6 | 5.00 | 0.06 | 0.0 | 0.0 | 49.8 |
| 107 Women's Restroom | 1 | 115.0 | 0.0 | 193.8 | 5.00 | 0.06 | 0.0 | 0.0 | 6.9 |
| 108 Kitchenette | 1 | 72.0 | 2.0 | 63.5 | 5.00 | 0.06 | 0.0 | 0.0 | 14.3 |
| 110 Lobby Meeting Room | 1 | 470.0 | 10.0 | 471.0 | 5.00 | 0.06 | 0.0 | 0.0 | 78.2 |
| 202 Training Room | 1 | 687.0 | 16.0 | 707.5 | 7.50 | 0.06 | 0.0 | 0.0 | 161.2 |
| 205 Elevator Lobby | 1 | 142.0 | 2.0 | 624.5 | 5.00 | 0.06 | 0.0 | 0.0 | 18.5 |
| 207 Men's Restroom | 1 | 122.0 | 0.0 | 240.7 | 5.00 | 0.06 | 0.0 | 0.0 | 7.3 |
| 208 Corridor | 1 | 28.0 | 0.0 | 7.2 | 0.00 | 0.06 | 0.0 | 0.0 | 1.7 |
| 210 Conference Room | 1 | 157.0 | 6.0 | 150.6 | 5.00 | 0.06 | 0.0 | 0.0 | 39.4 |
| 211 Adminstrative Office | 1 | 263.0 | 4.0 | 301.8 | 5.00 | 0.06 | 0.0 | 0.0 | 35.8 |
| 302 Business Incubator | 1 | 674.0 | 10.0 | 1348.2 | 5.00 | 0.06 | 0.0 | 0.0 | 90.4 |
| 305 Elevator Lobby | 1 | 142.0 | 2.0 | 647.8 | 5.00 | 0.06 | 0.0 | 0.0 | 18.5 |
| 307 Workroom | 1 | 430.0 | 7.0 | 463.6 | 5.00 | 0.06 | 0.0 | 0.0 | 60.8 |
| **Totals (incl. Space Multipliers)** | | | | **7806.5** | | | | | **782.6** |

# Air System Design Load Summary for 1205 Liverpool Street

Project Name: 1205 Liverpool Street 12/02/2020
Prepared by: Allen & Shariff Engineering, LLC 04:48PM

| | DESIGN COOLING | | | DESIGN HEATING | | |
|---|---|---|---|---|---|---|
| | COOLING DATA AT Aug 1400<br>COOLING OA DB / WB 88.4 °F / 71.8 °F | | | HEATING DATA AT DES HTG<br>HEATING OA DB / WB 2.0 °F / 0.3 °F | | |
| **ZONE LOADS** | **Details** | **Sensible (BTU/hr)** | **Latent (BTU/hr)** | **Details** | **Sensible (BTU/hr)** | **Latent (BTU/hr)** |
| Window & Skylight Solar Loads | 1065 ft² | 39811 | - | 1065 ft² | - | - |
| Wall Transmission | 3430 ft² | 9794 | - | 3430 ft² | 30898 | - |
| Roof Transmission | 1689 ft² | 5856 | - | 1689 ft² | 5934 | - |
| Window Transmission | 973 ft² | 5296 | - | 973 ft² | 33115 | - |
| Skylight Transmission | 92 ft² | 588 | - | 92 ft² | 3679 | - |
| Door Loads | 84 ft² | 3666 | - | 84 ft² | 3084 | - |
| Floor Transmission | 1602 ft² | 0 | - | 1602 ft² | 6955 | - |
| Partitions | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Ceiling | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Overhead Lighting | 7448 W | 20808 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 7905 W | 26970 | - | 0 | 0 | - |
| People | 79 | 14976 | 16195 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 12777 | 1620 | 25% | 20916 | 0 |
| **>> Total Zone Loads** | **-** | **140543** | **17815** | **-** | **104580** | **0** |
| Zone Conditioning | - | 157726 | 17815 | - | 104553 | 0 |
| Plenum Wall Load | 0% | 0 | - | 0 | 0 | - |
| Plenum Roof Load | 0% | 0 | - | 0 | 0 | - |
| Plenum Lighting Load | 0% | 0 | - | 0 | 0 | - |
| Return Fan Load | 8217 CFM | 0 | - | 8217 CFM | 0 | - |
| Ventilation Load | 783 CFM | 11470 | 15967 | 783 CFM | 55133 | 0 |
| Supply Fan Load | 8217 CFM | 3046 | - | 8217 CFM | -3046 | - |
| Space Fan Coil Fans | - | 0 | - | - | 0 | - |
| Duct Heat Gain / Loss | 5% | 7027 | - | 5% | 5229 | - |
| **>> Total System Loads** | **-** | **179269** | **33782** | **-** | **161869** | **0** |
| Central Cooling Coil | - | 179269 | 33808 | - | 0 | 0 |
| Central Heating Coil | - | 0 | - | - | 161869 | - |
| **>> Total Conditioning** | **-** | **179269** | **33808** | **-** | **161869** | **0** |
| **Key:** | **Positive values are clg loads<br>Negative values are htg loads** | | | **Positive values are htg loads<br>Negative values are clg loads** | | |

**August DESIGN COOLING DAY, 1400**

## TABLE 1: SYSTEM DATA

| Component | Location | Dry-Bulb Temp (°F) | Specific Humidity (lb/lb) | Airflow (CFM) | CO2 Level (ppm) | Sensible Heat (BTU/hr) | Latent Heat (BTU/hr) |
|---|---|---|---|---|---|---|---|
| Ventilation Air | Inlet | 88.4 | 0.01371 | 783 | 400 | 11470 | 15967 |
| Vent - Return Mixing | Outlet | 75.6 | 0.00964 | 8217 | 1402 | - | - |
| Central Cooling Coil | Outlet | 54.5 | 0.00874 | 8217 | 1402 | 179269 | 33808 |
| Central Heating Coil | Outlet | 54.5 | 0.00874 | 8217 | 1402 | 0 | - |
| Supply Fan | Outlet | 54.8 | 0.00874 | 8217 | 1402 | 3046 | - |
| Cold Supply Duct | Outlet | 55.7 | 0.00874 | 7806 | 1402 | - | - |
| Zone Air | - | 75.2 | 0.00924 | 7806 | 1513 | 157726 | 17815 |
| Return Plenum | Outlet | 75.2 | 0.00924 | 7806 | 1513 | 0 | - |
| Duct Leakage Air | Outlet | 54.8 | 0.00874 | 411 | 1402 | - | - |
| Return Duct | Outlet | 74.2 | 0.00921 | 8217 | 1507 | - | - |

*Air Density x Heat Capacity x Conversion Factor: At sea level = 1.080; At site altitude = 1.033 BTU/(hr-CFM-F)*
*Air Density x Heat of Vaporization x Conversion Factor: At sea level = 4746.6; At site altitude = 4540.4 BTU/(hr-CFM)*
*Site Altitude = 1224.0 ft*

## TABLE 2: ZONE DATA

| Zone Name | Zone Sensible Load (BTU/hr) | T-stat Mode | Zone Cond (BTU/hr) | Zone Temp (°F) | Zone Airflow (CFM) | CO2 Level (ppm) | Terminal Heating Coil (BTU/hr) | Zone Heating Unit (BTU/hr) |
|---|---|---|---|---|---|---|---|---|
| Zone 1 | 140543 | Cooling | 157726 | 75.2 | 7806 | 1513 | 0 | 0 |

## WINTER DESIGN HEATING

### TABLE 1: SYSTEM DATA

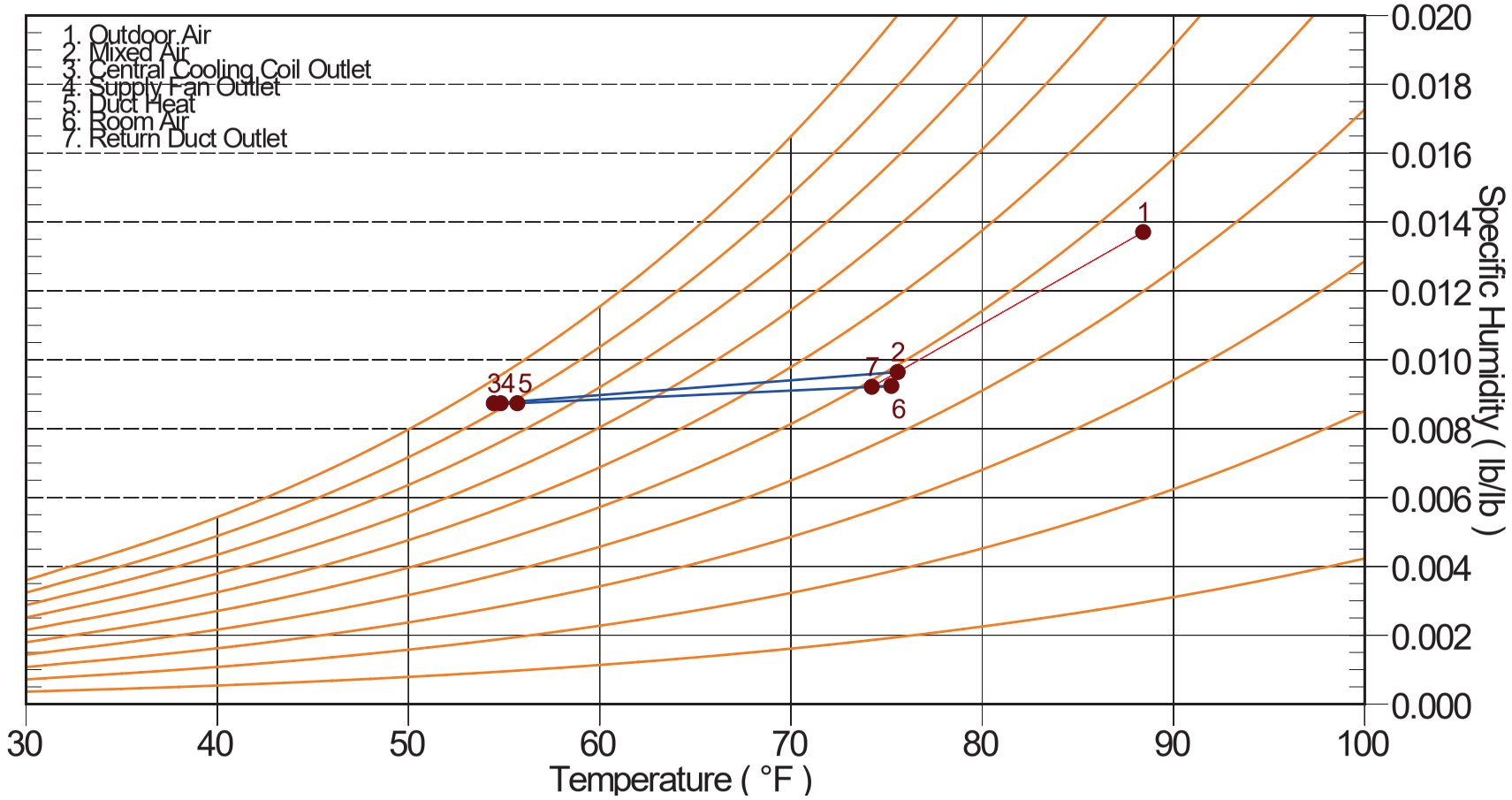
| Component | Location | Dry-Bulb Temp (°F) | Specific Humidity (lb/lb) | Airflow (CFM) | CO2 Level (ppm) | Sensible Heat (BTU/hr) | Latent Heat (BTU/hr) |
|---|---|---|---|---|---|---|---|
| Ventilation Air | Inlet | 2.0 | 0.00046 | 783 | 400 | -55133 | 0 |
| Vent - Return Mixing | Outlet | 63.7 | 0.00046 | 8217 | 489 | - | - |
| Central Cooling Coil | Outlet | 63.7 | 0.00046 | 8217 | 489 | 0 | 0 |
| Central Heating Coil | Outlet | 82.8 | 0.00046 | 8217 | 489 | 161869 | - |
| Supply Fan | Outlet | 83.1 | 0.00046 | 8217 | 489 | 3046 | - |
| Cold Supply Duct | Outlet | 82.5 | 0.00046 | 7806 | 489 | - | - |
| Zone Air | - | 69.5 | 0.00046 | 7806 | 499 | -104553 | 0 |
| Return Plenum | Outlet | 69.5 | 0.00046 | 7806 | 499 | 0 | - |
| Duct Leakage Air | Outlet | 83.1 | 0.00046 | 411 | 489 | - | - |
| Return Duct | Outlet | 70.2 | 0.00046 | 8217 | 499 | - | - |

*Air Density x Heat Capacity x Conversion Factor: At sea level = 1.080; At site altitude = 1.033 BTU/(hr-CFM-F)*
*Air Density x Heat of Vaporization x Conversion Factor: At sea level = 4746.6; At site altitude = 4540.4 BTU/(hr-CFM)*
*Site Altitude = 1224.0 ft*

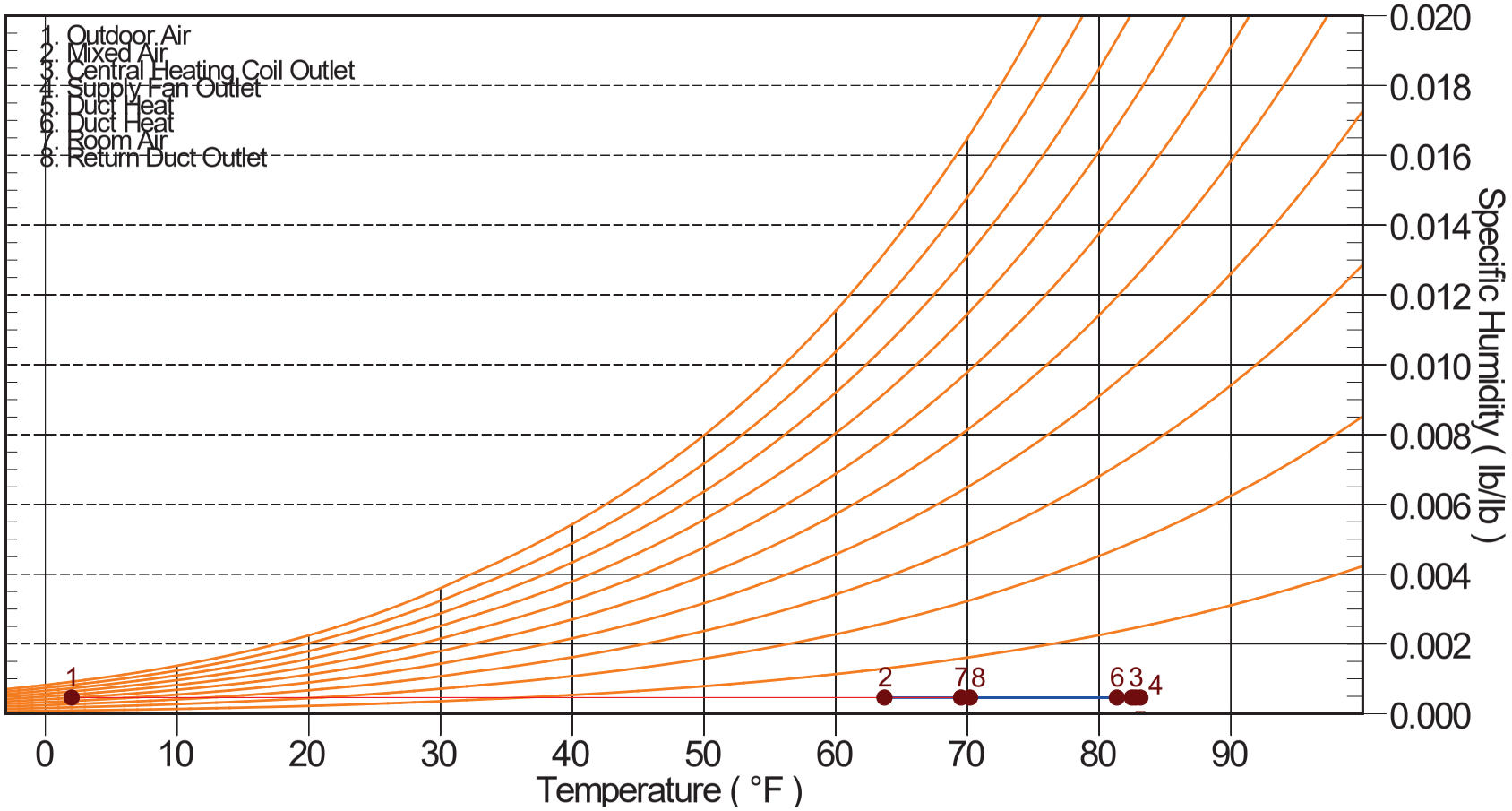
### TABLE 2: ZONE DATA

| Zone Name | Zone Sensible Load (BTU/hr) | T-stat Mode | Zone Cond (BTU/hr) | Zone Temp (°F) | Zone Airflow (CFM) | CO2 Level (ppm) | Terminal Heating Coil (BTU/hr) | Zone Heating Unit (BTU/hr) |
|---|---|---|---|---|---|---|---|---|
| Zone 1 | -104580 | Heating | -104553 | 69.5 | 7806 | 499 | 0 | 0 |

Location: Pittsburgh IAP, Pennsylvania
Altitude: 1224.0 ft.
Data for: August DESIGN COOLING DAY, 1400



Location: Pittsburgh IAP, Pennsylvania
Altitude: 1224.0 ft.
Data for: WINTER DESIGN HEATING



## 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, Development and Opportunities Center

1. Project Location: 1205 Liverpool Street, Pittsburgh, Pennsylvania

B. Owner: (HACP) Housing Authority of the City of Pittsburgh, 412 Boulevard of the Allies, Pittsburgh, Pennsylvania 15219.

1. HACP Contact: Morgan Block, 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
   Vincent Trevino

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: Allen & Shariff Engineering, Inc.
   a. Representative: Alex Radkoff

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 facility. 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 structural remediation work, roofing replacement, HVAC replacement, lighting replacement, fire alarm replacement and associated patch and reconstruction.

3. Electrical Prime Contractor: The Scope of Work includes but shall not be limited to the wiring and installation of new fixtures and equipment.

4. Mechanical Prime Contractor: The Scope of Work includes but shall not be limited to the replacement of HVAC equipment and associated ductwork.

5. Plumbing Prime Contractor: NO PLUMBING WORK; plumbing work is limited to piping associated with mechanical systems.

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 – ALTERNATES

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 alternates.

1. Certain items are specified in the Contract Documents by Alternate. Alternates have been established to define specific scopes of work subject to deletion from the project.

B. Types of Alternates include the following:

1. Deduct Alternates.

C. Alternates Defined:

1. **Alternate No. 1 - HVAC Deduct Alternate. The Contractors shall furnish an alternate, inclusive of all labor, materials, tax, overhead and profit, to deduct the cost of new furnaces FCU-B-1, FCU-B-2, and FCU-3-1 from the project scope. All work associated with replacement of this equipment shall be included in the deduct including but not limited to furnaces, condensing units, ductwork, controls, water and gas piping, electrical wiring, general partition construction and ceiling and wall patch. All prime contractors shall furnish independent deduct pricing reflecting the value of their respective scopes.**
2. **Alternate No.2 - Electrical Deduct Alternate. The Contractors shall furnish an alternate, inclusive of all labor, materials, tax, overhead and profit, to deduct the cost of new led lighting from the project scope. All work associated with the replacement of existing fixtures shall be included in the deduct including but not limited to fixtures, switches, wiring, wirless and wired controls, control panels, programming, general ceiling and wall patch. All prime contractors shall furnish independent deduct pricing reflecting the value of their respective scopes.**

1.3 COORDINATION

A. Coordinate work defined by Alternate with other portions of the Work.

1. 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 (Not Used)

END OF SECTION 012100

# 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 017000 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

### 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.

The existing structure shall remain occupied and in use for the duration of construction activities. Coordination with the occupant shall be conducted and a work schedule agreed to by all parties, including but not limited to the Occupant, HACP Construction Manager/Representative, Architect and Contractors prior to the onset of work. No portion of the project site shall be unusable to the tenant/Occupant for a period of longer than 5 business days. Where completion of the work requires temporary relocation of Occupant furniture, fixtures and equipment, Contractor shall be responsible for temporary relocation and replacement.

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 the Opportunities Center.
6. Coordinate access to the Opportunities 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: The Architect 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: Development and Opportunities Center

GAA Project Number: 2035

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 the Opportunities 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 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 013100 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.

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 7 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 10 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 Development 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 017000 - EXECUTION AND CLOSEOUT REQUIREMENTS

## PART 1 - GENERAL

### 1.1 CLOSEOUT SUBMITTALS

A. 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.

B. Operation and Maintenance Data: Submit one (1) 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.

### 1.2 CLOSEOUT PROCEDURES

A. Substantial Completion: Before requesting Substantial Completion inspection, complete the following:

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, maintenance service agreements, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Submit record Drawings, operation and maintenance manuals, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items.
7. Make final changeover of permanent locks and deliver keys to Owner.
8. Complete startup testing of systems.
9. Remove temporary facilities and controls.

10. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
11. Complete final cleaning requirements, including touchup painting.
12. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will proceed with inspection or advise Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will advise Contractor of items that must be completed or corrected before certificate will be issued.

C. Request inspection for Final Completion, once the following are complete:

1. Submit a copy of Substantial Completion inspection list stating that each item has been completed or otherwise resolved for acceptance.
2. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

D. Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

E. Submit a written request for final inspection for acceptance. On receipt of request, Architect will proceed with inspection or advise Contractor of unfulfilled requirements. Architect will prepare final Certificate for Payment after inspection or will advise Contractor of items that must be completed or corrected before certificate will be issued.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 EXAMINATION AND PREPARATION

A. Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Verify compatibility with and suitability of substrates.
2. Examine roughing-in for mechanical and electrical systems.
3. Examine walls, floors, and roofs for suitable conditions.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Take field measurements as required to fit the Work properly. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication.

D. Verify space requirements and dimensions of items shown diagrammatically on Drawings.

## 3.2 CONSTRUCTION LAYOUT AND FIELD ENGINEERING

A. Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks.

B. Engage a land surveyor to lay out the Work using accepted surveying practices.

## 3.3 INSTALLATION

A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated. Make vertical work plumb and make horizontal work level.

1. Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections to form hairline joints.
2. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
3. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.

B. Comply with manufacturer's written instructions and recommendations.

C. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

D. Use products, cleaners, and installation materials that are not considered hazardous.

E. Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place. Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed.

## 3.4 CUTTING AND PATCHING

A. Provide temporary support of work to be cut. Do not cut structural members without prior written approval of Architect.

B. Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

C. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

1. Restore exposed finishes of patched areas and extend finish restoration into adjoining construction in a manner that will minimize evidence of patching and refinishing.
2. 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 with adjacent surfaces.

## 3.5 CLEANING

A. Clean Project site and work areas daily, including common areas. Dispose of materials lawfully.

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.
3. Remove debris from concealed spaces before enclosing the space.

B. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion:

1. Remove labels that are not permanent.
2. Clean transparent materials, including mirrors. Remove excess glazing compounds. Replace chipped or broken glass.
3. Clean exposed finishes to a dust-free condition, free of stains, films, and foreign substances. Sweep concrete floors broom clean.
4. Vacuum carpeted surfaces and wax resilient flooring.
5. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication. Clean plumbing fixtures. Clean light fixtures, lamps, globes, and reflectors.
6. Clean Project site, yard, and grounds, in areas disturbed by construction activities. Sweep paved areas; remove stains, spills, and foreign deposits. Rake grounds to a smooth, even-textured surface.

## 3.6 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 017000**

## 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 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 075323 – SURE WHITE FLEECEBACK ADHERED (EPDM) ROOFING**

**PART 1 - GENERAL**

1.1 SUMMARY

A. Section Includes:

1. Adhered SURE WHITE FLEECEBACK 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 4637-96, Type III, 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. (Or Equal.)
2. Thickness: 115 mils nominal.
3. Exposed Face Color: White.

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: EPDM, partially cured or cured, according to application.
C. Protection Sheet: Epichlorohydrin or neoprene non-reinforced flexible sheet as 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.
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.

3.6 ROOF ACCESS

A. Contractor shall be responsible for roof access at all times during construction. Access shall be provided via lift. The contractor shall bear responsibility for storage, security and permitting of lift.

**END OF SECTION 075323**

# 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. Luxury Vinyl Tile (U/T)
B. Resilient rubber base.

### 1.2 REFERENCES

A. ASTM E84 - Surface Burning Characteristics of Building Materials
B. ASTM F1700 – Class III Printed Film Plank Type B.
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 manufacturer's installation instructions.

### 1.5 OPERATION AND MAINTENANCE DATA

A. Submit cleaning and maintenance data under provisions of Division 1.
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 – LUXURY VINYL TILE

A. SHAW CONTRACT, SOLITUDE (Color to be selected from Manufacturer’s full range.)

### 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.
E. Engineered Wood Underlayment: Minimum Thickness ¼" as recommended by the 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. Beginning of installation means acceptance of existing substrate and site conditions.

### 3.2 PREPARATION

A. Remove sub-floor ridges and bumps. Install ¼" underlayment throughout. 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 0965**

## 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 220010 - PLUMBING GENERAL REQUIREMENTS

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. These basic Plumbing Requirements are specifically applicable to all Plumbing Division Sections, in addition to Division 01 - General Requirements, the General Conditions and the Supplementary General Conditions which also apply to this division.

B. This Section includes instructions on general project objectives, alternates, allowances, as-built drawings, submittals, regulatory requirements, demolition instructions, and installation instructions.

### 1.2 DEFINITIONS

A. Any reference in this Division to "this Contractor", "Contractor" or reference to furnish or install or to supply any work with no reference to the Contractor responsible shall be furnished and installed under this division.

B. "Provide "- Furnish and install.

C. "Furnish" - Obtain and deliver to the job for installation by other trades.

D. "Install" - Set and connect an equipment item furnished by others. Place item in full operating condition.

E. Plumbing and Plumber are used inter-changeably and have the same meaning.

### 1.3 INTENT OF DRAWINGS

A. Separate drawings have been prepared for the convenience of the General, Fire Suppression, Plumbing, Heating and Electrical Trades. Their work is generally shown under the proper heading however; drawings listed are part of each contract insofar as they are applicable. Particularly as they apply to space limitations, obstructions, type of construction, and space requirements for the installation of other trades work.

B. The drawings are diagrammatic and additional transitions, offsets, fittings, drains, vents and drips shall be provided as may be required to install the systems, even if not shown, at no additional cost.

C. The drawings take precedence over the specifications where there is conflicting information or whichever is more stringent.

D. The systems shall be complete, ready for operation with all components required, including items which may not be fully shown or specified. Items not shown, fully detailed or specified, but required for a complete system shall be provided at no extra cost and shall conform to accepted trade practices. Connect every fixture, valve, piping, plumbing devices, and equipment items.

1.4 AS-BUILT DRAWINGS

A. During construction, the Contractor shall maintain a separate reproducible set of Xerox Mylar Mechanical drawings on which he shall record the exact location of all concealed piping and ductwork which is not installed as shown. These "as built" drawings shall be delivered to the Professional at the end of the job.

1.5 SUBMITTALS AND SUBSTITUTIONS

A. Submit under provisions of the General Requirements all products in this division. Submit shop drawings and product data only if manufacturers or products supplied deviate from the specification requirements, space indicated or capacities scheduled. Shop drawings submitted because of deviations shall be submitted as instructed in this section and in the further instructions given in the individual sections. Products fully complying with these specifications do not have to be submitted.

B. Submit Substitutions under provisions of the General Requirements and Conditions and the instructions given in this section of the specifications.

C. Basis of Design: Where drawings and specifications call for certain manufacturers, product will be by the manufacturers listed and in conformance with the product description. Where drawings and specifications call for materials of certain manufacturers, the contract shall be based on materials specified. In both instances, the first named manufacturer is the basis of design. Other manufacturers are listed and acceptable, but it is the contractor’s responsibility to verify capacities, sizes, weights, etc of the non-basis of design approved manufacturers. The contractor will pay additional costs related to modifications to the systems and/or structure required by the use of the non-basis of design product. If the Contractor wishes to offer substitutions for consideration he must request approval 10 days prior to bid opening. Any substitutions made after the bid is received will not be accepted.

D. Full Drawings: Submit field checked and coordinated equipment room piping and ductwork layouts at 3/8" equals 1'0" and ductwork layouts of the floor plans at 1/4" equals 1'0" scale.

E. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal. Highlight equipment data. General Catalog data will be returned unless custom highlighted.

F. Mark dimensions and values in units to match those specified. List any differences between the product submitted and the product specified and shown on the drawings.

G. Materials and equipment shall be new and shall of good quality and equal in all respects to the products of well recognized and reputable United States' manufacturers.

H. Within 15 days after the award of a contract, the Contractor shall submit a complete list of materials and sub-contractors he proposes to use for approval.

I. Manufacturer's installation diagrams shall be provided for all equipment requiring shop drawings. Shop drawings shall be submitted in a timely manner for examination and comment.

J. Approval shall be considered as general only and as aid to the Contractor. Any items missed in review and/or are counter to the drawings or do not relieve the Contractor from the necessity of furnishing the materials and performing all work as required by the plans and specifications. Review of shop drawing does not constitute the Professional takes responsibly the shop drawings are correct or complete and is only a convenience to the contractor to correct any errors made by the contractor or vendor.

## 1.6 REGULATORY REQUIREMENTS

A. Conform to the following codes:

1. International Mechanical Code/2015 Edition.
2. International Building Code/2015 Edition.
3. International Plumbing Code/2015 Edition
4. Building Code amendments as adopted by the local jurisdiction.

B. Nothing in the Contract Documents shall be construed to conflict with any laws, ordinances or regulations of authorities having jurisdiction over the contract work and all requirements shall be complied with throughout, without additional cost to the Using Agency.

C. Obtain permits, pay any fees and request inspections from authority having jurisdiction.

D. All mechanical equipment shall bear the label of an approved agency.

## 1.7 PROJECT/SITE CONDITIONS

A. Install Work in locations shown on Drawings, unless prevented by Project conditions.

B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other sections. Obtain permission of Professional/Professional before proceeding.

C. The Contractor is solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours. The duty of the Professional to visit the site is not intended to include review of the adequacy of the Contractor's safety in, on, or near the construction site.

1.8 CHASES, CUTTING AND PATCHING

A. This trade shall cooperate with the General trade, advising him of the sizes, number and locations of all openings, recesses, access doors and panels, and pipe sleeves required to properly install his pipe lines, ducts etc. Unless otherwise shown or noted all piping, ducts etc., in finished rooms shall be completely concealed in partitions or furred spaces. The Plumbing trade shall install required sleeves which shall be built into place as the general construction proceeds.

B. Cutting where necessary for Plumbing work shall be done by the Plumbing Trade in a neat and careful manner to prevent damage or weakening of walls, roof or floors and shall meet the approval of the Professional/Professional. Patching caused by the Plumbing Trade shall be done by the Plumbing Trade for holes up to 12"x 12" (one square foot). Patching material shall match adjacent surfaces. Larger holes shall be cut and patched by the General Trade at the expense of the Plumbing Trade.

**PART 2 - PRODUCTS**

2.1 FIRE BARRIER MATERIALS

A. Approved fill material for fire barriers shall be packed mineral wool, T & B Flame-Safe, 3M Fire Barrier caulk or Dow Corning RTV foam. Approved protective devices shall be UL listed fire dampers for ductwork and UL listed "link-seals" for piping. Large shaft and wall openings around ducts and piping and shaft floors where fire ratings must be maintained shall be infilled with 3M Inc. fire barrier wall sheets.

2.2 ACCESS DOORS

A. Manufacturers:
   1. Access doors shall be of metal with mounting frame and screw driver operated CAM lock latches flush with panel face. Provide 2 hour fire rated and 3 hour fire rated doors where required for shaft walls and fire rated floors and ceilings. See Professional drawings for locations of fire rated walls. Doors shall have continuous hinges.

**PART 3 - EXECUTION**

3.1 INSTALLATION

A. Install equipment in accordance with the instructions in these specifications and as shown on the drawings. In lieu of a where a specific item is not detailed, install in accordance with industry standards.

B. Euipment shall be installed in accordance with the instructions which shall be available at the job site. If the installation instructions are contrary to the work shown or specified, the contractor shall consult the Professional before proceeding with the installation.

3.2 PROCEDURE AND COORDINATION

A. Pipe lines, valves, etc., other than Plumbing contract work shall be under installation throughout the building site and this Contractor shall consult with all other trades to coordinate the assembly and installation of all trades to avoid conflict and need for rearrangement, as no extras shall be granted due to lack of coordination. This applies particularly to locations of ducts, heating and plumbing pipes, electric conduits, recessed lights fixtures, etc., which occur in close quarters such as furred walls, columns & ceilings, pipe and duct shafts etc., and where minimum head clearances shall be maintained.

B. Do not install piping in transformer rooms, electric equipment rooms, electric closets or generator rooms unless they serve these spaces. Do not install piping adjacent to electric devices. Provide double containment piping with drain if piping must be installed above or adjacent to electric panels or devices.

C. Plumbing equipment shall be installed in a manner to permit ease of service and the Plumbing n Contractor shall inform other trades of access requirement to prevent interference with same.

D. New piping, valves, fixtures, equipment, etc. shall be installed so that it does not interfere with access to existing valves, access doors, equipment, etc.

E. Protect unfinished work from damage. Seal off portions of the piping not being worked on to permit continued service and to prevent the entry of dirt. Repair or replace any damage caused by the installation of the Pluming systems.

3.3 PROTECTION OF BUILDING FIRE/SMOKE BARRIERS

A. Passages of pipes through fire barriers and/or smoke barriers shall be protected as follows:

1. The space between the penetrating item and the fire barrier and/or smoke barrier shall be filled with a material capable of maintaining the fire/smoke resistance of the barrier or be protected by an approved device design for the specific purpose.

B. Where the penetrating item uses a sleeve to penetrate the fire and/or smoke barrier the sleeve shall be solidly set in the fire/smoke barrier and the space between the item and the sleeve shall be filled as described below.

1. Piping shall stop at each side of a fire barrier and the void space between the item and the rated barrier shall be protected. Void space between fire barriers and piping subject to surface condensation shall be filled with caulk or foam material capable of preventing vapor transmission. Sufficient room shall be maintained for expansion.

C. Fire barriers shall include 1-hour, 2-hour, 3-hour and 4-hour UL rated floors and walls. Refer to Professional plans for location of fire barriers and smoke barriers and provide protection required to maintain ratings in accordance with all codes the applicable codes.

D. Approved fill material for fire barriers shall be packed mineral wool, T & B Flame-Safe, 3M Fire Barrier caulk or Dow Corning RTV foam. Approved protective devices shall be UL listed piping and UL listed "link-seals" for piping. Large shaft and wall openings around piping and shaft floors where fire ratings must be maintained shall be infilled with 3M Inc. fire barrier wall sheets.

## 3.4 ACCESS DOORS

A. Install access doors where shown on the drawings and where required to service equipment concealed behind walls, ceilings, or floors. Accessible ceilings do not require access doors. Minimum size 12”x6".

## 3.5 PAINTING

A. In finished spaces, painting of Plumbing equipment, apparatus and piping shall be done by the Painting Trade under the General Trade Specification, except where specified to be done by the Plumbing Trade.

B. Uncoated ferrous surfaces located outdoors, including ferrous metal piping covered by insulation, shall be painted at the job site with one coat of rust inhibited metal primer and one coat of exterior grade, enamel l paint applied by the Plumbing Trade.

C. Clean surfaces of loose rust and remove any residue oil or coatings down to bare surface suitable for painting. Paint uncoated ferrous surfaces with one coat of rust inhibited metal primer and one coat of industrial grade; two-part epoxy based interior paint. Do not paint galvanized metal, aluminum, copper or factory painted surfaces.

3.6 INTERFERENCE DRAWINGS

A. The contractor shall arrange with his subcontractors to prepare "Interference Drawings" immediately after the award of the contract. This shall be accomplished as set forth below.

B. The Mechanical Subcontractor shall initiate the drawings by preparing plans and sections by either hand drawing or in electronic CADD format at a scale of 1/4" to 1'-0" for the floor plans and at 3/8" to 1'-0" for the Mechanical Room plans, or larger if desired, on which he shall show all ducts, fans, air handling units, coils, filters, dampers, grilles, louvers, registers, piping, appliances, and equipment. The drawings shall clearly show the structural conditions into which his work will be incorporated. The Mechanical shop drawings and shop sheets of approved items shall be used in the preparation of the interference drawings. All items shall be drawing to scale in an accurate manner. If required, he shall consult with the Mechanical consulting Professional. At the completion of the drawings, he shall furnish re-producible sepia or in suitable electronic CADD format drawings and forward them to the Plumbing Subcontractor.

C. The Plumbing Subcontractor shall then add all plumbing piping and equipment to the drawings, using the sizes of the approved items, and depicting them accurately. The plumbing items shall be positioned to avoid interference with the Mechanical work, and the Plumbing Subcontractor shall consult with the Mechanical Contractor as required if interferences arise. All unresolved locations shall be discussed with the Plumbing consulting Professional. After the drawings have been completed to the satisfaction of both the Mechanical and Plumbing Subcontractors, the Plumbing Contractor shall furnish new reproducible sepia or electronic medium drawings and forward them to the Electrical Subcontractor.

D. The Electrical Subcontractor shall add his work to the drawings, showing conduit runs; pull boxes, panel boards, and all other equipment. Where interferences arise, he shall resolve them through discussions with the Mechanical Subcontractors, or with the electrical consulting Professional. After the installations are shown to the satisfaction of the Mechanical and Electrical Subcontractors, the Electrical Subcontractor shall forward new reproducible sepia or electronic medium drawings to the Professional.

E. The General Contractor shall advise his subcontractors for mechanical and electric work of the grid pattern for acoustical ceilings, the depth of acoustical and plastered ceiling systems, locations of hangers, and all else whatsoever which will affect the mechanical and electrical installations.

F. The Professional and the consulting Professionals will review the drawings, and after corrections and/or approval, shall return them to the General Contractor, who shall have the drawings printed for his own use and for distribution to his subcontractors. Two prints are required for each subcontractor, and four for the Professional.

G. The preparation of the drawings shall take place immediately following the award of the contract. Installation work shall be performed in the accordance with the interference drawings.

3.7 CLEANUP

A. Tools, benches and other workmen's materials and appliances shall be removed from the premises after formal and final approval of completion is given. The premises shall be cleaned of all remaining debris. Clean lose dust from the area.

3.8 INSTRUCTIONS and OPERATION AND MAINTENANCE MANUALS

A. See section 01700.

B. Upon final acceptance and turning over of the project to the Using Agency, make available qualified persons fully familiar with the installation and capable of instructing the Using Agency's staff in the operation, care and manipulation of the various systems.

C. Provide to Using Agency three copies of; final submittals, all shop drawings, equipment and piping layouts, valve tagging charts, operation and maintenance data on equipment furnished, list of suppliers and service organizations for each piece of equipment, spare parts list, warranty information, as-built drawings and all other information requested in Execution section of the mechanical sections of these specifications. Assemble into loose leaf binders indexed by tabs per each item with table of contents.

3.9 WARRANTY

A. Refer to Division 01 for general warranty requirements. Review Division 22 sections for additional installation and equipment warranties.

B. The plumbing contractor shall guarantee that apparatus is of best grade and quality and that work has been done in strict accord with the specifications and drawings. Correct defects in workmanship, materials and equipment that develop within one year from date of acceptance by repair or replacement.

**END OF SECTION 220010**

## SECTION 220517 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

### PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Sleeves.
2. Grout.

1.3 ACTION SUBMITTALS

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

### PART 2 - PRODUCTS

2.1 SLEEVES

A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

2.2 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

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

D. Packaging: Premixed and factory packaged.

**PART 3 - EXECUTION**

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

C. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 079200 "Joint Sealants."

D. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.2 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Concrete Slabs above Grade:

a. Piping Smaller Than 2″: PVC-pipe sleeves.
b. Piping 2-1/2″ and Larger: Stack-sleeve fittings.

2. Interior Partitions:

a. Piping Smaller Than 2″: PVC-pipe sleeves.
b. Piping 2-1/2″ and Larger: Galvanized-steel-sheet sleeves.

**END OF SECTION 220517**

## SECTION 220518 - ESCUTCHEONS FOR PLUMBING PIPING

### PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Escutcheons.
2. Floor plates.

1.3 ACTION SUBMITTALS

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

### PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.

C. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.

D. Split-Casting Brass Type: With polished, chrome-plated finish and with concealed hinge and setscrew.

E. Split-Plate, Stamped-Steel Type: With chrome-plated finish, concealed hinge, and spring-clip fasteners.

2.2 FLOOR PLATES

A. One-Piece Floor Plates: Cast-iron flange.

B. Split-Casting Floor Plates: Cast brass with concealed hinge.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.

1. Escutcheons for New Piping:

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

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping: One-piece, floor-plate type.
2. Existing Piping: Split-casting, floor-plate type.

3.2 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons and floor plates using new materials.

**END OF SECTION 220518**

## SECTION 220523.12 - BALL VALVES FOR PLUMBING PIPING

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes:

1. Brass ball valves.
2. Bronze ball valves.

### 1.3 DEFINITIONS

A. CWP: Cold working pressure.

### 1.4 ACTION SUBMITTALS

A. Product Data: For each type of valve.

1. Certification that products comply with NSF 61 and NSF 372.

### 1.5 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, and soldered ends.
3. Set ball valves open to minimize exposure of functional surfaces.

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.

## PART 2 - PRODUCTS

### 2.1 GENERAL REQUIREMENTS FOR VALVES

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B1.20.1 for threads for threaded end valves.
2. ASME B16.1 for flanges on iron valves.
3. ASME B16.5 for flanges on steel valves.
4. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
5. ASME B16.18 for solder-joint connections.
6. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61 and NSF 372 for valve materials for potable-water service.

D. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.

E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

F. Valve Sizes: Same as upstream piping unless otherwise indicated.

G. Valve Actuator Types:
1. Handlever: For quarter-turn valves smaller than 2".

H. Valves in Insulated Piping:

1. Include 2-inch stem extensions.
2. Extended operating handles of nonthermal-conductive material and protective sleeves that allow operation of valves without breaking vapor seals or disturbing insulation.
3. Memory stops that are fully adjustable after insulation is applied.

### 2.2 BRASS BALL VALVES

A. One-Piece, Brass Ball Valves:

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

a. Kitz Corporation.

2. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 400 psig.
c. Body Design: One piece.
d. Body Material: Forged brass or bronze.
e. Ends: Threaded and soldered.
f. Seats: PTFE.
g. Stem: Brass or stainless steel.
h. Ball: Chrome-plated brass or stainless steel.
i. Port: Reduced.

B. Two-Piece, Brass Ball Valves with Full Port and Brass Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Conbraco Industries, Inc.; Apollo Valves.
   b. Crane Co.; Crane Valve Group; Crane Valves.
   c. Crane Co.; Crane Valve Group; Stockham Valves.
   d. Hammond Valve.
   e. Milwaukee Valve Company.
   f. NIBCO INC.
   g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

   a. Standard: MSS SP-110.
   b. CWP Rating: 600 psig.
   c. Body Design: Two piece.
   d. Body Material: Forged brass.
   e. Ends: Threaded and soldered.
   f. Seats: PTFE.
   g. Stem: Brass.
   h. Ball: Chrome-plated brass.
   i. Port: Full.

## 2.3 BRONZE BALL VALVES

A. One-Piece, Bronze Ball Valves with Bronze Trim:

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

   a. Conbraco Industries, Inc.; Apollo Valves.
   b. NIBCO INC.
   c. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

   a. Standard: MSS SP-110.

b. CWP Rating: 400 psig.
c. Body Design: One piece.
d. Body Material: Bronze.
e. Ends: Threaded.
f. Seats: PTFE.
g. Stem: Bronze.
h. Ball: Chrome-plated brass.
i. Port: Reduced.

B. One-Piece, Bronze Ball Valves with Stainless-Steel Trim:

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

a. Conbraco Industries, Inc.; Apollo Valves.
b. NIBCO INC.
c. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 600 psig.
c. Body Design: One piece.
d. Body Material: Bronze.
e. Ends: Threaded.
f. Seats: PTFE.
g. Stem: Stainless steel.
h. Ball: Stainless steel, vented.
i. Port: Reduced.

C. Two-Piece, Bronze Ball Valves with Full Port, and Bronze or Brass Trim:

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

a. Conbraco Industries, Inc.; Apollo Valves.
b. Crane Co.; Crane Valve Group; Crane Valves.
c. Hammond Valve.
d. Milwaukee Valve Company.
e. NIBCO INC.
f. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 600 psig.
c. Body Design: Two piece.
d. Body Material: Bronze.
e. Ends: Threaded and soldered.

f. Seats: PTFE.
g. Stem: Bronze or brass.
h. Ball: Chrome-plated brass.
i. Port: Full.

**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 valve tags. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

3.3 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.

B. Select valves with the following end connections:
1. For Steel Piping, NPS 2 and Smaller: Threaded ends.

2. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
3. For Steel Piping, NPS 5 and Larger: Flanged ends.

**END OF SECTION 220523.12**

## SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

### PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Fastener systems.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems and system contents.

1.5 ACTION SUBMITTALS

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

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.7 QUALITY ASSURANCE

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

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

**PART 2 - PRODUCTS**

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.2 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.3 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

**PART 3 - EXECUTION**

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches 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.

C. Install lateral bracing with pipe hangers and supports to prevent swaying.

D. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

E. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

3.2 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.3 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use carbon-steel pipe hangers and supports and attachments for general service applications.

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.
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.

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 24.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 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 Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
2. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
3. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

H. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
6. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
7. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
8. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.

I. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

**END OF SECTION 220529**

## SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

## PART 1 - GENERAL

### 1.1 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. Valve tags.

### 1.3 ACTION SUBMITTALS

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

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Valve numbering scheme.

D. Valve Schedules: For each piping system to include in maintenance manuals.

### 1.4 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

## PART 2 - PRODUCTS

### 2.1 EQUIPMENT LABELS

### 2.2 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.032-inch Stainless steel, 0.025-inch Aluminum, 0.032-inch or anodized aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass wire-link or beaded chain.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

## PART 3 - EXECUTION

### 3.1 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

a. Natural Gas: 2 inches, square.

2. Valve-Tag Color:

a. Natural Gas: Natural.

3. Letter Color:

a. Natural Gas: Black.

3.2 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

**END OF SECTION 220553**

## SECTION 221123 - FACILITY NATURAL-GAS PIPING

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes:

1. Pipes, tubes, and fittings.
2. Piping specialties.
3. Piping and tubing joining materials.
4. Valves.

### 1.3 DEFINITIONS

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

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

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

### 1.4 PERFORMANCE REQUIREMENTS

A. Minimum Operating-Pressure Ratings:

1. Piping and Valves: 0.5 minimum unless otherwise indicated.
2. Minimum Operating Pressure of Service Meter: 0.5 psig.

Natural-Gas System Pressure within Buildings: 0.5 psig or less.

C. Natural-Gas System Pressures within Buildings: One pressure range. Primary pressure is more than 0.5 psig but not more than 2 psig, and is reduced to secondary pressure of 0.5 psig or less.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of the following:

1. Piping specialties.
2. Corrugated, stainless-steel tubing with associated components.
3. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
4. Dielectric fittings.

B. Shop Drawings: For facility natural-gas piping layout. Include plans, piping layout and elevations, sections, and details for fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to building structure. Detail location of anchors, alignment guides, and expansion joints and loops.

1. Shop Drawing Scale: 1/4 inch per foot.
2. Detail mounting, supports, and valve arrangements for pressure regulator assembly.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans and details, drawn to scale, on which natural-gas piping is shown and coordinated with other installations, using input from installers of the items involved.

B. Site Survey: Plans, drawn to scale, on which natural-gas piping is shown and coordinated with other services and utilities.

C. Qualification Data: For qualified professional engineer.

D. Welding certificates.

E. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For pressure regulators to include in emergency, operation, and maintenance manuals.

1.8 QUALITY ASSURANCE

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

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

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

1.9 DELIVERY, STORAGE, AND HANDLING

A. Handling Flammable Liquids: Remove and dispose of liquids from existing natural-gas piping according to requirements of authorities having jurisdiction.

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

1.10 PROJECT CONDITIONS

A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.

B. Interruption of Existing Natural-Gas Service: Do not interrupt natural-gas service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide purging and startup of natural-gas supply according to requirements indicated:

1. Notify Architect Construction Manager Owner no fewer than two days in advance of proposed interruption of natural-gas service.
2. Do not proceed with interruption of natural-gas service without Owner's written permission.

1.11 COORDINATION

A. Coordinate requirements for access panels and doors for valves installed concealed behind finished surfaces. Comply with requirements in Section 083113 "Access Doors and Frames."

**PART 2 - PRODUCTS**

2.1 PIPES, TUBES, AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding.
3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.

a. Material Group: 1.1.
b. End Connections: Threaded or butt welding to match pipe.
c. Bolts and Nuts: ASME B18.2.1, carbon steel aboveground and stainless steel underground.

B. Corrugated, Stainless-Steel Tubing: Comply with ANSI/IAS LC 1.

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

a. OmegaFlex, Inc.
b. Parker Hannifin Corporation; Parflex Division.
c. Titeflex.
d. Tru-Flex Metal Hose Corp.

2. Tubing: ASTM A 240/A 240M, corrugated, Series 300 stainless steel.
3. Coating: PE with flame retardant.

a. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1) Flame-Spread Index: 25 or less.
2) Smoke-Developed Index: 50 or less.

4. Fittings: Copper-alloy mechanical fittings with ends made to fit and listed for use with corrugated stainless-steel tubing and capable of metal-to-metal seal without gaskets. Include brazing socket or threaded ends complying with ASME B1.20.1.
5. Striker Plates: Steel, designed to protect tubing from penetrations.
6. Manifolds: Malleable iron or steel with factory-applied protective coating. Threaded connections shall comply with ASME B1.20.1 for pipe inlet and corrugated tubing outlets.
7. Operating-Pressure Rating: 5 psig.

## 2.2 PIPING SPECIALTIES

A. Appliance Flexible Connectors:

1. Indoor, Fixed-Appliance Flexible Connectors: Comply with ANSI Z21.24.
2. Outdoor, Appliance Flexible Connectors: Comply with ANSI Z21.75.
3. Corrugated stainless-steel tubing with polymer coating.
4. Operating-Pressure Rating: 0.5 psig.
5. End Fittings: Zinc-coated steel.
6. Threaded Ends: Comply with ASME B1.20.1.
7. Maximum Length: 72 inches

B. Quick-Disconnect Devices: Comply with ANSI Z21.41.

1. Nitrile seals.
2. Hand operated with automatic shutoff when disconnected.
3. For indoor or outdoor applications.

## 2.3 JOINING MATERIALS

A. Joint Compound and Tape: Suitable for natural gas.

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

C. Brazing Filler Metals: Alloy with melting point greater than 1000 deg F complying with AWS A5.8/A5.8M. Brazing alloys containing more than 0.05 percent phosphorus are prohibited.

## 2.4 MANUAL GAS SHUTOFF VALVES

A. See "Aboveground Manual Gas Shutoff Valve Schedule" Articles for where each valve type is applied in various services.

B. General Requirements for Metallic Valves, NPS 2 and Smaller: Comply with ASME B16.33.

1. CWP Rating: 125 psig.
2. Threaded Ends: Comply with ASME B1.20.1.
3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
4. Tamperproof Feature: Locking feature for valves indicated in "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch and smaller.
6. Service Mark: Valves 1-1/4 inches to NPS 2 shall have initials "WOG" permanently marked on valve body.

C. General Requirements for Metallic Valves, NPS 2-1/2 and Larger: Comply with ASME B16.38.

1. CWP Rating: 125 psig.
2. Tamperproof Feature: Locking feature for valves indicated in "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
3. Service Mark: Initials "WOG" shall be permanently marked on valve body.

D. One-Piece, Bronze Ball Valve with Bronze Trim: MSS SP-110.

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

a. BrassCraft Manufacturing Company; a Masco company.
b. Conbraco Industries, Inc.; Apollo Div.
c. Perfection Corporation; a subsidiary of American Meter Company.

2. Body: Bronze, complying with ASTM B 584.
3. Ball: Chrome-plated brass.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE; blowout proof.
6. Packing: Separate packnut with adjustable-stem packing threaded ends.
7. Ends: Threaded, flared, or socket as indicated in "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
8. CWP Rating: 600 psig.
9. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

E. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.

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

a. BrassCraft Manufacturing Company; a Masco company.
b. Conbraco Industries, Inc.; Apollo Div.
c. Perfection Corporation; a subsidiary of American Meter Company.

2. Body: Bronze, complying with ASTM B 584.
3. Ball: Chrome-plated bronze.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE; blowout proof.
6. Packing: Threaded-body packnut design with adjustable-stem packing.
7. Ends: Threaded, flared, or socket as indicated in "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
8. CWP Rating: 600 psig.
9. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

F. Two-Piece, Regular-Port Bronze Ball Valves with Bronze Trim: MSS SP-110.

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

a. BrassCraft Manufacturing Company; a Masco company.
b. Conbraco Industries, Inc.; Apollo Div.
c. Perfection Corporation; a subsidiary of American Meter Company.

2. Body: Bronze, complying with ASTM B 584.
3. Ball: Chrome-plated bronze.
4. Stem: Bronze; blowout proof.

5. Seats: Reinforced TFE.
6. Packing: Threaded-body packnut design with adjustable-stem packing.
7. Ends: Threaded, flared, or socket as indicated in "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
8. CWP Rating: 600 psig.
9. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

G. Bronze Plug Valves: MSS SP-78.

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

    a. Lee Brass Company.
    b. McDonald, A. Y. Mfg. Co.

2. Body: Bronze, complying with ASTM B 584.
3. Plug: Bronze.
4. Ends: Threaded, socket, or flanged as indicated "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Operator: Square head or lug type with tamperproof feature where indicated.
6. Pressure Class: 125 psig.
7. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
8. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

H. Cast-Iron, Nonlubricated Plug Valves: MSS SP-78.

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

    a. McDonald, A. Y. Mfg. Co.
    b. Mueller Co.; Gas Products Div.
    c. Xomox Corporation; a Crane company.

2. Body: Cast iron, complying with ASTM A 126, Class B.
3. Plug: Bronze or nickel-plated cast iron.
4. Seat: Coated with thermoplastic.
5. Stem Seal: Compatible with natural gas.
6. Ends: Threaded or flanged as indicated in "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
7. Operator: Square head or lug type with tamperproof feature where indicated.
8. Pressure Class: 125 psig.
9. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

I. Cast-Iron, Lubricated Plug Valves: MSS SP-78.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Homestead Valve; a division of Olson Technologies, Inc.
   b. Milliken Valve Company.
   c. Mueller Co.; Gas Products Div.

2. Body: Cast iron, complying with ASTM A 126, Class B.
3. Plug: Bronze or nickel-plated cast iron.
4. Seat: Coated with thermoplastic.
5. Stem Seal: Compatible with natural gas.
6. Ends: Threaded or flanged as indicated in "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
7. Operator: Square head or lug type with tamperproof feature where indicated.
8. Pressure Class: 125 psig.
9. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

2.5 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

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

   a. Matco-Norca, Inc.
   b. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
   c. Wilkins; a Zurn company.

2. Description:

   a. Standard: ASSE 1079.
   b. Pressure Rating: 125 psig minimum at 180 deg F.
   c. End Connections: Solder-joint copper alloy and threaded ferrous.

**PART 3 - EXECUTION**

3.1 EXAMINATION

A. Examine roughing-in for natural-gas piping system to verify actual locations of piping connections before equipment installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 PREPARATION

A. Close equipment shutoff valves before turning off natural gas to premises or piping section.

B. Inspect natural-gas piping according to the International Fuel Gas Code to determine that natural-gas utilization devices are turned off in piping section affected.

C. Comply with the International Fuel Gas Code requirements for prevention of accidental ignition.

## 3.3 OUTDOOR PIPING INSTALLATION

A. Comply with the International Fuel Gas Code for installation and purging of natural-gas piping.

B. Steel Piping with Protective Coating:

1. Apply joint cover kits to pipe after joining to cover, seal, and protect joints.

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

## 3.4 INDOOR PIPING INSTALLATION

A. Comply with the International Fuel Gas Code for installation and purging of natural-gas piping.

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

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

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

E. 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.

F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

G. Locate valves for easy access.

H. Install natural-gas piping at uniform grade of 2 percent down toward drip and sediment traps.

I. Install piping free of sags and bends.

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

K. Verify final equipment locations for roughing-in.

L. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.

M. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.

1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.

N. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.

O. Concealed Location Installations: Except as specified below, install concealed natural-gas piping and piping installed under the building in containment conduit constructed of steel pipe with welded joints as described in Part 2. Install a vent pipe from containment conduit to outdoors and terminate with weatherproof vent cap.

1. Above Accessible Ceilings: Natural-gas piping, fittings, valves, and regulators may be installed in accessible spaces without containment conduit.
2. In Walls or Partitions: Protect tubing installed inside partitions or hollow walls from physical damage using steel striker barriers at rigid supports.

a. Exception: Tubing passing through partitions or walls does not require striker barriers.

3. Prohibited Locations:

a. Do not install natural-gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
b. Do not install natural-gas piping in solid walls or partitions.

P. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

Q. Connect branch piping from top or side of horizontal piping.

R. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment. Unions are not required at flanged connections.

S. Do not use natural-gas piping as grounding electrode.

T. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

U. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

## 3.5 VALVE INSTALLATION

A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing, aluminum, or copper connector.

## 3.6 PIPING JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

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

C. Threaded Joints:

1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
2. Cut threads full and clean using sharp dies.
3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
5. 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.

D. Welded Joints:

1. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.
2. Bevel plain ends of steel pipe.
3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

## 3.7 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hangers and supports specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 1 and Smaller: Maximum span, 96 inches; minimum rod size, 3/8 inch.
2. NPS 1-1/4: Maximum span, 108 inches; minimum rod size, 3/8 inch.
3. NPS 1-1/2 and NPS 2: Maximum span, 108 inches; minimum rod size, 3/8 inch.
4. NPS 2-1/2 to NPS 3-1/2: Maximum span, 10 feet; minimum rod size, 1/2 inch.

C. Install hangers for horizontal drawn-temper copper tubing with the following maximum spacing and minimum rod sizes:

1. NPS 3/8: Maximum span, 48 inches; minimum rod size, 3/8 inch.
2. NPS 1/2 and NPS 5/8: Maximum span, 72 inches; minimum rod size, 3/8 inch.
3. NPS 3/4 and NPS 7/8: Maximum span, 84 inches; minimum rod size, 3/8 inch.
4. NPS 1: Maximum span, 96 inches; minimum rod size, 3/8 inch.

D. Install hangers for horizontal, corrugated stainless-steel tubing with the following maximum spacing and minimum rod sizes:

1. NPS 3/8: Maximum span, 48 inches; minimum rod size, 3/8 inch.
2. NPS 1/2: Maximum span, 72 inches; minimum rod size, 3/8 inch.
3. NPS 3/4 and Larger: Maximum span, 96 inches; minimum rod size, 3/8 inch.

## 3.8 CONNECTIONS

A. Connect to utility's gas main according to utility's procedures and requirements.

B. Install natural-gas piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.

C. Install piping adjacent to appliances to allow service and maintenance of appliances.

D. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.

E. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.9 LABELING AND IDENTIFYING

A. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment" for piping and valve identification.

3.10 PAINTING

A. Comply with requirements in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting" for painting interior and exterior natural-gas piping.

B. Paint exposed, exterior metal piping, valves, and piping specialties, except components, with factory-applied paint or protective coating.

1. Alkyd System: MPI EXT 5.1D.

a. Prime Coat: Alkyd anticorrosive metal primer.
b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
c. Topcoat: Exterior alkyd enamel TBD by architect.
d. Color: TBD.

C. Paint exposed, interior metal piping, valves, and piping specialties, except components, with factory-applied paint or protective coating.

1. Latex Over Alkyd Primer System: MPI INT 5.1Q.

a. Prime Coat: Alkyd anticorrosive metal primer.
b. Intermediate Coat: Interior latex matching topcoat.
c. Topcoat: Interior latex TBD by architect.
d. Color: TBD by architect.

2. Alkyd System: MPI INT 5.1E.

a. Prime Coat: Alkyd anticorrosive metal primer.
b. Intermediate Coat: Interior alkyd matching topcoat.
c. Topcoat: Interior alkyd TBD by architect.
d. Color: TBD by architect.

D. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish.

3.11 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Test, inspect, and purge natural gas according to the International Fuel Gas Code and authorities having jurisdiction.

C. Natural-gas piping will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

## 3.12 OUTDOOR PIPING SCHEDULE

A. Aboveground natural-gas piping shall be one of the following:

1. Steel pipe with malleable-iron fittings and threaded joints.
2. Steel pipe with wrought-steel fittings and welded joints.

B. Containment Conduit: Steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.

## 3.13 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES LESS THAN 0.5 PSIG

A. Aboveground, branch piping NPS 1 and smaller shall be:

1. Corrugated stainless-steel tubing with mechanical fittings having socket or threaded ends to match adjacent piping.

B. Aboveground, distribution piping shall be one of the following:

1. Steel pipe with malleable-iron fittings and threaded joints.
2. Steel pipe with wrought-steel fittings and welded joints.

C. Containment Conduit: Steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.

D. Containment Conduit Vent Piping: Steel pipe with malleable-iron fittings and threaded or wrought-steel fittings with welded joints. Coat underground pipe and fittings with protective coating for steel piping.

## 3.14 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Valves for pipe sizes NPS 2 and smaller at service meter shall be one of the following:

1. One-piece, bronze ball valve with bronze trim.
2. Two-piece, full-port, bronze ball valves with bronze trim.
3. Bronze plug valve.

B. Valves for pipe sizes NPS 2-1/2 and larger at service meter shall be one of the following:

1. Two-piece, full-port, bronze ball valves with bronze trim.
2. Bronze plug valve.
3. Cast-iron, nonlubricated plug valve.

C. Distribution piping valves for pipe sizes NPS 2 and smaller shall be one of the following:

1. One-piece, bronze ball valve with bronze trim.
2. Two-piece, full-port, bronze ball valves with bronze trim.
3. Bronze plug valve.

D. Distribution piping valves for pipe sizes NPS 2-1/2 and larger shall be one of the following:

1. Two-piece, full-port, bronze ball valves with bronze trim.
2. Bronze plug valve.
3. Cast-iron, nonlubricated plug valve.

E. Valves in branch piping for single appliance shall be one of the following:

1. One-piece, bronze ball valve with bronze trim.
2. Two-piece, full-port, bronze ball valves with bronze trim.
3. Bronze plug valve.

**END OF SECTION 231123**

## SECTION 230010 – MECHANICAL GENERAL REQUIREMENTS

### PART 1 - GENERAL

1.1 SECTION INCLUDES

A. These basic Mechanical Requirements are specifically applicable to all Mechanical Division Sections, in addition to Division 01 - General Requirements, the General Conditions and the Supplementary General Conditions which also apply to this division.

B. This Section includes instructions on general project objectives, alternates, allowances, as-built drawings, submittals, regulatory requirements, demolition instructions, and installation instructions.

C. Mechanical systems include all HVAC & mechanical work.

1.2 SCOPE OF WORK:

A. Low and high velocity ductwork.

B. Hot water piping.

C. Refrigerant piping and condensate drain piping.

D. Motor Starters and Disconnects

E. Variable Frequency Drives

F. Control Wiring

G. Power wiring to controls

H. Temperature controls, electronic.

I. Demolition of existing equipment and systems.

1.3 DEFINITIONS

A. Any reference in this Division to "this Contractor", "Contractor" or reference to furnish or install or to supply any work with no reference to the Contractor responsible shall be furnished and installed under this division.

B. "Provide "- Furnish and install.

C. "Furnish" - Obtain and deliver to the job for installation by other trades.

D. "Install" - Set and connect an equipment item furnished by others. Place item in full operating condition.

E. Mechanical and HVAC words are used inter-change ably and have the same meaning.

1.4 SITE VISIT

A. The Trades estimating this work shall visit the site before submitting bids and fully inform themselves of the nature of the work and of the existing conditions, obtain all necessary information to estimate and execute the work. Failure to do so shall in no

way obligate the Owner for any omissions or errors resulting from such negligence.

B. Any costs involved in relocating any items, including those of other trades, in order to install the work shown shall be included in the bid price.

1.5 INTENT OF DRAWINGS

A. Separate drawings have been prepared for the convenience of the General, Plumbing, Heating and Electrical Trades. Their work is generally shown under the proper heading however; all drawings listed are part of each contract insofar as they are applicable. Particularly as they apply to space limitations, obstructions, type of construction, and space requirements for the installation of other trades work.

B. The drawings are diagrammatic and additional transitions, offsets, fittings, drains, vents and drips shall be provided as may be required to install the systems, even if not shown, at no additional cost.

C. The drawings take precedence over the specifications where there is conflicting information or whichever is more stringent.

D. The systems shall be complete, ready for operation with all components required, including items which may not be fully shown or specified. Items not shown, fully detailed or specified, but required for a complete system shall be provided at no extra cost and shall conform to accepted trade practices. Connect every terminal unit, air outlet/inlet and equipment item.

1.6 AS-BUILT DRAWINGS

A. During construction, the Contractor shall maintain a separate reproducible set of Mechanical drawings on which he shall record the exact location of all concealed piping and ductwork which is not installed as shown. These "as built" drawings shall be delivered to the Architect at the end of the job.

1.7 SUBMITTALS AND SUBSTITUTIONS

A. Submit under provisions of the General Requirements all products in this division. Submit shop drawings and product data only if manufacturers or products supplied deviate from the specification requirements, space indicated or capacities scheduled. Shop drawings submitted because of deviations shall be submitted as instructed in this section and in the further instructions given in the individual sections. Products fully complying with these specifications do not have to be submitted.

B. Submit Substitutions under provisions of the General Requirements and Conditions and the instructions given in this section of the specifications.

C. Basis of Design: Where drawings and specifications call for materials of certain manufacturers, the contract shall be based on materials specified. If the Contractor wishes to offer substitutions for consideration he must request approval 10 days prior to bid opening. Any substitutions made after the bid is received will not be accepted.

D. Full Drawings: Submit field checked and coordinated equipment room piping and ductwork layouts at 3/8" equals 1'0" and ductwork layouts of the floor plans at 1/4" equals 1'0" scale.

E. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal. Highlight equipment data. General Catalog data will be returned unless custom highlighted.

F. Mark dimensions and values in units to match those specified. List any differences between the product submitted and the product specified and shown on the drawings.

G. All materials and equipment shall be new and shall of good quality and equal in all respects to the products of well recognized and reputable United States' manufacturers.

H. Where the specifications give more than one manufacturer's name for an item of equipment, the drawings are based on the name given first. Additional names indicate only that these manufacturers make equipment of acceptable quality and before using same, it shall be the responsibility of the Contractor to determine if the dimensions, mechanical and electrical characteristics are suitable. If revisions in the work or of other trades are required due to use of any equipment other than shown on the drawings, the additional cost shall be included in the Bid Price.

I. Within 15 days after the award of a contract, the Contractor shall submit a complete list of materials and sub-contractors he proposes to use for approval.

J. Manufacturer's installation diagrams shall be provided for all equipment requiring shop drawings. Shop drawings shall be submitted in a timely manner for examination and comment.

K. Approval shall be considered as general only and as aid to the Contractor. Any items missed in review and/or are counter to the drawings do not relieve the Contractor from the necessity of furnishing the materials and performing all work as required by the plans and specifications. Review of shop drawing does not constitute the engineer takes responsibly the shop drawings are correct or complete and is only a convenience to the contractor to correct any errors made by the contractor or vendor.

1.8 REGULATORY REQUIREMENTS

A. Conform to the following codes:

1. International Mechanical Code/2015 Edition.
2. International Energy Code/2015Edition
3. International Building Code/2015 Edition.
4. International Plumbing Code/2015 Edition
5. ASHRAE 90.1 - 2010 Energy Standard for Buildings Except Low-Rise Residential Buildings
6. Building Code amendments as adopted by the Commonwealth of Pennsylvania.
7. Building Code amendments as adopted by the local jurisdiction.

B. Nothing in the Contract Documents shall be construed to conflict with any laws, ordinances or regulations of authorities having jurisdiction over the contract work and all requirements shall be complied with throughout, without additional cost to the Owner.

C. Obtain permits, pay any fees and request inspections from authority having jurisdiction.

D. All mechanical equipment shall bear the label of an approved agency.

1.9 PROJECT/SITE CONDITIONS

A. Install Work in locations shown on Drawings, unless prevented by Project conditions.

B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other sections. Obtain permission of Architect/Engineer before proceeding.

C. The Contractor is solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours. The duty of the Engineer to visit the site is not intended to include review of the adequacy of the Contractor's safety in, on, or near the construction site.

1.10 CHASES, CUTTING AND PATCHING

A. This trade shall cooperate with the General trade, advising him of the sizes, number and locations of all openings, recesses, access doors and panels, and pipe sleeves required to properly install his pipe lines, ducts etc. Unless otherwise shown or noted all piping, ducts etc., in finished rooms shall be completely concealed in partitions or furred spaces. The Mechanical trade shall install all required sleeves which shall be built into place as the general construction proceeds.

B. Cutting where necessary for Mechanical work shall be done by the Mechanical Trade in a neat and careful manner to prevent damage or weakening of walls, roof or floors and shall meet the approval of the Architect/Engineer. Patching caused by the Mechanical Trade shall be done by the Mechanical Trade for holes up to 12"x 12" (one square foot). Patching material shall match adjacent surfaces. Larger holes shall be cut and patched by the General Trade at the expense of the Mechanical Trade.

1.11 SALVAGE AND SCRAP

A. This Contractor shall carefully dismantle all equipment and materials shown or specified to be removed. That which is not indicated or specified to be reused shall remain the property of the Owner and be placed in storage where directed on the premises. Unwanted materials shall become the property of the Contractor and shall be removed.

1.12 ASBESTOS REMOVAL

A. The removal of asbestos materials, if required, shall be done under another contract. No known asbestos present at the site shall require removal due to installation of the work for this Project.

**PART 2 - PRODUCTS**

2.01 FIRE BARRIER MATERIALS

A. Approved fill material for fire barriers shall be packed mineral wool, T & B Flame-Safe, 3M Fire Barrier caulk or Dow Corning RTV foam. Approved protective devices shall be UL listed fire dampers for ductwork and UL listed "link-seals" for piping. Large shaft and wall openings around ducts and piping and shaft floors where fire ratings must be maintained shall be infilled with 3M Inc. fire barrier wall sheets.

2.02 ACCESS DOORS

A. Manufacturers:

B. Milcor Inc. or approved equal as determined by the designer.

C. Access doors shall be of metal with mounting frame and screw driver operated CAM lock latches flush with panel face. Provide 2 hour fire rated and 3 hour fire rated doors where required for shaft walls and fire rated floors and ceilings. See architectural drawings for locations of fire rated walls. Doors shall have continuous hinges.

**PART 3 - EXECUTION**

3.01 INSTALLATION

A. Install equipment in accordance with the instructions in these specifications and as shown on the drawings. In lieu of a where a specific item is not detailed, install in accordance with industry standards.

B. All equipment shall be installed in accordance with the instructions which shall be available at the job site. If the installation instructions are contrary to the work shown or specified, the contractor shall consult the engineer before proceeding with the installation.

3.02 PROCEDURE AND COORDINATION

A. Pipe lines, conduits, etc., other than Mechanical contract work shall be under installation throughout the building site and this Contractor shall consult with all other trades to coordinate the assembly and installation of all trades to avoid conflict and need for rearrangement, as no extras shall be granted due to lack of coordination. This applies particularly to locations of ducts, heating and plumbing pipes, electric conduits, recessed lights fixtures, etc., which occur in close quarters such as furred walls, columns & ceilings, pipe and duct shafts etc., and where minimum head clearances shall be maintained.

B. Do not install piping or ductwork in transformer rooms, electric equipment rooms, electric closets or generator rooms unless they serve these spaces. Do not install piping adjacent to electric devices. Provide drip pan protection if piping must be installed above or adjacent to electric panels or devices.

C. Mechanical equipment shall be installed in a manner to permit ease of service and the Mechanical Contractor shall inform other trades of access requirement to prevent interference with same.

D. All new piping, ductwork, equipment, etc. shall be installed so that it does not interfere with access to existing valves, access doors, equipment, etc.

E. Protect all unfinished work from damage. Seal off all portions of the duct systems or piping not being worked on to permit continued service and to prevent the entry of dirt. Install temporary filters over all exhaust/return air openings in the work area. Repair or replace any damage caused by the installation of the Mechanical systems.

F. Where alterations of new work affect the use of present buildings or facilities, the

Contractor shall schedule his work and activities so that interference is kept to a minimum. When shutdown of existing systems or equipment is required, the work shall be executed at the convenience of the Owner under the direction of the Architect/Engineer.

3.03 PROTECTION OF BUILDING FIRE/SMOKE BARRIERS

A. Passages of pipes and air ducts through fire barriers and/or smoke barriers shall be protected as follows:

1. The space between the penetrating item and the fire barrier and/or smoke barrier shall be filled with a material capable of maintaining the fire/smoke resistance of the barrier or be protected by an approved device design for the specific purpose.

B. Where the penetrating item uses a sleeve to penetrate the fire and/or smoke barrier the sleeve shall be solidly set in the fire/smoke barrier and the space between the item and the sleeve shall be filled as described below.

1. All piping or duct insulation shall stop at each side of a fire barrier and the void space between the item and the rated barrier shall be protected. Void space between fire barriers and piping and ductwork subject to surface condensation shall be filled with caulk or foam material capable of preventing vapor transmission. Sufficient room shall be maintained for expansion.

C. Fire barriers shall include 1-hour, 2-hour, 3-hour and 4-hour UL rated floors and walls. Refer to architectural plans for location of fire barriers and smoke barriers and provide protection required to maintain ratings in accordance with all codes the applicable codes.

D. Approved fill material for fire barriers shall be packed mineral wool, T & B Flame-Safe, 3M Fire Barrier caulk or Dow Corning RTV foam. Approved protective devices shall be UL listed fire dampers for ductwork and UL listed "link-seals" for piping. Large shaft and wall openings around ducts and piping and shaft floors where fire ratings must be maintained shall be infilled with 3M Inc. fire barrier wall sheets.

3.04 ACCESS DOORS

A. Install access doors where required to service equipment or to reach devices for adjustment concealed behind walls, ceilings, or floors. Accessible ceilings do not require access doors. Minimum size 12x6".

3.05 PAINTING

A. In finished spaces, painting of all Mechanical equipment, apparatus and piping shall be done by the Painting Trade under the General Trade Specification, except where specified to be done by the Mechanical Trade.

3.06 TEMPORARY HEAT

A. The costs of temporary heat, including utility costs, shall be at the expense of the Heating Trade. The Heating Trade shall provide the means of temporary heat. Existing heating equipment and systems may be used and such use shall be coordinated

between the Heating Trade and General Trade.

B. The permanent Mechanical system shall not be used under any exceptions to provide temporary heating, ventilating, exhaust or air condition until the building is clean, without any dust or debris that can enter the Mechanical system and is ready for occupancy. Covering the return/exhaust air inlets with filter media is not acceptable alternative to having an enclosed, dust-free environment for the systems to operate in. In no event shall the Heating Contractor's one year warranty be shortened by the use of permanent equipment for temporary heat.

3.07 ELECTRICAL REQUIREMENTS

A. Furnish to the electrical trade for installation all disconnect switches, combination motor starters, variable frequency drives and electrical devices for all Mechanical equipment. Refer to Section 230510 Mechanical Electrical Devices and Requirements.

B. Electrical trade will provide power wiring to Mechanical equipment.

C. Mechanical Trade shall provide power wiring to Mechanical control devices.

D. Mechanical Trade shall provide control wiring to Mechanical systems.

E. Mechanical Trade shall furnish to electrical trade disconnect means for all Mechanical devices.

3.08 INTERFERENCE DRAWINGS

A. The contractor shall arrange with his subcontractors to prepare "Interference Drawings" immediately after the award of the contract. This shall be accomplished as set forth below.

B. The Mechanical Subcontractor shall initiate the drawings by preparing plans and sections by either hand drawing or in electronic CADD format at a scale of 1/4" to 1'-0" for the floor plans and at 3/8" to 1'-0" for the Mechanical Room plans, or larger if desired, on which he shall show all ducts, fans, air handling units, coils, filters, dampers, grilles, louvers, registers, piping, appliances, and equipment. The drawings shall clearly show the structural conditions into which his work will be incorporated. The Mechanical shop drawings and shop sheets of approved items shall be used in the preparation of the interference drawings. All items shall be drawing to scale in an accurate manner. If required, he shall consult with the Mechanical consulting engineer. At the completion of the drawings, he shall furnish re-producible sepia or in suitable electronic CADD format drawings and forward them to the Plumbing Subcontractor.

C. The Plumbing Subcontractor shall then add all plumbing piping and equipment to the drawings, using the sizes of the approved items, and depicting them accurately. The plumbing items shall be positioned to avoid interference with the Mechanical work, and the Plumbing Subcontractor shall consult with the Mechanical Contractor as required if interferences arise. All unresolved locations shall be discussed with the Plumbing consulting engineer. After the drawings have been completed to the satisfaction of both the Mechanical and Plumbing Subcontractors, the Plumbing Contractor shall furnish new reproducible sepia or electronic medium drawings and forward them to the Electrical Subcontractor.

D. The Electrical Subcontractor shall add his work to the drawings, showing conduit runs;

pull boxes, panel boards, and all other equipment. Where interferences arise, he shall resolve them through discussions with the Mechanical Subcontractors, or with the electrical consulting engineer. After the installations are shown to the satisfaction of the Mechanical and Electrical Subcontractors, the Electrical Subcontractor shall forward new reproducible sepia or electronic medium drawings to the Architect.

E. The General Contractor shall advise his subcontractors for mechanical and electric work of the grid pattern for acoustical ceilings, the depth of acoustical and plastered ceiling systems, locations of hangers, and all else whatsoever which will affect the mechanical and electrical installations.

F. The Architect and the consulting engineers will review the drawings, and after corrections and/or approval, shall return them to the General Contractor, who shall have the drawings printed for his own use and for distribution to his subcontractors. Two prints are required for each subcontractor, and four for the Architect.

G. The preparation of the drawings shall take place immediately following the award of the contract. All installation work shall be performed in the accordance with the interference drawings.

3.09 CLEANUP

A. All tools, benches and other workmen's materials and appliances shall be removed from the premises after formal and final approval of completion is given. The premises shall be cleaned of all remaining debris. During start-up of duct cleaning of air systems, protect all occupied areas from dirt from protective filters over air outlets and where needed, air tight covers over computers and other sensitive equipment. Clean lose dust from the area.

3.10 INSTRUCTIONS and OPERATION AND MAINTENANCE MANUALS

A. See section 01700.

B. Upon final acceptance and turning over of the project to the Owner, make available qualified persons fully familiar with the installation and capable of instructing the Owner's staff in the operation, care and manipulation of the various systems.

C. Engage a factory-authorized service representative to train]Owner's maintenance personnel to adjust, operate, and maintain units.

D. Provide to owner three copies of; final submittals, all shop drawings, equipment and ductwork layouts, valve tagging charts, testing and balancing data, operation and maintenance data on equipment furnished, list of suppliers and service organizations for each piece of equipment, spare parts list, warranty information, as-built drawings and all other information requested in Execution section of the mechanical sections of these specifications. Assemble into loose leaf binders indexed by tabs per each item with table of contents.

3.11 MECHANICAL WARRANTY

A. Refer to Division 01 for general warranty requirements. Review all Division 23 sections for additional installation and equipment warranties.

B. The mechanical contractor shall guarantee that all apparatus is of best grade and quality

and that all work has been done in strict accord with the specifications and drawings. Correct defects in workmanship, materials and equipment that develop within one year from date of acceptance by repair or replacement.

C. Provide an additional one year of warranty beyond the first year's warranty for the control system to include (2) two additional visits in the second year, one during the heating season and on during the cooling season. During these visits check the systems for proper operation and make adjustments necessary, including software re-programming, to ensure the control system operates as intended.

**END OF SECTION 230010**

## SECTION 230130.51 - HVAC AIR-DISTRIBUTION SYSTEM CLEANING

## 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 cleaning HVAC air-distribution equipment, ducts, plenums, and system components.

### 1.3 DEFINITIONS

A. ASCS: Air systems cleaning specialist.

B. NADCA: National Air Duct Cleaners Association.

### 1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For an ASCS.

B. Strategies and procedures plan.

C. Cleanliness verification report.

### 1.5 QUALITY ASSURANCE

A. ASCS Qualifications: A certified member of NADCA

1. Certification: Employ an ASCS certified by NADCA on a full-time basis.
2. Supervisor Qualifications: Certified as an ASCS by NADCA

B. UL Compliance: Comply with UL 181 and UL 181A for fibrous-glass ducts.

C. Cleaning Conference: Conduct conference at Project site.

1. Review methods and procedures related to HVAC air-distribution system cleaning including, but not limited to, review of the cleaning strategies and procedures plan.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION**

3.1 EXAMINATION

A. Examine HVAC air-distribution equipment, ducts, plenums, and system components to determine appropriate methods, tools, and equipment required for performance of the Work.

B. Perform "Project Evaluation and Recommendation" according to NADCA ACR 2006.

C. Prepare written report listing conditions detrimental to performance of the Work.

D. Proceed with work only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare a written plan that includes strategies and step-by-step procedures. At a minimum, include the following:

1. Supervisor contact information.
2. Work schedule including location, times, and impact on occupied areas.
3. Methods and materials planned for each HVAC component type.
4. Required support from other trades.
5. Equipment and material storage requirements.
6. Exhaust equipment setup locations.

B. Use the existing service openings, as required for proper cleaning, at various points of the HVAC system for physical and mechanical entry and for inspection.

C. Comply with NADCA ACR 2006, "Guidelines for Constructing Service Openings in HVAC Systems" Section.

3.3 CLEANING

A. Comply with NADCA ACR 2006.

B. Remove visible surface contaminants and deposits from within the HVAC system.

C. Systems and Components to Be Cleaned:

1. Air devices for supply and return air.
2. Air-terminal units.
3. Ductwork:

a. Supply-air ducts, including turning vanes and reheat coils, to the air-handling unit.
b. Return-air ducts to the air-handling unit.
c. Exhaust-air ducts.

4. Air-Handling Units:

a. Interior surfaces of the unit casing.
b. Coil surfaces compartment.
c. Condensate drain pans.
d. Fans, fan blades, and fan housings.

5. Filters and filter housings.

D. Collect debris removed during cleaning. Ensure that debris is not dispersed outside the HVAC system during the cleaning process.

E. Particulate Collection:

1. For particulate collection equipment, include adequate filtration to contain debris removed. Locate equipment downwind and away from all air intakes and other points of entry into the building.
2. HEPA filtration with 99.97 percent collection efficiency for particles sized 0.3 micrometer or larger shall be used where the particulate collection equipment is exhausting inside the building,

F. Control odors and mist vapors during the cleaning and restoration process.

G. Mark the position of manual volume dampers and air-directional mechanical devices inside the system prior to cleaning. Restore them to their marked position on completion of cleaning.

H. System components shall be cleaned so that all HVAC system components are visibly clean. On completion, all components must be returned to those settings recorded just prior to cleaning operations.

I. Clean all air-distribution devices, registers, grilles, and diffusers.

J. Clean visible surface contamination deposits according to NADCA ACR 2006 and the following:

1. Clean air-handling units, airstream surfaces, components, condensate collectors, and drains.
2. Ensure that a suitable operative drainage system is in place prior to beginning wash-down procedures.
3. Clean evaporator coils, reheat coils, and other airstream components.

K. Duct Systems:

1. Create service openings in the HVAC system as necessary to accommodate cleaning.
2. Mechanically clean duct systems specified to remove all visible contaminants so that the systems are capable of passing the HVAC System Cleanliness Tests (see NADCA ACR 2006).

L. Debris removed from the HVAC system shall be disposed of according to applicable Federal, state, and local requirements.

M. Mechanical Cleaning Methodology:

1. Source-Removal Cleaning Methods: The HVAC system shall be cleaned using source-removal mechanical cleaning methods designed to extract contaminants from within the HVAC system and to safely remove these contaminants from the facility. No cleaning method, or combination of methods, shall be used that could potentially damage components of the HVAC system or negatively alter the integrity of the system.

    a. Use continuously operating vacuum-collection devices to keep each section being cleaned under negative pressure.
    b. Cleaning methods that require mechanical agitation devices to dislodge debris that is adhered to interior surfaces of HVAC system components shall be equipped to safely remove these devices. Cleaning methods shall not damage the integrity of HVAC system components or damage porous surface materials such as duct and plenum liners.

2. Cleaning Mineral-Fiber Insulation Components:

    a. Fibrous-glass thermal or acoustical insulation elements present in equipment or ductwork shall be thoroughly cleaned with HEPA vacuuming equipment while the HVAC system is under constant negative pressure and shall not be permitted to get wet according to NADCA ACR 2006.
    b. Cleaning methods used shall not cause damage to fibrous-glass components and will render the system capable of passing the HVAC System Cleanliness Tests (see NADCA ACR 2006).
    c. Fibrous materials that become wet shall be discarded and replaced.

N. Coil Cleaning:

1. Measure static-pressure differential across each coil.
2. See NADCA ACR 2006, "Coil Surface Cleaning" Section. Type 1, or Type 1 and Type 2, cleaning methods shall be used to render the coil visibly clean and capable of passing Coil Cleaning Verification (see applicable NADCA ACR 2006).
3. Coil drain pans shall be subject to NADCA ACR 2006, "Non-Porous Surfaces Cleaning Verification." Ensure that condensate drain pans are operational.
4. Electric-resistance coils shall be de-energized, locked out, and tagged before cleaning.

5. Cleaning methods shall not cause any appreciable damage to, cause displacement of, inhibit heat transfer, or cause erosion of the coil surface or fins, and shall comply with coil manufacturer's written recommendations when available.
6. Rinse thoroughly with clean water to remove any latent residues.

O. Antimicrobial Agents and Coatings:

1. Apply antimicrobial agents and coatings if active fungal growth is reasonably suspected or where unacceptable levels of fungal contamination have been verified. Apply antimicrobial agents and coatings according to manufacturer's written recommendations and EPA registration listing after the removal of surface deposits and debris.
2. When used, antimicrobial treatments and coatings shall be applied after the system is rendered clean.
3. Apply antimicrobial agents and coatings directly onto surfaces of interior ductwork.
4. Sanitizing agent products shall be registered by the EPA as specifically intended for use in HVAC systems and ductwork.

## 3.4 CLEANLINESS VERIFICATION

A. Verify cleanliness according to NADCA ACR 2006, "Verification of HVAC System Cleanliness" Section.

B. Verify HVAC system cleanliness after mechanical cleaning and before applying any treatment or introducing any treatment-related substance to the HVAC system, including biocidal agents and coatings.

C. Perform visual inspection for cleanliness. If no contaminants are evident through visual inspection, the HVAC system shall be considered clean. If visible contaminants are evident through visual inspection, those portions of the system where contaminants are visible shall be re-cleaned and subjected to re-inspection for cleanliness.

D. Additional Verification:

1. Perform surface comparison testing or NADCA vacuum test.
2. Conduct NADCA vacuum gravimetric test analysis for nonporous surfaces.

E. Verification of Coil Cleaning:

1. Measure static-pressure differential across each coil.
2. Coil will be considered clean if cleaning restored the coil static-pressure differential within 10 percent of factory set static pressure, the differential measured when the coil was first installed.
3. Coil will be considered clean if the coil is free of foreign matter and chemical residue, based on a thorough visual inspection.

F. Prepare a written cleanliness verification report. At a minimum, include the following:

1. Written documentation of the success of the cleaning.
2. Site inspection reports, initialed by supervisor, including notation on areas of inspection, as verified through visual inspection.
3. Surface comparison test results if required.
4. Gravimetric analysis (nonporous surfaces only).
5. System areas found to be damaged.

G. Photographic Documentation: Provide photographs of cleaning procedures, before and after photos, and cleaning methods while conducting the duct cleaning procedure. Provide photographs to owner after completion of cleaning.

## 3.5 RESTORATION

A. Restore and repair HVAC air-distribution equipment, ducts, plenums, and components according to NADCA ACR 2006, "Restoration and Repair of Mechanical Systems" Section.

B. Restore service openings capable of future reopening. Comply with requirements in Section 233113 "Metal Ducts." Include location of service openings in Project closeout report.

C. Replace fibrous-glass materials that cannot be restored by cleaning or resurfacing. Comply with requirements in Section 233113 "Metal Ducts".

D. Replace damaged insulation according to Section 230713 "Duct Insulation."

E. Ensure that closures do not hinder or alter airflow.

F. New closure materials, including insulation, shall match opened materials and shall have removable closure panels fitted with gaskets and fasteners.

**END OF SECTION 230130.51**

## SECTION 230513 - COMMON MOTOR AND ELEC. REQUIREMENTS FOR HVAC EQUIP.

## 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 requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

### 1.3 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:

1. Motor controllers.
2. Torque, speed, and horsepower requirements of the load.
3. Ratings and characteristics of supply circuit and required control sequence.
4. Ambient and environmental conditions of installation location.

## PART 2 - PRODUCTS

### 2.1 GENERAL MOTOR REQUIREMENTS

A. Comply with NEMA MG 1 unless otherwise indicated.

B. Comply with IEEE 841 for severe-duty motors.

### 2.2 MOTOR CHARACTERISTICS

A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.

B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

## 2.3 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Efficiency: Energy efficient, as defined in NEMA MG 1.

C. Service Factor: 1.15.

D. Multispeed Motors: Variable torque.

1. For motors with 2:1 speed ratio, consequent pole, single winding.
2. For motors with other than 2:1 speed ratio, separate winding for each speed.

E. Multispeed Motors: Separate winding for each speed.

F. Rotor: Random-wound, squirrel cage.

G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.

H. Temperature Rise: Match insulation rating.

I. Insulation: Class F.

J. Code Letter Designation:
1. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.

K. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

## 2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.

B. Motors Used with Variable Frequency Controllers:

1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.

3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.
5. Provide shaft protection brushes to prevent eddy currents from VFD drive.

C. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

## 2.5 SINGLE-PHASE MOTORS

A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:

1. Permanent-split capacitor.
2. Split phase.
3. Capacitor start, inductor run.
4. Capacitor start, capacitor run.

B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

D. Motors 1/20 HP and Smaller: Shaded-pole type.

E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

## 2.6 ACCEPTABLE MANUFACTURERS - MOTOR STARTERS, DISCONNECTS

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. Square D; www.squared.com.

B. Eaton Electrical/Cutler-Hammer; www.eatonelectrical.com.

C. GE Industrial; www.geindustrial.com.

D. Substitutions: See Section 01600 - Product Requirements.

2.7 MANUAL MOTOR STARTERS

A. Manual Motor Starter: NEMA ICS 2; size M-0 2 pole, AC general-purpose Class A manually operated, non-reversing, full-voltage controller for induction motors rated in horsepower, with overload relay, low voltage protection, red, neon or LED pilot light to indicate motor is energized, and toggle operator. Provide the number of contacts required to satisfy the sequence of described control in Section 230993.

B. Enclosure: ANSI/NEMA ICS 6; Type 1.

2.8 MANUAL START SWITCHES

A. Manual Start Switches: Toggle type snap switch, thermal overload device operating on the solder-ratchet principal, manual reset, red, neon or LED pilot light to indicate motor is energized, rated for 1 HP maximum at 115/230 volts AC.

B. Enclosure: NEMA 1, general purpose, suitable for flush mounting in standard 2-5/8" deep wall switch box, brushed stainless steel cover plate.

2.9 DISCONNECT SWITCHES

A. Fusible Switch Assemblies: NEMA KS 1; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle with defeatable interlock to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse Clips: FS W-F-870. Designed to accommodate Class R fuses.

B. Nonfusible Switch Assemblies: NEMA KS 1; Type HD; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle with defeatable interlock to prevent opening front cover with switch in ON position. Handle lockable in OFF position.

C. Enclosures: NEMA KS 1; Type 1. or as indicated on Drawings.

**PART 3 - EXECUTION**

3.1 ELECTRICAL MOTOR STARTER, AND DISCONNECT SWITCH INSTALLATION AND SELECTION

A. Furnish disconnect switches to electrical trade to be installed by them.

B. Furnish disconnect means for all HVAC devices either integral to the equipment or via a separate disconnect switch. Furnish fused disconnect switches with fuses where required by the equipment manufacturer.

C. Furnish fuses to electrical trade for installation in fusible disconnect switches.

D. Furnish manual motor starters, combination motor starters and/or variable frequency drives for all HVAC equipment to the electrical trade for installation.

E. All three phase starters shall be combination type and have control power transformers.

F. Furnish all items of electrical apparatus shown and described on the drawings. Those items which are indicated to be installed by the Electrical Contractor shall be properly tagged and delivered to him at the job site. All shall be of same brand.

G. Inform electrical trade to install motor control equipment and/or variable frequency drives in accordance with manufacturer's instructions.

H. Select and install heater elements in motor starters to match installed motor characteristics and furnish to electrical trade for installation.

I. Motor Data: Provide neatly typed label inside each motor starter enclosure door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.

J. Motors indicated as being provided with the equipment shall be furnished installed in the equipment by the equipment manufacturer.

K. All power wiring will be provided by the Electrical trade. All control wiring and power wiring to the controls will be provided by the Temperature Control Sub-Contractor.

L. All motors 30 horsepower and larger shall have reduced voltage starters.

M. The EQUIPMENT SCHEDULES TAKE PRECEDENCE over any wiring diagrams and motor control center schedules. The horsepower s and loads listed in the equipment schedules shall be used to select the motor starters, disconnects switches and the motor control centers.

3.2 ELECTRICAL REQUIREMENTS DIVISION OF WORK

A. Furnish to the electrical trade for installation all disconnect switches, combination motor starters, variable frequency drives and electrical devices for all HVAC equipment.

B. Electrical trade will provide power wiring to HVAC equipment.

C. HVAC Trade shall provide power wiring to HVAC control devices.

D. HVAC Trade shall provide control wiring to HVAC system.

E. HVAC Trade shall provide power/control wring to damper and valve actuators. (This is not shown on the drawings.)

F. HVAC Trade shall furnish to Electrical Trade disconnect means for all HVAC equipment.

**END OF SECTION 230513**

## SECTION 230517 - SLEEVES AND SLEEVE SEALS 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.

### 1.2 SUMMARY

A. Section Includes:

1. Sleeves.
2. Stack-sleeve fittings.
3. Sleeve-seal systems.
4. Sleeve-seal fittings.
5. Grout.

### 1.3 ACTION SUBMITTALS

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

## PART 2 - PRODUCTS

### 2.1 SLEEVES

A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.

C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

D. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

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

2.2 STACK-SLEEVE FITTINGS

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

1. Smith, Jay R. Mfg. Co.
2. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.

B. Description: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with setscrews.

2.3 SLEEVE-SEAL SYSTEMS

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

1. Advance Products & Systems, Inc.
2. CALPICO, Inc.
3. Metraflex Company (The).
4. Pipeline Seal and Insulator, Inc.
5. Proco Products, Inc.

B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Carbon steel.
3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.4 SLEEVE-SEAL FITTINGS

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

1. Presealed Systems.

B. Description: Manufactured plastic, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall. Unit has plastic or rubber waterstop collar with center opening to match piping OD.

2.5 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

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

D. Packaging: Premixed and factory packaged.

**PART 3 - EXECUTION**

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. In fire rated assembly infill opening between sleeve and pipe with fire proofing material.

C. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 079200 "Joint Sealants."

E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.2 STACK-SLEEVE-FITTING INSTALLATION

A. Install stack-sleeve fittings in new slabs as slabs are constructed.

1. Install fittings that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Section 076200 "Sheet Metal Flashing and Trim."

3. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.
4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
5. Using grout, seal the space around outside of stack-sleeve fittings.

B. Fire-Barrier Penetrations: Maintain indicated fire rating of floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

## 3.3 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Interior Partitions:

a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves.
b. Piping NPS 6 Insert pipe size and Larger: Galvanized-steel-sheet sleeves.

**END OF SECTION 230517**

## 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.

### 1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Thermal-hanger shield inserts.
3. Fastener systems.

B. Related Sections:

1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
2. Section 230516 "Expansion Fittings and Loops for HVAC Piping" for pipe guides and anchors.
3. Section 233113 "Metal Ducts" for duct hangers and supports.

### 1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

### 1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment.

1.5 ACTION SUBMITTALS

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

B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Metal pipe hangers and supports.
2. Thermal-hanger shield inserts.
3. Fastener systems.

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.7 QUALITY ASSURANCE

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

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

**PART 2 - PRODUCTS**

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

## 2.2 THERMAL-HANGER SHIELD INSERTS

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

1. Carpenter & Paterson, Inc.
2. Clement Support Services.
3. ERICO International Corporation.
4. National Pipe Hanger Corporation.
5. PHS Industries, Inc.
6. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.
7. Piping Technology & Products, Inc.
8. Rilco Manufacturing Co., Inc.
9. Value Engineered Products, Inc.

B. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength and vapor barrier.

C. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength.

D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

F. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

## 2.3 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

## 2.4 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

## PART 3 - EXECUTION

### 3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. 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 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 attachments, inserts, bolts, rods, nuts, washers, and other accessories.

E. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

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 2-1/2 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 that 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 to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

J. Insulated Piping:

1. Attach clamps and spacers to piping.

    a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
    b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. 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 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

    a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.

5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

## 3.2 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/D1.1M 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 so contours of welded surfaces match adjacent contours.

## 3.3 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

## 3.4 PAINTING

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

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

B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Section 230010

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

## 3.5 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports and metal framing systems and attachments for general service applications.

F. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.

G. Use padded hangers for piping that is subject to scratching.

H. Use thermal-hanger shield inserts for insulated piping and tubing.

I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
15. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
16. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
17. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
18. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.

J. 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 for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

K. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
3. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
4. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
5. C-Clamps (MSS Type 23): For structural shapes.
6. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
7. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
8. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
9. 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.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.

10. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
11. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
12. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

L. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

M. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.

4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.

N. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

O. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

**END OF SECTION 230529**

## SECTION 230548 - VIBRATION AND SEISMIC CONTROLS 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.

### 1.2 SUMMARY

A. Section Includes:

1. Elastomeric isolation pads.
2. Elastomeric isolation mounts.
3. Restrained elastomeric isolation mounts.
4. Open-spring isolators.
5. Housed-spring isolators.
6. Restrained-spring isolators.
7. Housed-restrained-spring isolators.
8. Pipe-riser resilient supports.
9. Resilient pipe guides.
10. Air-spring isolators.
11. Restrained-air-spring isolators.
12. Elastomeric hangers.
13. Spring hangers.
14. Snubbers.
15. Restraint channel bracings.
16. Restraint cables.
17. Seismic-restraint accessories.
18. Mechanical anchor bolts.
19. Adhesive anchor bolts.
20. Vibration isolation equipment bases.
21. Restrained isolation roof-curb rails.

B. Related Requirements:

1. Section 210548 "Vibration and Seismic Controls for Fire Suppression" for devices for fire-suppression equipment and systems.
2. Section 220548 "Vibration and Seismic Controls for Plumbing" for devices for plumbing equipment and systems.

1.3 DEFINITIONS

A. IBC: International Building Code.

B. ICC-ES: ICC-Evaluation Service.

C. OSHPD: Office of Statewide Health Planning & Development (for the State of California).

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of vibration isolation device and seismic-restraint component required.

a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.
b. Annotate to indicate application of each product submitted and compliance with requirements.

3. Interlocking Snubbers: Include ratings for horizontal, vertical, and combined loads.

B. Shop Drawings:

1. Detail fabrication and assembly of equipment bases. Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
2. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

C. Delegated-Design Submittal: For each vibration isolation and seismic-restraint device.

1. Include design calculations and details for selecting vibration isolators, seismic restraints, and vibration isolation bases complying with performance requirements, design criteria, and analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
2. Design Calculations: Calculate static and dynamic loading due to equipment weight, operation, and seismic and wind forces required to select vibration isolators and seismic and wind restraints and for designing vibration isolation bases.

a. Coordinate design calculations with wind load calculations required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.

3. Riser Supports: Include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on building structure, spring deflection changes, and seismic loads. Include certification that riser system was examined for excessive stress and that none exists.
4. Seismic and Wind-Restraint Details:

    a. Design Analysis: To support selection and arrangement of seismic[ and wind] restraints. Include calculations of combined tensile and shear loads.
    b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
    c. Coordinate seismic-restraint and vibration isolation details with wind-restraint details required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.
    d. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

## 1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Show coordination of vibration isolation device installation and seismic bracing for HVAC piping and equipment with other systems and equipment in the vicinity, including other supports and restraints, if any.

B. Qualification Data: For professional engineer and testing agency.

C. Welding certificates.

D. Air-Mounting System Performance Certification: Include natural frequency, load, and damping test data.

E. Field quality-control reports.

## 1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air-spring mounts to include in operation and maintenance manuals.

## 1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7 and that is acceptable to authorities having jurisdiction.

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

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

D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are unavailable, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

## PART 2 - PRODUCTS

### 2.1 ELASTOMERIC ISOLATION PADS

A. Elastomeric Isolation Pads:

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:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Ace Mountings Co., Inc.
    b. California Dynamics Corporation.
    c. Isolation Technology, Inc.
    d. Kinetics Noise Control, Inc.
    e. Mason Industries, Inc.
    f. Vibration Eliminator Co., Inc.
    g. Vibration Isolation.
    h. Vibration Mountings & Controls, Inc.

3. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
4. Size: Factory or field cut to match requirements of supported equipment.
5. Pad Material: Oil and water resistant with elastomeric properties.
6. Surface Pattern: [Smooth] [Ribbed] [Waffle] pattern.
7. Infused nonwoven cotton or synthetic fibers.
8. Load-bearing metal plates adhered to pads.
9. Sandwich-Core Material: [Resilient] [and] [elastomeric] <Insert compound>.

    a. Surface Pattern: [Smooth] [Ribbed] [Waffle] pattern.
    b. Infused nonwoven cotton or synthetic fibers.

## 2.2 ELASTOMERIC ISOLATION MOUNTS

A. Double-Deflection, Elastomeric Isolation Mounts:

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:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Ace Mountings Co., Inc.
    b. California Dynamics Corporation.
    c. Isolation Technology, Inc.
    d. Kinetics Noise Control, Inc.
    e. Mason Industries, Inc.
    f. Vibration Eliminator Co., Inc.
    g. Vibration Isolation.
    h. Vibration Mountings & Controls, Inc.

3. Mounting Plates:

    a. Top Plate: Encapsulated steel load transfer top plates, factory drilled and threaded with threaded studs or bolts.
    b. Baseplate: Encapsulated steel bottom plates with holes provided for anchoring to support structure.

4. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

## 2.3 RESTRAINED ELASTOMERIC ISOLATION MOUNTS

A. Restrained Elastomeric Isolation Mounts:

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:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawingsor comparable product by one of the following:

    a. Ace Mountings Co., Inc.
    b. California Dynamics Corporation.
    c. Isolation Technology, Inc.
    d. Kinetics Noise Control, Inc.
    e. Mason Industries, Inc.
    f. Vibration Eliminator Co., Inc.
    g. Vibration Isolation.
    h. Vibration Mountings & Controls, Inc.

3. Description: All-directional isolator with seismic restraints containing two separate and opposing elastomeric elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.

    a. Housing: Cast-ductile iron or welded steel.
    b. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

## 2.4 OPEN-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators:

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:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Ace Mountings Co., Inc.
    b. California Dynamics Corporation.
    c. Isolation Technology, Inc.
    d. Kinetics Noise Control, Inc.
    e. Mason Industries, Inc.
    f. Vibration Eliminator Co., Inc.
    g. Vibration Isolation.
    h. Vibration Mountings & Controls, Inc.

3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
7. Baseplates: Factory-drilled steel plate for bolting to structure with an elastomeric isolator pad attached to the underside. Baseplates shall limit floor load to 500 psig (3447 kPa).
8. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

## 2.5 HOUSED-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators in Two-Part Telescoping Housing:

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:

2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Ace Mountings Co., Inc.
    b. California Dynamics Corporation.
    c. Isolation Technology, Inc.
    d. Kinetics Noise Control, Inc.
    e. Mason Industries, Inc.
    f. Vibration Eliminator Co., Inc.
    g. Vibration Isolation.
    h. Vibration Mountings & Controls, Inc.

3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
7. Two-Part Telescoping Housing: A steel top and bottom frame separated by an elastomeric material and enclosing the spring isolators.

    a. Drilled base housing for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig (3447 kPa).
    b. Top housing with [attachment and leveling bolt] [threaded mounting holes and internal leveling device] [elastomeric pad].

## 2.6 PIPE-RISER RESILIENT SUPPORT

A. Description: All-directional, acoustical pipe anchor consisting of two steel tubes separated by a minimum 1/2-inch- (13-mm-) thick neoprene

1. Vertical-Limit Stops: Steel and neoprene vertical-limit stops arranged to prevent vertical travel in both directions.
2. Maximum Load Per Support: 500 psig (3.45 MPa)on isolation material providing equal isolation in all directions.

## 2.7 RESILIENT PIPE GUIDES

A. Description: Telescopic arrangement of two steel tubes or post and sleeve arrangement separated by a minimum 1/2-inch- (13-mm-) thick neoprene

1. Factory-Set Height Guide with Shear Pin: Shear pin shall be removable and reinsertable to allow for selection of pipe movement. Guides shall be capable of motion to meet location requirements.

## 2.8 AIR-SPRING ISOLATORS

A. Freestanding, Single or Multiple, Compressed-Air Bellows:

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:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawingsor comparable product by one of the following:

    a. Firestone Industrial Products Company.
    b. Mason Industries, Inc.

3. Bellows Assembly: Upper and lower powder-coated steel sections connected by a replaceable, flexible, nylon-reinforced neoprene bellows or similar elastomeric material.
4. Maximum Natural Frequency: 3 Hz.
5. Operating Pressure Range: 25 to 100 psig (172 to 690 kPa).
6. Burst Pressure: At least three times manufacturer's published maximum operating pressure.
7. Tank valves.

## 2.9 RESTRAINED-AIR-SPRING ISOLATORS

A. Freestanding, Single or Multiple, Compressed-Air Bellows with Vertical-Limit Stop Restraint:

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:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [product indicated on Drawings] or comparable product by one of the following:

    a. Firestone Industrial Products Company.
    b. Mason Industries, Inc.

3. Housing: Steel housing with vertical-limit stops to prevent spring extension due to weight being removed.

    a. Base with holes for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig (3447 kPa).
    b. Top plate with [threaded mounting holes] [elastomeric pad].
    c. Internal leveling bolt that acts as blocking during installation.

4. Restraint: Limit stop as required for equipment and authorities having jurisdiction.
5. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
6. Minimum Additional Travel: 50 percent of the required deflection at rated load.

7. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
8. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
9. Bellows Assembly: Upper and lower powder-coated steel sections connected by a replaceable, flexible, nylon-reinforced neoprene bellows or similar elastomeric material.
10. Maximum Natural Frequency: 3 Hz.
11. Operating Pressure Range: 25 to 100 psig (172 to 690 kPa).
12. Burst Pressure: At least three times manufacturer's published maximum operating pressure.
13. Tank valves.

## 2.10 ELASTOMERIC HANGERS

A. Elastomeric Mount in a Steel Frame with Upper and Lower Steel Hanger Rods:

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:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Ace Mountings Co., Inc.
    b. California Dynamics Corporation.
    c. Isolation Technology, Inc.
    d. Kinetics Noise Control, Inc.
    e. Mason Industries, Inc.
    f. Vibration Eliminator Co., Inc.
    g. Vibration Mountings & Controls, Inc.

3. Frame: Steel, fabricated with a connection for an upper threaded hanger rod and an opening on the underside to allow for a maximum of 30 degrees of angular lower hanger-rod misalignment without binding or reducing isolation efficiency.
4. Dampening Element: Molded, oil-resistant rubber, neoprene, or other elastomeric material with a projecting bushing for the underside opening preventing steel to steel contact.

## 2.11 SPRING HANGERS

A. Combination Coil-Spring and Elastomeric-Insert Hanger with Spring and Insert in Compression:

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:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [product indicated on Drawings] or comparable product by one of the following:

a. Ace Mountings Co., Inc.
b. California Dynamics Corporation.
c. Kinetics Noise Control, Inc.
d. Mason Industries, Inc.
e. Vibration Eliminator Co., Inc.
f. Vibration Isolation.
g. Vibration Mountings & Controls, Inc.

3. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
4. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
5. Minimum Additional Travel: 50 percent of the required deflection at rated load.
6. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
7. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
8. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
9. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
10. Self-centering hanger-rod cap to ensure concentricity between hanger rod and support spring coil.

## 2.12 RESTRAINT CHANNEL BRACINGS

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

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Cooper B-Line, Inc.
2. Hilti, Inc.
3. Mason Industries, Inc.
4. Unistrut.

C. Description: MFMA-4, shop- or field-fabricated bracing assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; rated in tension, compression, and torsion forces.

## 2.13 RESTRAINT CABLES

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

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Kinetics Noise Control, Inc.
2. Loos & Co., Inc.
3. Vibration Mountings & Controls, Inc.

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

## 2.14 MECHANICAL ANCHOR BOLTS

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

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Cooper B-Line, Inc.
2. Hilti, Inc.
3. Kinetics Noise Control, Inc.
4. Mason Industries, Inc.

C. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

## 2.15 ADHESIVE ANCHOR BOLTS

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

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Hilti, Inc.
2. Kinetics Noise Control, Inc.
3. Mason Industries, Inc.

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

## 2.16 VIBRATION ISOLATION EQUIPMENT BASES

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

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. California Dynamics Corporation.
2. Kinetics Noise Control.
3. Mason Industries, Inc.
4. Vibration Eliminator Co., Inc.
5. Vibration Isolation.
6. Vibration Mountings & Controls, Inc.

C. Steel Rails: Factory-fabricated, welded, structural-steel rails.

1. Design Requirements: Lowest possible mounting height with not less than 1-inch (25-mm) clearance above the floor. Include equipment anchor bolts and auxiliary motor slide rails.

    a. Include supports for suction and discharge elbows for pumps.

2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Rails shall have shape to accommodate supported equipment.
3. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.

D. Steel Bases: Factory-fabricated, welded, structural-steel bases and rails.

1. Design Requirements: Lowest possible mounting height with not less than 1-inch (25-mm) clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails.

    a. Include supports for suction and discharge elbows for pumps.

2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall have shape to accommodate supported equipment.
3. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.

E. Concrete Inertia Base: [Factory-fabricated] [or] [field-fabricated], welded, structural-steel bases and rails ready for placement of cast-in-place concrete.

1. Design Requirements: Lowest possible mounting height with not less than 1-inch (25-mm) clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails.

a. Include supports for suction and discharge elbows for pumps.

2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall have shape to accommodate supported equipment.
3. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.
4. Fabrication: Fabricate steel templates to hold equipment anchor-bolt sleeves and anchors in place during placement of concrete. Obtain anchor-bolt templates from supported equipment manufacturer.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine areas and equipment to receive vibration isolation and seismic and wind-control devices for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 APPLICATIONS

A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.

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

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

## 3.3 VIBRATION CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Coordinate the location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Section 033000 Cast-in-Place Concrete.

B. Installation of vibration isolators must not cause any change of position of equipment, piping, or ductwork resulting in stresses or misalignment.

C. Equipment Restraints:

1. Install seismic snubbers on HVAC equipment mounted on vibration isolators. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.
2. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch (3.2 mm).
3. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction that provides required submittals for component.

D. Piping Restraints:

1. Comply with requirements in MSS SP-127.
2. Space lateral supports a maximum of [40 feet (12 m)] o.c., and longitudinal supports a maximum of [80 feet (24 m)] o.c.
3. Brace a change of direction longer than 12 feet (3.7 m).

E. Install cables so they do not bend across edges of adjacent equipment or building structure.

F. Install seismic-restraint devices using methods approved by agency acceptable to authorities having jurisdiction that provides required submittals for component.

G. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.

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

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

J. Drilled-in Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.

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

## 3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in Section 232113 "Hydronic Piping" for piping flexible connections.

## 3.5 ADJUSTING

A. Adjust isolators after piping system is at operating weight.

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

## 3.6 AIR-SPRING ISOLATOR INSTALLATION

A. Independent Isolator Installation:

1. Install tank valve into each air isolator.
2. Inflate each isolator to [height] [and] [pressure] specified on Drawings.

B. Pressure-Regulated Isolator Installation:

1. Coordinate the constant pressure-regulated air supply to air springs with the requirements for piping and connections specified in Section 221513 "General-Service Compressed-Air Piping."
2. Connect all pressure regulators to a single dry, filtered [facility] [constant] air supply.
3. Inflate isolators to [height] [and] [or] [pressure] specified on Drawings.

3.7 VIBRATION ISOLATION EQUIPMENT BASES INSTALLATION

A. Coordinate the location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in [Section 033000 "Cast-in-Place Concrete."] [Section 033053, "Miscellaneous Cast-in-Place Concrete."]

**END OF SECTION 230548**

## SECTION 230553 - IDENTIFICATION 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.

### 1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Pipe labels.
3. Duct labels.
4. Valve tags.

### 1.3 ACTION SUBMITTALS

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

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

### 1.4 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

**PART 2 - PRODUCTS**

2.1 EQUIPMENT LABELS

A. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.
2. Letter Color: Black.
3. Background Color: Yellow.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Fasteners: Stainless-steel rivets or self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to partially cover [cover full] circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches high.

## 2.3 DUCT LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: White.

C. Background Color: Blue.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings, duct size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions, or as separate unit on each duct label to indicate flow direction.
2. Lettering Size: At least 1-1/2 incheshigh.

## 2.4 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.032-inch or anodized aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass wire-link or beaded chain; or S-hook.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

## PART 3 - EXECUTION

### 3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

### 3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

### 3.3 PIPE LABEL INSTALLATION

A. Piping Color-Coding: Painting of piping per ANSI standards.

B. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

C. Pipe Label Color Schedule:

1. Heating Water Piping:

    a. Background Color: Orange.
    b. Letter Color: White.

2. Refrigerant Piping:

    a. Background Color: Light Blue.
    b. Letter Color: White.

## 3.4 DUCT LABEL INSTALLATION

A. Install self-adhesive duct labels with permanent adhesive on air ducts in the following color codes:

1. Blue: For cold-air supply ducts.
2. Yellow: For hot-air supply ducts.
3. Green: For exhaust-, outside-, relief-, return-, and mixed-air ducts.
4. ASME A13.1 Colors and Designs: For hazardous material exhaust.

B. Locate labels near points where ducts enter into concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

## 3.5 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:
   a. Refrigerant: 1-1/2 inches, square.
   b. Hot Water: 1-1/2 inches, round.

2. Valve-Tag Color:
   a. Refrigerant: Natural.
   b. Hot Water: Natural.

3. Letter Color:
   a. Refrigerant: White.
   b. Hot Water: White.

**END OF SECTION 230553**

## 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.

### 1.2 SUMMARY

A. Section Includes:

1. Balancing Air Systems:
   a. Variable-air-volume systems.
   b. .

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 INFORMATIONAL SUBMITTALS

A. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.

B. Contract Documents Examination Report: Within 30 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.

C. Strategies and Procedures Plan: Within 30 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.

D. Certified TAB reports.

E. Sample report forms.

F. 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 or TABB.

1. TAB Field Supervisor: Employee of the TAB contractor and certified by NEBB or TABB.
2. TAB Technician: Employee of the TAB contractor and who is certified by NEBB or TABB as a TAB technician.

B. TAB Conference: Meet with Commissioning Authority on approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Require the participation of the TAB field supervisor and technicians. Provide seven days' advance notice of scheduled meeting time and location.

1. Agenda Items:

a. The Contract Documents examination report.
b. The TAB plan.
c. Coordination and cooperation of trades and subcontractors.
d. Coordination of documentation and communication flow.

C. 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.

D. TAB Report Forms: Use standard TAB contractor's forms approved by Commissioning Authority.

E. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

F. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

G. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.6 PROJECT CONDITIONS

A. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.7 COORDINATION

A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.

B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

**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.

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.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they meet the leakage class of connected ducts as specified in Section 233113 "Metal Ducts" and are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.

F. Examine equipment performance data including fan curves.

1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

H. Examine test reports specified in individual system and equipment Sections.

I. 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.

J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.

K. Examine strainers. Verify that startup screens are replaced by permanent screens with indicated perforations.

L. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

M. Examine operating safety interlocks and controls on HVAC equipment.

N. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

## 3.2 PREPARATION

A. Prepare a TAB plan that includes strategies and step-by-step procedures.

B. Complete system-readiness checks and prepare reports. 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 AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.

1. Comply with requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

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. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 233300 "Air Duct Accessories."
3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation," Section 230716 "HVAC Equipment Insulation," and Section 230719 "HVAC Piping 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. 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.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

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 Section 233113 "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-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. 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.

B. Prepare schematic diagrams of systems' "as-built" piping layouts.

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. 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 MOTORS

A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer's name, model number, and serial number.
2. Motor horsepower rating.
3. Motor rpm.
4. Efficiency rating.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter thermal-protection-element rating.

B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

## 3.9 PROCEDURES FOR CONDENSING UNITS

A. Verify proper rotation of fans.

B. Measure entering- and leaving-air temperatures.

C. Record compressor data.

## 3.10 PROCEDURES FOR HEAT-TRANSFER COILS

A. Measure, adjust, and record the following data for each water coil:

1. Entering- and leaving-water temperature.
2. Water flow rate.
3. Water pressure drop.
4. Dry-bulb temperature of entering and leaving air.
5. Wet-bulb temperature of entering and leaving air for cooling coils.
6. Airflow.
7. Air pressure drop.

B. Measure, adjust, and record the following data for each electric heating coil:

1. Nameplate data.
2. Airflow.
3. Entering- and leaving-air temperature at full load.
4. Voltage and amperage input of each phase at full load and at each incremental stage.
5. Calculated kilowatt at full load.
6. Fuse or circuit-breaker rating for overload protection.

C. Measure, adjust, and record the following data for each steam coil:

1. Dry-bulb temperature of entering and leaving air.
2. Airflow.
3. Air pressure drop.
4. Inlet steam pressure.

D. Measure, adjust, and record the following data for each refrigerant coil:

1. Dry-bulb temperature of entering and leaving air.
2. Wet-bulb temperature of entering and leaving air.
3. Airflow.
4. Air pressure drop.
5. Refrigerant suction pressure and temperature.

## 3.11 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 motor voltage and amperage. Compare the values to motor nameplate information.
3. Check the refrigerant charge.
4. Check the condition of filters.
5. Check the condition of coils.

6. Check the operation of the drain pan and condensate-drain trap.
7. Check bearings and other lubricated parts for proper lubrication.
8. 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 calculations increase or decrease the air flow 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.

## 3.12 TOLERANCES

A. Set HVAC system's air flow rates and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 5 percent.
2. Air Outlets and Inlets: Plus or minus 10 percent.
3. Heating-Water Flow Rate: Plus or minus 10 percent.
4. Cooling-Water Flow Rate: Plus or minus 10 percent.

## 3.13 REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

B. Status Reports: Prepare weekly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

## 3.14 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. Pump curves.
2. Fan curves.
3. Manufacturers' test data.
4. Field test reports prepared by system and equipment installers.
5. Other information relative to equipment performance; 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.
    c. Description of system operation sequence if it varies from the Contract Documents.

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. Face and bypass damper settings at coils.
e. Fan drive settings including settings and percentage of maximum pitch diameter.
f. Inlet vane settings for variable-air-volume systems.
g. Settings for supply-air, static-pressure controller.
h. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Water and steam flow rates.
3. Duct, outlet, and inlet sizes.
4. Pipe and valve sizes and locations.
5. Terminal units.
6. Balancing stations.
7. Position of balancing devices.

E. Apparatus-Coil Test Reports:

1. Coil Data:

a. System identification.
b. Location.
c. Coil type.
d. Number of rows.
e. Fin spacing in fins per inch o.c.
f. Make and model number.
g. Face area in sq. ft..
h. Tube size in NPS.
i. Tube and fin materials.
j. Circuiting arrangement.

2. Test Data (Indicated and Actual Values):

a. Air flow rate in cfm.
b. Average face velocity in fpm.
c. Air pressure drop in inches wg.
d. Outdoor-air, wet- and dry-bulb temperatures in deg F.
e. Return-air, wet- and dry-bulb temperatures in deg F.
f. Entering-air, wet- and dry-bulb temperatures in deg F.
g. Leaving-air, wet- and dry-bulb temperatures in deg F.
h. Water flow rate in gpm.
i. Water pressure differential in feet of head or psig.
j. Entering-water temperature in deg F.
k. Leaving-water temperature in deg F.

l. Refrigerant expansion valve and refrigerant types.
m. Refrigerant suction pressure in psig.
n. Refrigerant suction temperature in deg F.
o. Inlet steam pressure in psig.

F. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and size.
e. Manufacturer's serial number.
f. Arrangement and class.
g. Sheave make, size in inches, and bore.
h. Center-to-center dimensions of sheave, and amount of adjustments in inches.

2. Motor Data:

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. Sheave make, size in inches, and bore.
f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
g. Number, make, and size of belts.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Suction static pressure in inches wg.

G. Round, Flat-Oval, and Rectangular Duct Traverse Reports: 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.
d. Duct static pressure in inches wg.
e. Duct size in inches.
f. Duct area in sq. ft..
g. Indicated air flow rate in cfm.
h. Indicated velocity in fpm.

i. Actual air flow rate in cfm.
j. Actual average velocity in fpm.
k. Barometric pressure in psig.

H. Air-Terminal-Device Reports:

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..

2. Test Data (Indicated and Actual Values):

a. Air flow rate in cfm.
b. Air velocity in fpm.
c. Preliminary air flow rate as needed in cfm.
d. Preliminary velocity as needed in fpm.
e. Final air flow rate in cfm.
f. Final velocity in fpm.
g. Space temperature in deg F.

I. System-Coil Reports: For reheat coils and water coils of terminal units, include the following:

1. Unit Data:

a. System and air-handling-unit identification.
b. Location and zone.
c. Room or riser served.
d. Coil make and size.
e. Flowmeter type.

2. Test Data (Indicated and Actual Values):

a. Air flow rate in cfm.
b. Entering-water temperature in deg F.
c. Leaving-water temperature in deg F.
d. Water pressure drop in feet of head or psig.
e. Entering-air temperature in deg F.
f. Leaving-air temperature in deg F.

J. Instrument Calibration Reports:

1. Report Data:

    a. Instrument type and make.
    b. Serial number.
    c. Application.
    d. Dates of use.
    e. Dates of calibration.

## 3.15 INSPECTIONS

A. Initial Inspection:

1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
2. Check the following for each system:

    a. Measure airflow of at least 10 percent of air outlets.
    b. Measure water flow of at least 5 percent of terminals.
    c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
    d. Verify that balancing devices are marked with final balance position.
    e. Note deviations from the Contract Documents in the final report.

B. Final Inspection:

1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Architect Commissioning Authority.
2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of Commissioning Authority.
3. Commissioning Authorityshall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
4. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:

1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.

D. Prepare test and inspection reports.

## 3.16 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 230713 - DUCT 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.

### 1.2 SUMMARY

A. Section includes insulating the following duct services:

1. Indoor, concealed supply and outdoor air.
2. Indoor, exposed supply and outdoor air.
3. Indoor, concealed return located in unconditioned space.
4. Indoor, exposed return located in unconditioned space.

B. Related Sections:
1. Section 233113 "Metal Ducts" for duct liners.

### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).

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

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
3. Detail application of field-applied jackets.
4. Detail application at linkages of control devices.

C. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use. Sample sizes are as follows:

1. Sheet Form Insulation Materials: 12 inches square.
2. Sheet Jacket Materials: 12 inches square.
3. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

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

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

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

## PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

D. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type II for sheet materials.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Aeroflex USA, Inc.; Aerocel.
b. Armacell LLC; AP Armaflex.
c. K-Flex USA; Insul-Sheet, K-Flex Gray Duct Liner, and K-FLEX LS.

E. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following:

a. CertainTeed Corp.; Commercial Board.
b. Fibrex Insulations Inc.; FBX.
c. Johns Manville; 800 Series Spin-Glas.
d. Knauf Insulation; Insulation Board.
e. Manson Insulation Inc.; AK Board.
f. Owens Corning; Fiberglas 700 Series.

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. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Aeroflex USA, Inc.; Aeroseal.
b. Armacell LLC; Armaflex 520 Adhesive.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-75.K-Flex USA; R-373 Contact Adhesive.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.Eagle Bridges - Marathon Industries; 225.
b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. ASJ Adhesive, and FSK Jacket 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 one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
b. Eagle Bridges - Marathon Industries; 225.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-50.Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Dow Corning Corporation; 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; Polyco VP Adhesive.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

## 2.3 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
   b. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-30.
b. Eagle Bridges - Marathon Industries; 501.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-35.
d. Mon-Eco Industries, Inc.; 55-10.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.
3. Service Temperature Range: 0 to 180 deg F.
4. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
5. Color: White.

D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Encacel.
b. Eagle Bridges - Marathon Industries; 570.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 60-95/60-96.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
3. Service Temperature Range: Minus 50 to plus 220 deg F.
4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
5. Color: White.

E. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.
b. Eagle Bridges - Marathon Industries; 550.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 46-50.
d. Mon-Eco Industries, Inc.; 55-50.
e. Vimasco Corporation; WC-1/WC-5.

2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

## 2.4 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.

1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Products: Subject to compliance with requirements, provide one of the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-50 AHV2.Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-36.
    b. Vimasco Corporation; 713 and 714.

3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct insulation.
4. Service Temperature Range: 0 to plus 180 deg F.
5. Color: White.

## 2.5 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.Eagle Bridges - Marathon Industries; 405.
    b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
    c. Mon-Eco Industries, Inc.; 44-05.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: Aluminum.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. ASJ Flashing Sealants, and Vinyl and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 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.
5. Color: White.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

## 2.6 TAPES

A. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. ABI, Ideal Tape Division; 488 AWF.
   b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
   c. Compac Corporation; 120.
   d. Venture Tape; 3520 CW.

2. Width: 2 inches.
3. Thickness: 3.7 mils.
4. Adhesion: 100 ounces force/inch in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

## 2.7 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. ITW Insulation Systems; Gerrard Strapping and Seals.
   b. RPR Products, Inc.; Insul-Mate Strapping, Seals, and Springs.

2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch thick, 1/2 inch wide with wing seal.
3. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing seal or closed seal.
4. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

B. Insulation Pins and Hangers:

1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- diameter shank, length to suit depth of insulation indicated.

    a. Products: Subject to compliance with requirements, provide one of the following:

        1) AGM Industries, Inc.; CWP-1.
        2) GEMCO; CD.
        3) Midwest Fasteners, Inc.; CD.
        4) Nelson Stud Welding; TPA, TPC, and TPS.

2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.

    a. Products: Subject to compliance with requirements, provide one of the following:

        1) AGM Industries, Inc.; CHP-1.
        2) GEMCO; Cupped Head Weld Pin.
        3) Midwest Fasteners, Inc.; Cupped Head.
        4) Nelson Stud Welding; CHP.

3. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:

    a. Products: Subject to compliance with requirements, provide one of the following:

        1) AGM Industries, Inc.; Tactoo Perforated Base Insul-Hangers.
        2) GEMCO; Perforated Base.
        3) Midwest Fasteners, Inc.; Spindle.

    b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
    c. Spindle: Copper- or zinc-coated, low-carbon steel, fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
    d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

4. Nonmetal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate fastened to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:

a. Products: Subject to compliance with requirements, provide one of the following:

1) GEMCO; Nylon Hangers.
2) Midwest Fasteners, Inc.; Nylon Insulation Hangers.

b. Baseplate: Perforated, nylon sheet, 0.030 inch thick by 1-1/2 inches in diameter.
c. Spindle: Nylon, 0.106-inch-diameter shank, length to suit depth of insulation indicated, up to 2-1/2 inches.
d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

5. Self-Sticking-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:

a. Products: Subject to compliance with requirements, provide one of the following:

1) AGM Industries, Inc.; Tactoo Self-Adhering Insul-Hangers.
2) GEMCO; Peel & Press.
3) Midwest Fasteners, Inc.; Self Stick.

b. Baseplate: Galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
c. Spindle: Copper- or zinc-coated, low-carbon steel, fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
d. Adhesive-backed base with a peel-off protective cover.

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

a. Products: Subject to compliance with requirements, provide one of the following:

1) AGM Industries, Inc.; RC-150.
2) GEMCO; R-150.
3) Midwest Fasteners, Inc.; WA-150.
4) Nelson Stud Welding; Speed Clips.

b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

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

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

1) GEMCO.
2) Midwest Fasteners, Inc.

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

D. Wire: 0.080-inch nickel-copper alloy.

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

a. C & F Wire.

2.8 CORNER ANGLES

A. Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum according to ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14.

**PART 3 - EXECUTION**

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. 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.

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 ducts and fittings.

B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

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

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

F. Keep insulation materials dry during application and finishing.

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

H. Install insulation with least number of joints practical.

I. 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.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.

    a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.

L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

## 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: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.

1. Comply with requirements in Section 078413 "Penetration Firestopping"irestopping and fire-resistive joint sealers.

C. Insulation Installation at Floor Penetrations:

1. Duct: For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

## 3.5 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

## 3.6 INSTALLATION OF MINERAL-FIBER INSULATION

A. 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 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.

3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

    a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    d. Do not overcompress 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 from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch 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 at 18-foot 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 two times the insulation thickness, but not less than 3 inches.

5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches 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-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.

2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

    a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    b. On duct sides with dimensions larger than 18 inches, space pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    d. Do not overcompress insulation during installation.
    e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

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 from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch 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 at 18-foot 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 two times the insulation thickness, but not less than 3 inches.

5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

## 3.7 FIELD-APPLIED JACKET INSTALLATION

A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.

1. Draw jacket smooth and tight to surface with 2-inch overlap at seams and joints.
2. Embed glass cloth between two 0.062-inch-thick coats of lagging adhesive.
3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch-wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

C. Where PVC jackets are indicated, install with 1-inch 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.

D. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

## 3.8 FIRE-RATED INSULATION SYSTEM INSTALLATION

A. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.

B. Insulate duct access panels and doors to achieve same fire rating as duct.

C. Install firestopping at penetrations through fire-rated assemblies. Fire-stop systems are specified in Section 078413 "Penetration Firestopping."

## 3.9 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

## 3.10 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.

D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

## 3.11 DUCT INSULATION SCHEDULE, GENERAL

A. Plenums and Ducts Requiring Insulation:

1. Indoor, concealed supply and outdoor air.
2. Indoor, exposed supply and outdoor air.
3. Indoor, concealed return located in unconditioned space.
4. Indoor, exposed return located in unconditioned space.
5. Indoor, concealed, Type I, commercial, kitchen hood exhaust.
6. Indoor, exposed, Type I, commercial, kitchen hood exhaust.
7. Indoor, concealed oven and warewash exhaust.
8. Indoor, exposed oven and warewash exhaust.
9. Indoor, concealed exhaust between isolation damper and penetration of building exterior.
10. Indoor, exposed exhaust between isolation damper and penetration of building exterior.
11. Outdoor, concealed supply and return.
12. Outdoor, exposed supply and return.

B. Items Not Insulated:

1. Fibrous-glass ducts.

2. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
3. Factory-insulated flexible ducts.
4. Factory-insulated plenums and casings.
5. Flexible connectors.
6. Vibration-control devices.
7. Factory-insulated access panels and doors.

3.12 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. See schedule on the drawings.

3.13 ABOVEGROUND, OUTDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. See schedule on the drawings.

3.14 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

A. See schedule on the drawings.

**END OF SECTION 230713**

## SECTION 230716 - HVAC EQUIPMENT INSULATION

## PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Equipment insulation.

B. Covering.

1.2 REFERENCE STANDARDS

A. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

B. ASTM C 177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.

C. ASTM C 195 - Standard Specification for Mineral Fiber Thermal Insulating Cement.

D. ASTM C 518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

E. ASTM C 534/C 534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.

F. ASTM C 553 - Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

G. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

H. ASTM E 96/E 96M - Standard Test Methods for Water Vapor Transmission of Materials.

1.3 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for equipment scheduled.

C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified

in this section with not less than 2 years of documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum 2 years of experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.6 FIELD CONDITIONS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

**PART 2 - PRODUCTS**

2.1 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION

A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E 84, NFPA 255, or UL 723.

2.2 GLASS FIBER, FLEXIBLE (Type F)

A. Manufacturers:
1. Knauf Insulation: www.knaufusa.com.
2. Johns Manville Corporation: www.jm.com.
3. Owens Corning Corp: www.owenscorning.com.
4. CertainTeed Corporation: www.certainteed.com.

B. Insulation: ASTM C 553; flexible, noncombustible.
1. 'K' Value: 0.36 at 75 degrees F, when tested in accordance with ASTM C 177 or ASTM C 518.
2. Maximum Service Temperature: 450 degrees F.
3. Maximum Water Vapor Sorption: 5.0 percent by weight.

C. Vapor Barrier Jacket: Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
1. Moisture Vapor Permeability: 0.029 ng/Pa s m (0.02 perm inch), when tested in accordance with ASTM E 96/E 96M.
2. Secure with self-sealing longitudinal laps and butt strips.
3. Secure with outward clinch expanding staples and vapor barrier mastic.

D. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

E. Vapor Barrier Lap Adhesive:
   1. Compatible with insulation.

F. Insulating Cement/Mastic:
   1. ASTM C 195; hydraulic setting on mineral wool.

2.3 FLEXIBLE ELASTOMERIC CELLULAR INSULATION (Type A)

A. Manufacturer:
   1. Armacell International: www.armacell.com.
   2. Or approved equal.

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C 534 Grade 3, in sheet form.
   1. Minimum Service Temperature: -40 degrees F.
   2. Maximum Service Temperature: 220 degrees F.
   3. Connection: Waterproof vapor barrier adhesive.

C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

2.4 JACKETS

A. PVC Plastic:
   1. Jacket: Sheet material, off-white color.
      a. Minimum Service Temperature: -40 degrees F.
      b. Maximum Service Temperature: 150 degrees F.
      c. Moisture Vapor Permeability: 0.029 ng/Pa s m (0.02 perm inch), when tested in accordance with ASTM E 96/E 96M.
      d. Thickness: 10 mil.
      e. Connections: Brush on welding adhesive.
   2. Covering Adhesive Mastic:
      a. Compatible with insulation.

B. Aluminum Jacket: ASTM B 209 (ASTM B 209M) formed aluminum sheet.
   1. Thickness: 0.016 inch sheet.
   2. Finish: Smooth.
   3. Joining: Longitudinal slip joints and 2 inch laps.
   4. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

**PART 3 - EXECUTION**

3.1 EXAMINATION

A. Verify that equipment has been tested before applying insulation materials.

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

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Factory Insulated Equipment: Do not insulate.

C. Exposed Equipment: Locate insulation and cover seams in least visible locations.

D. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands.

E. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor barrier cement.

F. Insulated equipment containing fluids below ambient temperature: Insulate entire system.

G. Fiber glass insulated equipment containing fluids below ambient temperature: Provide vapor barrier jackets, factory-applied or field-applied. Finish with glass cloth and vapor barrier adhesive.

H. For hot equipment containing fluids 140 degrees F or less, do not insulate flanges and unions, but bevel and seal ends of insulation.

I. For hot equipment containing fluids over 140 degrees F, insulate flanges and unions with removable sections and jackets.

J. Fiber glass insulated equipment containing fluids above ambient temperature: Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Finish with glass cloth and adhesive.

K. Inserts and Shields:
   1. Application: Equipment 1-1/2 inches diameter or larger.
   2. Shields: Galvanized steel between hangers and inserts.
   3. Insert location: Between support shield and equipment and under the finish jacket.
   4. Insert configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
   5. Insert material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

L. Finish insulation at supports, protrusions, and interruptions.

M. Equipment in Mechanical Equipment Rooms or Finished Spaces: Finish with PVC jacket and fitting covers.

N. Exterior Applications: Provide vapor barrier jacket or finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal equipment.

O. Cover glass fiber insulation with aluminum jacket.

P. Nameplates and ASME Stamps: Bevel and seal insulation around; do not insulate over.

Q. Equipment Requiring Access for Maintenance, Repair, or Cleaning: Install insulation so it can be easily removed and replaced without damage.

3.3 SCHEDULE

| | EQUIPMENT | INSULATION TYPE | INCHES |
|---|---|---|---|
| A. | Air Separator | F | 1.0 |
| B. | Condenser Water Pump Bodies | A | 0.75 |

**END OF SECTION 230716**

## SECTION 230719 - HVAC PIPING INSULATION

### PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Piping insulation.

B. Jackets and accessories.

1.2 REFERENCE STANDARDS

A. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

B. ASTM C 177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus.

C. ASTM C 195 - Standard Specification for Mineral Fiber Thermal Insulating Cement.

D. ASTM C 449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.

E. ASTM C 518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

F. ASTM C 534/C 534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.

G. ASTM C 547 - Standard Specification for Mineral Fiber Pipe Insulation.

H. ASTM C 552 - Standard Specification for Cellular Glass Thermal Insulation.

I. ASTM C 585 - Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System).

J. ASTM C 591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.

K. ASTM C 795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.

L. ASTM D 2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics.

M. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

N. ASTM E 96/E 96M - Standard Test Methods for Water Vapor Transmission of Materials.

O. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association.

P. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.

1.3 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

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

C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than 2 years of documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum 2 years of experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.6 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

B. Maintain temperature before, during, and after installation for minimum of 24 hours.

**PART 2 - PRODUCTS**

2.1 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION

A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E 84, NFPA 255, or UL 723.

2.2 GLASS FIBER (Type F)

A. Manufacturers:
1. einsulation.com, Inc.: www.einsulation.com
2. Knauf Insulation: www.knaufusa.com.
3. Johns Manville Corporation: www.jm.com.
4. Owens Corning Corp: www.owenscorning.com.
5. CertainTeed Corporation: www.certainteed.com.

B. Insulation: ASTM C 547 and ASTM C 795; rigid molded, noncombustible.
   1. 'K' value: ASTM C 177, 0.24 at 75 degrees F.
   2. Maximum service temperature: 850 degrees F.
   3. Maximum moisture absorption: 0.2 percent by volume.

C. Insulation: ASTM C 547 and ASTM C 795; semi-rigid, noncombustible, end grain adhered to jacket.
   1. 'K' value: ASTM C 177, 0.24 at 75 degrees F.
   2. Maximum service temperature: 650 degrees F.
   3. Maximum moisture absorption: 0.2 percent by volume.

D. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E 96/E 96M of 0.02 perm-inches.

E. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

F. Vapor Barrier Lap Adhesive:
   1. Compatible with insulation.

G. Insulating Cement/Mastic:
   1. ASTM C 195; hydraulic setting on mineral wool.

H. Fibrous Glass Fabric:
   1. Cloth: Untreated; 9 oz/sq yd weight.
   2. Blanket: 1.0 lb/cu ft density.
   3. Weave: 5x5.

I. Indoor Vapor Barrier Finish:
   1. Cloth: Untreated; 9 oz/sq yd weight.
   2. Vinyl emulsion type acrylic, compatible with insulation, black color.

J. Outdoor Vapor Barrier Mastic:
   1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

K. Outdoor Breather Mastic:
   1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

L. Insulating Cement:
   1. ASTM C 449/C 449M.

2.3 CELLULAR GLASS (Type G)

A. Manufacturers:
   1. Pittsburgh Corning Corporation: www.pittsburghcorning.com.
   2. Or approved equal.

B. Insulation: ASTM C 552, Grade 1.
   1. 'K' value: 0.37 at 100 degrees F.
   2. Service Temperature: Up to 900 degrees F.
   3. Water Vapor Permeability: 0.005 perm inch.
   4. Water Absorption: 0.2 percent by volume, maximum.

2.4 POLYISOCYANURATE CELLULAR PLASTIC (Type CP)

A. Insulation Material: ASTM C 591, rigid molded modified polyisocyanurate cellular plastic.
   1. Dimension: Comply with requirements of ASTM C 585.
   2. 'K' value: 0.18 at 75 degrees F, when tested in accordance with ASTM C 518.
   3. Minimum Service Temperature: -70 degrees F.
   4. Maximum Service Temperature: 300 degrees F.
   5. Water Absorption: 0.5 percent by volume, maximum, when tested in accordance with ASTM D 2842..
   6. Moisture Vapor Transmission: 4.0 perm in.
   7. Connection: Waterproof vapor barrier adhesive.

2.5 FLEXIBLE ELASTOMERIC CELLULAR INSULATION (Type A)

A. Manufacturer:
   1. Armacell International: www.armacell.com.
   2. Or approved equal.

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C 534 Grade 3; use molded tubular material wherever possible.
   1. Minimum Service Temperature: -40 degrees F.
   2. Maximum Service Temperature: 220 degrees F.
   3. Connection: Waterproof vapor barrier adhesive.

C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

2.6 JACKETS

A. PVC Plastic.
   1. Manufacturers:
      a. Johns Manville Corporation: www.jm.com.
      b. Or approved equal.
   2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
      a. Minimum Service Temperature: 0 degrees F.
      b. Maximum Service Temperature: 150 degrees F.
      c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E 96/E 96M.
      d. Thickness: 10 mil.
      e. Connections: Brush on welding adhesive.
   3. Covering Adhesive Mastic:
      a. Compatible with insulation.

B. Aluminum Jacket: ASTM B 209 (ASTM B 209M) formed aluminum sheet.
   1. Thickness: 0.016 inch sheet.
   2. Finish: Smooth.
   3. Joining: Longitudinal slip joints and 2 inch laps.
   4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
   5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

**PART 3 - EXECUTION**

3.1 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

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

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. Exposed Piping: Locate insulation and cover seams in least visible locations.

D. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

E. Glass fiber insulated pipes conveying fluids below ambient temperature:
   1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
   2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

F. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

G. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.

H. Glass fiber insulated pipes conveying fluids above ambient temperature:
   1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
   2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.

I. Inserts and Shields:
   1. Application: Piping 1-1/2 inches diameter or larger.
   2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
   3. Insert location: Between support shield and piping and under the finish jacket.
   4. Insert configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
   5. Insert material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

J. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 078400.

K. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers.

L. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

M. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

3.3 SCHEDULE

| | PIPING | TEMP. RANGE Degrees F | PIPE INSUL. Type | SIZE | Inches |
|---|---|---|---|---|---|
| A. | Hot Water Supply/Return | 120-200 | F | RUNOUTS | 1.0 |
| B. | Hot Water Supply/Return | 120-200 | F | 3"& SMALLER | 1.0 |
| C. | Hot Water Supply/Return | 120-200 | F | 4" & LARGER | 1.5 |
| D. | Refrigerant Suction | BELOW 45 F | 1" AND SMALLER | | 1.0 |
| E. | Refrigerant Suction | BELOW 45 F | 1 1/4" & LARGER | | 1.0 |
| F. | Refrigerant Hot Gas | 90-140 F | ALL SIZES | | 1.0 |
| G. | Condenser Water | 55-100 N/A | ALL SIZES | | NONE |
| H. | Glycol System Piping | 35-90 F | ALL SIZES | | 1.0 |
| I. | Cold Condensate Drains | 40-55 A | ALL SIZES | | 0.5 |
| J. | Domestic Water Piping | 50-120 F | ALL SIZES | | 1.0 |
| K. | Piping Exposed to Freezing (Including Heat Traced Pipe) | 40-100 F | ALL SIZES | | 2.0 |

**END OF SECTION 230719**

**SECTION 230800 - COMMISSIONING OF HVAC**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes commissioning process requirements for HVAC&R systems, assemblies, and equipment.

1.3 DEFINITIONS

A. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.

B. CxA: Commissioning Authority.

C. HVAC&R: Heating, Ventilating, Air Conditioning, and Refrigeration.

D. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates of readiness.

B. Certificates of completion of installation, prestart, and startup activities.

1.5 ALLOWANCES

A. Labor, instrumentation, tools, and equipment costs for technicians for the performance of commissioning testing are covered by the "Schedule of Allowances" Article in Section 012100 "Allowances."

1.6 CONTRACTOR'S RESPONSIBILITIES

A. Perform commissioning tests at the direction of the CxA.

B. Attend construction phase controls coordination meeting.

C. Attend testing, adjusting, and balancing review and coordination meeting.

D. Participate in HVAC&R systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.

E. Provide information requested by the CxA for final commissioning documentation.

F. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.

## 1.7 CxA'S RESPONSIBILITIES

A. Provide Project-specific construction checklists and commissioning process test procedures for actual HVAC&R systems, assemblies, equipment, and components to be furnished and installed as part of the construction contract.

B. Direct commissioning testing.

C. Verify testing, adjusting, and balancing of Work are complete.

D. Provide test data, inspection reports, and certificates in Systems Manual.

## 1.8 COMMISSIONING DOCUMENTATION

A. Provide the following information to the CxA for inclusion in the commissioning plan:

1. Plan for delivery and review of submittals, systems manuals, and other documents and reports.
2. Identification of installed systems, assemblies, equipment, and components including design changes that occurred during the construction phase.
3. Process and schedule for completing construction checklists and manufacturer's prestart and startup checklists for HVAC&R systems, assemblies, equipment, and components to be verified and tested.
4. Certificate of completion certifying that installation, prestart checks, and startup procedures have been completed.
5. Certificate of readiness certifying that HVAC&R systems, subsystems, equipment, and associated controls are ready for testing.
6. Test and inspection reports and certificates.
7. Corrective action documents.
8. Verification of testing, adjusting, and balancing reports.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION**

3.1 TESTING PREPARATION

A. Certify that HVAC&R systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.

B. Certify that HVAC&R instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.

C. Certify that testing, adjusting, and balancing procedures have been completed and that testing, adjusting, and balancing reports have been submitted, discrepancies corrected, and corrective work approved.

D. Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

E. Inspect and verify the position of each device and interlock identified on checklists.

F. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.

G. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.2 Testing AND BALANCING VERIFICATION

A. Prior to performance of testing and balancing Work, provide copies of reports, sample forms, checklists, and certificates to the CxA.

B. Notify the CxA at least 10 days in advance of testing and balancing Work, and provide access for the CxA to witness testing and balancing Work.

C. Provide technicians, instrumentation, and tools to verify testing and balancing of HVAC&R systems at the direction of the CxA.

1. The CxA will notify testing and balancing Subcontractor 10 days in advance of the date of field verification. Notice will not include data points to be verified.
2. The testing and balancing Subcontractor shall use the same instruments (by model and serial number) that were used when original data were collected.
3. Failure of an item includes, other than sound, a deviation of more than 10 percent. Failure of more than 10 percent of selected items shall result in rejection of final testing, adjusting,

and balancing report. For sound pressure readings, a deviation of 3 dB shall result in rejection of final testing. Variations in background noise must be considered.

4. Remedy the deficiency and notify the CxA so verification of failed portions can be performed.

## 3.3 GENERAL TESTING REQUIREMENTS

A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.

B. Scope of HVAC&R testing shall include entire HVAC&R installation, from central equipment for heat generation and refrigeration through distribution systems to each conditioned space. Testing shall include measuring capacities and effectiveness of operational and control functions.

C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.

D. The CxA along with the HVAC&R Contractor, testing and balancing Subcontractor, and HVAC&R Instrumentation and Control Subcontractor shall prepare detailed testing plans, procedures, and checklists for HVAC&R systems, subsystems, and equipment.

E. Tests will be performed using design conditions whenever possible.

F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.

G. The CxA may direct that set points be altered when simulating conditions is not practical.

H. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.

I. If tests cannot be completed because of a deficiency outside the scope of the HVAC&R system, document the deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.

J. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

## 3.4 HVAC&R systems, subsystems, and equipment Testing Procedures

A. Boiler Testing and Acceptance Procedures: Testing requirements are specified in HVAC boiler Sections. Provide submittals, test data, inspector record, and boiler certification to the CxA.

B. HVAC&R Instrumentation and Control System Testing: Field testing plans and testing requirements are specified in Section 230900 "Instrumentation and Control for HVAC" and Section 230993 "Sequence and Operations for HVAC Controls." Assist the CxA with preparation of testing plans.

C. Pipe system cleaning, flushing, hydrostatic tests, and chemical treatment requirements are specified in HVAC piping Sections. HVAC&R Contractor shall prepare a pipe system cleaning, flushing, and hydrostatic testing plan. Provide cleaning, flushing, testing, and treating plan and final reports to the CxA. Plan shall include the following:

1. Sequence of testing and testing procedures for each section of pipe to be tested, identified by pipe zone or sector identification marker. Markers shall be keyed to Drawings for each pipe sector, showing the physical location of each designated pipe test section. Drawings keyed to pipe zones or sectors shall be formatted to allow each section of piping to be physically located and identified when referred to in pipe system cleaning, flushing, hydrostatic testing, and chemical treatment plan.
2. Description of equipment for flushing operations.
3. Minimum flushing water velocity.
4. Tracking checklist for managing and ensuring that all pipe sections have been cleaned, flushed, hydrostatically tested, and chemically treated.

D. HVAC&R Distribution System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of air, steam, and hydronic distribution systems; special exhaust; and other distribution systems, including HVAC&R terminal equipment and unitary equipment.

## PART 4 - MEASUREMENT AND PAYMENT

### 4.1 MEASUREMENT

A. The Work of this Section shall not be measured separately for payment.

### 4.2 PAYMENT

A. No separate payment will be made for the Work of this Section.

**END OF SECTION 230800**

## SECTION 230900 - INSTRUMENTATION AND 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.

### 1.2 SUMMARY

A. This Section includes control equipment for HVAC systems and components, including control components for terminal heating and cooling units not supplied with factory-wired controls.

B. Related Sections include the following:

1. Section 230519 "Meters and Gages for HVAC Piping" for measuring equipment that relates to this Section.
2. Section 230993 "Sequence of Operations for HVAC Controls" for requirements that relate to this Section.

### 1.3 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.

### 1.4 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.
    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.
    e. Ducted Air Temperature: Plus or minus 1 deg F.
    f. Outside Air Temperature: Plus or minus 2 deg F.
    g. Dew Point Temperature: Plus or minus 3 deg F.
    h. Temperature Differential: Plus or minus 0.25 deg F.
    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.
    n. Air Pressure (Ducts): Plus or minus 0.1-inch wg.
    o. Carbon Monoxide: Plus or minus 5 percent of reading.
    p. Carbon Dioxide: Plus or minus 50 ppm.
    q. Electrical: Plus or minus 5 percent of reading.

## 1.5 SEQUENCE OF OPERATION

## 1.6 ACTION SUBMITTALS

A. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.

1. DDC System Hardware: Bill of materials of equipment indicating quantity, manufacturer, and model number. Include technical data for operator workstation equipment, interface equipment, control units, transducers/transmitters, sensors, actuators, valves, relays/switches, control panels, and operator interface equipment.

2. Control System Software: Include technical data for operating system software, operator interface, color graphics, and other third-party applications.
3. Controlled Systems: Instrumentation list with element name, type of device, manufacturer, model number, and product data. Include written description of sequence of operation including schematic diagram.

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. Bill of materials of equipment indicating quantity, manufacturer, and model number.
2. Schematic flow diagrams showing fans, pumps, coils, dampers, valves, and control devices.
3. Wiring Diagrams: Power, signal, and control wiring.
4. Details of control panel faces, including controls, instruments, and labeling.
5. Written description of sequence of operation.
6. Schedule of dampers including size, leakage, and flow characteristics.
7. Schedule of valves including flow characteristics.
8. DDC System Hardware:

    a. Wiring diagrams for control units with termination numbers.
    b. Schematic diagrams and floor plans for field sensors and control hardware.
    c. Schematic diagrams for control, communication, and power wiring, showing trunk data conductors and wiring between operator workstation and control unit locations.

9. Control System Software: List of color graphics indicating monitored systems, data (connected and calculated) point addresses, output schedule, and operator notations.
10. Controlled Systems:

    a. Schematic diagrams of each controlled system with control points labeled and control elements graphically shown, with wiring.
    b. Scaled drawings showing mounting, routing, and wiring of elements including bases and special construction.
    c. Written description of sequence of operation including schematic diagram.
    d. Points list.

C. Samples for Initial Selection: For each color required, of each type of thermostat[ or sensor] cover with factory-applied color finishes.

D. Samples for Verification: For each color required, of each type of thermostat[ or sensor] cover.

## 1.7 INFORMATIONAL SUBMITTALS

A. Data Communications Protocol Certificates: Certify that each proposed DDC system component complies with ASHRAE 135.

B. Data Communications Protocol Certificates: Certify that each proposed DDC system component complies with LonWorks.

C. Qualification Data: For [Installer] [and] [manufacturer].

D. Software Upgrade Kit: For Owner to use in modifying software to suit future systems revisions or monitoring and control revisions.

E. Field quality-control test reports.

## 1.8 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For HVAC instrumentation and control system to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Maintenance instructions and lists of spare parts for each type of control device and compressed-air station.
2. Interconnection wiring diagrams with identified and numbered system components and devices.
3. Keyboard illustrations and step-by-step procedures indexed for each operator function.
4. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
5. Calibration records and list of set points.

B. Software and Firmware Operational Documentation: Include the following:

1. Software operating and upgrade manuals.
2. Program Software Backup: On a magnetic media or compact disc, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.
5. Software license required by and installed for DDC workstations and control systems.

## 1.9 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Replacement Materials: One replacement diaphragm or relay mechanism for each unique [pneumatic damper motor] [valve motor] [controller] [thermostat] [positioning relay].
2. Maintenance Materials: [One] <Insert number required> thermostat adjusting key(s).

3. Maintenance Materials: One pneumatic thermostat test kit.

## 1.10 QUALITY ASSURANCE

A. Installer Qualifications: Automatic control system manufacturer's authorized representative who is trained and approved for installation of system components required for this Project.

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

C. Comply with ASHRAE 135 for DDC system components.

## 1.11 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.

## 1.12 COORDINATION

A. Coordinate location of thermostats, humidistats, and other exposed control sensors with plans and room details before installation.

B. Coordinate equipment with Section 281600 "Intrusion Detection" to achieve compatibility with equipment that interfaces with that system and with building master clock.

C. Coordinate equipment with Section 281300 "Access Control" to achieve compatibility with equipment that interfaces with that system.

D. Coordinate equipment with Section 275313 "Clock Systems" to achieve compatibility with equipment that interfaces with that system.

E. Coordinate equipment with Section 284619 "PLC Electronic Detention Monitoring and Control Systems" to achieve compatibility with equipment that interfaces with that system.

F. Coordinate equipment with Section 260943.13 "Addressable-Fixture Lighting Controls" and Section 260943.23 "Relay-Based Lighting Controls" to achieve compatibility with equipment that interfaces with that system.

G. Coordinate equipment with Section 283111 "Digital, Addressable Fire-Alarm System" and Section 283112 "Zoned (DC Loop) Fire-Alarm System" to achieve compatibility with equipment that interfaces with that system.

H. Coordinate supply of conditioned electrical branch circuits for control units and operator workstation.

I. Coordinate equipment with Section 260913 "Electrical Power Monitoring and Control" to achieve compatibility of communication interfaces.

J. Coordinate equipment with Section 262416 "Panelboards" to achieve compatibility with starter coils and annunciation devices.

K. Coordinate equipment with Section 262419 "Motor-Control Centers" to achieve compatibility with motor starters and annunciation devices.

L. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Section 033000 "Cast-in-Place Concrete."

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

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

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

### 2.2 CONTROL SYSTEM

A. Manufacturers:

1. Alerton Inc.
2. American Auto-Matrix.
3. Andover Controls Corporation.
4. Automated Logic Corporation.
5. Carel.
6. Delta Controls Inc.
7. EDA Controls Corp.
8. Electronic Systems USA, Inc.
9. Functional Devices Inc.

10. Heat-Timer Corporation.
11. Honeywell International Inc.; Home & Building Control.
12. Impact Energy Controls Corp.
13. Invensys Building Systems.
14. Johnson Controls, Inc.; Controls Group.
15. KMC Controls/Kreuter Manufacturing Company.
16. Luwa USA, Inc.; Textile Air Engineering.
17. MAMAC Systems, Inc.
18. McQuay International.
19. Pneuline Controls.
20. Sauter Controls Corporation.
21. Siemens Building Technologies, Inc.
22. Solidyne Corp.
23. Spence Engineering Company, Inc.
24. Staefa Control System Inc.; Siemens Building Technologies, Inc.
25. TAC Americas, INC.
26. TCS/Basys Controls.
27. tekmar Control Systems, Inc.
28. Teletrol Systems Incorporated.
29. Temco Controls Ltd. USA.
30. Tour & Andersson Control, Inc.
31. Trane; Worldwide Applied Systems Group
32. Triangle MicroSystems, Inc.
33. Voltec, Inc.

B. Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, and accessories to control mechanical systems.

C. Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, accessories, and software connected to distributed controllers operating in multiuser, multitasking environment on token-passing network and programmed to control mechanical systems. An operator workstation permits interface with the network via dynamic color graphics with each mechanical system, building floor plan, and control device depicted by point-and-click graphics.

## 2.3 UNITARY CONTROLLERS

A. Unitized, capable of stand-alone operation with sufficient memory to support its operating system, database, and programming requirements, and with sufficient I/O capacity for the application.

1. Configuration: Local keypad and display; diagnostic LEDs for power, communication, and processor; wiring termination to terminal strip or card connected with ribbon cable; memory with bios; and 72 hour battery backup.
2. Operating System: Manage I/O communication to allow distributed controllers to share real and virtual object information and allow central monitoring and alarms.

Perform scheduling with real-time clock. Perform automatic system diagnostics; monitor system and report failures.

3. ASHRAE 135 Compliance: Communicate using read (execute and initiate) and write (execute and initiate) property services defined in ASHRAE 135. Reside on network using MS/TP datalink/physical layer protocol and have service communication port for connection to diagnostic terminal unit.
4. Enclosure: Dustproof rated for operation at 32 to 120 deg F.
5. Enclosure: Waterproof rated for operation at 40 to 150 deg F.

## 2.4 ALARM PANELS

A. Unitized cabinet with suitable brackets for wall or floor mounting. Fabricate of 0.06-inch-thick, furniture-quality steel or extruded-aluminum alloy, totally enclosed, with hinged doors and keyed lock and with manufacturer's standard shop-painted finish. Provide common keying for all panels.

B. Indicating light for each alarm point, single horn, acknowledge switch, and test switch, mounted on hinged cover.

1. Alarm Condition: Indicating light flashes and horn sounds.
2. Acknowledge Switch: Horn is silent and indicating light is steady.
3. Second Alarm: Horn sounds and indicating light is steady.
4. Alarm Condition Cleared: System is reset and indicating light is extinguished.
5. Contacts in alarm panel allow remote monitoring by independent alarm company.

## 2.5 ANALOG CONTROLLERS

A. Step Controllers: 6- or 10-stage type, with heavy-duty switching rated to handle loads and operated by electric motor.

B. Electric, Outdoor-Reset Controllers: Remote-bulb or bimetal rod-and-tube type, proportioning action with adjustable throttling range, adjustable set point, scale range minus 10 to plus 70 deg F, and single- or double-pole contacts.

C. Electronic Controllers: Wheatstone-bridge-amplifier type, in steel enclosure with provision for remote-resistance readjustment. Identify adjustments on controllers, including proportional band and authority.

1. Single controllers can be integral with control motor if provided with accessible control readjustment potentiometer.

D. Fan-Speed Controllers: Solid-state model providing field-adjustable proportional control of motor speed from maximum to minimum of 55 percent and on-off action below minimum fan speed. Controller shall briefly apply full voltage, when motor is started, to rapidly bring motor up to minimum speed. Equip with filtered circuit to eliminate radio interference.

E. Receiver Controllers: Single- or multiple-input models with control-point adjustment, direct or reverse acting with mechanical set-point adjustment with locking device, proportional band adjustment, authority adjustment, and proportional control mode.

1. Remote-control-point adjustment shall be plus or minus 20 percent of sensor span, input signal of 3 to 13 psig.
2. Proportional band shall extend from 2 to 20 percent for 5 psig.
3. Authority shall be 20 to 200 percent.
4. Air-supply pressure of 18 psig, input signal of 3 to 15 psig, and output signal of zero to supply pressure.
5. Gages: [1-1/2 inches] [2-1/2 inches] [3-1/2 inches] in diameter, 2.5 percent wide-scale accuracy, and range to match transmitter input or output pressure.

## 2.6 TIME CLOCKS

A. Manufacturers:

1. ATC-Diversified Electronics.
2. Grasslin Controls Corporation.
3. Paragon Electric Co., Inc.
4. Precision Multiple Controls, Inc.
5. SSAC Inc.; ABB USA.
6. TCS/Basys Controls.
7. Theben AG - Lumilite Control Technology, Inc.
8. Time Mark Corporation.

B. Seven-day, programming-switch timer with synchronous-timing motor and seven-day dial; continuously charged, nickel-cadmium-battery-driven, eight-hour, power-failure carryover; multiple-switch trippers; minimum of two and maximum of eight signals per day with two normally open and two normally closed output contacts.

C. Solid-state, programmable time control with 4 separate programs each with up to 100 on-off operations; 1-second resolution; lithium battery backup; keyboard interface and manual override; individual on-off-auto switches for each program; 365-day calendar with 20 programmable holidays; choice of fail-safe operation for each program; system fault alarm; and communications package allowing networking of time controls and programming from PC.

## 2.7 ELECTRONIC SENSORS

A. Description: Vibration and corrosion resistant; for wall, immersion, or duct mounting as required.

B. Thermistor Temperature Sensors and Transmitters:

1. Manufacturers:

a. BEC Controls Corporation.
b. Ebtron, Inc.
c. Heat-Timer Corporation.
d. I.T.M. Instruments Inc.
e. MAMAC Systems, Inc.
f. RDF Corporation.

2. Accuracy: Plus or minus 0.5 deg F at calibration point.
3. Wire: Twisted, shielded-pair cable.
4. Insertion Elements in Ducts: Single point, 8 inches long; use where not affected by temperature stratification or where ducts are smaller than 9 sq. ft..
5. Averaging Elements in Ducts:36 inches long, flexibleuse where prone to temperature stratification or where ducts are larger than 10 sq. ft..
6. Insertion Elements for Liquids: Brass or stainless-steel socket with minimum insertion length of 2-1/2 inches.
7. Room Sensor Cover Construction: Manufacturer's standard locking covers.

a. Set-Point Adjustment: Exposed.
b. Set-Point Indication: Exposed.
c. Thermometer: Exposed
d. Color: Select from manufacturer’s full range.
e. Orientation: Vertical or Horizontal.

8. Outside-Air Sensors: Watertight inlet fitting, shielded from direct sunlight.
9. Room Security Sensors: Stainless-steel cover plate with insulated back and security screws.

C. Room Sensor Cover Construction: Manufacturer's standard locking covers.

1. Set-Point Adjustment: Exposed.
2. Set-Point Indication: Exposed.
3. Color: Select from manufacturer’s full range of colors.
4. Orientation: Vertical or Horizontal.

D. Room sensor accessories include the following:

1. Insulating Bases: For sensors located on exterior walls.
2. Guards: Locking; heavy-duty, transparent plastic; mounted on separate base
3. Adjusting Key: As required for calibration and cover screws.

## 2.8 STATUS SENSORS

A. Status Inputs for Fans: Differential-pressure switch with pilot-duty rating and with adjustable range of 0- to 5-inch wg.

B. Status Inputs for Pumps: Differential-pressure switch with pilot-duty rating and with adjustable pressure-differential range of 8 to 60 psig, piped across pump.

C. Status Inputs for Electric Motors: Comply with ISA 50.00.01, current-sensing fixed- or split-core transformers with self-powered transmitter, adjustable and suitable for 175 percent of rated motor current.

D. Voltage Transmitter (100- to 600-V ac): Comply with ISA 50.00.01, single-loop, self-powered transmitter, adjustable, with suitable range and 1 percent full-scale accuracy.

E. Power Monitor: 3-phase type with disconnect/shorting switch assembly, listed voltage and current transformers, with pulse kilowatt hour output and 4- to 20-mA kW output, with maximum 2 percent error at 1.0 power factor and 2.5 percent error at 0.5 power factor.

F. Current Switches: Self-powered, solid-state with adjustable trip current, selected to match current and system output requirements.

G. Electronic Valve/Damper Position Indicator: Visual scale indicating percent of travel and 2- to 10-V dc, feedback signal.

H. Water-Flow Switches: Bellows-actuated mercury or snap-acting type with pilot-duty rating, stainless-steel or bronze paddle, with appropriate range and differential adjustment, in NEMA 250, Type 1 enclosure.

1. Manufacturers:

a. BEC Controls Corporation.
b. I.T.M. Instruments Inc.

## 2.9 FLOW MEASURING STATIONS

A. Duct Airflow Station: Combination of air straightener and multiport, self-averaging pitot tube station.

1. Manufacturers:

a. Air Monitor Corporation.
b. Wetmaster Co., Ltd.

2. Casing: Galvanized-steel frame.
3. Flow Straightener: Aluminum honeycomb, 3/4-inch parallel cell, 3 inches deep.
4. Sensing Manifold: Copper manifold with bullet-nosed static pressure sensors positioned on equal area basis.

## 2.10 THERMOSTATS

A. Manufacturers:

1. Erie Controls.
2. Danfoss Inc.; Air-Conditioning and Refrigeration Div.

3. Heat-Timer Corporation.
4. Sauter Controls Corporation.
5. tekmar Control Systems, Inc.
6. Theben AG - Lumilite Control Technology, Inc.

B. Combination Thermostat and Fan Switches: Line-voltage thermostat with push-button or lever-operated fan switch.

1. Label switches “FAN HIGH-LOW-OFF"
2. Mount on single electric switch box.

C. Electric, solid-state, microcomputer-based room thermostat with remote sensor.

1. Automatic switching from heating to cooling.
2. Preferential rate control to minimize overshoot and deviation from set point.
3. Set up for four separate temperatures per day.
4. Instant override of set point for continuous or timed period from 1 hour to 31 days.
5. Short-cycle protection.
6. Programming based on every day of week.
7. Selection features include degree F or degree C display, 12- or 24-hour clock, keyboard disable, remote sensor, and fan on-auto.
8. Battery replacement without program loss.
9. Thermostat display features include the following:

    a. Time of day.
    b. Actual room temperature.
    c. Programmed temperature.
    d. Programmed time.
    e. Duration of timed override.
    f. Day of week.
    g. System mode indications include "heating," "off," "fan auto," and "fan on."

D. Low-Voltage, On-Off Thermostats: NEMA DC 3, 24-V, bimetal-operated, mercury-switch type, with adjustable or fixed anticipation heater, concealed set-point adjustment, 55 to 85 deg F set-point range, and 2 deg F maximum differential.

E. Line-Voltage, On-Off Thermostats: Bimetal-actuated, open contact or bellows-actuated, enclosed, snap-switch or equivalent solid-state type, with heat anticipator; listed for electrical rating; with concealed set-point adjustment, 55 to 85 deg F set-point range, and 2 deg F maximum differential.

1. Electric Heating Thermostats: Equip with off position on dial wired to break ungrounded conductors.
2. Selector Switch: Integral, manual on-off-auto.

F. Remote-Bulb Thermostats: On-off or modulating type, liquid filled to compensate for changes in ambient temperature; with copper capillary and bulb, unless otherwise indicated.

1. Bulbs in water lines with separate wells of same material as bulb.
2. Bulbs in air ducts with flanges and shields.
3. Averaging Elements: Copper tubing with either single- or multiple-unit elements, extended to cover full width of duct or unit; adequately supported.
4. Scale settings and differential settings are clearly visible and adjustable from front of instrument.
5. On-Off Thermostat: With precision snap switches and with electrical ratings required by application.
6. Modulating Thermostats: Construct so complete potentiometer coil and wiper assembly is removable for inspection or replacement without disturbing calibration of instrument.

G. Fire-Protection Thermostats: Listed and labeled by an NRTL acceptable to authorities having jurisdiction; with fixed or adjustable settings to operate at not less than 75 deg F above normal maximum operating temperature, and the following:

1. Reset: Manual.
2. Reset: Automatic, with control circuit arranged to require manual reset at central control panel; with pilot light and reset switch on panel labeled to indicate operation.

H. Immersion Thermostat: Remote-bulb or bimetal rod-and-tube type, proportioning action with adjustable throttling range and adjustable set point.

I. Airstream Thermostats: Two-pipe, fully proportional, single-temperature type; with adjustable set point in middle of range, adjustable throttling range, plug-in test fitting or permanent pressure gage, remote bulb, bimetal rod and tube, or averaging element.

J. Electric, Low-Limit Duct Thermostat: Snap-acting, single-pole, single-throw, manual- or automatic- reset switch that trips if temperature sensed across any 12 inches of bulb length is equal to or below set point.

1. Bulb Length: Minimum 20 feet.
2. Quantity: One thermostat for every 20 sq. ft. of coil surface.

K. Electric, High-Limit Duct Thermostat: Snap-acting, single-pole, single-throw, manual- or automatic- reset switch that trips if temperature sensed across any 12 inches of bulb length is equal to or above set point.

1. Bulb Length: Minimum 20 feet.
2. Quantity: One thermostat for every 20 sq. ft. of coil surface.

L. Heating/Cooling Valve-Top Thermostats: Proportional acting for proportional flow, with molded-rubber diaphragm, remote-bulb liquid-filled element, direct and reverse acting at minimum shutoff pressure of 25 psig, and cast housing with position indicator and adjusting knob.

## 2.11 HUMIDISTATS

A. [Available ]Manufacturers:

1. MAMAC Systems, Inc.
2. ROTRONIC Instrument Corp.
3.

B. Pneumatic Room Humidistats: Wall-mounting, proportioning type with adjustable throttling range, 20 to 90 percent operating range, and cover matching room thermostat cover.

C. Duct-Mounting Humidistats: Electric insertion, 2-position type with adjustable, 2 percent throttling range, 20 to 80 percent operating range, and single- or double-pole contacts.

D. Pneumatic Duct-Mounting Humidistats: Proportioning type with adjustable throttling range, 20 to 90 percent operating range, in galvanized-steel duct box.

## 2.12 ACTUATORS

A. Electric Motors: Size to operate with sufficient reserve power to provide smooth modulating action or two-position action.

1. Comply with requirements in Section 230513 "Common Motor Requirements for HVAC Equipment."
2. Permanent Split-Capacitor or Shaded-Pole Type: Gear trains completely oil immersed and sealed. Equip spring-return motors with integral spiral-spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.
3. Nonspring-Return Motors for Valves Larger Than NPS 2-1/2: Size for running torque of 150 in. x lbf and breakaway torque of 300 in. x lbf.
4. Spring-Return Motors for Valves Larger Than NPS 2-1/2: Size for running and breakaway torque of 150 in. x lbf.
5. Nonspring-Return Motors for Dampers Larger Than 25 Sq. Ft.: Size for running torque of 150 in. x lbf and breakaway torque of 300 in. x lbf.
6. Spring-Return Motors for Dampers Larger Than 25 Sq. Ft.: Size for running and breakaway torque of 150 in. x lbf.

B. Electronic Actuators: Direct-coupled type designed for minimum 60,000 full-stroke cycles at rated torque.

1. Manufacturers:

a. Belimo Aircontrols (USA), Inc.
b.

2. Valves: Size for torque required for valve close off at maximum pump differential pressure.
3. Dampers: Size for running torque calculated as follows:

a. Parallel-Blade Damper with Edge Seals: 7 inch-lb/sq. ft. of damper.
b. Opposed-Blade Damper with Edge Seals: 5 inch-lb/sq. ft. of damper.
c. Parallel-Blade Damper without Edge Seals: 4 inch-lb/sq. ft of damper.
d. Opposed-Blade Damper without Edge Seals: 3 inch-lb/sq. ft. of damper.
e. Dampers with 2- to 3-Inch wg of Pressure Drop or Face Velocities of 1000 to 2500 fpm: Increase running torque by 1.5.
f. Dampers with 3- to 4-Inch wg of Pressure Drop or Face Velocities of 2500 to 3000 fpm: Increase running torque by 2.0.

4. Coupling: V-bolt and V-shaped, toothed cradle.
5. Overload Protection: Electronic overload or digital rotation-sensing circuitry.
6. Fail-Safe Operation: Mechanical, spring-return mechanism. Provide external, manual gear release on nonspring-return actuators.
7. Power Requirements (Two-Position Spring Return): [24] [120] [230]-V ac.
8. Power Requirements (Modulating): Maximum 10 VA at 24-V ac or 8 W at 24-V dc.
9. Proportional Signal: 2- to 10-V dc or 4 to 20 mA, and 2- to 10-V dc position feedback signal.
10. Temperature Rating: Minus 22 to plus 122 deg F
11. Temperature Rating (Smoke Dampers): Minus 22 to plus 250 deg F.

## 2.13 DAMPERS

A. Manufacturers:

1. Air Balance Inc.
2. Don Park Inc.; Autodamp Div.
3. TAMCO (T. A. Morrison & Co. Inc.).
4. United Enertech Corp.
5. Vent Products Company, Inc.

B. Dampers: AMCA-rated, opposed-blade design; 0.108-inch-minimum thick, galvanized-steel or 0.125-inch-minimum thick, extruded-aluminum frames with holes for duct mounting; damper blades shall not be less than 0.064-inch-thick galvanized steel with maximum blade width of 8 inches and length of 48 inches.

1. Secure blades to 1/2-inch-diameter, zinc-plated axles using zinc-plated hardware, with oil-impregnated sintered bronze or nylon blade bearings, blade-linkage hardware of zinc-plated steel and brass, ends sealed against spring-stainless-steel blade bearings, and thrust bearings at each end of every blade.
2. Operating Temperature Range: From minus 40 to plus 200 deg F.
3. Edge Seals, Standard Pressure Applications: Closed-cell neoprene.
4. Edge Seals, Low-Leakage Applications: Use inflatable blade edging or replaceable rubber blade seals and spring-loaded stainless-steel side seals, rated for leakage at less than 10 cfm per sq. ft. of damper area, at differential pressure of 4-inch wg when damper is held by torque of 50 in. x lbf; when tested according to AMCA 500D.

2.14 AIR SUPPLY

A. Manufacturers:

1. Drainview Products.
2. Pneuline Controls.

B. Control and Instrumentation Tubing: Copper tubing complying with ASTM B 88, Type K or ASTM B 280 Type ACR.

1. Fittings: Cast-bronze solder fittings complying with ASME B16.18; or wrought-copper solder fittings complying with ASME B16.22, except forged-brass compression-type fittings at connections to equipment.
2. Joining Method: Soldered or brazed.

C. Control and Instrumentation Tubing: ASTM D 2737 Type FR plenum-rated polyethylene, flame-retardant, nonmetallic tubing rated for 30 psig and ambient temperature range of 10 to 150 deg F with flame-retardant harness for multiple tubing.

1. Fittings: Compression or push-on polyethylene fittings.

D. Tank: ASME storage tank with drain test cock, automatic moisture removal trap, tank relief valve, and rubber-cork vibration isolation mounting pads.

E. Duplex Air Compressor: Capacity to supply compressed air to temperature-control system.

1. Pressure control with adjustable electric contacts, set to start and stop both compressors at different pressures.
2. Electrical alternation set with motor starters and disconnect to operate compressors alternately or on time schedule.

F. Simplex Air Compressor: Tank-mounting compressor with capacity to supply compressed air to temperature-control system, with starter and disconnect.

1. Pressure control with adjustable electric contacts, set to start and stop compressor.

G. Compressor Type: Scroll.

H. Size compressor and tank to operate compressor not more than 30 minutes during a 60-minute period.

I. Compressor Accessories: Low-resistance intake-air filter, and belt guards.

J. System Accessories: Air filter rated for 97 percent efficiency at rated airflow, and combination filter/pressure-reducing station or separate filter and pressure-reducing station.

K. Refrigerated Air Dryer: Self-contained, refrigerated air dryer complete with heat exchangers, moisture separator, internal wiring and piping, and with manual bypass valve.

1. Heat Exchangers: Air-to-refrigerant coils with centrifugal-type moisture separator and automatic trap assembly.
2. Refrigeration Unit: Hermetically sealed, operating to maintain dew point of 13 deg F at 20 psig, housed in steel cabinet with access door and panel.
3. Accessories: Air-inlet temperature gage, air-inlet pressure gage, on-off switch, high-temperature light, power-on light, refrigerant gage on back, air-outlet temperature gage, air-outlet pressure gage, and with contacts for remote indication of power status and high-temperature alarm.

L. Desiccant Dryer: Obtains dew point in pneumatic air piping between compressor and tank at least 15 deg F below inlet-air dew point at design conditions.

M. Pressure Gages: Black letters on white background, 2-1/2 inches in diameter, flush or surface mounting, with front calibration screw to match sensor, and having a graduated scale in psig.

N. Instrument Pressure Gages: Black letters on white background, 1-1/2 inches in diameter, stem mounted, with suitable dial range.

O. Diaphragm Control and Instrument Valves: 1/4-inch forged-brass body with reinforced polytetrafluoroethylene diaphragm, stainless-steel spring, and color-coded phenolic handle.

P. Gage Cocks: Tee or level handle, bronze, rated for 125 psig.

Q. Relays: For summing, reversing, and amplifying highest or lowest pressure selection; with adjustable I/O ratio.

R. Switches: With indicating plates and accessible adjustment; calibrated and marked.

S. Pressure Regulators: Zinc or aluminum castings with elastomeric diaphragm, balanced construction to automatically prevent pressure buildup, and producing flat reduced-pressure curve.

T. Particle Filters: Zinc or aluminum castings with 97 percent filtration efficiency at rated airflow, quick-disconnect service devices, and aluminum or plastic bowl with metal guard and manual drain cock.

U. Combination Filter/Regulators: Zinc or aluminum castings with elastomeric diaphragm, balanced construction to automatically prevent pressure buildup, and producing flat reduced-pressure curve; with threaded pipe connections, quick-disconnect service devices, and aluminum or plastic bowl with metal guard and manual drain cock.

V. Airborne Oil Filter: Filtration efficiency of 99.9 percent for airborne lubricating oil particles of 0.025 micron or larger.

W. Pressure Relief Valves: ASME rated and labeled.

1. High Pressure: Size for installed capacity.

2. Low Pressure: Size for installed capacity of pressure regulators and set at 20 percent above low pressure.

X. Pressure-Reducing Stations: Two parallel pressure regulators.

2.15 CONTROL CABLE

A. Electronic and fiber-optic cables for control wiring are specified in Section 271500 "Communications Horizontal Cabling."

**PART 3 - EXECUTION**

3.1 EXAMINATION

A. Verify that conditioned power supply is available to control units and operator workstation.

B. Verify that pneumatic piping and duct-, pipe-, and equipment-mounted devices are installed before proceeding with installation.

3.2 INSTALLATION

A. Install software in control units and operator workstation(s). Implement all features of programs to specified requirements and as appropriate to sequence of operation.

B. Connect and configure equipment and software to achieve sequence of operation specified.

C. Mount compressor and tank unit on spring isolators with 1-inch static deflection. Isolate air supply with wire-braid-reinforced rubber hose. Secure and anchor according to manufacturer's written instructions and seismic-control requirements.

1. Pipe manual and automatic drains to nearest floor drain.
2. Supply instrument air from compressor units through filter, pressure-reducing valve, and pressure relief valve, with pressure gages and shutoff and bypass valves.

D. Verify location of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation. Install devices 48 inches above the floor.

1. Install averaging elements in ducts and plenums in crossing or zigzag pattern.

E. Install guards on thermostats in the following locations:

1. Entrances.
2. Public areas.
3. Where indicated.

F. Install automatic dampers according to Section 233300 "Air Duct Accessories."

G. Install damper motors on outside of duct in warm areas, not in locations exposed to outdoor temperatures.

H. Install labels and nameplates to identify control components according to Section 230553 "Identification for HVAC Piping and Equipment."

I. Install hydronic instrument wells, valves, and other accessories according to Section 232116 Hydronic Piping Specialties."

J. Install steam and condensate instrument wells, valves, and other accessories according toSection 232216 Steam and Condensate Piping Specialties."

K. Install refrigerant instrument wells, valves, and other accessories according to Section 232300 "Refrigerant Piping."

L. Install duct volume-control dampers according to Section 233113 "Metal Ducts" and Section 233116 "Nonmetal Ducts."

M. Install electronic and fiber-optic cables according to Section 271500 "Communications Horizontal Cabling."

## 3.3 ELECTRICAL WIRING AND CONNECTION INSTALLATION

A. Install raceways, boxes, and cabinets according to Section 260533 "Raceways and Boxes for Electrical Systems."

B. Install building wire and cable according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Install signal and communication cable according to Section 271500 "Communications Horizontal Cabling."

1. Conceal cable, except in mechanical rooms and areas where other conduit and piping are exposed.
2. Install exposed cable in raceway.
3. Install concealed cable in raceway.
4. Bundle and harness multiconductor instrument cable in place of single cables where several cables follow a common path.
5. Fasten flexible conductors, bridging cabinets and doors, along hinge side; protect against abrasion. Tie and support conductors.
6. Number-code or color-code conductors for future identification and service of control system, except local individual room control cables.
7. Install wire and cable with sufficient slack and flexible connections to allow for vibration of piping and equipment.

D. Connect manual-reset limit controls independent of manual-control switch positions. Automatic duct heater resets may be connected in interlock circuit of power controllers.

E. Connect hand-off-auto selector switches to override automatic interlock controls when switch is in hand position.

## 3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.

B. Perform the following field tests and inspections and prepare test reports:

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove and replace malfunctioning units and retest.
2. Test and adjust controls and safeties.
3. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
4. Pressure test control air piping at 30 psig or 1.5 times the operating pressure for 24 hours, with maximum 5-psig loss.
5. Pressure test high-pressure control air piping at 150 psig and low-pressure control air piping at 30 psig for 2 hours, with maximum 1-psig loss.
6. Test calibration of electronic controllers by disconnecting input sensors and stimulating operation with compatible signal generator.
7. Test each point through its full operating range to verify that safety and operating control set points are as required.
8. Test each control loop to verify stable mode of operation and compliance with sequence of operation. Adjust PID actions.
9. Test each system for compliance with sequence of operation.
10. Test software and hardware interlocks.

C. DDC Verification:

1. Verify that instruments are installed before calibration, testing, and loop or leak checks.
2. Check instruments for proper location and accessibility.
3. Check instrument installation for direction of flow, elevation, orientation, insertion depth, and other applicable considerations.
4. Check instrument tubing for proper fittings, slope, material, and support.
5. Check installation of air supply for each instrument.
6. Check flow instruments. Inspect tag number and line and bore size, and verify that inlet side is identified and that meters are installed correctly.
7. Check pressure instruments, piping slope, installation of valve manifold, and self-contained pressure regulators.
8. Check temperature instruments and material and length of sensing elements.
9. Check control valves. Verify that they are in correct direction.

10. Check air-operated dampers. Verify that pressure gages are provided and that proper blade alignment, either parallel or opposed, has been provided.
11. Check DDC system as follows:

    a. Verify that DDC controller power supply is from emergency power supply, if applicable.
    b. Verify that wires at control panels are tagged with their service designation and approved tagging system.
    c. Verify that spare I/O capacity has been provided.
    d. Verify that DDC controllers are protected from power supply surges.

D. Replace damaged or malfunctioning controls and equipment and repeat testing procedures.

## 3.5 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 up to three visits to Project during other than normal occupancy hours for this purpose.

## 3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain HVAC instrumentation and controls. Refer to Section 017900 "Demonstration and Training."

**END OF SECTION 230900**

## SECTION 230993 - SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes control sequences for HVAC systems, subsystems, and equipment.

B. See Division 23 Section "Instrumentation and Control for HVAC" for control equipment and devices and for submittal requirements.

### 1.2 SPLIT SYSTEM AIR CONDITIONERS AND FURNACES

A. GENERAL

1. The condenser water system will provide cooling to the heat pump loop.

B. SCHEDULE

1. The system will operate during the occupied hours of the building in occupied mode and shall operate during the unoccupied hours of the building in unoccupied mode as determined by the associated 7 day programmable thermostat.

C. OCCUPIED MODE

1. Occupied heating setpoint 70ºF (ADJ.)
2. Occupied cooling setpoint 74ºF (ADJ.)
3. During the occupied mode, the outside air damper shall open to 100% open position.
4. The supply fan shall operate continuously during the occupied hours of building operation.
5. When the space temperature rises above the occupied cooling setpoint, the DX cooling coil section and condensing unit shall be energized to maintain the designated space temperature setpoint. As space temperature falls below the occupied cooling setpoint, the DX cooling coil section and condensing unit shall be de-energized. If the space temperature continues to fall below the minimum heating setpoint, the furnace's gas fired heating section shall energize to maintain space temperature.

D. UNOCCUPIED MODE

1. Unoccupied heating setpoint 65ºF (ADJ.)
2. Unoccupied cooling setpoint 80ºF (ADJ.)
3. During the unoccupied mode, the outside air damper shall be closed 100%.

4. The supply fan shall operate intermittently to maintain space temperature during the occupied hours of building operation.
5. When the space temperature rises above the unoccupied cooling setpoint, the DX cooling coil section and condensing unit shall be energized to maintain the designated space temperature setpoint. As space temperature falls below the unoccupied cooling setpoint, the DX cooling coil section and condensing unit shall be de-energized. If the space temperature continues to fall below the minimum heating setpoint in the unoccupied mode, the furnace's gas fired heating section shall energize to maintain space temperature.

E. ECONOMIZER MODE

1. The split system furnace and condensing unit shall be equipped with an enthalpy economizer.
2. An outdoor air enthalpy sensor shall be installed on the exterior wall of the building in an area in which a true representation of the outdoor dry bulb and wet bulb temperatures can be measured. An indoor enthalpy sensor shall be installed in the occupied space served by the furnace and shall measure space temperature and relative humidity.
3. In the condition that the thermostat associated with the split system calls for cooling and the outdoor air temperature and relative humidity are less than that of the return air temperature and relative humidity, the motorized damper associated with the return air ductwork shall close 100% and the associated outside air ductwork motorized damper and relief air damper shall open 100%.

F. SAFETIES

1. The unit shall de-energize upon sensing water in the secondary containment drain pan as sensed by the auto-water level sensor cut-off alarm. Provide alarm at 7 day programmable thermostat.
2. A pressure switch shall be provided across the air filter. This shall provide an alarm on the 7-day programmable thermostat upon detection of factory default pressure differential.

1.3 ELECTRIC WALL HEATER

A. GENERAL

1. Units shall operate via their factory-provided thermostats to maintain 70 degrees Fahrenheit. (Adj.)

1.4 ROOFTOP UNIT (EXISTING)

A. GENERAL

1. Existing rooftop unit shall operate as currently configured.

1.5 BATHROOM EXHAUST FANS (EXISTING)

A. GENERAL

1. Existing exhaust fans shall operate as currently configured.

**PART 2 – PRODUCTS**

NOT USED

**PART 3 – EXECUTION**

NOT USED

**END OF SECTION 230993**

**SECTION 232300 - REFRIGERANT PIPING**

**PART 1 - GENERAL**

1.1 SUMMARY

A. This Section includes refrigerant piping used for air-conditioning applications.

1.2 PERFORMANCE REQUIREMENTS

A. Line Test Pressure for Refrigerant R-410a:

1. Suction Lines for Air-Conditioning Applications: 650 psig.
2. Suction Lines for Heat-Pump Applications: 650 psig.
3. Hot-Gas and Liquid Lines: 800 psig.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of valve and refrigerant piping specialty indicated. Include pressure drop based on manufacturer's test data.

B. Shop Drawings: Show layout of refrigerant piping and specialties, including pipe, tube, and fitting sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall and floor penetrations, and equipment connection details. Show interface and spatial relationships between piping and equipment.

1. Refrigerant piping indicated on Drawings is schematic only. Size piping and design actual piping layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control test reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 QUALITY ASSURANCE

A. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."

B. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

1.7 PRODUCT STORAGE AND HANDLING

A. Store piping in a clean and protected area with end caps in place to ensure that piping interior and exterior are clean when installed.

**PART 2 - PRODUCTS**

2.1 COPPER TUBE AND FITTINGS

A. Copper Tube: ASTM B 280, Type ACR.

B. Wrought-Copper Fittings: ASME B16.22.

C. Wrought-Copper Unions: ASME B16.22.

D. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.

E. Brazing Filler Metals: AWS A5.8.

F. Flexible Connectors:

1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
2. End Connections: Socket ends.
3. Offset Performance: Capable of minimum 3/4-inch misalignment in minimum 7-inch-long assembly.
4. Pressure Rating: Factory test at minimum 500 psig.
5. Maximum Operating Temperature: 250 deg F.

2.2 VALVES AND SPECIALTIES

A. Diaphragm Packless Valves:

1. Body and Bonnet: Forged brass or cast bronze; globe design with straight-through or angle pattern.
2. Diaphragm: Phosphor bronze and stainless steel with stainless-steel spring.
3. Operator: Rising stem and hand wheel.
4. Seat: Nylon.

5. End Connections: Socket, union, or flanged.
6. Working Pressure Rating: 500 psig.
7. Maximum Operating Temperature: 275 deg F.

B. Packed-Angle Valves:

1. Body and Bonnet: Forged brass or cast bronze.
2. Packing: Molded stem, back seating, and replaceable under pressure.
3. Operator: Rising stem.
4. Seat: Nonrotating, self-aligning polytetrafluoroethylene.
5. Seal Cap: Forged-brass or valox hex cap.
6. End Connections: Socket, union, threaded, or flanged.
7. Working Pressure Rating: 500 psig.
8. Maximum Operating Temperature: 275 deg F.

C. Check Valves:

1. Body: Ductile iron, forged brass, or cast bronze; globe pattern.
2. Bonnet: Bolted ductile iron, forged brass, or cast bronze; or brass hex plug.
3. Piston: Removable polytetrafluoroethylene seat.
4. Closing Spring: Stainless steel.
5. Manual Opening Stem: Seal cap, plated-steel stem, and graphite seal.
6. End Connections: Socket, union, threaded, or flanged.
7. Maximum Opening Pressure: 0.50 psig.
8. Working Pressure Rating: 500 psig.
9. Maximum Operating Temperature: 275 deg F.

D. Service Valves:

1. Body: Forged brass with brass cap including key end to remove core.
2. Core: Removable ball-type check valve with stainless-steel spring.
3. Seat: Polytetrafluoroethylene.
4. End Connections: Copper spring.
5. Working Pressure Rating: 500 psig.

E. Solenoid Valves: Comply with ARI 760 and UL 429; listed and labeled by an NRTL.

1. Body and Bonnet: Plated steel.
2. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
3. Seat: Polytetrafluoroethylene.
4. End Connections: Threaded.
5. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch conduit adapter, and 24-V ac coil.
6. Working Pressure Rating: 400 psig.
7. Maximum Operating Temperature: 240 deg F.
8. Manual operator.

F. Safety Relief Valves: Comply with ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.

1. Body and Bonnet: Ductile iron and steel, with neoprene O-ring seal.
2. Piston, Closing Spring, and Seat Insert: Stainless steel.
3. Seat Disc: Polytetrafluoroethylene.
4. End Connections: Threaded.
5. Working Pressure Rating: 400 psig.
6. Maximum Operating Temperature: 240 deg F.

G. Thermostatic Expansion Valves: Comply with ARI 750.

1. Body, Bonnet, and Seal Cap: Forged brass or steel.
2. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
3. Packing and Gaskets: Non-asbestos.
4. Capillary and Bulb: Copper tubing filled with refrigerant charge.
5. Suction Temperature: 40 deg F.
6. Superheat: Nonadjustable.
7. Reverse-flow option (for heat-pump applications).
8. End Connections: Socket, flare, or threaded union.
9. Working Pressure Rating: 700 psig.

H. Straight-Type Strainers:

1. Body: Welded steel with corrosion-resistant coating.
2. Screen: 100-mesh stainless steel.
3. End Connections: Socket or flare.
4. Working Pressure Rating: 500 psig.
5. Maximum Operating Temperature: 275 deg F.

I. Angle-Type Strainers:

1. Body: Forged brass or cast bronze.
2. Drain Plug: Brass hex plug.
3. Screen: 100-mesh monel.
4. End Connections: Socket or flare.
5. Working Pressure Rating: 500 psig.
6. Maximum Operating Temperature: 275 deg F.

J. Moisture/Liquid Indicators:

1. Body: Forged brass.
2. Window: Replaceable, clear, fused glass window with indicating element protected by filter screen.
3. Indicator: Color coded to show moisture content in ppm.
4. Minimum Moisture Indicator Sensitivity: Indicate moisture above 60 ppm.
5. End Connections: Socket or flare.
6. Working Pressure Rating: 500 psig.
7. Maximum Operating Temperature: 240 deg F.

K. Replaceable-Core Filter Dryers: Comply with ARI 730.

1. Body and Cover: Painted-steel shell with ductile-iron cover, stainless-steel screws, and neoprene gaskets.
2. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
3. Desiccant Media: Activated alumina.
4. Designed for reverse flow (for heat-pump applications).
5. End Connections: Socket.
6. Access Ports: NPS 1/4 connections at entering and leaving sides for pressure differential measurement.
7. Maximum Pressure Loss: 2 psig.
8. Rated Flow: Per Contract Drawings
9. Working Pressure Rating: 650 psig.
10. Maximum Operating Temperature: 240 deg F.

L. Permanent Filter Dryers: Comply with ARI 730.

1. Body and Cover: Painted-steel shell.
2. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
3. Desiccant Media: Activated alumina.
4. Designed for reverse flow (for heat-pump applications).
5. End Connections: Socket.
6. Access Ports: NPS 1/4 connections at entering and leaving sides for pressure differential measurement.
7. Maximum Pressure Loss: 2 psig.
8. Rated Flow: Per contract drawings
9. Working Pressure Rating: 650 psig.
10. Maximum Operating Temperature: 240 deg F.

M. Liquid Accumulators: Comply with ARI 495.

1. Body: Welded steel with corrosion-resistant coating.
2. End Connections: Socket or threaded.
3. Working Pressure Rating: 500 psig.
4. Maximum Operating Temperature: 275 deg F.

## 2.3 REFRIGERANTS

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

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

1. Atofina Chemicals, Inc.
2. DuPont Company; Fluorochemicals Div.
3. Honeywell, Inc.; Genetron Refrigerants.

C. ASHRAE 34, R-410a

**PART 3 - EXECUTION**

3.1 PIPING APPLICATIONS

A. Suction Lines NPS 1-1/2 and Smaller for Conventional Air-Conditioning Applications: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed joints.

B. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed joints.

3.2 PIPING INSTALLATION

A. Install refrigerant piping according to ASHRAE 15 and manufacturer guidelines.

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

C. 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.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping adjacent to machines to allow service and maintenance.

F. Install piping free of sags and bends.

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

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

I. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

J. Install refrigerant piping in protective conduit where installed belowground.

K. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.

L. Slope refrigerant piping as follows:

1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
2. Install horizontal suction lines with a uniform slope downward to compressor.
3. Install traps and double risers to entrain oil in vertical runs.
4. Liquid lines may be installed level.

M. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.

N. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.

O. Identify refrigerant piping and valves according to Section 230553 "Identification for HVAC Piping and Equipment."

P. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

Q. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

R. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 230518 "Escutcheons for HVAC Piping."

## 3.3 PIPE JOINT CONSTRUCTION

A. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."

1. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper pipe.

## 3.4 HANGERS AND SUPPORTS

A. Hanger, support, and anchor products are specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet long.
2. Roller hangers and spring hangers for individual horizontal runs 20 feet or longer.
3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.
4. Spring hangers to support vertical runs.
5. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

C. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:

1. NPS 1/2: Maximum span, 60 inches; minimum rod size, 1/4 inch.
2. NPS 5/8: Maximum span, 60 inches; minimum rod size, 1/4 inch.
3. NPS 1: Maximum span, 72 inches; minimum rod size, 1/4 inch.
4. NPS 1-1/4: Maximum span, 96 inches; minimum rod size, 3/8 inch.
5. NPS 1-1/2: Maximum span, 96 inches; minimum rod size, 3/8 inch.
6. NPS 2: Maximum span, 96 inches; minimum rod size, 3/8 inch.
7. NPS 2-1/2: Maximum span, 108 inches; minimum rod size, 3/8 inch.
8. NPS 3: Maximum span, 10 feet; minimum rod size, 3/8 inch.
9. NPS 4: Maximum span, 12 feet; minimum rod size, 1/2 inch.

D. Support multifloor vertical runs at least at each floor.

## 3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Comply with ASME B31.5, Chapter VI.
2. Test refrigerant piping and specialties. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in Part 1 "Performance Requirements" Article.

    a. Fill system with nitrogen to the required test pressure.
    b. System shall maintain test pressure at the manifold gage throughout duration of test.
    c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
    d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

## 3.6 SYSTEM CHARGING

A. Charge system using the following procedures:

1. Install core in filter dryers after leak test but before evacuation.
2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
4. Charge system with a new filter-dryer core in charging line.

## 3.7 ADJUSTING

A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.

B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.

C. Adjust set-point temperature of air-conditioning or chilled-water controllers to the system design temperature.

D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:

1. Open shutoff valves in condenser water circuit.
2. Verify that compressor oil level is correct.
3. Open compressor suction and discharge valves.
4. Open refrigerant valves except bypass valves that are used for other purposes.
5. Check open compressor-motor alignment and verify lubrication for motors and bearings.

E. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

**END OF SECTION 232300**

**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.

1.2 SUMMARY

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Double-wall rectangular ducts and fittings.
3. Single-wall round ducts and fittings.
4. Double-wall round and flat-oval ducts and fittings.
5. Sheet metal materials.
6. Duct liner.
7. Sealants and gaskets.
8. Hangers and supports.
9. Seismic-restraint devices.

B. Related Sections:

1. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Section 233116 "Nonmetal Ducts" for fibrous-glass ducts, thermoset fiber-reinforced plastic ducts, thermoplastic ducts, PVC ducts, and concrete ducts.
3. Section 233119 "HVAC Casings" for factory- and field-fabricated casings for mechanical equipment.
4. Section 233300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Duct Design: 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 "Duct Schedule" Article.

B. Structural Performance: Duct hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct

Construction Standards - Metal and Flexible" and SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."

1. Seismic Hazard Level A: Seismic force to weight ratio, 0.48.
2. Seismic Hazard Level B: Seismic force to weight ratio, 0.30.
3. Seismic Hazard Level C: Seismic force to weight ratio, 0.15.

C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

## 1.4 ACTION SUBMITTALS

A. Product Data: For each type of the following products:

1. Liners and adhesives.
2. Sealants and gaskets.
3. Seismic-restraint devices.

B. Shop Drawings:

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.

C. Delegated-Design Submittal:

1. Sheet metal thicknesses.
2. Joint and seam construction and sealing.
3. Reinforcement details and spacing.
4. Materials, fabrication, assembly, and spacing of hangers and supports.
5. Design Calculations: Calculations for selecting hangers and supports and seismic restraints.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: 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. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
2. Suspended ceiling components.
3. Structural members to which duct will be attached.
4. Size and location of initial access modules for acoustical tile.
5. Penetrations of smoke barriers and fire-rated construction.
6. Items penetrating finished ceiling including the following:

    a. Lighting fixtures.
    b. Air outlets and inlets.
    c. Speakers.
    d. Sprinklers.
    e. Access panels.
    f. Perimeter moldings.

B. Welding certificates.

C. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."

D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

**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 2-1, "Rectangular Duct/Transverse 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."

1. Duct constructed using prefabricated systems will refer to the manufacturer’s guidelines for sheet gauge, intermediate reinforcement size and spacing, and proper joint reinforcement(s).

2. Manufacturers of prefabricated systems must have duct construction and reinforcement guidelines along with supporting independent leakage and deflection performance testing. Manufacturer’s prefabricated systems printed assembly and installation procedures must be adhered to during all phases.

3. All components of prefabricated system must be clearly embossed with manufacturer’s markings and systems manufacturer clearly identified on all duct labels. No substitution of system components is permitted.

4. Approved Manufacturer: Ductmate Industries or Ward Duct Connectors Incorporated “W.D.C.I.”

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," 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 4, "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 DOUBLE-WALL RECTANGULAR DUCTS AND FITTINGS

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

1. McGill AirFlow LLC.
2. Sheet Metal Connectors, Inc.

B. Rectangular Ducts: Fabricate ducts with indicated dimensions for the inner duct.

C. Outer Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

D. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse 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."

E. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," 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."

F. Interstitial Insulation: Fibrous-glass liner complying with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."

1. Maximum Thermal Conductivity: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
2. Install spacers that position the inner duct at uniform distance from outer duct without compressing insulation.
3. Coat insulation with antimicrobial coating.
4. Cover insulation with polyester film complying with UL 181, Class 1.

G. Interstitial Insulation: Flexible elastomeric duct liner complying with ASTM C 534, Type II for sheet materials, and with NFPA 90A or NFPA 90B.

1. Maximum Thermal Conductivity: 0.25 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.

H. Inner Duct: Minimum 0.028-inch perforated galvanized sheet steel having 3/32-inch-diameter perforations, with overall open area of 23 percent.

I. Formed-on Transverse Joints (Flanges): Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Traverse 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."

J. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," 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 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.

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

    a. Lindab Inc.
    b. McGill AirFlow LLC.
    c. SEMCO Incorporated.
    d. Sheet Metal Connectors, Inc.
    e. Spiral Manufacturing Co., Inc.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse 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."

1. Transverse Joints in Ducts Larger Than 50 Inches in Diameter: Flanged.

    a. Unexposed Duct 3 inch to 30 inch Diameter: Round duct connects with a one-piece interior slip coupling at least two gages heavier than duct wall, beaded at center and fastened to duct with screws. Seal joint with an approved sealant applied continuously around both ends of coupler prior to assembling and after fastening.
    b. All Exposed Duct and Unexposed Duct 30 inch to 72 inch Diameter: Three-piece, gasket flanged-joint consisting of two internal flanges, with integral mastic sealant, and one external closure band, which compress the gasket between the internal flanges.

    c. Duct above 72 inch diameter: Use companion angle flanged joints as defined in Figure 3-1 of the 2005 SMACNA Manual "HVAC Duct Construction Standards, Metal and Flexible" Third Edition. Refer to manual for proper sizing and construction details.
    d. Dust Collection Systems and Exposed Duct 3 inch to 14 inch: Use a one-piece, polyethylene lined gasket connector with integrated bolt for the closure system.

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," 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."

1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
2. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.

D. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "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."

## 2.4 DOUBLE-WALL ROUND AND FLAT-OVAL DUCTS AND FITTINGS

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

1. Lindab Inc.
2. McGill AirFlow LLC.
3. SEMCO Incorporated.
4. Sheet Metal Connectors, Inc.

B. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension) of the inner duct.

C. Outer Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on static-pressure class unless otherwise indicated.

1. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse 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."

    a. Transverse Joints in Ducts Larger Than 50 Inches in Diameter: Flanged.

        1) All Exposed Duct and Unexposed Duct 30 inch to 72 inch Diameter: Three-piece, gasket flanged-joint consisting of two internal flanges, with integral mastic sealant, and one external closure band, which compress the gasket between the internal flanges.
        2) Basis-of-Design Product: Subject to compliance with requirements, provide Ductmate Industries, Inc.; Spiralmate or comparable product by one of the following:

2. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," 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."

    a. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
    b. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.

3. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "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."

D. Inner Duct: Minimum 0.028-inch perforated galvanized sheet steel having 3/32-inch-diameter perforations, with overall open area of 23 percent.

E. Interstitial Insulation: Fibrous-glass liner complying with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."

1. Maximum Thermal Conductivity: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
2. Install spacers that position the inner duct at uniform distance from outer duct without compressing insulation.
3. Coat insulation with antimicrobial coating.
4. Cover insulation with polyester film complying with UL 181, Class 1.

F. Interstitial Insulation: Flexible elastomeric duct liner complying with ASTM C 534, Type II for sheet materials, and with NFPA 90A or NFPA 90B.

1. Maximum Thermal Conductivity: 0.25 Btu x in./h x sq. ft. x deg F at75 deg F mean temperature.

## 2.5 SELF-SEALING SINGLE-WALL ROUND DUCT AND FITTINGS FOR LOW PRESSURE DUCT

A. Basis-of-Design Product: Subject to compliance with requirements, provide Ductmate Industries, Inc.; Greenseam + and Greenseam Sealed Fittings or comparable product.

B. Duct Construction Pressure 2 inches wg:

1. Round Low Velocity Ductwork:

a. Constructed from a minimum of 26 gauge, self-locking, factory sealed snaplock pipe, which incorporates a factory-applied gasket in the longitudinal seam and on the female end of the transverse joint.

2. Fittings:

a. All high efficiency take-offs, conicals, ad collars must have a factory applied gasket along all rivets, co-latches, and flange.
b. All fittings shall be constructed from a minimum of 26 gauge steel.
c. All dampered fittings must have low-leakage hardware with closed-end bearings.

## 2.6 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: G60.
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. PVC-Coated, Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G60.
2. Minimum Thickness for Factory-Applied PVC Coating: 4 mils thick on sheet metal surface of ducts and fittings exposed to corrosive conditions, and minimum 1 mil thick on opposite surface.
3. Coating Materials: Acceptable to authorities having jurisdiction for use on ducts listed and labeled by an NRTL for compliance with UL 181, Class 1.

D. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.

E. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or 316, as indicated in the "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B, No. 2D, No. 3, or No. 4 as indicated in the "Duct Schedule" Article.

F. Aluminum Sheets: Comply with ASTM B 209 Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.

G. Factory- or Shop-Applied Antimicrobial Coating:

1. Apply to the surface of sheet metal that will form the interior surface of the duct. An untreated clear coating shall be applied to the exterior surface.

2. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
3. Coating containing the antimicrobial compound shall have a hardness of 2H, minimum, when tested according to ASTM D 3363.
4. 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.
5. Shop-Applied Coating Color: Black.
6. Antimicrobial coating on sheet metal is not required for duct containing liner treated with antimicrobial coating.

H. 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.

I. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

## 2.7 DUCT LINER

A. Fibrous-Glass Duct Liner: Comply with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."

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

a. CertainTeed Corporation; Insulation Group.
b. Johns Manville.
c. Knauf Insulation.
d. Owens Corning.

B. Maximum Thermal Conductivity:

1) Type I, Flexible: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
2) Type II, Rigid: 0.23 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.

2. Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-resistant coating. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.

3. Water-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.

    a. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
    b. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. 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. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.

    a. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
    b. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Natural-Fiber Duct Liner: 85 percent cotton, 10 percent borate, and 5 percent polybinding fibers, treated with a microbial growth inhibitor and complying with NFPA 90A or NFPA 90B.

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

    a. Bonded Logic, Inc.
    b. Reflectix Inc.

2. Maximum Thermal Conductivity: 0.24 Btu x in./h x sq. ft. x deg F at75 deg F mean temperature when tested according to ASTM C 518.
3. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to ASTM E 84; certified by an NRTL.

4. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.

    a. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
    b. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Polyester Duct Liner: Duct liner shall be an engineered nonwoven, thermally bonded Polyester with a smooth and durable FSK facing. Liner must have a noise reduction coefficient of at least 0.65 and have thermal values greater or equal to an R-5 at 1 ¼", R-6 at 1½" and R-8 at 2" respectively.

1. Basis-of-Design Product: Subject to compliance with requirements, provide [product indicated on Drawings]
    a. Ductmate Industries, PolyArmor

2. Polyester liner must be able to withstand a constant internal temperature up to 250°F (121°C,) must be compliant with Greenguard Environmental Institute, and contain zero VOCs per ASTM D5116. Liner must comply with all applicable standards including ASTM E84, ASTM C518, ASTM G-21, NFPA 90A and 90B, and UL 181.
3. Polyester duct liner must be attached using a non flammable, low VOC water based adhesive. When applicable, apply a non flammable, low VOC water based lagging adhesive to the exposed leading edge of the insulation. Install fasteners per SMACNA HVAC Duct Liner installation instructions. Liner must consist of at least 25% recycled content.
4. Polyester duct liner must be installed per section 7.4 of the 2005 SMACNA Manual, "HVAC Duct Construction Standards, Metal and Flexible," Third Edition unless otherwise specified.

F. Insulation Pins and Washers:

1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick galvanized steel; with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

G. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 7-11, "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. Apply adhesive coating on longitudinal seams in ducts with air velocity of 2500 fpm.
7. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.
8. 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.
    c. Upstream edges of transverse joints in ducts where air velocities are higher than 2500 fpm or where indicated.

9. Secure insulation between perforated sheet metal inner duct of same thickness as specified for outer shell. Use mechanical fasteners that maintain inner duct at uniform distance from outer shell without compressing insulation.

    a. Sheet Metal Inner Duct Perforations: 3/32-inch diameter, with an overall open area of 23 percent.

10. 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.

## 2.8 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. Two-Part Tape Sealing System:

1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
2. Tape Width: 4 inches.
3. Sealant: Modified styrene acrylic.
4. Water resistant.

5. Mold and mildew resistant.
6. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
7. Service: Indoor and outdoor.
8. Service Temperature: Minus 40 to plus 200 deg F.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
10. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
11. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Water-Based Joint and Seam Sealant:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Ductmate Industries, Inc.; Proseal or comparable product by one of the following:

    a. Hardcast.
    b. Polymer Adhesives

2. Application Method: Brush on.
3. Solids Content: Minimum 65 percent.
4. Shore A Hardness: Minimum 20.
5. Water resistant.
6. Mold and mildew resistant.
7. VOC: Maximum 75 g/L (less water).
8. Flexibility: Flexible after curing.
9. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
10. UL 181 B-M listed; UL 723 Classified.
11. Service: Indoor or outdoor.
12. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Solvent-Based Joint and Seam Sealant:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Ductmate Industries, Ic.; Solvseal or comparable product by one of the following:

    a. Hardcast.
    b. Polymer Adhesives.

2. Application Method: Brush on.
3. Base: Synthetic rubber resin.
4. Solvent: Toluene and heptane.
5. Solids Content: Minimum 60 percent.
6. Shore A Hardness: Minimum 60.
7. Water resistant.

8. Mold and mildew resistant.
9. Flexibility: Flexible after curing.
10. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
11. VOC: Maximum 395 g/L.
12. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
13. Maximum Static-Pressure Class: 10-inch wg, positive or negative.
14. Service: Indoor or outdoor.
15. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

E. 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.
6. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

F. Flange Gaskets: Butyl rubber. gaskets complying with UL 723 and meeting Mil-C 18969B and TTS-S-001657. Material shall not contain vegetable oils, fish oils, or any other type vehicle that will support fugal and/or bacterial growth.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Ductmate industries, Inc.; Ductmate 440 Butyl Gasket or comparable productg:

G. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

## 2.9 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. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.

E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.

F. 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.

G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

H. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

## 2.10 SEISMIC-RESTRAINT DEVICES

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

1. Cooper B-Line, Inc.; a division of Cooper Industries.
2. Hilti Corp.
3. Kinetics Noise Control.
4. Loos & Co.; Cableware Division.
5. Mason Industries.
6. TOLCO; a brand of NIBCO INC.
7. Unistrut Corporation; Tyco International, Ltd.

B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an evaluation service member of the ICC Evaluation Service an agency acceptable to authorities having jurisdiction.

1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.

C. Channel Support System: Shop- or field-fabricated support assembly made of slotted steel channels rated in tension, compression, and torsion forces and with accessories for attachment to braced component at one end and to building structure at the other end. Include matching components and corrosion-resistant coating.

D. Restraint Cables: ASTM A 603, galvanized-steel cables with end connections made of cadmium-plated steel assemblies with brackets, swivel, and bolts designed for restraining cable service; and with an automatic-locking and clamping device or double-cable clips.

E. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections or Reinforcing steel angle clamped to hanger rod.

F. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

**PART 3 - EXECUTION**

3.1 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 and flat-oval 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 clearance of 1 inch, 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.

K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 233300 "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 "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

## 3.2 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.

## 3.3 SUPPLY, OUTSIDE AIR AND RETURN DUCTWORK LOCATED OUTDOORS

A. Fabricate ducts with ALUMINUM with three sides. Locate longitudinal seams on bottom. Use flanged joints sealed weather and water tight. Cross breaks top to shed water. Internally insulate with non-fibrous duct insulation with coating to resist high air velocities.

## 3.4 ADDITIONAL INSTALLATION REQUIREMENTS FOR COMMERCIAL KITCHEN HOOD EXHAUST DUCT

A. Install commercial kitchen hood exhaust ducts without dips and traps that may hold grease, and sloped a minimum of 2 percent to drain grease back to the hood.

B. Install fire-rated access panel assemblies at each change in direction and at maximum intervals of 20 feet in horizontal ducts, and at every floor for vertical ducts, or as indicated on Drawings. Locate access panel on top or sides of duct a minimum of 1-1/2 inches from bottom of duct.

C. Do not penetrate fire-rated assemblies except as allowed by applicable building codes and authorities having jurisdiction.

## 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."

B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
2. Outdoor, Supply-Air Ducts: Seal Class A.
3. Outdoor, Exhaust Ducts: Seal Class C.
4. Outdoor, Return-Air Ducts: Seal Class C.
5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class B.
6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
7. Unconditioned Space, Exhaust Ducts: Seal Class C.
8. Unconditioned Space, Return-Air Ducts: Seal Class B.
9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.
11. Conditioned Space, Exhaust Ducts: Seal Class B.
12. Conditioned Space, Return-Air Ducts: Seal Class C.

## 3.6 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 or for slabs more than 4 inches thick.
4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
5. Do not use powder-actuated concrete fasteners for seismic restraints.

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports.

E. 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.

F. 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 SEISMIC-RESTRAINT-DEVICE INSTALLATION

A. Install ducts with hangers and braces designed to support the duct and to restrain against seismic forces required by applicable building codes. Comply with SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."

1. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
2. Brace a change of direction longer than 12 feet.

B. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.

C. Install cables so they do not bend across edges of adjacent equipment or building structure.

D. Install cable restraints on ducts that are suspended with vibration isolators.

E. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction.

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

G. Drilling for and Setting Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcement or embedded items during drilling. Notify the Architect if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.

2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Set anchors to manufacturer's recommended torque, using a torque wrench.
5. Install zinc-coated steel anchors for interior applications and stainless-steel anchors for applications exposed to weather.

## 3.8 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

## 3.9 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 Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

## 3.10 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Leakage Tests:

1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
2. Test the following systems:

    a. Ducts with a Pressure Class Higher Than 3-Inch wg: Test representative duct sections, selected by Architect from sections installed, totaling no less than 25 percent of total installed duct area for each designated pressure class.
    b. Supply Ducts with a Pressure Class of 3-Inch wg or Higher: Test representative duct sections, selected by Architect from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.
    c. Return Ducts with a Pressure Class of 3-Inch wg or Higher: Test representative duct sections, selected by Architect from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.

d. Exhaust Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections, selected by Architect from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.
e. Outdoor Air Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections, selected by Architect from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.

3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
4. Test for leaks before applying external insulation.
5. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
6. Give seven days' advance notice for testing.

C. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.
2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."

a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.

D. Duct system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

## 3.11 DUCT CLEANING

A. Clean new and existing duct system(s) before testing, adjusting, and balancing.

B. Use service openings for entry and inspection.

1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
3. Remove and reinstall ceiling to gain access during the cleaning process.

C. Particulate Collection and Odor Control:

1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

D. Clean the following components by removing surface contaminants and deposits:

1. Air outlets and inlets (registers, grilles, and diffusers).
2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
4. Coils and related components.
5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.
7. Dedicated exhaust and ventilation components and makeup air systems.

E. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
6. Provide drainage and cleanup for wash-down procedures.
7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

## 3.12 START UP

A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.13 DUCT SCHEDULE

A. See schedule on the drawings.

B. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:

1. Underground Ducts: Concrete-encased, PVC-coated, galvanized sheet steel with thicker coating on duct exterior.

C. Supply, return, transfer and outside air Ducts: See schedule on drawings for construction and pressure class ratings.

D. Kitchen Exhaust Ductwork

1. Kitchen exhaust ductwork shall be sized to have a minimum velocity of 1500 FPM with the same net area from the duct collar to the exhaust fan.

2. It shall be constructed of 16 gauge metal of either black iron steel, properly primed and painted with suitable high temperature paint, or galvanized steel with welded seams which are primed and painted.

3. Ductwork shall be welded, liquid tight (continuous external welds) to comply with NFPA 96.

4. Furnish airtight cleanouts as required by code, as indicated on the drawings, and at each change in direction.

5. Ductwork shall be sloped to pitch a minimum of ¼" per lineal foot.

E. Listed Grease Ducts

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Heat-Fab, Inc.
   b. Metal-Fab, Inc.
   c. Schebler Co. (The).
   d. Selkirk Inc.; Selkirk Metalbestos and Air Mate.
   e. Van-Packer Company, Inc.

2. Description: Double-wall metal vents tested according to UL 1978 and rated for 500 deg F continuously, or 2000 deg F for 30 minutes; with positive or negative duct pressure and complying with NFPA 211.

3. Construction: Inner shell and outer jacket separated by at least a 1- inch annular `space filled with high- temperature, ceramic-fiber insulation.

4. Inner Shell: ASTM A 666, Type 304 stainless steel.

5. Outer Jacket: Aluminized steel where concealed. Stainless steel where exposed.

6. Accessories: Tees, elbows, increasers, hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight sections; all listed for same assembly. Include unique components required to comply with NFPA 96 including cleanouts, transitions, adapters and drain fittings.

F. Dishwasher Exhaust Ductwork

1. Dishwasher exhaust ductwork shall be 16 gauge, type 304 stainless steel, liquid-tight, continuous welded construction.

G. FUME EXHAUST DUCTWORK (Corrosive Atmosphere)

1. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards or High Pressure Duct Construction Standards depending on the duct velocities and pressure duty.

2. Construct of 304 stainless steel with stainless steel "Ductmate" or "WARD Connector" mechanical flanges using neoprene gaskets.

***OR***

3. Construct of 316 stainless steel with all welded joint construction.

***OR***

4. Construct of 304 stainless steel using standard SMACNA joints and seams suitable for the class of constructions. Seal all joints water and air tight with clear silicone sealer

H. Intermediate Reinforcement:

1. Galvanized-Steel Ducts: Galvanized steel.
2. PVC-Coated Ducts:

   a. Exposed to Airstream: Match duct material.
   b. Not Exposed to Airstream: Match duct material.

3. Stainless-Steel Ducts:

   a. Exposed to Airstream: Match duct material.
   b. Not Exposed to Airstream: Match duct material.

4. Aluminum Ducts: or galvanized sheet steel coated with zinc chromate.

I. Liner: (Where indicated on plans.)

1. Supply Air Ducts: Poly Natural fiber, 1.5 inch thick.
2. Return Air Ducts: Fibrous glass, Type I or Natural fiber, 1 inch thick.
3. Exhaust Air Ducts: Fibrous glass, Type I or Natural fiber, 1 inch thick.
4. Supply Fan Plenums: Flexible elastomeric or Natural fiber, 1.5 inch thick.
5. Return- and Exhaust-Fan Plenums: Fibrous glass, Type II, 2 inches thick.
6. Transfer Ducts: Fibrous glass, Type I, 1 inch thick.
7. Located outdoors: 2 inch thick Natural or poly fiber

J. Double-Wall Duct Interstitial Insulation:

1. Supply Air Ducts: 1.5 inch thick.
2. Return Air Ducts: 1 inch thick.
3. Exhaust Air Ducts: 1 inch thick.

K. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

   a. Velocity 1000 fpm or Lower:

1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
2) Mitered Type RE 4 without vanes.

b. Velocity 1000 to 1500 fpm:

1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

c. Velocity 1500 fpm or Higher:

1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."

a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.

1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
4) Radius-to Diameter Ratio: 1.5.

b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam.

L. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."

    a. Rectangular Main to Rectangular Branch: 45-degree entry.
    b. Rectangular Main to Round Branch: Spin in.

2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.

    a. Velocity 1000 fpm or Lower: 90-degree tap.
    b. Velocity 1000 to 1500 fpm: Conical tap.
    c. Velocity 1500 fpm or Higher: 45-degree lateral.

**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.

### 1.2 SUMMARY

A. Section Includes:

1. Backdraft and pressure relief dampers.
2. Barometric relief dampers.
3. Manual volume dampers.
4. Control dampers.
5. Fire dampers.
6. Ceiling radiation dampers.
7. Smoke dampers.
8. Combination fire and smoke dampers.
9. Corridor dampers.
10. Flange connectors.
11. Duct silencers.
12. Turning vanes.
13. Remote damper operators.
14. Duct-mounted access doors.
15. Flexible connectors.
16. Flexible ducts.
17. Duct security bars.
18. Duct accessory hardware.

B. Related Requirements:

1. Section 233723 "HVAC Gravity Ventilators" for roof-mounted ventilator caps.
2. Section 283111 "Digital, Addressable Fire-Alarm System" for duct-mounted fire and smoke detectors.
3. Section 283112 "Zoned (DC-Loop) Fire-Alarm System" for duct-mounted fire and smoke detectors.

### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For duct silencers, include pressure drop and dynamic insertion loss data. Include breakout noise calculations for high transmission loss casings.

B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.

1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:

a. Special fittings.
b. Manual volume damper installations.
c. Control-damper installations.
d. Fire-damper, smoke-damper, combination fire- and smoke-damper, ceiling, and corridor damper installations, including sleeves; and duct-mounted access doors and remote damper operators.
e. Duct security bars.
f. Wiring Diagrams: For power, signal, and control wiring.

## 1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.

B. Source quality-control reports.

## 1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

## 1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

## PART 2 - PRODUCTS

### 2.1 ASSEMBLY DESCRIPTION

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."

B. 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.

### 2.2 MATERIALS

A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G60.
2. Exposed-Surface Finish: Mill phosphatized.

B. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a No. 2 finish for concealed ducts and brushed finish for exposed ducts.

C. Aluminum Sheets: Comply with ASTM B 209, 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, 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 minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

### 2.3 BACKDRAFT AND PRESSURE RELIEF 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. American Warming and Ventilating; a division of Mestek, Inc.
3. Cesco Products; a division of Mestek, Inc.
4. Greenheck Fan Corporation.
5. Nailor Industries Inc.
6. Pottorff.
7. Ruskin Company.

B. Description: Gravity balanced.

C. Maximum Air Velocity: 2000 fpm.

D. Maximum System Pressure: 2-inch wg.

E. Frame: Hat-shaped, 0.05-inch-thick, galvanized sheet steel, with welded corners or mechanically attached and mounting flange.

F. Blades: Multiple single-piece blades, off-center pivoted, maximum 6-inch width, 0.025-inch-thick, roll-formed aluminum with sealed edges.

G. Blade Action: Parallel.

H. Blade Seals: Extruded vinyl, mechanically locked.

I. Blade Axles:

1. Material: Nonferrous metal.
2. Diameter: 0.20 inch.

J. Tie Bars and Brackets: Aluminum.

K. Return Spring: Adjustable tension.

L. Bearings: Steel ball or synthetic pivot bushings.

M. Accessories:

1. Adjustment device to permit setting for varying differential static pressure.
2. Counterweights and spring-assist kits for vertical airflow installations.
3. Electric actuators.
4. Chain pulls.
5. Screen Mounting: Front mounted in sleeve.

    a. Sleeve Thickness: 20 gage minimum.
    b. Sleeve Length: 6 inches minimum.

6. Screen Mounting: Rear mounted.
7. Screen Material: Aluminum.
8. Screen Type: Bird.
9. 90-degree stops.

## 2.4 BAROMETRIC RELIEF 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. American Warming and Ventilating; a division of Mestek, Inc.
3. Cesco Products; a division of Mestek, Inc.
4. Greenheck Fan Corporation.
5. Nailor Industries Inc.
6. Pottorff.
7. Ruskin Company.

B. Suitable for horizontal or vertical mounting.

C. Maximum Air Velocity: 2000 fpm.

D. Maximum System Pressure: 2-inch wg.

E. Frame: Hat-shaped, 0.05-inch-thick, galvanized sheet steel, with welded corners or mechanically attached.

F. Blades:

1. Multiple, 0.025-inch-thick, roll-formed aluminum.
2. Maximum Width: 6 inches.
3. Action: Parallel.
4. Balance: Gravity.
5. Eccentrically pivoted.

G. Blade Seals: Vinyl.

H. Blade Axles: Nonferrous metal.

I. Tie Bars and Brackets:

1. Material: Aluminum.
2. Rattle free with 90-degree stop.

J. Return Spring: Adjustable tension.

K. Bearings: Synthetic.

L. Accessories:

1. Flange on intake.
2. Adjustment device to permit setting for varying differential static pressures.

## 2.5 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. Nailor Industries Inc.
    f. Pottorff.
    g. Ruskin Company.
    h. Trox USA Inc.

2. Standard leakage rating.
3. Suitable for horizontal or vertical applications.
4. Frames:

    a. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel.
    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 thick.

6. Blade Axles: Galvanized steel.
7. Bearings:

    a. Molded synthetic.
    b. Dampers in ducts with pressure classes of 3-inch wg 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.

B. Standard, Aluminum, 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. McGill AirFlow LLC.
    d. Nailor Industries Inc.
    e. Pottorff.
    f. Ruskin Company.
    g. Trox USA Inc.

2. Standard leakage rating.
3. Suitable for horizontal or vertical applications.
4. Frames: Hat-shaped, 0.10-inch-thick, aluminum sheet channels; frames with 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. Roll-Formed Aluminum Blades: 0.10-inch-thick aluminum sheet.
    e. Extruded-Aluminum Blades: 0.050-inch-thick extruded aluminum.

6. Blade Axles: Nonferrous metal.
7. Bearings:

    a. Molded synthetic.
    b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.

8. Tie Bars and Brackets: Aluminum.

C. Low-Leakage, 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. McGill AirFlow LLC.
    d. Nailor Industries Inc.
    e. Pottorff.
    f. Ruskin Company.
    g. Trox USA Inc.

2. Comply with AMCA 500-D testing for damper rating.
3. Low-leakage rating and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
4. Suitable for horizontal or vertical applications.
5. Frames:

    a. Hat shaped.
    b. 0.094-inch-thick, galvanized sheet steel.
    c. Mitered and welded corners.
    d. Flanges for attaching to walls and flangeless frames for installing in ducts.

6. Blades:

    a. Multiple or single blade.
    b. Parallel- or opposed-blade design.

c. Stiffen damper blades for stability.
d. Galvanized, roll-formed steel, 0.064 inch thick.

7. Blade Axles: [Galvanized steel].
8. Bearings:

a. Molded synthetic.
b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.

9. Blade Seals: Vinyl.
10. Jamb Seals: Cambered stainless steel.
11. Tie Bars and Brackets: Galvanized steel.
12. Accessories:

a. Include locking device to hold single-blade dampers in a fixed position without vibration.

D. Low-Leakage, Aluminum, 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. McGill AirFlow LLC.
d. Nailor Industries Inc.
e. Pottorff.
f. Ruskin Company.
g. Trox USA Inc.

2. Comply with AMCA 500-D testing for damper rating.
3. Low-leakage rating and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
4. Suitable for horizontal or vertical applications.
5. Frames: Hat-shaped, 0.10-inch-thick, aluminum sheet channels; frames with flanges for attaching to walls and flangeless frames for installing in ducts.
6. Blades:

a. Multiple or single blade.
b. Parallel- or opposed-blade design.
c. Roll-Formed Aluminum Blades: 0.10-inch-thick aluminum sheet.
d. Extruded-Aluminum Blades: 0.050-inch-thick extruded aluminum.

7. Blade Axles: Nonferrous metal.
8. Bearings:

a. Molded synthetic.

b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.

9. Blade Seals: Vinyl.
10. Jamb Seals: Cambered stainless steel.
11. Tie Bars and Brackets: Aluminum.
12. Accessories:

a. Include locking device to hold single-blade dampers in a fixed position without vibration.

E. Jackshaft:

1. Size: 0.5-inch diameter.
2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.

F. Damper Hardware:

1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
2. Include center hole to suit damper operating-rod size.
3. Include elevated platform for insulated duct mounting.

## 2.6 CONTROL DAMPERS

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

1. American Warming and Ventilating; 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. Nailor Industries Inc.
7. Pottorff.
8. Ruskin Company.
9. Young Regulator Company.

B. Low-leakage rating and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.

C. Frames:

1. Hat shaped.
2. 0.094-inch-thick, galvanized sheet steel.

3. Mitered and welded corners.

D. Blades:

1. Multiple blade with maximum blade width of 6 inches.
2. Parallel- and opposed-blade design.
3. Galvanized-steel.
4. 0.064 inch thick single skin or 0.0747-inch-thick dual skin.
5. Blade Edging: Closed-cell neoprene.
6. Blade Edging: Inflatable seal blade edging, or replaceable rubber seals.

E. Blade Axles: 1/2-inch-diameter; galvanized steel; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.

1. Operating Temperature Range: From minus 40 to plus 200 deg F.

F. Bearings:

1. Molded synthetic.
2. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
3. Thrust bearings at each end of every blade.

## 2.7 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. Nailor Industries Inc.
6. Pottorff.
7. Prefco; Perfect Air Control, Inc.
8. Ruskin Company.
9. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Type: Static and dynamic; rated and labeled according to UL 555 by an NRTL.

C. Closing rating in ducts up to 4-inch wg static pressure class and minimum 2000-fpm velocity.

D. Fire Rating: 1-1/2 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-thick galvanized steel; with mitered and interlocking corners.

F. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.

1. Minimum Thickness: 0.05 or 0.39 inch thick, as indicated, 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.

H. Blades: Roll-formed, interlocking, 0.024-inch-0.034-inch-thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch-thick, galvanized-steel blade connectors.

I. Horizontal Dampers: Include blade lock and stainless-steel closure spring.

J. Heat-Responsive Device: Replaceable, 212 deg F Insert temperature rated, fusible links.

K. Heat-Responsive Device: Electric, resettable link and switch package, factory installed, 165 deg F and 212 deg F rated.

## 2.8 CEILING RADIATION 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. Cesco Products; a division of Mestek, Inc.
3. Nailor Industries Inc.
4. Pottorff.
5. Prefco; Perfect Air Control, Inc.
6. Ruskin Company.
7. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. General Requirements:

1. Labeled according to UL 555C by an NRTL.
2. Comply with construction details for tested floor- and roof-ceiling assemblies as indicated in UL's "Fire Resistance Directory."

C. Frame: Galvanized sheet steel, round or rectangular, style to suit ceiling construction.

D. Blades: Galvanized sheet steel with refractory insulation.

E. Heat-Responsive Device: Replaceable, 212 deg F rated, fusible links.

F. Fire Rating: 2 hours.

2.9 SMOKE 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. Cesco Products; a division of Mestek, Inc.
3. Greenheck Fan Corporation.
4. Nailor Industries Inc.
5. Pottorff.
6. Ruskin Company.

B. General Requirements: Label according to UL 555S by an NRTL.

C. Smoke Detector: Integral, factory wired for single-point connection.

D. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel, with welded or mechanically attached corners and mounting flange.

E. Blades: Roll-formed, horizontal, interlocking, 0.034-inch-thick, galvanized sheet steel.

F. Leakage: Class I.

G. Rated pressure and velocity to exceed design airflow conditions.

H. Mounting Sleeve: Factory-installed, 0.039-inch-thick, galvanized sheet steel; length to suit wall or floor application.

I. Damper Motors: Modulating or two-position action.

J. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Section 230900 "Instrumentation and Control for HVAC."
3. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
4. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 in. x lbf and breakaway torque rating of 150 in. x lbf.
5. Outdoor Motors and Motors in Outdoor-Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at minus 40 deg F.

6. Nonspring-Return Motors: For dampers larger than 25 sq. ft., size motor for running torque rating of 150 in. x lbf and breakaway torque rating of 300 in. x lbf.
7. Electrical Connection: 115 V, single phase, 60 Hz.

K. Accessories:

1. Auxiliary switches for signaling or position indication.
2. Test and reset switches, remote mounted.

## 2.10 COMBINATION FIRE AND SMOKE 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. Cesco Products; a division of Mestek, Inc.
3. Greenheck Fan Corporation.
4. Nailor Industries Inc.
5. Pottorff.
6. Ruskin Company.

B. Type: Dynamic; rated and labeled according to UL 555 and UL 555S by an NRTL.

C. Closing rating in ducts up to 4-inch wg static pressure class and minimum 2000-fpm velocity.

D. Fire Rating: 1-1/2 and 3 hours.

E. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel, with welded or mechanically attached corners and mounting flange.

F. Heat-Responsive Device: Resettable, 212 deg F rated, fire-closure device.

G. Heat-Responsive Device: Electric resettable device and switch package, factory installed, rated.

H. Smoke Detector: Integral, factory wired for single-point connection.

I. Blades: Roll-formed, horizontal, interlocking, 0.063-inch-thick, galvanized sheet steel.

J. Leakage: Class I.

K. Rated pressure and velocity to exceed design airflow conditions.

L. Mounting Sleeve: Factory-installed, 0.039-inch-thick, galvanized sheet steel; length to suit wall or floor application.

M. Master control panel for use in dynamic smoke-management systems.

N. Damper Motors: Modulating or two-position action.

O. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Section 230900 "Instrumentation and Control for HVAC."
3. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
4. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 in. x lbf and breakaway torque rating of 150 in. x lbf.
5. Outdoor Motors and Motors in Outdoor-Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at minus 40 deg F.
6. Nonspring-Return Motors: For dampers larger than 25 sq. ft., size motor for running torque rating of 150 in. x lbf and breakaway torque rating of 300 in. x lbf.
7. Electrical Connection: 115 V, single phase, 60 Hz.

P. Accessories:

1. Auxiliary switches for signaling or position indication.
2. Test and reset switches, remote mounted.

## 2.11 CORRIDOR 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. Cesco Products; a division of Mestek, Inc.
3. Nailor Industries Inc.
4. Pottorff.
5. Ruskin Company.

B. General Requirements: Label combination fire and smoke dampers according to UL 555 for 1-hour or 1-1/2-hour rating by an NRTL.

C. Heat-Responsive Device: Replaceable, 212 deg F rated, fusible links.

D. Heat-Responsive Device: Electric resettable device and switch package, factory installed, rated.

E. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel, with welded or mechanically attached corners.

F. Blades: Roll-formed, horizontal, interlocking, 0.034-inch-thick, galvanized sheet steel.

G. Mounting Sleeve: Factory-installed, 0.039-inch-thick, galvanized sheet steel; length to suit wall or floor application.

H. Damper Motors: Modulating or two-position action.

I. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Section 230900 "Instrumentation and Control for HVAC."
3. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
4. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 in. x lbf and breakaway torque rating of 150 in. x lbf.
5. Outdoor Motors and Motors in Outdoor-Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at minus 40 deg F.
6. Nonspring-Return Motors: For dampers larger than 25 sq. ft., size motor for running torque rating of 150 in. x lbf and breakaway torque rating of 300 in. x lbf.
7. Electrical Connection: 115 V, single phase, 60 Hz.

## 2.12 FLANGE CONNECTORS

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

1. Ductmate Industries, Inc.
2. Nexus PDQ; Division of Shilco Holdings Inc.
3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Description: Add-on or roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.

C. Material: Galvanized steel.

D. Gage and Shape: Match connecting ductwork.

2.13 DUCT SILENCERS

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

1. Dynasonics.
2. Industrial Noise Control, Inc.
3. McGill AirFlow LLC.
4. Ruskin Company.
5. Vibro-Acoustics.

B. General Requirements:

1. Factory fabricated.
2. Fire-Performance Characteristics: Adhesives, sealants, packing materials, and accessory materials shall have flame-spread index not exceeding 25 and smoke-developed index not exceeding 50 when tested according to ASTM E 84.
3. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

C. Shape:

1. Rectangular straight with splitters or baffles.
2. Round straight with center bodies or pods.
3. Rectangular elbow with splitters or baffles.
4. Round elbow with center bodies or pods.
5. Rectangular transitional with splitters or baffles.

D. Rectangular Silencer Outer Casing: ASTM A 653/A 653M, G90, galvanized sheet steel, 0.034 inch thick.

E. Round Silencer Outer Casing: ASTM A 653/A 653M, G90, galvanized sheet steel.

1. Sheet Metal Thickness for Units up to 24 Inches in Diameter: 0.034 inch thick.
2. Sheet Metal Thickness for Units 26 through 40 Inches in Diameter: 0.040 inch thick.
3. Sheet Metal Thickness for Units 42 through 52 Inches in Diameter: 0.05 inch thick.
4. Sheet Metal Thickness for Units 54 through 60 Inches in Diameter: 0.064 inch thick.

F. Inner Casing and Baffles: ASTM A 653/A 653M, G90 galvanized sheet metal, 0.034 inch thick, and with 1/8-inch-diameter perforations.

G. Special Construction:

1. Suitable for outdoor use.
2. High transmission loss to achieve STC 45.

H. Connection Sizes: Match connecting ductwork unless otherwise indicated.

I. Principal Sound-Absorbing Mechanism:

1. Controlled impedance membranes and broadly tuned resonators without absorptive media.
2. Film-lined type with fill material.

    a. Fill Material: Inert and vermin-proof fibrous material, packed under not less than 15 percent compression.
    b. Erosion Barrier: Polymer bag enclosing fill, and heat sealed before assembly.

3. Lining: Mylar.

J. Fabricate silencers to form rigid units that will not pulsate, vibrate, rattle, or otherwise react to system pressure variations. Do not use mechanical fasteners for unit assemblies.

1. Joints: Lock formed and sealed or flanged connections.
2. Suspended Units: Factory-installed suspension hooks or lugs attached to frame in quantities and spaced to prevent deflection or distortion.
3. Reinforcement: Cross or trapeze angles for rigid suspension.

K. Accessories:

1. Integral 1-1/2-hour fire damper with access door.
2. Factory-installed end caps to prevent contamination during shipping.
3. Removable splitters.
4. Airflow measuring devices.

L. Source Quality Control: Test according to ASTM E 477.

1. Testingto be witnessed by Architect.
2. Record acoustic ratings, including dynamic insertion loss and generated-noise power levels with an airflow of at least 2000-fpm face velocity.
3. Leak Test: Test units for airtightness at 200 percent of associated fan static pressure or 6-inch wg static pressure, whichever is greater.

M. Capacities and Characteristics:

1. Configuration: Straight or 90-degree elbow.
2. Shape: Rectangular or Round.
3. Attenuation Mechanism: Acoustical glass fiber with protective film liner Helmholtz resonator mechanism with no internal media.
4. Maximum Pressure Drop: 0.35-inch wg.
5. Casing:

    a. Attenuation: Standard.
    b. Outer Material: Galvanized steel.
    c. Inner Material: Galvanized steel.

6. Velocity Range: 1000-2500 fps>.
7. End Connection: Flange.
8. Length: as scheduled.

9. Face Dimension: as scheduled.

10. Face Velocity: as scheduled.
11. Dynamic Insertion Loss: as scheduled.
12. Generated Noise: as scheduled.

## 2.14 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. Elgen Manufacturing.
4. METALAIRE, Inc.
5. SEMCO Incorporated.
6. 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.

1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

C. Manufactured Turning Vanes for Nonmetal Ducts: Fabricate curved blades of resin-bonded fiberglass with acrylic polymer coating; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

D. 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."

E. Vane Construction: Double wall.

F. Vane Construction: Single wall for ducts up to 48 inches wide and double wall for larger dimensions.

## 2.15 REMOTE DAMPER OPERATORS

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

1. Pottorff.
2. Ventfabrics, Inc.
3. Young Regulator Company.

B. Description: Cable system designed for remote manual damper adjustment.

C. Tubing: Brass.

D. Cable: Stainless steel.

E. Wall-Box Mounting: Recessed.

F. Wall-Box Cover-Plate Material: Steel.

## 2.16 DUCT-MOUNTED ACCESS DOORS

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

1. American Warming and Ventilating; a division of Mestek, Inc.
2. Cesco Products; a division of Mestek, Inc.
3. Ductmate Industries, Inc.
4. Elgen Manufacturing.
5. Flexmaster U.S.A., Inc.
6. Greenheck Fan Corporation.
7. McGill AirFlow LLC.
8. Nailor Industries Inc.
9. Pottorff.
10. Ventfabrics, Inc.
11. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2, "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct."

1. Door:

   a. Double wall, rectangular.
   b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
   c. Vision panel.
   d. Hinges and Latches: 1-by-1-inchbutt or piano hinge and cam latches.
   e. Fabricate doors airtight and suitable for duct pressure class.

2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
3. Number of Hinges and Locks:

   a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
   b. Access Doors up to 18 Inches Square: Two hinges and two sash locks.
   c. Access Doors up to 24 by 48 Inches: Three hinges and two compression latches.

d. Access Doors Larger Than 24 by 48 Inches: Four hinges and two compression latches with outside and inside handles.

C. Pressure Relief Access Door:

1. Door and Frame Material: Galvanized sheet steel.
2. Door: Double wall with insulation fill with metal thickness applicable for duct pressure class.
3. Operation: Open outward for positive-pressure ducts and inward for negative-pressure ducts.
4. Factory set at 3.0- to 8.0-inch wg Insert value.
5. Doors close when pressures are within set-point range.
6. Hinge: Continuous piano.
7. Latches: Cam.
8. Seal: Neoprene or foam rubber.
9. Insulation Fill: 1-inch-thick, fibrous-glass or polystyrene-foam board.

## 2.17 DUCT ACCESS PANEL ASSEMBLIES

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

1. Ductmate Industries, Inc.
2. Flame Gard, Inc.
3. 3M.

B. Labeled according to UL 1978 by an NRTL.

C. Panel and Frame: Minimum thickness 0.0528-inch carbon steel.

D. Fasteners: Carbon steel. Panel fasteners shall not penetrate duct wall.

E. Gasket: Comply with NFPA 96; grease-tight, high-temperature ceramic fiber, rated for minimum 2000 deg F.

F. Minimum Pressure Rating: 10-inch wg, positive or negative.

## 2.18 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. Elgen Manufacturing.
4. Ventfabrics, Inc.
5. 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 3-1/2 inches wide attached to two strips of 2-3/4-inch-wide, 0.028-inch-thick, galvanized sheet steel or 0.032-inch-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..
2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F.

F. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.

1. Minimum Weight: 24 oz./sq. yd..
2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
3. Service Temperature: Minus 50 to plus 250 deg F.

G. High-Temperature System, Flexible Connectors: Glass fabric coated with silicone rubber.

1. Minimum Weight: 16 oz./sq. yd..
2. Tensile Strength: 285 lbf/inch in the warp and 185 lbf/inch in the filling.
3. Service Temperature: Minus 67 to plus 500 deg F.

H. High-Corrosive-Environment System, Flexible Connectors: Glass fabric with chemical-resistant coating.

1. Minimum Weight: 14 oz./sq. yd..
2. Tensile Strength: 450 lbf/inch in the warp and 340 lbf/inch in the filling.
3. Service Temperature: Minus 67 to plus 500 deg F.

I. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.

1. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
2. Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.

7. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch movement at start and stop.

## 2.19 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. Noninsulated, Flexible Duct: UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helically wound, spring-steel wire.

1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
2. Maximum Air Velocity: 4000 fpm.
3. Temperature Range: Minus 20 to plus 210 deg F.

C. Insulated, Flexible Duct: UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helically wound, spring-steel wire; fibrous-glass insulation; aluminized vapor-barrier film.

1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
2. Maximum Air Velocity: 4000 fpm.
3. Temperature Range: Minus 20 to plus 210 deg F.
4. Insulation R-value: Comply with ASHRAE/IESNA 90.1.

D. Flexible Duct Connectors:

1. Clamps: Nylon strap in sizes 3 through 18 inches, to suit duct size.
2. Non-Clamp Connectors: Liquid adhesive plus tape.

## 2.20 DUCT SECURITY BARS

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

1. Carnes.
2. KEES, Inc.
3. Lloyd Industries, Inc.
4. Metal Form Manufacturing, Inc.
5. Price Industries.

B. Description: Field- or factory-fabricated and field-installed duct security bars.

C. Configuration:

1. Frame: 2 by 1/4 inch flat frame.
2. Sleeve: 0.1345-inch continuously welded steel frames with 1-by-1-by-3/16-inch angle frame factory welded to 1 end. To be poured in place or set with concrete block or welded or bolted to wall, one side only. Duct connections on both sides.
3. Horizontal Bars: 1/2 inch.
4. Vertical Bars: 1/2 inch.
5. Bar Spacing: 6 inches.
6. Mounting: Metal deck or roofing Bolted or welded with masonry anchors Ductwork or other framing.

2.21 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 backdraft dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.

D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. 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. Install steel volume dampers in steel ducts.
2. Install aluminum volume dampers in aluminum ducts.

E. Set dampers to fully open position before testing, adjusting, and balancing.

F. Where dampers or equipment that need servicing or adjustment are located behind inaccessible walls, floors, or ceilings, provide an access door in the inaccessible construction to enable servicing of the device.

G. Install test holes at fan inlets and outlets and elsewhere as indicated.

H. Install fire and smoke dampers according to UL listing.

I. Install duct security bars. Construct duct security bars from 0.164-inchsteel sleeve, continuously welded at all joints and 1/2-inch-diameter steel bars, 6 inches o.c. in each direction in center of sleeve. Weld each bar to steel sleeve and each crossing bar. Weld 2-1/2-by-2-1/2-by-1/4-inch steel angle to 4 sides and both ends of sleeve. Connect duct security bars to ducts with flexible connections. Provide 12-by-12-inch hinged access panel with cam lock in duct in each side of sleeve.

J. Connect ducts to duct silencers with flexible duct connectors.

K. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:

1. On both sides of duct coils.
2. Upstream and downstream from duct filters.
3. At outdoor-air intakes and mixed-air plenums.
4. At drain pans and seals.
5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
7. At each change in direction and at maximum 50-foot spacing.
8. Upstream from turning vanes.
9. Upstream or downstream from duct silencers.
10. Control devices requiring inspection.
11. Elsewhere as indicated.

L. Install access doors with swing against duct static pressure.

M. Access Door Sizes:

1. One-Hand or Inspection Access: 8 by 5 inches.
2. Two-Hand Access: 12 by 6 inches.
3. Head and Hand Access: 18 by 10 inches.
4. Head and Shoulders Access: 21 by 14 inches.
5. Body Access: 25 by 14 inches.
6. Body plus Ladder Access: 25 by 17 inches.

N. Label access doors according to Section 230553 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.

O. Install flexible connectors to connect ducts to equipment.

P. For fans developing static pressures of 5-inch wg and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.

Q. Connect terminal units to supply ducts with maximum 12-inch lengths of flexible duct. Do not use flexible ducts to change directions.

R. Connect diffusers or light troffer boots to ducts with maximum 60-inch lengths of flexible duct clamped or strapped in place.

S. Connect flexible ducts to metal ducts with draw bands.

T. Install duct test holes where required for testing and balancing purposes.

U. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch movement during start and stop of fans.

## 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, smoke, and combination fire and smoke 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.
5. Operate remote damper operators to verify full range of movement of operator and damper.

**END OF SECTION 233300**

## SECTION 233713 - DIFFUSERS, REGISTERS, AND GRILLES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:
1. Round ceiling diffusers.
2. Rectangular and square ceiling diffusers.
3. Perforated diffusers.
4. Louver face diffusers.
5. Linear bar diffusers.
6. Linear slot diffusers.
7. Adjustable bar grilles.
8. Fixed face grilles.
9. Linear bar grilles.

B. Related Sections:
1. Section 089116 "Operable Wall Louvers" and Section 089119 "Fixed Louvers" for fixed and adjustable louvers and wall vents, whether or not they are connected to ducts.
2. Section 233300 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.

### 1.2 ACTION 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.

B. Samples: For each exposed product and for each color and texture specified.

## PART 2 - PRODUCTS

### 2.1 CEILING DIFFUSERS

A. Louver Face Diffuser SD:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Anemostat Products; a Mestek company.
b. Nailor Industries Inc.

c. Price Industries.
d. Titus.
e. Tuttle & Bailey.

2. Devices shall be specifically designed for variable-air-volume flows.
3. Material: Aluminum.
4. Finish: Baked enamel, white.
5. Face Size: See schedule on the drawings.
6. Mounting: Surface.
7. Pattern: As indicated on the drawings..
8. Dampers: None, dampers by MC in branch duct 3'0" from grille.
9. Accessories:
   a. Square to round neck adaptor.
   b. Adjustable pattern vanes.
   c. Throw reducing vanes.
   d. Equalizing grid.
   e. Plaster ring.

## 2.2 CEILING LINEAR SLOT OUTLETS

A. Linear Slot Diffuser LD:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Anemostat Products; a Mestek company.
   b. Nailor Industries Inc.
   c. Price Industries.
   d. Titus.
   e. Tuttle & Bailey.
2. Devices shall be specifically designed for variable-air-volume flows.
3. Material - Shell: Aluminum, insulated.
4. Material - Pattern Controller and Tees: Aluminum.
5. Finish - Face and Shell: Baked enamel, black.
6. Finish - Pattern Controller: Baked enamel, black.
7. Finish - Tees: Baked enamel, color selected by Architect.
8. Slot Width: 3/4 inch.
9. Number of Slots: As indicated on the drawings.
10. Length: As indicated on the drawings..
11. Accessories: Plaster frame.
12. Damper: None, dampers by MC in branch duct 3'0" from grille.

## 2.3 GRILLES

A. Adjustable Bar Grille SG:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Anemostat Products; a Mestek company.
   b. Krueger.
   c. Nailor Industries Inc.

d. Price Industries.
e. Titus.
f. Tuttle & Bailey.

2. Material: Aluminum.
3. Finish: Baked enamel, color selected by Architect.
4. Face Blade Arrangement: Horizontal spaced 3/4 inch apart.
5. Core Construction: Integral.
6. Rear-Blade Arrangement: Vertical spaced 3/4 inch apart.
7. Frame: 1 inch wide.
8. Mounting: Countersunk screw.
9. Volume damper: None, dampers by MC in branch duct 3'0" from grille.

B. Fixed Face Register EG:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Anemostat Products; a Mestek company.
b. Krueger.
c. Nailor Industries Inc.
d. Price Industries.
e. Titus.
f. Tuttle & Bailey.

2. Material: Aluminum.
3. Finish: Baked enamel, color selected by Architect.
4. Face Arrangement: 1/2-by-1/2-by-1/2-inch grid core.
5. Core Construction: Integral.
6. Frame: 1 inch wide.
7. Mounting: Countersunk screw.
8. Damper Type: None, dampers by MC in branch duct 3'0" from grille..

C. Linear Bar Grille SG:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Anemostat Products; a Mestek company.
b. Krueger.
c. Nailor Industries Inc.
d. Price Industries.
e. Titus.
f. Tuttle & Bailey.
2. Material: Aluminum.
3. Finish: Baked enamel, color selected by Architect.
4. Face Arrangement: 1/2-by-1/2-by-1/2-inch grid core.
5. Distribution plenum.
a. Internal insulation.
b. Inlet damper.
6. Frame: 1 inch wide.
7. Mounting: Countersunk screw.

8. Damper Type: None, dampers by MC in branch duct 3'0" from grille..

2.4 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 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.

D. Wall-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. Locate units where indicated on Architectural Drawings. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

3.2 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 233733 - FIXED LOUVERS**

**PART 1 - GENERAL**

1.1 SUMMARY

A. Section includes fixed, extruded-aluminum louvers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.

C. Samples: For each type of metal finish required.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on tests performed according to AMCA 500-L.

**PART 2 - PRODUCTS**

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.

1. Wind Loads: Determine loads based on pressures as indicated on Drawings.

B. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

## 2.2 FIXED, EXTRUDED-ALUMINUM LOUVERS

A. Horizontal, Drainable-Blade Louver:

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. Greenheck Fan Corporation.
   b. Louvers & Dampers; a division of Mestek, Inc.
   c. Pottorff.
   d. Reliable Products, Inc.
   e. Ruskin Company; Tomkins PLC.

2. Louver Depth: 4 inches.
3. Frame and Blade Nominal Thickness: Not less than 0.080 inch.
4. Mullion Type: Exposed.
5. Louver Performance Ratings:

   a. Free Area: Not less than 8.32 sq. ft. for 48-inch- wide by 48-inch- high louver.
   b. Point of Beginning Water Penetration: Not less than 963 fpm.
   c. Air Performance: Not more than 0.10-inch wg static pressure drop at 750-fpm free-area intake velocity.
   d. Air Performance: Not more than 0.1-inch wg static pressure drop at 850-fpm free-area exhaust velocity.

6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

## 2.3 LOUVER SCREENS

A. General: Provide screen at each exterior louver.

1. Screen Location for Fixed Louvers: Interior face.
2. Screening Type: Bird screening.

B. Louver Screen Frames: Same type and form of metal as indicated for louver to which screens are attached.

C. Louver Screening for Aluminum Louvers:

1. Bird Screening: Flattened Expanded Aluminum, 3/4-inch- square mesh, 0.051-inch wire.

## 2.4 MATERIALS

A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5, T-52, or T6.

B. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.

C. Fasteners: Use types and sizes to suit unit installation conditions.

1. Use tamper-resistant screws for exposed fasteners unless otherwise indicated.
2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
3. For fastening galvanized steel, use hot-dip-galvanized steel or 300 series stainless-steel fasteners.
4. For fastening stainless steel, use 300 series stainless-steel fasteners.
5. For color-finished louvers, use fasteners with heads that match color of louvers.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.5 FABRICATION

A. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

B. Join frame members to each other and to fixed louver blades with fillet welds , threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.6 ALUMINUM FINISHES

1. Provide full range of manufacturer’s finishes, including custom finishes. Final finish and color to be selected by Architect.

**PART 3 - EXECUTION**

3.1 INSTALLATION

A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.

B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.

C. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

D. Protect unpainted galvanized and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

3.2 ADJUSTING

A. Restore louvers damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

END OF SECTION 233733

**SECTION 235400 - FURNACES**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Gas-fired, condensing furnaces and accessories complete with controls.
2. Air filters.
3. Air cleaners.
4. Ultraviolet germicidal lights.
5. Humidifiers.
6. Ventilation heat exchangers.
7. Refrigeration components.

1.3 ACTION SUBMITTALS

A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each of the following as applicable:

1. Furnace.
2. Thermostat.
3. Humidistat.
4. Air filter.
5. Air cleaner.
6. Ultraviolet germicidal light.
7. Humidifier.
8. Ventilation heat exchanger.
9. Refrigeration components.

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.

1.4 INFORMATIONAL SUBMITTALS

A. Warranty: Special warranty specified in this Section.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each furnace to include in emergency, operation, and maintenance manuals for each of the following:

1. Furnace and accessories complete with controls.
2. Air filter.
3. Air cleaner.
4. Ultraviolet germicidal light.
5. Humidifier.
6. Ventilation heat exchanger.
7. Refrigeration components.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Disposable Air Filters: Furnish two complete sets.
2. Disposable Air-Cleaner Media: Furnish one complete set(s).
3. Fan Belts: Furnish one set(s) for each furnace fan.
4. Disposable Humidifier Media: Furnish one set(s).

1.7 QUALITY ASSURANCE

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

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

C. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

D. Comply with NFPA 70.

1.8 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Section 077200 "Roof Accessories."

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace the following components of furnaces that fail in materials or workmanship within specified warranty period:

1. Warranty Period, Commencing on Date of Substantial Completion:

a. Furnace Heat Exchanger: 20 years.
b. Integrated Ignition and Blower Control Circuit Board: Five years.
c. Draft-Inducer Motor: Five years.
d. High-Efficiency Oil Furnace Burner: Three years.
e. Refrigeration Compressors: 10 years.
f. Evaporator and Condenser Coils: Five years.

**PART 2 - PRODUCTS**

2.1 GAS-FIRED FURNACES, CONDENSING

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

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

C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. American Standard Companies, Inc.
2. Bryant Heating & Cooling Systems; Div. of United Technologies Corp.
3. Carrier Corporation; Div. of United Technologies Corp.
4. Comfort-Aire; a division of Heat Controller, Inc.
5. Comfortmaker Air Conditioning & Heating; a division of International Comfort Products, LLC.
6. Goodman Manufacturing Company, L.P.
7. Lennox Industries Inc.
8. Rheem Manufacturing Company; Air Conditioning Division.
9. Ruud Air Conditioning Division.

10. Tempstar Heating & Cooling Products; a division of International Comfort Products, LLC.
11. Thermo Products, Inc.; a division of Burnham Holdings Inc.
12. Trane.
13. York International Corp.; a division of Unitary Products Group.

D. General Requirements for Gas-Fired, Condensing Furnaces: Factory assembled, piped, wired, and tested; complying with ANSI Z21.47/CSA 2.3, "Gas-Fired Central Furnaces," and with NFPA 54.

E. Cabinet: Galvanized steel.

1. Cabinet interior around heat exchanger shall be factory-installed insulation.
2. Lift-out panels shall expose burners and all other items requiring access for maintenance.
3. Factory paint external cabinets in manufacturer's standard color.
4. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

F. Fan: Centrifugal, factory balanced, resilient mounted, direct drive.

1. Fan Motors: Comply with requirements in Section 230513 "Common Motor Requirements for HVAC Equipment."
2. Special Motor Features: Single speed, Premium (TM) efficiency, as defined in Section 230513 "Common Motor Requirements for HVAC Equipment," and with internal thermal protection and permanent lubrication.
3. Special Motor Features: Multitapped, multispeed with internal thermal protection and permanent lubrication.
4. Special Motor Features: Electronically controlled motor (ECM) controlled by integrated furnace/blower control.

G. Type of Gas: **Natural**.

H. Heat Exchanger:

1. Primary: Stainless steel.
2. Secondary: Stainless steel.

I. Burner:

1. Gas Valve: 100 percent safety two-stage main gas valve, main shutoff valve, pressure regulator, safety pilot with electronic flame sensor, limit control, transformer, and combination ignition/fan timer control board.
2. Ignition: Electric pilot ignition, with hot-surface igniter or electric spark ignition.

J. Gas-Burner Safety Controls:

1. Electronic Flame Sensor: Prevents gas valve from opening until pilot flame is proven; stops gas flow on ignition failure.

2. Flame Rollout Switch: Installed on burner box; prevents burner operation.
3. Limit Control: Fixed stop at maximum permissible setting; de-energizes burner on excessive bonnet temperature; automatic reset.

K. Combustion-Air Inducer: Centrifugal fan with thermally protected motor and sleeve bearings prepurges heat exchanger and vents combustion products; pressure switch prevents furnace operation if combustion-air inlet or flue outlet is blocked.

L. Furnace Controls: Solid-state board integrates ignition, heat, cooling, and fan speeds; adjustable fan-on and fan-off timing; terminals for connection to accessories; diagnostic light with viewport.

M. Accessories:

1. Combination Combustion-Air Intake and Vent: Plenum rated PVC plastic fitting to combine combustion-air inlet and vent through outside wall or roof as indicated on drawings.
2. CPVC Plastic Vent Materials.

    a. CPVC Plastic Pipe: Schedule 40, complying with ASTM F 441/F 441M.
    b. CPVC Plastic Fittings: Schedule 40, complying with ASTM F 438, socket type.
    c. CPVC Solvent Cement: ASTM F 493.

        1) CPVC solvent cement shall have a VOC content of 490 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
        2) Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
        3) Solvent cement and adhesive primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

3. PVC Plastic Vent Materials:

    a. PVC Plastic Pipe and Fittings shall be plenum rated and shall meet the minimum flame spread and smoke spread ratings for plenum use.
    b. PVC Plastic Pipe: Schedule 40, complying with ASTM D 1785.
    c. PVC Plastic Fittings: Schedule 40, complying with ASTM D 2466, socket type.
    d. PVC Solvent Cement: ASTM D 2564.

        1) PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
        2) Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
        3) Solvent cement and adhesive primer shall comply with the testing and product requirements of the California Department of Health Services'

"Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

N. Capacities and Characteristics:

1. Airflow Configuration: Upflow and Horizontal.
2. Gas:

   a. Type: Natural.
   b. Venting Type: Power venter with combustion-air intake.
   c. Minimum Efficiency AFUE: 96 percent.

## 2.2 THERMOSTATS AND HUMIDISTATS

A. Controls shall comply with requirements in ASHRAE/IESNA 90.1, "Controls."

B. Solid-State Thermostat: **Wall-mounting**, programmable, microprocessor-based unit with automatic switching from heating to cooling, preferential rate control, seven-day programmability with minimum of four temperature presets per day, vacation mode, and battery backup protection against power failure for program settings.

C. Single-Stage, Heating-Cooling Thermostat: Adjustable, heating-cooling, wall-mounting unit with fan on-automatic selector.

D. Two-Stage, Heating-Cooling Thermostat: Adjustable, heating-cooling, wall-mounting unit with fan on-automatic selector.

E. **Two**-Stage Heating & Single Stage Cooling Thermostat: Wall-mounting unit with fan on-automatic selector.

F. Solid-State, Combination Thermostat and Humidistat: Wall-mounting programmable, microprocessor-based unit with automatic switching from heating to cooling and humidifying to dehumidifying, preferential rate control, seven-day programmability with minimum of four temperature presets per day, vacation mode, and battery backup protection against power failure for program settings.

G. Humidistat: Adjustable, wall-mounting unit.

H. Control Wiring: Unshielded twisted-pair cabling.

1. No. 24 AWG, 100 ohm, four pair.
2. Cable Jacket Color: Blue.

## 2.3 AIR FILTERS

A. Disposable Filters: 1-inch- (25-mm-) thick fiberglass media with ASHRAE 52.2 MERV rating of 8 or higher, in sheet metal frame.

B. Charged Media Air Filters: Sheet metal housing arranged to be ducted in return-air duct connection to furnace, generates electrostatic charge; MERV 10 rating.

## 2.4 ULTRAVIOLET GERMICIDAL LIGHTS

A. Description: Lighting unit in metal housing arranged for installation in supply-air duct and controlled to cycle on and off with furnace fan, with two 75-W ultraviolet-light bulb(s).

## 2.5 REFRIGERATION COMPONENTS

A. General Refrigeration Component Requirements:

1. Refrigeration compressor, coils, and specialties shall be designed to operate with CFC-free refrigerants.
2. Energy Efficiency: Equal to or greater than prescribed by ASHRAE/IESNA 90.1, "Energy Standard for Buildings except Low-Rise Residential Buildings."

B. Refrigerant Coil: Copper tubes mechanically expanded into aluminum fins. Comply with ARI 210/240, "Unitary Air-Conditioning and Air-Source Heat Pump Equipment." Match size with furnace. Include condensate drain pan with accessible drain outlet complying with ASHRAE 62.1.

1. Refrigerant Coil Enclosure: Steel, matching furnace and evaporator coil, with access panel and flanges for integral mounting at or on furnace cabinet and galvanized sheet metal drain pan coated with black asphaltic base paint.

C. Refrigerant Line Kits: Annealed-copper suction and liquid lines factory cleaned, dried, pressurized with nitrogen, sealed, and with suction line insulated. Provide in standard lengths for installation without joints, except at equipment connections.

1. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I, 1 inch (25 mm) thick.

D. Refrigerant Piping: Comply with requirements in Section 232300 "Refrigerant Piping."

E. Air-Cooled, Compressor-Condenser Unit:

1. Casing: Steel, finished with baked enamel, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
2. Compressor: Hermetically sealed scroll type.

a. Crankcase heater.
b. Vibration isolation mounts for compressor.

c. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
d. Two-speed compressor motors shall have manual-reset high-pressure switch and automatic-reset low-pressure switch.
e. Refrigerant Charge: R-410A.
f. Refrigerant: R-410A.

3. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.
4. Heat-Pump Components: Reversing valve and low-temperature air cut-off thermostat.
5. Fan: Aluminum-propeller type, directly connected to motor.
6. Motor: Permanently lubricated, with integral thermal-overload protection.
7. Low Ambient Kit: Permits operation down to 45 deg F (7 deg C).
8. Mounting Base: Polyethylene.

**PART 3 - EXECUTION**

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine factory-installed insulation before furnace installation. Reject units that are wet, moisture damaged, or mold damaged.

C. Examine roughing-in for gas and refrigerant piping systems to verify actual locations of piping connections before equipment installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install gas-fired furnaces and associated fuel and vent features and systems according to NFPA 54.

B. Install oil-fired furnaces and associated fuel and vent piping according to NFPA 31.

C. Suspended Units: Suspend from structure using threaded rods, spring hangers, and building attachments. Secure rods to unit hanger attachments. Adjust hangers so unit is level and plumb.

1. Install seismic restraints to limit movement of furnace by resisting code-required seismic acceleration.

D. Base-Mounted Units: Secure units to substrate. Provide optional bottom closure base if required by installation conditions.

1. Anchor furnace to substrate to resist code-required seismic acceleration.

E. Controls: Install thermostats and humidistats at mounting height of 44 inches (1500 mm) above floor.

F. Wiring Method: Install control wiring in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Conceal control wiring except in unfinished spaces.

G. Install ground-mounted, compressor-condenser components on 4-inch- (100-mm-) thick, reinforced concrete base; 4 inches (100 mm) larger on each side than unit. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete." Section 033053 "Miscellaneous Cast-in-Place Concrete." Coordinate anchor installation with concrete base.

H. Install ground-mounted, compressor-condenser components on polyethylene mounting base.

I. Install roof-mounted, compressor-condenser components on equipment supports specified in Section 077200 "Roof Accessories." Anchor units to supports with removable, cadmium-plated fasteners.

## 3.3 CONNECTIONS

A. Gas piping installation requirements are specified in Section 231123 "Facility Natural-Gas Piping." Drawings indicate general arrangement of piping, fittings, and specialties. Connect gas piping with union or flange and appliance connector valve.

B. Install piping adjacent to equipment to allow service and maintenance.

C. Water piping installation requirements are specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties. Connect water piping with union and ball valve.

D. Vent Connection, Noncondensing, Gas-Fired Furnaces: Connect Type B vents to furnace vent connection and extend outdoors. Type B vents and their installation requirements are specified in Section 235100 "Breechings, Chimneys, and Stacks"

E. Vent and Outside-Air Connection, Condensing, Gas-Fired Furnaces: Connect plastic piping vent material to furnace connections and extend outdoors. Terminate vent outdoors with a cap and in an arrangement that will protect against entry of birds, insects, and dirt.

1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

3. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

    a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
    b. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
    c. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
    d. Requirements for Low-Emitting Materials:

        1) CPVC solvent cement shall have a VOC content of 490 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
        2) PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
        3) Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
        4) Solvent cement and adhesive primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

4. Slope pipe vent back to furnace or to outside terminal.

F. Vent Connections, Oil-Fired Furnaces: Connect Type L vents to furnace vent connection and extend outdoors. Type L vents and their installation requirements are specified in Section 235100 "Breechings, Chimneys, and Stacks"

G. Connect ducts to furnace with flexible connector. Comply with requirements in Section 233300 "Air Duct Accessories."

H. Connect refrigerant tubing kits to refrigerant coil in furnace and to air-cooled, compressor-condenser unit.

1. Flared Joints: Use ASME B16.26 fitting and flared ends, following procedures in CDA's "Copper Tube Handbook."
2. 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.
3. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

I. Comply with requirements in Section 232300 "Refrigerant Piping" for installation and joint construction of refrigerant piping.

## 3.4 FIELD QUALITY CONTROL

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

1. Perform electrical test and visual and mechanical inspection.
2. Leak Test: After installation, charge systems with refrigerant and oil and test for leaks. Repair leaks, replace lost refrigerant and oil, and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation, product capability, and compliance with requirements.
4. Verify that fan wheel is rotating in the correct direction and is not vibrating or binding.
5. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.

## 3.5 STARTUP SERVICE

A. Complete installation and startup checks according to manufacturer's written instructions and perform the following:

1. Inspect for physical damage to unit casings.
2. Verify that access doors move freely and are weathertight.
3. Clean units and inspect for construction debris.
4. Verify that all bolts and screws are tight.
5. Adjust vibration isolation and flexible connections.
6. Verify that controls are connected and operational.

B. Adjust fan belts to proper alignment and tension.

C. Start unit according to manufacturer's written instructions and complete manufacturer's operational checklist.

D. Measure and record airflows.

E. Verify proper operation of capacity control device.

F. After startup and performance test, lubricate bearings and adjust belt tension.

## 3.6 ADJUSTING

A. Adjust initial temperature and humidity set points.

B. Set controls, burner, and other adjustments for optimum heating performance and efficiency. Adjust heat-distribution features, including shutters, dampers, and relays, to provide optimum heating performance and system efficiency.

3.7 CLEANING

A. After completing installation, clean furnaces internally according to manufacturer's written instructions.

B. Install new filters in each furnace within 14 days after Substantial Completion.

3.8 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain condensing units. Refer to Section 017900 "Demonstration and Training."

**END OF SECTION 235400**

**SECTION 238323 - ELECTRIC HEATING DEVICES**

**PART 1 - GENERAL**

1.1 SUMMARY

A. Section includes electric wall heaters and infrared electric ceiling suspended heaters.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace electric heating panels that fail in materials or workmanship within specified warranty period.

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

**PART 2 - PRODUCTS**

2.1 GENERAL REQUIREMENTS FOR ELECTRIC HEATERS

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

2.2 ELECTRIC WALL HEATERS

A. Description: Automatic fan-forced air heater with integral thermostat.
1. Heater Assembly: The heater assembly which fits into the back box shall consist of a fan panel upon which is mounted all of the operational parts of the heater.
2. Heating Element: Shall be of the non-glowing design consisting of a special resistance wire enclosed in a steel sheath to which steel plate fins are copper brazed.
3. Fan shall be five-bladed aluminum. Fan motor shall be totally enclosed.
4. Fan delay switch: Fan control shall be of bi-metallic, snap-action type and shall activate fan after heating element reaches operating temperature. Fan shall continue to operate after thermostat is satisfied until heating element is cool.

5. Thermostat: The tamper-proof thermostat shall be of the bi-metallic snap-action type with enclosed contacts. It shall be completely concealed behind the front cover.
6. Thermal Cut-out: A manual-reset thermal cutout shall be built into the system to shut off the heater in the event of overheating.
7. Power ON/OFF switch: A double-pole, single throw ON/OFF switch shall be mounted on the back box for positive disconnect of power supply. It will be completely concealed behind the front grille panel.
8. Back Box: Shall be designed for recessed or surface mounting. Back box shall be 20-gauge galvanized steel and shall contain knockouts through which power leads are brought.
9. Front Panel: The front panel shall be of the bar grille type and shall be constructed of 16-gauge cold-rolled steel, welded into a uniform grille.

B. Capacities and Characteristics:

1. Refer to Mechanical Drawings.

**PART 3 - EXECUTION**

3.1 INSTALLATION

A. Install equipment level and plumb.

B. Verify locations of thermostats with Drawings and room details before installation.

C. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

**END OF SECTION 238323**

## SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Electrical equipment coordination and installation.
2. Sleeves for raceways and cables.
3. Sleeve seals.
4. Grout.
5. Common electrical installation requirements.

### 1.2 DEFINITIONS

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

### 1.3 SUBMITTALS

A. Product Data: For sleeve seals.

### 1.4 COORDINATION

A. Coordinate arrangement, mounting, and support of electrical equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping and conduit installed at required slope.
4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

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

C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."

D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

**PART 2 - PRODUCTS**

2.1 SLEEVES FOR RACEWAYS AND CABLES

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

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

C. Sleeves for Rectangular Openings: Galvanized sheet steel.

1. Minimum Metal Thickness:

a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE SEALS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

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

a. Advance Products & Systems, Inc.
b. Metraflex Co.
c. 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: Carbon steel. Include two for each sealing element.
4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

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

**PART 3 - EXECUTION**

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.

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

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

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

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

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

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

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

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

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

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

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

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

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

I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. 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 cast-iron pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

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

## 3.3 SLEEVE-SEAL INSTALLATION

A. Install to seal exterior wall penetrations.

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

## 3.4 FIRESTOPPING

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

**END OF SECTION 260500**

## SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

## PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

## PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Copper & Aluminum (where applicable) Conductors: Comply with NEMA WC 70/ICEA S-95-658.

B. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THW-2 and Type THHN-2-THWN-2. Comply with UL 83 and UL 44 for Type NM (where Applicable).

C. Multiconductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for metal-clad cable, Type MC with ground wire.

2.2 CONNECTORS AND SPLICES

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

2.3 SYSTEM DESCRIPTION

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

B. Comply with NFPA 70.

**PART 3 - EXECUTION**

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper unless otherwise indicated on the Electrical Riser Diagram. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper unless otherwise indicated on the Electrical Riser Diagram or Panel Schedules. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger, except VFC cable, which shall be extra flexible stranded.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN-2-THWN-2, single conductors in raceway.

B. Exposed Feeders: Type THHN-2-THWN-2, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN-2-THWN-2, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.

E. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-2-THWN-2, single conductors in raceway or Type MC for normal power circuits.

F. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.

G. Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

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

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

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

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

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

## 3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material.

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

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

## 3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

## 3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.7 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

3.8 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors and conductors feeding the following critical equipment and services for compliance with requirements.

2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

B. Test and Inspection Reports: Prepare a written report to record the following:

1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

C. Cables will be considered defective if they do not pass tests and inspections.

**END OF SECTION 260519**

## SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes grounding and bonding systems and equipment.

### 1.2 ACTION SUBMITTALS

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

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

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

1. Burndy; Part of Hubbell Electrical Systems.
2. Dossert; AFL Telecommunications LLC.
3. ERICO International Corporation.
4. Fushi Copperweld Inc.
5. Galvan Industries, Inc.; Electrical Products Division, LLC.
6. Harger Lightning and Grounding.
7. ILSCO.
8. O-Z/Gedney; A Brand of the EGS Electrical Group.
9. Robbins Lightning, Inc.
10. Siemens Power Transmission & Distribution, Inc.

### 2.2 SYSTEM DESCRIPTION

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

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

### 2.3 CONDUCTORS

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

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches (6.3 by 100 mm) in cross section, with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

2.4 CONNECTORS

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

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.

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

D. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.5 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet (19 mm by 3 m).

**PART 3 - EXECUTION**

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install bare tinned-copper conductor, as sized per drawing.

1. Bury at least 24 inches (600 mm) below grade.

C. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
   1. Install bus horizontally, on insulated spacers 2 inches (50 mm) minimum from wall, 6 inches (150 mm) above finished floor unless otherwise indicated.
   2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.

D. Conductor Terminations and Connections:

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

## 3.2 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

## 3.3 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Comply with IEEE C2 grounding requirements.

B. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches (100 mm) will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches (50 mm) above to 6 inches (150 mm) below concrete. Seal floor opening with waterproof, nonshrink grout.

C. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields according to written instructions by manufacturer of splicing and termination kits.

D. Pad-Mounted Transformers and Switches: Install two ground rods around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned-copper conductor not less than No. 2 AWG for taps to equipment grounding terminals.

## 3.4 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.
7. Armored and metal-clad cable runs.

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

D. Water Heater: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

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

## 3.5 INSTALLATION

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

B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

C. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.

2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

D. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes shall be at least 12 inches (300 mm) deep, with cover.

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

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

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

F. Grounding and Bonding for Piping:

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

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

H. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet (18 m) apart.

I. Concrete-Encased Grounding Electrode (Ufer Ground): Fabricate according to NFPA 70; using electrically conductive coated steel reinforcing bars or rods, at least 20 feet (6.0 m) long. If reinforcing is in multiple pieces, connect together by the usual steel tie wires or exothermic welding to create the required length.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. 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.

D. Tests and Inspections:
   1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
   2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
   3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells. Make tests at ground rods before any conductors are connected.
      a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
      b. Perform tests by fall-of-potential method according to IEEE 81.
   4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

E. Grounding system will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

**END OF SECTION 260526**

## 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.
2. Construction requirements for concrete bases.

### 1.2 PERFORMANCE REQUIREMENTS

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

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

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

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

### 1.3 ACTION SUBMITTALS

A. Product Data: For steel slotted support systems.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following:

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

### 1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.5 QUALITY ASSURANCE

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

B. Comply with NFPA 70.

**PART 2 - PRODUCTS**

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
   1. Manufacturers: Subject to compliance with requirements, available 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.
      c. ERICO International Corporation.
      d. GS Metals Corp.
      e. Thomas & Betts Corporation.
      f. Unistrut; Atkore International.
      g. Wesanco, Inc.

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

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

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

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

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

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

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

a. Manufacturers: Subject to compliance with requirements, available 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; Illinois Tool Works, Inc.
3) MKT Fastening, LLC.
4) Simpson Strong-Tie Co., Inc.

2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

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

1) Cooper B-Line, Inc.
2) Empire Tool and Manufacturing Co., Inc.
3) Hilti, Inc.
4) ITW Ramset/Red Head; 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.

## 2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Section 055000 "Metal Fabrications" for steel shapes and plates.

## 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 (6 mm) 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.

D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

### 3.2 SUPPORT INSTALLATION

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

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

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

D. 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 (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
6. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts.

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

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

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

## 3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 033000 "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 (0.05 mm).

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

**END OF SECTION 260529**

## SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Metal wireways and auxiliary gutters.
4. Nonmetal wireways and auxiliary gutters.
5. Boxes, enclosures, and cabinets.
6. Handholes and boxes for exterior underground cabling.

### 1.2 ACTION SUBMITTALS

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

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

### 1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

B. Seismic Qualification Certificates: For enclosures, cabinets, and conduit racks and their mounting provisions, including those for internal components, from manufacturer.

**PART 2 - PRODUCTS**

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. GRC: Comply with ANSI C80.1 and UL 6.

C. ARC: Comply with ANSI C80.5 and UL 6A.

D. IMC: Comply with ANSI C80.6 and UL 1242.

E. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.

1. Comply with NEMA RN 1.
2. Coating Thickness: 0.040 inch (1 mm), minimum.

F. EMT: Comply with ANSI C80.3 and UL 797.

G. FMC: Comply with UL 1; zinc-coated steel or aluminum.

H. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

I. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
2. Fittings for EMT:

    a. Material: Steel or die cast.
    b. Type: Setscrew or compression.

3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.

J. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

## 2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ENT: Comply with NEMA TC 13 and UL 1653.

C. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

D. LFNC: Comply with UL 1660.

E. Continuous HDPE: Comply with UL 651B.

F. Coilable HDPE: Preassembled with conductors or cables, and complying with ASTM D 3485.

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

H. Fittings for LFNC: Comply with UL 514B.

I. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

J. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

## 2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.

1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

## 2.4 NONMETALLIC WIREWAYS AND AUXILIARY GUTTERS

A. Listing and Labeling: Nonmetallic wireways and auxiliary gutters shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Description: Fiberglass polyester, extruded and fabricated to required size and shape, without holes or knockouts. Cover shall be gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections shall be flanged and have stainless-steel screws and oil-resistant gaskets.

C. Description: PVC, extruded and fabricated to required size and shape, and having snap-on cover, mechanically coupled connections, and plastic fasteners.

D. Fittings and Accessories: Couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings shall match and mate with wireways as required for complete system.

E. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

F. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

## 2.5 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

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

C. Metal Floor Boxes:

1. All specified on drawings.
2. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Luminaire Outlet Boxes: CAST METAL GALVANIZED Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.

E. Small Sheet Metal Pull and Junction Boxes: NEMA 4.

F. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.

G. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

H. Device Box Dimensions: Double gang: 4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep) or Single gang: 4 inches by 2-1/8 inches by 2-1/8 inches deep (100 mm by 60 mm by 60 mm deep).

I. Gangable boxes are allowed.

J. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel NEMA 4, finished inside and out with manufacturer's standard enamel.
2. Interior Panels: Steel NEMA 4; all sides finished with manufacturer's standard enamel.

K. Cabinets:

1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

## 2.6 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. General Requirements for Handholes and Boxes:

1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.
1. Standard: Comply with SCTE 77.
2. Color: Green in landscape areas. Grey in concrete areas.
3. Configuration: Designed for flush burial with integral closed bottom unless otherwise indicated.

4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
6. Cover Legend: Molded lettering, "ELECTRIC", "TELEPHONE" or as indicated for each service.
7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
8. Handholes 12 inches wide by 24 inches long (300 mm wide by 600 mm long) and larger shall have factory-installed inserts for cable racks and pulling-in irons.

C. Fiberglass Handholes and Boxes: Molded of fiberglass-reinforced polyester resin, with frame and covers of reinforced concrete or cast iron or fiberglass.

1. Standard: Comply with SCTE 77.
2. Color: Green in landscape areas. Grey in concrete areas.
3. Configuration: Designed for flush burial with integral closed bottom unless otherwise indicated.
4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
6. Cover Legend: Molded lettering, "ELECTRIC", "TELEPHONE" or as indicated for each service.
7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
8. Handholes 12 inches wide by 24 inches long (300 mm wide by 600 mm long) and larger shall have factory-installed inserts for cable racks and pulling-in irons.

## PART 3 - EXECUTION

### 3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC IMC RMC
2. Concealed Conduit, Aboveground: EMT.
3. Underground Conduit: RNC or Type EPC-80-PVC concrete encased.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Indoors: Apply raceway products as specified below unless otherwise indicated.

1. Exposed, Not Subject to Physical Damage: EMT or RMC.
2. Concealed in Ceilings and Interior Walls and Partitions: EMT or RMC.
3. Damp or Wet Locations: GRC or IMC.

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

C. Minimum Raceway Size: 3/4-inch (16-mm) trade size.

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

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use compression, fittings. Comply with NEMA FB 2.10.
4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

## 3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

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

E. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.

F. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

G. Support conduit within 12 inches (300 mm) of enclosures to which attached.

H. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot (3-m) intervals.

2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum of 2 inches (50 mm) of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
5. Change to RNC before rising above floor.

I. Stub-ups to Above Recessed Ceilings:

1. Use EMT, IMC, or RMC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

K. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

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

M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35-mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

N. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

O. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces.

P. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

Q. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F (17 deg C) and that has straight-run length that exceeds 25 feet (7.6 m).

2. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per degree F (0.06 mm per meter of length of straight run per degree C) of temperature change for PVC conduits.
3. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
4. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

R. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches (1830 mm) of flexible conduit for recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

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

S. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

T. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between the box and cover plate or the supported equipment and box.

U. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

V. Locate boxes so that cover or plate will not span different building finishes.

W. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

X. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

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

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

## 3.3 UNDERGROUND ENCLOSURE APPLICATION

A. Handholes and Boxes for 600 V and Less, including Telephone, Communications, and Data Wiring:

1. Units in Roadways and Other Deliberate Traffic Paths: Precast concrete. AASHTO HB 17, H-20 structural load rating.
2. Units in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Fiberglass enclosures with polymer concrete frame and cover, SCTE 77, Tier 15 structural load rating.
3. Units in Sidewalk and Similar Applications with a Safety Factor for Nondeliberate Loading by Vehicles: Heavy-duty fiberglass units with polymer concrete frame and cover, SCTE 77, Tier 8 structural load rating.
4. Units Subject to Light-Duty Pedestrian Traffic Only: Fiberglass-reinforced polyester resin, structurally tested according to SCTE 77 with 3000-lbf (13 345-N) vertical loading.

## 3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch (12.5-mm) sieve to No. 4 (4.75-mm) sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch (25 mm) above finished grade.

D. Install handholes with bottom below frost line, below grade.

E. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

## 3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

## 3.6 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.7 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

**END OF SECTION 260533**

## SECTION 260544 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

### PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

B. Related Requirements:

1. Section 078413 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

### PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. Sleeves for Rectangular Openings:

1. Material: Galvanized sheet steel.
2. Minimum Metal Thickness:

    a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and with no side larger than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
    b. For sleeve cross-section rectangle perimeter 50 inches (1270 mm) or more and one or more sides larger than 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

## 2.2 SLEEVE-SEAL SYSTEMS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Manufacturers: Subject to compliance with requirements,:

    a. Advance Products & Systems, Inc.
    b. CALPICO, Inc.
    c. Metraflex Company (The).
    d. Pipeline Seal and Insulator, Inc.
    e. Proco Products, Inc.

2. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Carbon steel.
4. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

## 2.3 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.

1. Manufacturers: Subject to compliance with requirements,:

    a. Presealed Systems.
    b. Or approved equal.

## 2.4 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
2. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

**PART 3 - EXECUTION**

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Comply with NECA 1.

B. Comply with NEMA VE 2 for cable tray and cable penetrations.

C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:

a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.

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

3. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.
4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level. Install sleeves during erection of floors.

D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:

1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

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

F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

## 3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.

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

## 3.3 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

**END OF SECTION 260544**

## SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

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

### 1.2 ACTION SUBMITTALS

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

### 1.3 QUALITY ASSURANCE

A. Comply with ANSI A13.1.

B. Comply with NFPA 70.

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

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

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

## PART 2 - PRODUCTS

### 2.1 POWER RACEWAY IDENTIFICATION MATERIALS

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

B. Colors for Raceways Carrying Circuits at 600 V or Less:

1. Black letters on an orange field.

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

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

E. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

F. Write-On Tags: Polyester tag, 0.010 inch (0.25 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

## 2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

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

B. Colors for Raceways Carrying Circuits at 600 V and Less:

1. Black letters on an orange field.

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

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

## 2.3 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

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

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

C. Write-On Tags: Polyester tag, 0.010 inch (0.25 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

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

E. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

## 2.4 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.

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

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

D. Write-On Tags: Polyester tag, 0.010 inch (0.25 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

## 2.5 FLOOR MARKING TAPE

A. 2-inch- (50-mm-) wide, 5-mil (0.125-mm) pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

## 2.6 UNDERGROUND-LINE WARNING TAPE

A. Tape:

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

## 2.7 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

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

C. Baked-Enamel Warning Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal size, 7 by 10 inches (180 by 250 mm).

D. Metal-Backed, Butyrate Warning Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm) galvanized-steel backing; and with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal size, 10 by 14 inches (250 by 360 mm).

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

1. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

## 2.8 EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.

B. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

C. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch (25 mm).

2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

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

**PART 3 - EXECUTION**

3.1 INSTALLATION

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

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

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

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

E. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.

F. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trenchexceeds 16 inches (400 mm) overall.

G. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Install labels at 10-foot (3-m) maximum intervals.

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

1. Emergency Power.
2. Power.

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

1. Color-Coding for three Phase Identification, 600 V or Less: Use colors listed below for ungrounded conductors.

a. Color shall be factory applied.
b. Colors for 208/120-V Circuits:

1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.

c. Colors for 480/277-V Circuits:
1) Phase A: Brown.
2) Phase B: Orange.
3) Phase C: Yellow.

d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

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

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

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

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

G. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.

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

    a. Power transfer switches.
    b. Controls with external control power connections.

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

I. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

    1. Labeling Instructions:

        a. Indoor Equipment: Adhesive film label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
        b. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
        c. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

    2. Equipment to Be Labeled:
        a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be engraved, laminated acrylic or melamine label.
        b. Enclosures and electrical cabinets.
        c. Access doors and panels for concealed electrical items.
        d. Switchgear.
        e. Switchboards.
        f. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
        g. Emergency system boxes and enclosures.
        h. Enclosed switches.
        i. Enclosed circuit breakers.
        j. Enclosed controllers.
        k. Variable-speed controllers.
        l. Power transfer equipment.

m. Contactors.
n. Remote-controlled switches, dimmer modules, and control devices.

**END OF SECTION 260553**

**SECTION 260923 - LIGHTING CONTROL DEVICES**

**PART 1 - GENERAL**

1.1 SUMMARY

The following specifications detail the minimum performance and related criteria for occupancy sensors proposed for this project. Any deviations from this specification must be documented in writing and submitted to the Architect prior to the issuance of any contracts and must also include all associated cost savings or additions, including but not limited to equipment, equipment installation, power wiring labor and materials, programming, documentation and project management.

1.2 REFERENCES

A. Underwriters Laboratories Inc. (UL)

B. National Electrical Code (NEC)

C. Passive Infrared (PIR)

D. Passive Infrared/Microphonic (PDT)

1.3 SYSTEM DESCRIPTION

A. The Occupancy Sensor system shall sense the presence of human activity within the desired space and fully control the “On” / “Off” function of the loads automatically. Sensors shall turn “On” the load within 2 feet of entrance and shall not initiate “On” outside of entrance. Sensing technologies shall be completely passive in nature. The occupancy sensor system shall not emit or interfere with any electronic device, or human characteristic. Acceptable technologies are Passive Infrared (PIR), Microphonic, Ultrasonic, and/or Passive Dual Technology - PIR/Microphonic or PIR/Ultrasonic (PDT). Time Delay settings shall be factory set at 10 minutes, and shall not be adjusted unless specifically instructed by Architect. This delay selection is based on lamp life vs. energy savings and sensor performance. Maximum adjustment shall be 20 minutes. Automatic adjustments to this delay period by the sensor shall not be permitted. Installer, in accordance with manufacturer’s recommendation, shall determine final sensor location. All sensors shall have non-adjustable factory calibrated sensitivity for maximum performance. Time Delay and Photocell field adjustments shall be provided as needed. The installing contractor shall be responsible for a complete and functional system in accordance with all applicable local and national codes.

B. The Vacancy Sensor system shall sense the lack of presence of human activity within the desired space and fully control the "Off" function of the loads automatically. Sensing technologies shall be completely passive in nature. The vacancy sensor system shall not emit or interfere with any electronic device, or human characteristic. Acceptable technologies are Passive Infrared (PIR), Microphonic, Ultrasonic, and/or Passive Dual Technology - PIR/Microphonic or PIR/Ultrasonic (PDT). Time Delay settings shall be factory set at 10 minutes, and shall not be adjusted unless specifically instructed by Architect. This delay selection is based on lamp life vs. energy savings and sensor performance. Maximum adjustment shall be 20 minutes. Automatic adjustments to this delay period by the sensor shall not be permitted. Installer, in accordance with manufacturer's recommendation, shall determine final sensor location. All sensors shall have non-adjustable factory calibrated sensitivity for maximum performance. Time Delay and Photocell field adjustments shall be provided as needed. The installing contractor shall be responsible for a complete and functional system in accordance with all applicable local and national codes.

## 1.4 SUBMITTALS

A. Provide a written line-by-line review of the specification.

B. Shall include catalog cut sheets with performance specifications including historical testing data demonstrating complete compliance to all of the specifications herein.

## 1.5 APPROVALS

A. Complete catalog data, specifications, and technical information on alternate equipment must be provided including all associated cost savings or additions, including but not limited to equipment, equipment installation, power wiring and materials, programming, documentation and project management.

## 1.6 QUALITY INSURANCE

A. Manufacturer shall have a minimum of 10 years continuous experience in the manufacturing of occupancy sensors.

B. All devices shall be UL Listed under Energy Management Equipment, or Industrial Control Equipment.

C. In high humidity or cold environments, the sensors must be conformably coated and rated for condensing humidity and -40 degree Fahrenheit (and Celsius) operation.

## 1.7 PROJECT/SITE CONDITIONS

A. Wall Switch occupancy sensors shall operate in an ambient temperature range of -10°C (14°F) to 29°C (85°F) with a low temperature, PIR -40°F / PDT -4°F, and high humidity option available. Storage ambient temperature range of -25°C (-14°F) to 71°C (160°F).

B. Low Voltage occupancy sensors shall operate in an ambient temperature range of -10°C (14°F) to 71°C (160°F) with a low temperature, PIR -40°F / PDT -4°F, and high humidity option available. Storage ambient temperature range of -25°C (-14°F) to 71°C (160°F).

1.8 WARRANTY

A. The manufacturer shall provide a full five-year limited warranty on all equipment supplied. The warranty shall cover 100% of the parts and manufacturers labor costs required over the first five-years, which are directly attributable to the manufacturer. Warranty coverage shall begin on the date that the equipment is energized.

**PART 2 – PRODUCTS**

2.1 ACCEPTABLE MANUFACTURERS

A. Cooper

B. Sensor Switch, Inc.

C. The listing of a manufacturer as "acceptable" does not imply automatic approval. It is the sole responsibility of the electrical contractor to ensure that any price quotations received and submittals made are for products/systems that meet or exceed the specifications included herein.

2.2 WALL SWITCH SENSORS - SMALL AREAS

A. Sensor shall recess into single gang switch box and fit a standard decorator opening.

B. Sensor must meet NEC grounding requirements by providing a dedicated ground connection and grounding to mounting strap. Line and load wire connections shall be interchangeable. Sensor shall not allow current to pas to the load when sensor is in the unoccupied (Off) condition.

C. Sensor shall use PIR sensing incorporating a nominal one half inch focal length lens viewing 9 inches above and below horizontal view pattern measured at 10 feet.

D. In areas with obstructions to the occupant’s workspace, sensor shall utilize dual technology sensing (PDT).

E. All models shall have "Reduced Turn On". This is a field programmable function for problematic areas with unforeseen reflective surfaces. False turn on shall be eliminated with this feature.

F. Sensor shall be the following Cooper model numbers. Device color and optional features as specified.

1. ONW D (Passive Dual Technology)

## 2.3 LOW VOLTAGE SENSORS

A. Sensors shall operate on a class 2, three-conductor system. Sensors shall operate on 12 to 24 VAC or VDC and consume no more than 5 milliamps so that up to 14 sensors may be connected to a single power pack.

B. Upon initial power up, sensors must immediately turn on. Power packs may be wired on the line or load side of local switching and must not exhibit any delays when switch is energized.

C. In areas with clear line of site view of the workspace, sensors shall use PIR detection. In areas with obstructions, sensors shall use dual technology detection (PDT).

D. Sensors shall be the following Cooper model numbers. Device optional features as specified.

1. CWPD-1500 (Passive Infrared ceiling)

## 2.4 POWER PACKS

A. Power Packs shall accept 120 or 277 VAC, be plenum rated, and provide class 2 power for up to 14 remote sensors.

B. Power Pack shall securely mount to junction location through a threaded ½ inch chase nipple. Plastic clips into junction box shall not be accepted. All class 1 wiring shall pass through chase nipple into adjacent junction box without any exposure of wire leads.

1. UL Listing under Energy Management or Industrial Control Equipment automatically meets this requirement, whereas Appliance Control Listing does not meet this safety requirement.

C. When required by local code, Power Pack must install inside standard electrical enclosure and provide UL recognized support to junction box. All class 1 wiring is to pass through chase nipple into adjacent junction box without any exposure of wire leads.

D. Power Pack shall incorporate a class 1 relay and an A/C electronic switching device. The A/C electronic switching device shall make and break the load, while the relay shall carry the current in the On condition. This system shall provide full 20 amp switching of all load types, and be rated for 400,000 cycles.

E. Power Packs shall be single circuit.

F. Power Packs shall be the following Cooper model numbers.

1. WSP-MV-120 (Single Pole)

**PART 3 – EXECUTION**

3.1 INSTALLATION

A. Install equipment level and plumb and according to manufacturer's written instructions.

B. Mount lighting control devices according to manufacturer's written instructions and requirements.

C. Mounting heights indicated are to bottom of unit for suspended devices and to center of unit for wall-mounted devices.

3.2 CONTROL WIRING INSTALLATION

A. Install wiring between sensing and control devices according to manufacturer's written instructions.

B. Wiring Method: Install all wiring in raceway.

C. Bundle, train, and support wiring in enclosures.

D. Ground equipment.

E. Connections: Tighten electrical connectors and terminals according to manufacture's published torue-tighting values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

3.3 IDENTIFICATION

A. Identify components and power and control wiring.

3.4 FIELD QUALITY CONTROL

A. Schedule visual and mechanical inspections and electrical tests with at least seven day's advance notice.

B. Inspect control components for defects and physical damage, testing laboratory labeling, and nameplate compliance with the Contract Documents.

C. Check tightness of electrical connections with torque wrench calibrated within previous six months. Use manufacturer's recommended torque values.

D. Electrical Tests: Use particular caution when testing devices containing solid-state components. Perform the following according to manufacturer's written instructions:

1. Continuity tests of circuits.
2. Operational Tests: Set and operate devices to demonstrate their functions and capabilities in a methodical sequence that cues and reproduces actual operating functions.

    a. Include testing of devices under conditions that simulate actual operational conditions. Record control settings, operations, cues, and functional observations.

E. Correct deficiencies, make necessary adjustment, and retest. Verify that specified requirements are met.

F. Test Labeling: After satisfactory completion of tests and inspections, apply a label to tested components indicating test results, date, and responsible agency and representative.

G. Reports: Written reports of tests and observations. Record defective materials and workmanship and unsatisfactory test results. Record repairs and adjustments.

## 3.5 CLEANING

A. Cleaning: Clean equipment and devices internally and externally using methods and materials recommended by manufacturers, and repair damaged finishes.

## 3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel as specified below:

1. Train Owner's maintenance personnel on troubleshooting, servicing, adjusting, and preventive maintenance. Provide a minimum of two hour's training.
2. Training Aid: Use the approved final version of maintenance manuals as a training aid.
3. Schedule training with Owner, through Architect, with at least seven days' advance notice.

## 3.7 ON-SITE ASSISTANCE

A. Occupancy Adjustments (at additional cost): Within one year of date of Substantial Completion, provide up to two Project site visits, when requested, to make program changes, and adjust controls to suit actual conditions.

**END OF SECTION 260923**

**SECTION 262726 - WIRING DEVICES**

**PART 1 - GENERAL**

1.1 SUMMARY

A. Section Includes:

1. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Weather-resistant receptacles.
3. Snap switches.
4. Wall-switch occupancy sensors.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:

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

2. Cooper Wiring Devices; Division of Cooper Industries, Inc. (Cooper).
3. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
4. Leviton Mfg. Company Inc. (Leviton).
5. Pass & Seymour/Legrand (Pass & Seymour).

B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

## 2.2 GENERAL WIRING-DEVICE REQUIREMENTS

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

B. Comply with NFPA 70.

C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:

1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
2. Devices shall comply with the requirements in this Section.

## 2.3 STRAIGHT-BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

1. Products: Subject to compliance with requirements:

a. Cooper; 5351 (single), CR5362 (duplex).
b. Hubbell; HBL5351 (single), HBL5352 (duplex).
c. Leviton; 5891 (single), 5352 (duplex).
d. Pass & Seymour; 5361 (single), 5362 (duplex).

## 2.4 GFCI RECEPTACLES

A. General Description:

1. Straight blade, non-feed-through type.

2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

1. Products: Subject to compliance with requirements:

a. Cooper; VGF20.
b. Hubbell; GFR5352L.
c. Pass & Seymour; 2095.
d. Leviton; 7590.

## 2.5 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Switches, 120/277 V, 20 A:

1. Products: Subject to compliance with requirements, provide the following:

1) Single Pole:

2) Cooper; AH1221.
3) Hubbell; HBL1221.
4) Leviton; 1221-2.
5) Pass & Seymour; CSB20AC1.

6) Three Way:

7) Cooper; AH1223.
8) Hubbell; HBL1223.
9) Leviton; 1223-2.
10) Pass & Seymour; CSB20AC3.

## 2.6 DECORATOR-STYLE DEVICES

A. Convenience Receptacles: Square face, 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, and UL 498.

1. Products: Subject to compliance with requirements:

a. Cooper; 6252.
b. Hubbell; DR15.
c. Leviton; 16252.
d. Pass & Seymour; 26252.

B. GFCI, Non-Feed-Through Type, Convenience Receptacles: Square face, 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and UL 943 Class A.

1. Products: Subject to compliance with requirements:

a. Cooper; VGF15.
b. Hubbell; GF15LA.
c. Leviton; 8599.
d. Pass & Seymour; 1594.

C. Toggle Switches, Square Face, 120/277 V, 20 A: Comply with NEMA WD 1, UL 20, and FS W-S-896.

1. Products: Subject to compliance with requirements, provide the following:

a. Cooper; 7621 (single pole), 7623 (three way).
b. Hubbell; DS115 (single pole), DS315 (three way).
c. Leviton; 56291-2 (single pole), 5623-2 (three way).
d. Pass & Seymour; 2621 (single pole), 2623 (three way).

## 2.7 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Smooth, high-impact thermoplastic.
3. Material for Unfinished Spaces: Smooth, high-impact thermoplastic.
4. Material for Damp Locations: Thermoplastic with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant thermoplastic with lockable cover.

## 2.8 FINISHES

A. Device Color:

1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.

B. Wall Plate Color: For plastic covers, match device color.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.
5. All guest room receptacles shall be mounted horizontally except above kitchen counter.

C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.

9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. 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.

H. Adjust locations of service poles to suit arrangement of partitions and furnishings.

## 3.2 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Test Instruments: Use instruments that comply with UL 1436.
2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

B. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

C. Wiring device will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

**END OF SECTION 262726**

## SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Nonfusible switches.
3. Shunt trip switches.
4. Molded-case circuit breakers (MCCBs).
5. Enclosures.

### 1.2 DEFINITIONS

A. NC: Normally closed.

B. NO: Normally open.

C. SPDT: Single pole, double throw.

### 1.3 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Enclosed switches and circuit breakers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

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

### 1.4 SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Include evidence of NRTL listing for series rating of installed devices.

5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
6. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.

B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: For power, signal, and control wiring.

C. Qualification Data: For qualified testing agency.

D. Seismic Qualification Certificates: For enclosed switches and circuit breakers, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

E. Field quality-control reports.

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

F. Manufacturer's field service report.

G. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
2. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.

## 1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

B. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

D. 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.

E. Comply with NFPA 70.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
2. Altitude: Not exceeding 6600 feet.

1.7 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.8 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
2. Fuse Pullers: Two for each size and type.

**PART 2 - PRODUCTS**

2.1 FUSIBLE SWITCHES

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

1. Square D; a brand of Schneider Electric.

2. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
3. Siemens Energy & Automation, Inc.

B. Type GD, General Duty, Single Throw, 240-V ac, 800 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with cartridge fuse interiors to accommodate specified fuses, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Isolated Ground Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
4. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
5. Auxiliary Contact Kit: Two NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open.
6. Hookstick Handle: Allows use of a hookstick to operate the handle.
7. Lugs: Mechanical type, suitable for number, size, and conductor material.
8. Service-Rated Switches: Labeled for use as service equipment.

## 2.2 NONFUSIBLE SWITCHES

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

1. Square D; a brand of Schneider Electric.
2. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
3. Siemens Energy & Automation, Inc.

B. Type GD, General Duty, Single Throw, 600 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Isolated Ground Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
4. Auxiliary Contact Kit: Two NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open.

5. Hookstick Handle: Allows use of a hookstick to operate the handle.
6. Lugs: Mechanical type, suitable for number, size, and conductor material.

## 2.3 SHUNT TRIP SWITCHES

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

1. Cooper Bussmann, Inc.
2. Ferraz Shawmut, Inc.
3. Littelfuse, Inc.

B. General Requirements: Comply with ASME A17.1, UL 50, and UL 98, with 200-kA interrupting and short-circuit current rating when fitted with Class J fuses.

C. Switches: Three-pole, horsepower rated, with integral shunt trip mechanism and Class J fuse block; lockable handle with capability to accept three padlocks; interlocked with cover in closed position.

D. Control Circuit: 120-V ac; obtained from integral control power transformer, with primary and secondary fuses, with a control power transformer of enough capacity to operate shunt trip, connected pilot, and indicating and control devices.

E. Accessories:

1. Oiltight key switch for key-to-test function.
2. Oiltight red ON pilot light.
3. Isolated neutral lug; 100 percent rating.
4. Mechanically interlocked auxiliary contacts that change state when switch is opened and closed.
5. Form C alarm contacts that change state when switch is tripped.
6. Three-pole, double-throw, fire-safety and alarm relay; 120-V ac coil voltage.
7. Three-pole, double-throw, fire-alarm voltage monitoring relay complying with NFPA 72.

## 2.4 MOLDED-CASE CIRCUIT BREAKERS

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

1. Square D; a brand of Schneider Electric.
2. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
3. Siemens Energy & Automation, Inc.

B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

D. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

E. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:

1. Instantaneous trip.
2. Long- and short-time pickup levels.
3. Long- and short-time time adjustments.
4. Ground-fault pickup level, time delay, and $I^2t$ response.

F. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.

G. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker and trip activation on fuse opening or on opening of fuse compartment door.

H. Ground-Fault, Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).

I. Ground-Fault, Equipment-Protection (GFEP) Circuit Breakers: With Class B ground-fault protection (30-mA trip).

J. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
4. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
5. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
6. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
7. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
8. Electrical Operator: Provide remote control for on, off, and reset operations.

2.5 MOLDED-CASE SWITCHES

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

1. Square D; a brand of Schneider Electric.
2. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
3. Siemens Energy & Automation, Inc.

B. General Requirements: MCCB with fixed, high-set instantaneous trip only, and short-circuit withstand rating equal to equivalent breaker frame size interrupting rating.

C. Features and Accessories:

1. Standard frame sizes and number of poles.
2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
3. Ground-Fault Protection: Comply with UL 1053; remote-mounted and powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
4. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
5. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.

2.6 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
2. Outdoor Locations: NEMA 250, Type 3R.
3. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
4. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

**PART 3 - EXECUTION**

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Comply with mounting and anchoring requirements specified in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."

C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

D. Install fuses in fusible devices.

E. Comply with NECA 1.

## 3.3 IDENTIFICATION

A. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

## 3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Perform the following infrared scan tests and inspections and prepare reports:

a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch

and circuit breaker. Remove front panels so joints and connections are accessible to portable scanner.

b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each enclosed switch and circuit breaker 11 months after date of Substantial Completion.

c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

## 3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

**END OF SECTION 262816**

**SECTION 265100 - INTERIOR LIGHTING**

**PART 1 - GENERAL**

1.1 SUMMARY

A. Section Includes:

1. Interior lighting fixtures, lamps, and ballasts.
2. Emergency lighting units.
3. Exit signs.
4. Lighting fixture supports.
5. Retrofit kits for fluorescent lighting fixtures.

B. Related Sections:

1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.
2. Section 262726 "Wiring Devices" for manual wall-box dimmers for incandescent lamps.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, and finishes.

B. Shop Drawings: Show details of nonstandard or custom lighting fixtures. Indicate dimensions, weights, methods of field assembly, components, features, and accessories. Product Certificates: For each type of ballast for bi-level and dimmer-controlled fixtures, from manufacturer.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 QUALITY ASSURANCE

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

B. Comply with NFPA 70.

C. Special Warranty for LED Lamps: Manufacturer's standard form, made out to Owner and signed by lamp manufacturer agreeing to replace lamps that fail in materials or workmanship, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: Five year(s) from date of Substantial Completion. Warranty shall cover source replacement if LED color shift is greater than +/- 200K and/or if output falls below 85%.

1.5 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps: 10 % of each type and rating installed. Furnish at least five of each type.
2. Plastic Diffusers, Globes, and Lenses: 10 % of each type and rating installed. Furnish at least one of each type.
3. Ballasts: 10 % of each type and rating installed. Furnish at least five of each type.
4. LED Boards and Modules: 5% of each type, minimum of two of each type installed.
5. Exit Signs: 3 single-face and 3 double-face signs with universal mounting brackets.

**PART 2 - PRODUCTS**

2.1 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.

B. Fluorescent Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5 and NEMA LE 5A as applicable.

C. Metal Parts: Free of burrs and sharp corners and edges.

D. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.

E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Diffusers and Globes:

1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

a. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.
b. UV stabilized.

2. Glass: Annealed crystal glass unless otherwise indicated.

## 2.2 BALLASTS FOR LINEAR FLUORESCENT LAMPS

A. General Requirements for Electronic Ballasts:

1. Comply with UL 935 and with ANSI C82.11.
2. Designed for type and quantity of lamps served.
3. Ballasts shall be designed for full light output unless another BF, dimmer, or bi-level control is indicated.
4. Total Harmonic Distortion Rating: Less than 10 percent.
5. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
6. BF: 0.88 or higher.
7. Power Factor: 0.95 or higher.

B. Luminaires controlled by occupancy sensors shall have programmed-start ballasts.

C. Electromagnetic Ballasts: Comply with ANSI C82.1; energy saving, high-power factor, Class P, and having automatic-reset thermal protection.

1. Ballast Manufacturer Certification: Indicated by label.

D. Single Ballasts for Multiple Lighting Fixtures: Factory wired with ballast arrangements and bundled extension wiring to suit final installation conditions without modification or rewiring in the field.

E. Ballasts for Dimmer-Controlled Lighting Fixtures: Electronic type.

1. Dimming Range: 100 to 5 percent of rated lamp lumens.
2. Ballast Input Watts: Can be reduced to 20 percent of normal.
3. Compatibility: Certified by manufacturer for use with specific dimming control system and lamp type indicated.
4. Control: Coordinate wiring from ballast to control device to ensure that the ballast, controller, and connecting wiring are compatible.
5. Power Factor: 0.95 ballasts or higher.
6. Interference: Comply with 47 CFR 18, Ch. 1, Subpart C, for limitations on electromagnetic and radio-frequency interference for nonconsumer equipment.

## 2.3 EXIT SIGNS

A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.

B. Internally Lighted Signs:

1. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.

## 2.4 FLUORESCENT LAMPS

A. T8 rapid-start lamps, rated 32 W maximum, nominal length of 48 inches (1220 mm), 2800 initial lumens (minimum), CRI 82 (minimum), color temperature per lighting fixture schedule, and average rated life 20,000 hours unless otherwise indicated.

## 2.5 LED LIGHTING

A. Manufacturers: All LED lamps to be by the same manufacturer.

1. Philips
2. Cree
3. Nichia
4. Samsung
5. Osram

B. LED lamps shall be EnergyStar listed.

C. LED lamps shall possess a minimum CRI aand CCT per lighting fixture schedule.

D. LED lamps shall possess less than a 100 kelvin temperature shift over the life of the product. Confirmation of color consistency shall be noted in manufacturer's published data.

E. Dimming shall be integral to all fixtures indicated as dimmable on the Lighting Fixture Schedule. Dimming shall be flicker free and controllable between 100% and 10% light output. Dimmers that are not integral to the fixture shall not be acceptable.

F. LED fixture manufacturer shall indicate a defined ambient temperature maximum for thermal management of LEDs. Ambient temperature maximum shall be 40 degree C or higher at minimum.

G. All LED lamps for fixture type shall be provided by the same LED lamp manufacturer and BIN number. Color consistency between bins shall be equal to or less than 5 SDCM – Standard Deviation of Color Matching. Chips shall be binned no more than a 2-step MacAdam Ellipse.

H. White LED lamps shall be supplied in all fixtures. Color mixing of LED lamps to produce white light is not acceptable.

I. Heat sinks serving LED fixtures shall be secured to fixture using a frame system. Use of spring clips to support the weight of the heat sink is not acceptable.

J. LED Downlight fixtures shall possess self-flanged reflectors. Use of plastic trim rings is not acceptable.

K. LED downlights shall possess channel bar hangers for integration into grid ceilings where applicable.

L. Fixtures shall be UL listed.

M. Minimum efficiency of lamps to be 70 lumens per watt.

N. LED fixtures shall be tested for conformance under IESNA LM-79 and LM-80. Test life calculations based on IES TM-21. Results shall be documented in the submittals. LM-80 results shall indicate a minimum 70% lumen output at 50,000 hours.

O. LED driversal shall have the following characteristics:
1. Maximum drive current: 350 mA.
2. Minimum Efficiency: 85%.
3. Operating Temperature Range: - 40 degree C to 50 degree C
4. Minimum Rated Life: 50,000 hours
5. Dimming Range: 100% to 10%.
6. UL Class I or II output.
7. Power Factor: 90%
8. Total Harmonic Distortion: 20%
9. Comply with FCC 47 CFR part 15 non-consumer RFI/EMI standards.

## 2.6 LIGHTING FIXTURE SUPPORT COMPONENTS

A. Comply with Section 260529 "Hangers and Supports for Electrical Systems" for channel- and angle-iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2-inch (13-mm) steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.

C. Twin-Stem Hangers: Two, 1/2-inch (13-mm) steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.

D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).

E. Wires for Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 12 gage (2.68 mm).

F. Rod Hangers: 3/16-inch (5-mm) minimum diameter, cadmium-plated, threaded steel rod.

G. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

**PART 3 - EXECUTION**

3.1 INSTALLATION

A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.

B. Comply with NFPA 70 for minimum fixture supports.

C. Suspended Lighting Fixture Support:

1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.

D. Adjust aimable lighting fixtures to provide required light intensities.

E. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.2 FIELD QUALITY CONTROL

A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to emergency and retransfer to normal.

B. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

**END OF SECTION 265100**

## SECTION 265600 - EXTERIOR LIGHTING

## PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior luminaires with lamps and ballasts.
2. Luminaire-mounted photoelectric relays.

## PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide product indicated on Drawings.

2.2 GENERAL REQUIREMENTS FOR LUMINAIRES

A. Luminaires shall comply with UL 1598 and be listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.

B. Lateral Light Distribution Patterns: Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.

C. Metal Parts: Free of burrs and sharp corners and edges.

D. Sheet Metal Components: Corrosion-resistant aluminum unless otherwise indicated. Form and support to prevent warping and sagging.

E. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.

F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Designed to disconnect ballast when door opens.

G. Exposed Hardware Material: Stainless steel.

H. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

I. Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.

J. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:

1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.

K. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

L. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.

M. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.

    a. Color: As selected by Architect from manufacturer's full range.

N. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax.
3. Class I, Clear Anodic Finish: AA-M32C22A41 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
4. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.

a. Color: Per Architect

O. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp and ballast characteristics:

a. "USES ONLY" and include specific lamp type.
b. Lamp tube configuration (twin, quad, triple), base type, and nominal wattage for compact fluorescent luminaires.
c. Lamp type, wattage, bulb type (ED17, BD56, etc.) and coating (clear or coated) for HID luminaires.
d. Start type (preheat, rapid start, instant start) compact fluorescent luminaires.
e. ANSI ballast type (M98, M57, etc.) for HID luminaires.
f. CCT and CRI for all luminaires.

**PART 3 - EXECUTION**

3.1 LUMINAIRE INSTALLATION

A. Install lamps in each luminaire.

B. Fasten luminaire to indicated structural supports.

1. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

C. Adjust luminaires that require field adjustment or aiming.

3.2 BOLLARD LUMINAIRE INSTALLATION

A. Align units for optimum directional alignment of light distribution.

B. Install on concrete base with top 4 inches (100 mm) above finished grade or surface at bollard location. Cast conduit into base, and shape base to match shape of bollard base. Finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Section 033000 "Cast-in-Place Concrete."

3.3 INSTALLATION OF INDIVIDUAL GROUND-MOUNTING LUMINAIRES

A. Install on concrete base with top 4 inches (100 mm) above finished grade or surface at luminaire location. Cast conduit into base, and finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Section 033000 "Cast-in-Place Concrete."

3.4 CORROSION PREVENTION

A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.

B. Steel Conduits: Comply with Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch-thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.5 GROUNDING

A. Ground metal poles and support structures according to Section 260526 "Grounding and Bonding for Electrical Systems."

1. Install grounding electrode for each pole unless otherwise indicated.
2. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.

B. Ground nonmetallic poles and support structures according to Section 260526 "Grounding and Bonding for Electrical Systems."

1. Install grounding electrode for each pole.
2. Install grounding conductor and conductor protector.
3. Ground metallic components of pole accessories and foundations.

**END OF SECTION 265600**

## SECTION 283111.01 - DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

## 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. Fire-alarm control unit.
2. Manual fire-alarm boxes.
3. System smoke detectors.
4. Heat detectors.
5. Notification appliances.
6. Remote annunciator.
7. Addressable interface device.
8. Digital alarm communicator transmitter.
9. Network communications.

### 1.3 DEFINITIONS

A. LED: Light-emitting diode.

B. NICET: National Institute for Certification in Engineering Technologies.

### 1.4 SYSTEM DESCRIPTION

A. Noncoded, UL-certified addressable system, with multiplexed signal transmission and horn/strobe evacuation.

B. All components provided shall be listed for use with the selected system.

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

1.5 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Fire-alarm control unit and raceways shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

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

1.6 SUBMITTALS

A. General Submittal Requirements:

1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect.
2. Shop Drawings shall be prepared by persons with the following qualifications:

a. Trained and certified by manufacturer in fire-alarm system design.
b. NICET-certified fire-alarm technician, Level III minimum.
c. Licensed or certified by authorities having jurisdiction.

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

C. Shop Drawings: For fire-alarm system. Include plans, elevations, sections, details, and attachments to other work.

1. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72.
2. Include voltage drop calculations for notification appliance circuits.
3. Include battery-size calculations.
4. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
5. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale and coordinating installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations.
6. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
7. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits.

D. Delegated-Design Submittal: For smoke and heat detectors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Drawings showing the location of each smoke and heat detector, ratings of each, and installation details as needed to comply with listing conditions of the detector.
2. Design Calculations: Calculate requirements for selecting the spacing and sensitivity of detection, complying with NFPA 72.

E. Qualification Data: For qualified Installer.

F. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
b. Provide "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documents" Article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
c. Complete wiring diagrams showing connections between all devices and equipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.
d. Riser diagram.
e. Device addresses.
f. Record copy of site-specific software.
g. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:

1) Equipment tested.
2) Frequency of testing of installed components.
3) Frequency of inspection of installed components.
4) Requirements and recommendations related to results of maintenance.
5) Manufacturer's user training manuals.

h. Manufacturer's required maintenance related to system warranty requirements.

G. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Program Software Backup: On magnetic media or compact disk, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.

## 1.7 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

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

C. NFPA Certification: Obtain certification according to NFPA 72 by a UL-listed alarm company.

1.8 SOFTWARE SERVICE AGREEMENT

A. Comply with UL 864.

B. Technical Support: Beginning with Substantial Completion, provide software support for two years.

C. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.

1. Provide 30 days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

1.9 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps for Remote Indicating Lamp Units: Quantity equal to 10 percent of amount installed.
2. Lamps for Strobe Units: Quantity equal to 10 percent of amount installed.
3. Smoke Detectors, Fire Detectors: Quantity equal to 10 percent of amount of each type installed, but no fewer than 1 unit of each type.
4. Detector Bases: Quantity equal to 2 percent of amount of each type installed, but no fewer than 1 unit of each type.
5. Keys and Tools: One extra set for access to locked and tamperproofed components.
6. Audible and Visual Notification Appliances: One of each type installed.
7. Fuses: Two of each type installed in the system.

**PART 2 - PRODUCTS**

2.1 SYSTEM DESCRIPTION

A. Noncoded, UL-certified addressable system, with multiplexed signal transmission and voice/strobe evacuation.

B. Automatic sensitivity control of certain smoke detectors.

C. All components provided shall be listed for use with the selected system.

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

## 2.2 SYSTEMS OPERATIONAL DESCRIPTION

A. Fire-alarm signal initiation shall be by one or more of the following devices and systems:

1. Manual stations.
2. Heat detectors.
3. Smoke detectors.
4. Duct smoke detectors.
5. Verified automatic alarm operation of smoke detectors.
6. Automatic sprinkler system water flow.
7. Heat detectors in elevator shaft and pit.
8. Fire-extinguishing system operation.
9. Fire standpipe system.

B. Fire-alarm signal shall initiate the following actions:

1. Continuously operate alarm notification appliances.
2. Identify alarm and specific initiating device at fire-alarm control unit, off-premises network control panels, and remote annunciators.
3. Transmit an alarm signal to the remote alarm receiving station.
4. Unlock electric door locks in designated egress paths.
5. Release fire and smoke doors held open by magnetic door holders.
6. Activate alarm communication system.
7. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
8. Recall elevators to primary or alternate recall floors.
9. Close smoke dampers in air ducts of designated air-conditioning duct systems.
10. Record events in the system memory.

C. Supervisory signal initiation shall be by one or more of the following devices and actions:

1. Valve supervisory switch.
2. Elevator shunt-trip supervision.
3. User disabling of zones or individual devices.
4. Loss of communication with any panel on the network.

D. System trouble signal initiation shall be by one or more of the following devices and actions:

1. Open circuits, shorts, and grounds in designated circuits.

2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
3. Loss of communication with any addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.
4. Loss of primary power at fire-alarm control unit.
5. Ground or a single break in fire-alarm control unit internal circuits.
6. Abnormal ac voltage at fire-alarm control unit.
7. Break in standby battery circuitry.
8. Failure of battery charging.
9. Abnormal position of any switch at fire-alarm control unit or annunciator.

E. System Trouble and Supervisory Signal Actions: Initiate notification appliance and annunciate at fire-alarm control unit and remote annunciators. Record the event on system memory.

## 2.3 FIRE-ALARM CONTROL UNIT

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   1. SimplexGrinnell LP. (or approved equal)

B. General Requirements for Fire-Alarm Control Unit:

   1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864 and listed and labeled by an NRTL.

      a. System software and programs shall be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining the information through failure of primary and secondary power supplies.
      b. Include a real-time clock for time annotation of events on the event recorder and printer.
      c. Provide communication between the FACP and remote circuit interface panels, annunciators, and displays.
      d. The FACP shall be listed for connection to a central-station signaling system service.
      e. Provide nonvolatile memory for system database, logic, and operating system and event history. The system shall require no manual input to initialize in the event of a complete power down condition. The FACP shall provide a minimum 500-event history log.

   2. Addressable initiation devices that communicate device identity and status.

      a. Smoke sensors shall additionally communicate sensitivity setting and allow for adjustment of sensitivity at fire-alarm control unit.

b. Temperature sensors shall additionally test for and communicate the sensitivity range of the device.

3. Addressable control circuits for operation of mechanical equipment.

C. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.

1. Annunciator and Display: Liquid-crystal type, 3 line(s) of 80 characters, minimum.
2. Keypad: Arranged to permit entry and execution of programming, display, and control commands and to indicate control commands to be entered into the system for control of smoke-detector sensitivity and other parameters.

D. Circuits:

1. Initiating Device, Notification Appliance, and Signaling Line Circuits: NFPA 72, Class B.

2. Serial Interfaces: Contractor shall coordinate all necessary ports with campus wide system (Simplex structure) to allow for communication between central station and new FACP.

a. One dedicated RS 485 port for central-station operation using point ID DACT.
b. One RS 485 port for remote annunciators, Ethernet module, or multi-interface module
c. One RS 232 port for PC configuration.

E. Smoke-Alarm Verification:

1. Initiate audible and visible indication of an "alarm-verification" signal at fire-alarm control unit.
2. Activate an NRTL-listed and -approved "alarm-verification" sequence at fire-alarm control unit and detector.
3. Sound general alarm if the alarm is verified.
4. Cancel fire-alarm control unit indication and system reset if the alarm is not verified.

F. Notification-Appliance Circuit:

1. Audible appliances shall sound in a three-pulse temporal pattern, as defined in NFPA 72.
2. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.

G. Elevator Recall:

1. Elevator recall shall be initiated only by one of the following alarm-initiating devices:

    a. Elevator lobby detectors except the lobby detector on the designated floor.
    b. Smoke detector in elevator machine room.
    c. Smoke detectors in elevator hoistway.

2. Elevator controller shall be programmed to move the cars to the alternate recall floor if lobby detectors located on the designated recall floors are activated.
3. Water-flow alarm connected to sprinkler in an elevator shaft and elevator machine room shall shut down elevators associated with the location without time delay.

    a. Water-flow switch associated with the sprinkler in the elevator pit may have a delay to allow elevators to move to the designated floor.

H. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke-barrier walls shall be connected to fire-alarm system.

I. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory, and print out the final adjusted values on system printer.

J. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.

K. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory signals, supervisory and digital alarm communicator transmitters shall be powered by 24-V dc source.

    1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.

L. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.

    1. Batteries: Sealed lead calcium.

M. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

## 2.4 MANUAL FIRE-ALARM BOXES

A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
   1. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
   2. Station Reset: Key- or wrench-operated switch.
   3. Indoor Protective Shield: Factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation. Use where indicated on drawings.
   4. Weatherproof Protective Shield: Factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Use where indicated on drawings as weatherproof device.

## 2.5 SYSTEM SMOKE DETECTORS

A. General Requirements for System Smoke Detectors:

   1. Comply with UL 268; operating at 24-V dc, nominal.
   2. Detectors shall be two-wire type.
   3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
   4. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
   5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
   6. Integral Visual-Indicating Light: LED type indicating detector has operated and power-on status.
   7. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit.

      a. Rate-of-rise temperature characteristic shall be selectable at fire-alarm control unit for 15 or 20 deg F per minute.
      b. Fixed-temperature sensing shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135 or 155 deg F.
      c. Provide multiple levels of detection sensitivity for each sensor.

B. Photoelectric Smoke Detectors:

   1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.

2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:

    a. Primary status.
    b. Device type.
    c. Present average value.
    d. Present sensitivity selected.
    e. Sensor range (normal, dirty, etc.).

C. Ionization Smoke Detector:

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:

    a. Primary status.
    b. Device type.
    c. Present average value.
    d. Present sensitivity selected.
    e. Sensor range (normal, dirty, etc.).

D. Duct Smoke Detectors: Photoelectric type complying with UL 268A.

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:

    a. Primary status.
    b. Device type.
    c. Present average value.
    d. Present sensitivity selected.
    e. Sensor range (normal, dirty, etc.).

3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector.
4. Each sensor shall have multiple levels of detection sensitivity.
5. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
6. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.

## 2.6 HEAT DETECTORS

A. General Requirements for Heat Detectors: Comply with UL 521.

B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F or a rate of rise that exceeds 15 deg F per minute unless otherwise indicated.

1. Mounting: Adapter plate for outlet box mounting.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

C. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 190 deg F.

1. Mounting: Adapter plate for outlet box mounting.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

D. Continuous Linear Heat-Detector System:

1. Detector Cable: Rated detection temperature 155 deg F. NRTL listed for "regular" service and a standard environment. Cable includes two steel actuator wires twisted together with spring pressure, wrapped with protective tape, and finished with PVC outer sheath. Each actuator wire is insulated with heat-sensitive material that reacts with heat to allow the cable twist pressure to short- circuit wires at the location of elevated temperature.
2. Control Unit: Two-zone or multizone unit as indicated. Provide same system power supply, supervision, and alarm features as specified for fire-alarm control unit.
3. Signals to Fire-Alarm Control Unit: Any type of local system trouble shall be reported to fire-alarm control unit as a composite "trouble" signal. Alarms on each detection zone shall be individually reported to central fire-alarm control unit as separately identified zones.
4. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

## 2.7 NOTIFICATION APPLIANCES

A. General Requirements for Notification Appliances: Individually addressed, connected to a signaling line circuit, equipped for mounting as indicated and with screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated and with screw terminals for system connections.

B. Chimes, Low-Level Output: Vibrating type, 75-dBA minimum rated output.

C. Chimes, High-Level Output: Vibrating type, 81-dBA minimum rated output.

D. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure

level of 90 dBA, measured 10 feet from the horn, using the coded signal prescribed in UL 464 test protocol.

E. Visible Notification Appliances: Xenon strobe lights comply with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- high letters on the lens.

1. Rated Light Output:
   a. 15/30/75/110 cd, selectable in the field.

2. Mounting: Wall mounted unless otherwise indicated.
3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
4. Flashing shall be in a temporal pattern, synchronized with other units.
5. Strobe Leads: Factory connected to screw terminals.
6. Mounting Faceplate: Factory finished, red.

## 2.8 REMOTE ANNUNCIATOR

A. Description: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.

1. Mounting: Flush cabinet, NEMA 250, Type 1.

B. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

## 2.9 ADDRESSABLE INTERFACE DEVICE

A. Description: Microelectronic monitor module, NRTL listed for use in providing a system address for alarm-initiating devices for wired applications with normally open contacts.

1. Include address-setting means on the module.
2. Store an internal identifying code for control panel use to identify the module type.
3. Listed for controlling HVAC fan motor controllers.

B. Monitor Module: Microelectronic module providing a system address for alarm-initiating devices for wired applications with normally open contacts.

C. Integral Relay: Capable of providing a direct signal to elevator controller to initiate elevator recall or to circuit-breaker shunt trip for power shutdown.

1. Allow the control panel to switch the relay contacts on command.

2. Have a minimum of two normally open and two normally closed contacts available for field wiring.

## 2.10 DIGITAL ALARM COMMUNICATOR TRANSMITTER

A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632 and be listed and labeled by an NRTL.

B. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture two telephone line(s) and dial a preset number for a remote central station. When contact is made with central station(s), signals shall be transmitted. If service on line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.

C. Local functions and display at the digital alarm communicator transmitter shall include the following:

1. Verification that both telephone lines are available.
2. Programming device.
3. LED display.
4. Manual test report function and manual transmission clear indication.
5. Communications failure with the central station or fire-alarm control unit.

D. Digital data transmission shall include the following:

1. Address of the alarm-initiating device.
2. Address of the supervisory signal.
3. Address of the trouble-initiating device.
4. Loss of ac supply or loss of power.
5. Low battery.
6. Abnormal test signal.
7. Communication bus failure.

E. Secondary Power: Integral rechargeable battery and automatic charger.

F. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

## 2.11 NETWORK COMMUNICATIONS

A. Provide network communications pathway per manufacturer's written requirements and requirements in NFPA 72 and NFPA 70.

B. Provide integration gateway using BACnet or Modbus for connection to building automation system. Coordinate fully with building automation system manufacturer/installer.

C. Provide multi-mode fibers as required by the manufacturer from the FACP to the nearest existing building fire alarm panel or demark location for tie-in of system onto the network bus.

**PART 3 - EXECUTION**

3.1 EQUIPMENT INSTALLATION

A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."

1. Devices placed in service before all other trades have completed cleanup shall be replaced.
2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.

B. Equipment Mounting: Install fire-alarm control unit on concrete base with tops of cabinets not more than 72 inches above the finished floor. Comply with requirements for concrete base specified in Division 03 Section "Cast-in-Place Concrete."
1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to supported equipment.

C. Manual Fire-Alarm Boxes:

1. Install manual fire-alarm box in the normal path of egress within 60 inches of the exit doorway.
2. Mount manual fire-alarm box on a background of a contrasting color.
3. The operable part of manual fire-alarm box shall be between 42 inches and 48 inches above floor level. All devices shall be mounted at the same height unless otherwise indicated.

D. Smoke- or Heat-Detector Spacing:

1. Comply with NFPA 72, "Smoke-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for smoke-detector spacing.
2. Comply with NFPA 72, "Heat-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for heat-detector spacing.
3. Smooth ceiling spacing shall not exceed 30 feet.
4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Appendix A in NFPA 72.
5. HVAC: Locate detectors not closer than 3 feet from air-supply diffuser or return-air opening.
6. Lighting Fixtures: Locate detectors not closer than 12 inches from any part of a lighting fixture.

E. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct. Tubes more than 36 inches long shall be supported at both ends.

1. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.

F. Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location. Do not install smoke detectors in sprinklered elevator shafts.

G. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.

H. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches below the ceiling. Install all devices at the same height unless otherwise indicated.

I. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.

J. Device Location-Indicating Lights: Locate in public space near the device they monitor.

K. Fire-Alarm Control Unit: Surface mounted, with tops of cabinets not more than 72 inches above the finished floor.

L. Annunciator: Install with top of panel not more than 72 inches above the finished floor.

## 3.2 PATHWAYS

A. Pathways shall be installed in EMT. Fire alarm rated MC cable is acceptable where hidden above ceilings and within walls, or at high-bay ceilings where exposed. Where MC cable is exposed within the high-bay, it shall be neatly run in parallel and perpendicular runs to the structure and secured at regular intervals to prevent sagging.

## 3.3 CONNECTIONS

A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Division 08 Section "Door Hardware." Connect hardware and devices to fire-alarm system.

1. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.

B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 3 feet from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.

1. Smoke dampers in air ducts of designated HVAC duct systems.
2. Magnetically held-open doors.
3. Electronically locked doors and access gates.
4. Alarm-initiating connection to elevator recall system and components.
5. Supervisory connections at valve supervisory switches.
6. Supervisory connections at elevator shunt-trip breaker.
7. Data communication circuits for connection to building management system.

## 3.4 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

B. Install framed instructions in a location visible from fire-alarm control unit.

## 3.5 GROUNDING

A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

## 3.6 FIELD QUALITY CONTROL

A. Field tests shall be witnessed by authorities having jurisdiction.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Tests and Inspections:

1. Visual Inspection: Conduct visual inspection prior to testing.

    a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
    b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.

2. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
4. Test audible appliances for the private operating mode according to manufacturer's written instructions.
5. Test visible appliances for the public operating mode according to manufacturer's written instructions.
6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.

D. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

E. Fire-alarm system will be considered defective if it does not pass tests and inspections.

F. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.

G. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

## 3.7 OUTAGES

A. Where an anticipated fire watch occurs, it shall be performed to the specifications outlined in the ICC, NFPA, and OSHA. The fire watch shall start immediately and provide coverage 24 hours a day, 7 days a week.

3.8 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

**END OF SECTION 283111**

PROPERTY REHABILITATION FOR:

# HACP TASK ORDERS #35 and #41
# DEVELOPMENT & OPPORTUNITIES CENTER

1205 LIVERPOOL STREET, BUILDING #35
ALLEGHENY COUNTY
PITTSBURGH, PENNSYLVANIA 15233

2035 ■ DECEMBER 18, 2020 ■ DESIGN DEVELOPMENT SUBMISSION - FOR HACP REVIEW
■ FEBRUARY 15, 2021 ■ FOR CONSTRUCTION

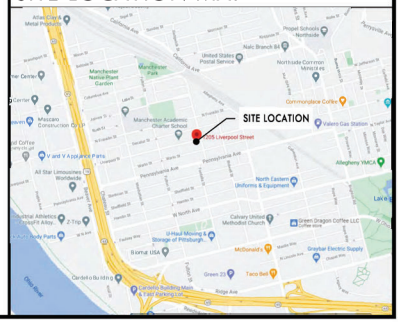

GERARD
ASSOCIATES ARCHITECTS

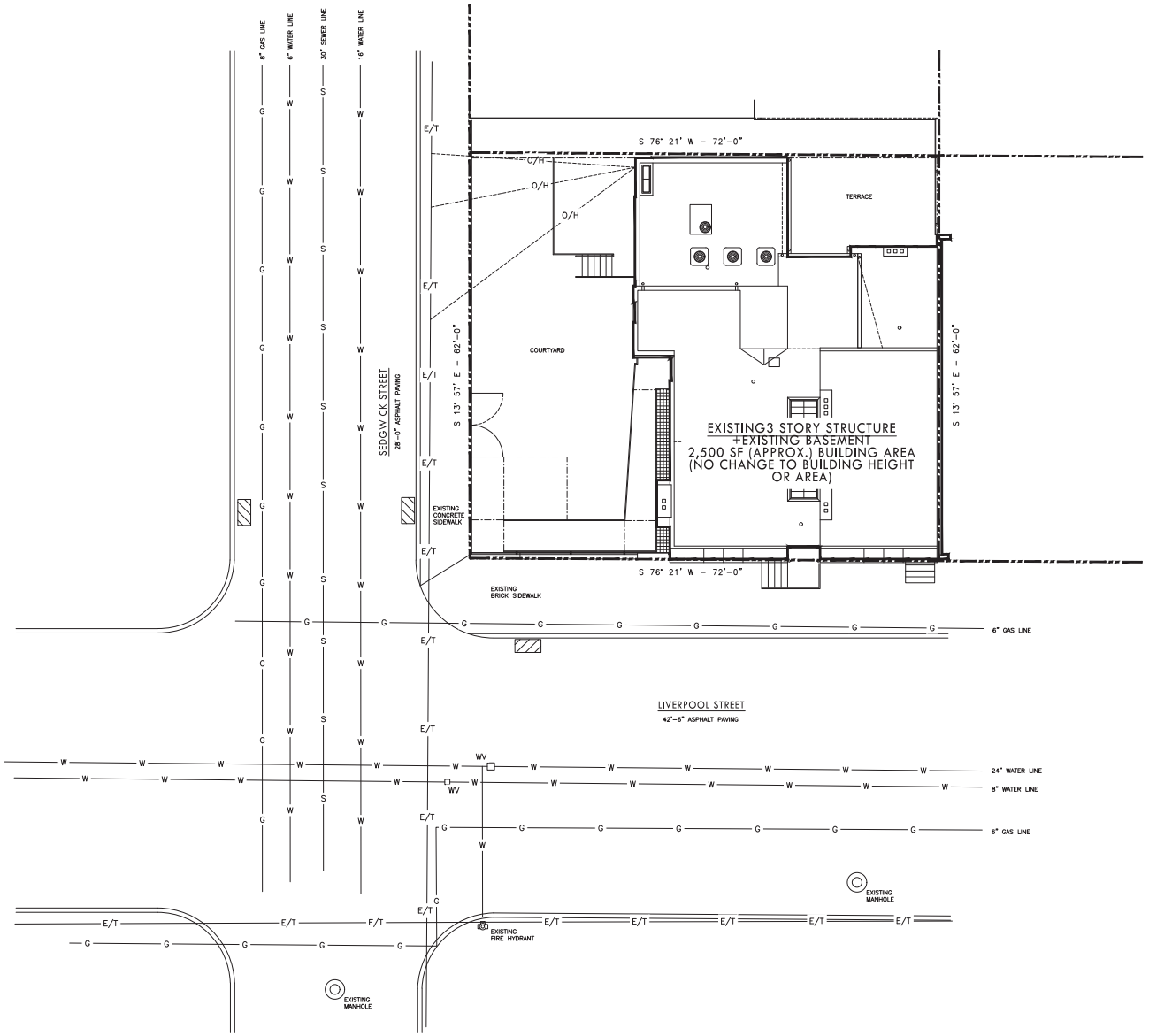
410 FT. PITT COMMONS, 445 FT. PITT BLVD.
PITTSBURGH, PENNSYLVANIA 15219-1333
PHONE: 412-566-1531 FAX: 412-566-1532


## DRAWING LIST

| NO. | DRAWING NAME | CURRENT |
|---|---|---|
| **ARCHITECTURAL** | | |
| AC-101 | SITE PLAN | 02/15/21 |
| G-001 | GENERAL NOTES | 02/15/21 |
| G-002 | CODE SUMMARY | 02/15/21 |
| D-100 | BASEMENT DEMOLITION PLAN | 02/15/21 |
| D-101 | FIRST FLOOR DEMOLITION PLAN | 02/15/21 |
| D-102 | SECOND & THIRD FLOOR DEMOLITION PLAN | 02/15/21 |
| A-100 | BASEMENT FLOOR PLAN | 02/15/21 |
| A-101 | FIRST FLOOR PLAN | 02/15/21 |
| A-102 | SECOND & THIRD FLOOR PLAN | 02/15/21 |
| A-103 | ROOF PLAN PLAN | 02/15/21 |
| A-201 | NORTH ELEVATION | 02/15/21 |
| A-202 | EAST ELEVATION | 02/15/21 |
| A-203 | SOUTH ELEVATION | 02/15/21 |
| A-301 | BUILDING SECTIONS | 02/15/21 |
| A-302 | BUILDING SECTIONS | 02/15/21 |
| A-400 | BASEMENT REFLECTED CEILING PLAN | 02/15/21 |
| A-401 | FIRST FLOOR REFLECTED CEILING PLAN | 02/15/21 |
| A-402 | SECOND AND THIRD FLOOR REFLECTED CEILING PLANS | 02/15/21 |
| A-602 | FINISH SCHEDULE | 02/15/21 |
| **STRUCTURAL** | | |
| S-101 | PARTIAL FIRST FLOOR FRAMING PLAN | 02/15/21 |
| **MECHANICAL** | | |
| M-001 | MECHANICAL DATA SHEET | 02/15/21 |
| M-100 | BASEMENT MECHANICAL DEMOLITION PLAN | 02/15/21 |
| M-101 | FIRST FLOOR MECHANICAL DEMOLITION PLAN | 02/15/21 |
| M-102 | SECOND FLOOR MECHANICAL DEMOLITION PLAN | 02/15/21 |
| M-103 | THIRD FLOOR MECHANICAL DEMOLITION PLAN | 02/15/21 |
| M-200 | BASEMENT MECHANICAL PLAN | 02/15/21 |
| M-201 | FIRST FLOOR MECHANICAL PLAN | 02/15/21 |
| M-202 | SECOND FLOOR MECHANICAL PLAN | 02/15/21 |
| M-203 | THIRD FLOOR MECHANICAL PLAN | 02/15/21 |
| M-204 | ROOF MECHANICAL PLAN | 02/15/21 |
| M-205 | SITE MECHANICAL PLAN | 02/15/21 |
| M-301 | MECHANICAL DETAILS | 02/15/21 |
| M-302 | MECHANICAL DETAILS | 02/15/21 |
| M-303 | MECHANICAL DETAILS | 02/15/21 |
| M-401 | MECHANICAL SCHEDULES | 02/15/21 |
| M-402 | MECHANICAL SCHEDULES | 02/15/21 |
| **PLUMBING** | | |
| P-001 | PLUMBING DATA SHEET | 02/15/21 |
| P-100 | BASEMENT PLUMBING DEMOLITION PLAN | 02/15/21 |
| P-101 | FIRST FLOOR PLUMBING DEMOLITION PLAN | 02/15/21 |
| P-102 | SECOND FLOOR PLUMBING DEMOLITION PLAN | 02/15/21 |
| P-200 | BASEMENT PLUMBING PLAN | 02/15/21 |
| P-201 | FIRST FLOOR PLUMBING PLAN | 02/15/21 |
| P-202 | SECOND FLOOR PLUMBING PLAN | 02/15/21 |
| P-203 | THIRD FLOOR PLUMBING PLAN | 02/15/21 |
| **ELECTRICAL** | | |
| E-001 | ELECTRICAL DATA SHEET | 02/15/21 |
| E-100 | BASEMENT ELECTRICAL DEMOLITION PLAN | 02/15/21 |
| E-101 | FIRST FLOOR ELECTRICAL DEMOLITION PLAN | 02/15/21 |
| E-102 | SECOND FLOOR ELECTRICAL DEMOLITION PLAN | 02/15/21 |
| E-103 | THIRD FLOOR ELECTRICAL DEMOLITION PLAN | 02/15/21 |
| E-200 | BASEMENT LIGHTING PLAN | 02/15/21 |
| E-201 | FIRST FLOOR LIGHTING PLAN | 02/15/21 |
| E-202 | SECOND FLOOR LIGHTING PLAN | 02/15/21 |
| E-203 | THIRD FLOOR LIGHTING PLAN | 02/15/21 |
| E-300 | BASEMENT POWER PLAN | 02/15/21 |
| E-301 | FIRST FLOOR POWER PLAN | 02/15/21 |
| E-302 | SECOND FLOOR POWER PLAN | 02/15/21 |
| E-303 | THIRD FLOOR POWER PLAN | 02/15/21 |
| E-400 | BASEMENT FIRE ALARM PLAN | 02/15/21 |
| E-401 | FIRST FLOOR FIRE ALARM PLAN | 02/15/21 |
| E-402 | SECOND FLOOR FIRE ALARM PLAN | 02/15/21 |
| E-403 | THIRD FLOOR FIRE ALARM PLAN | 02/15/21 |
| E-501 | ELECTRICAL DETAILS | 02/15/21 |
| E-601 | FIRE ALARM RISER DIAGRAM | 02/15/21 |
| E-701 | ELECTRICAL SCHEDULES | 02/15/21 |

## SITE LOCATION MAP






EXISTING SITE PLAN

SCALE: 1/8"=1'-0"

EXISTING CONDITIONS SITE PLAN TAKEN FROM "NORTHERN COMMUNITIES FAMILY SELF SUFFICIENCY CENTER" DRAWINGS PREPARED BY ARTHUR LUBETZ ASSOCIATES ARCHITECTS, JANUARY 1998

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ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE.

REVISIONS

1

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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

ARCHITECTURAL SITE PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | AC-101 |
| ISSUE DATE 02/15/21 | | |

# ARCHITECTURAL SYMBOL LEGEND

MATERIALS

- CONCRETE MASONRY
- REINFORCED CONCRETE MASONRY
- CONCRETE
- BRICK
- CAST STONE
- 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

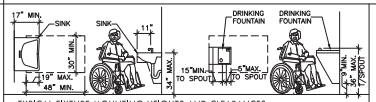
DRAWING SYMBOLS

- SECTION/DETAIL NUMBER / DRAWING NUMBER
- ROOM NUMBERS REFERENCED ON SCHEDULES
- DOOR NUMBERS REFERENCED ON SCHEDULES
- WINDOW TYPE
- PARTITION TYPE

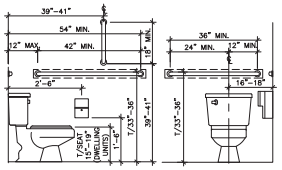
# ABBREVIATIONS

| | |
|---|---|
| A.C. | AQUATIC CONTRACTOR |
| A.F.F. | ABOVE FINISHED FLOOR |
| ADD'L | ADDITIONAL |
| ADJ | ADJACENT |
| ALT | ALTERNATE |
| ALUM | ALUMINUM |
| APPROX | APPROXIMATE |
| AVG | AVERAGE |
| B.L. | BUILDING LINE |
| B.M. | BENCH MARK |
| B.O.C.A. | BUILDING OFFICIALS AND CODE ADMINISTRATORS |
| B/ | BOTTOM OF |
| BITUM | BITUMINOUS |
| BLDG | BUILDING |
| BLK'G | BLOCKING |
| BSM'T | BASEMENT |
| C.B. | CATCH BASIN |
| C.L. | CENTER LINE |
| C.O. | CLEAN OUT |
| CER. | CERAMIC |
| CJ | CONTROL JOINT |
| CLG | CEILING |
| CMU | CONCRETE MASONRY UNIT |
| COL | COLUMN |
| CONC | CONCRETE |
| CONT | CONTINUOUS |
| CRS | COURSE |
| CUH | CABINET UNIT HEATER |
| D.L.O. | DAY LIGHT OPENING |
| D.S. | DOWN SPOUT |
| DWG'S | DRAWINGS |
| E.C. | ELECTRICAL CONTRACTOR |
| EA | EACH |
| EIFS | EXTERIOR INSULATION FINISHING SYSTEM |
| EJ | EXPANSION JOINT |
| ELEC | ELECTRIC |
| ELEV | ELEVATION |
| EPDM | ETHYLENE PROPYLENE DIENE MONOMER |
| EQ | EQUAL |
| EWC | ELECTRICAL WATER COOLER |
| F.E. | FIRE EXTINGUISHER |
| F.E.C. | FIRE EXTINGUISHER CABINET |
| F.F. | FINISHED FLOOR |
| F.P.C. | FIRE PROTECTION CONTRACTOR |
| FD | FLOOR DRAIN |
| FDN | FOUNDATION |
| FLR | FLOOR |
| FPHB | FROSTPROOF HOSE BIB |
| FRTW | FIRE RETARDANT TREATED WOOD |
| FTG | FOOTING |
| G.C. | GENERAL CONTRACTOR |
| GA | GAUGE |
| GWB | GYPSUM WALL BOARD |
| PTD | PAPER TOWEL DISPENSER |
| SD | SOAP DISPENSER |
| H.B. | HOSE BIB |
| H.C. | HEATING CONTRACTOR |
| HOR | HORIZONTAL |
| HVAC | HEATING/VENTILATION/AIR CONDITIONING |
| IBC | INTERNATIONAL BUILDING CODE |
| INSUL | INSULATION |
| INV | INVERT |
| JT | JOINT |
| L&I | PA DEPARTMENT OF LABOR AND INDUSTRY |
| LAV | LAVATORY |
| M.C. | MECHANICAL CONTRACTOR |
| M.H. | MANHOLE |
| M.O. | MASONRY OPENING |
| MTD | MOUNTED |
| MTL | METAL |
| N.T.S. | NOT TO SCALE |
| NIC | NOT IN CONTRACT |
| O.C. | ON CENTER |
| O/A | OVERALL |
| OPG | OPENING |
| P.C. | PLUMBING CONTRACTOR |
| P.LAM | PLASTIC LAMINATE |
| PL | PLATE |
| PMB | PRE-ENGINEERED METAL BUILDING |
| PNL | PANEL |
| PSF | POUNDS PER SQUARE FOOT |
| PSI | POUNDS PER SQUARE INCH |
| PTN | PARTITION |
| PVC | POLY VINYL CHLORIDE |
| R.D. | ROOF DRAIN |
| R.O. | ROUGH OPENING |
| REQ'D | REQUIRED |
| S.C. | SECURITY CONTRACTOR |
| S.I. | SQUARE INCH |
| S.O.G. | SLAB ON GRADE |
| S.S. | STAINLESS STEEL |
| S.Y. | SQUARE YARD |
| SF | SQUARE FEET |
| SIM | SIMILAR |
| SQ | SQUARE |
| STD | STANDARD |
| STL | STEEL |
| T/ | TOP OF |
| TWP | TOWNSHIP |
| TYP | TYPICAL |
| UNO | UNLESS NOTED OTHERWISE |
| VCT | VINYL COMPOSITION TILE |
| VERT | VERTICAL |
| VWC | VINYL WALL COVERING |
| W/ | WITH |
| W/O | WITH OUT |
| WC | WATER CLOSET |
| WWF | WELDED WIRE FABRIC |
| O.F.J.C. | OWNER FURNISHED, INSTALLED BY CONTRACTOR |
| O.F.I. | OWNER FURNISHED AND INSTALLED |
| N.I.C. | NOT IN CONTRACT |

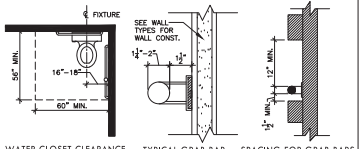
# ACCESSIBILITY STANDARDS




TYPICAL FIXTURE MOUNTING HEIGHTS AND CLEARANCES



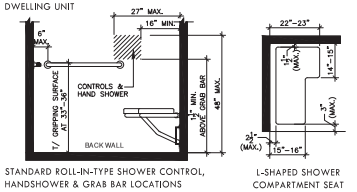

TYPICAL WATERCLOSET AND GRAB BAR CLEARANCES FOR DWELLING UNITS




WATER CLOSET CLEARANCE AND LOCATION IN DWELLING UNIT

TYPICAL GRAB BAR

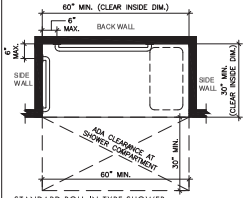
SPACING FOR GRAB BARS



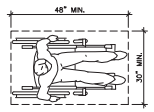

STANDARD ROLL-IN-TYPE SHOWER CONTROL, HANDSHOWER & GRAB BAR LOCATIONS



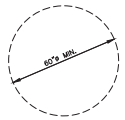

L-SHAPED SHOWER COMPARTMENT SEAT



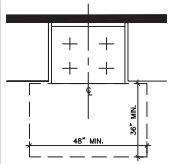

STANDARD ROLL-IN-TYPE SHOWER COMPARTMENT SIZE, CLEARANCE & GRAB BARS



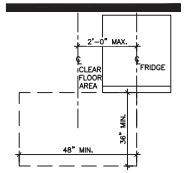

CLEAR FLOOR SPACE



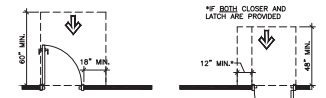

CLEAR TURNING RADIUS

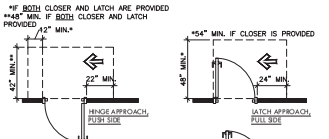


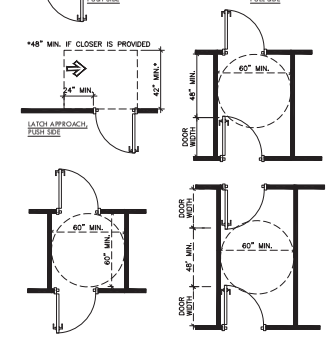

CLEAR FLOOR AREA AT RANGE



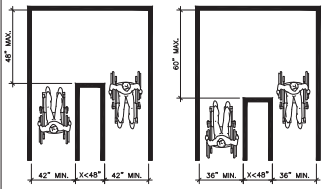

CLEAR FLOOR AREA AT REFRIGERATOR



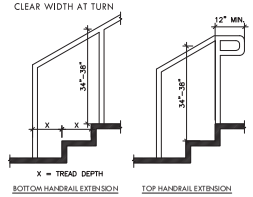




DOOR CLEARANCES

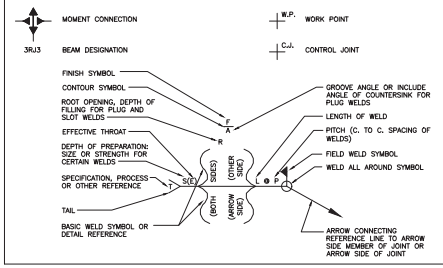



CLEAR WIDTH AT TURN




STAIR HANDRAIL EXTENSIONS

# STRUCTURAL SYMBOL LEGEND

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REVISIONS

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

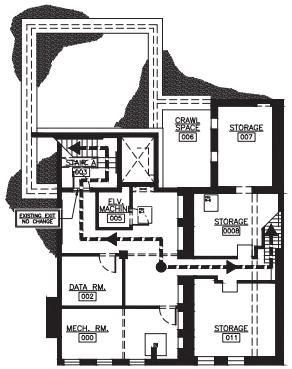
1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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

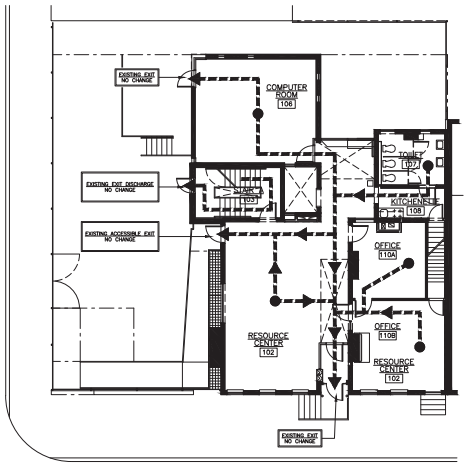
GENERAL

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | △ | G-001 |
| ISSUE DATE 02/15/21 | | |



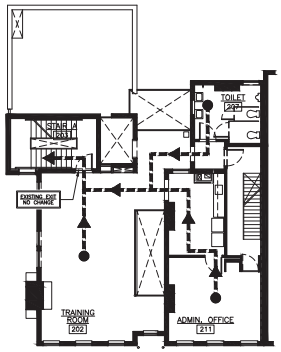

## BASEMENT FLOOR PLAN

SCALE: 3/32"=1'-0"
BUILDING AREA = 1,685 SF



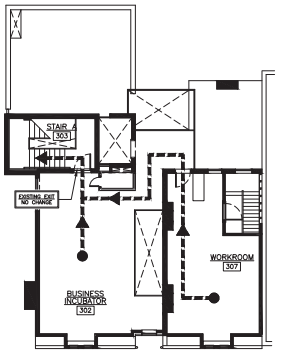

## FIRST FLOOR PLAN

SCALE: 3/32"=1'-0"
BUILDING AREA = 2,229 SF




## SECOND FLOOR PLAN

SCALE: 3/32"=1'-0"
BUILDING AREA = 1,707 SF




## THIRD FLOOR PLAN

SCALE: 3/32"=1'-0"
BUILDING AREA = 1,488 SF

## 2015 INTERNATIONAL EXISTING BUILDING CODE INFORMATION

| CODE ITEM REFERENCE | BUILDING DESIGN | CODE ITEM REFERENCE | BUILDING DESIGN |
|---|---|---|---|
| CHAPTER 5 CLASSIFICATION OF WORK | WORK SHALL BE CLASSIFIED AS REPAIRS (502.1 STRUCTURAL REMEDIATION WORK), ALTERATION LEVEL 1 (503.1 ROOF RE-COVERING), AND ALTERATION LEVEL 2 (504.1 REPLACEMENT AND EXTENSION OF EXISTING MECHANICAL AND ELECTRICAL SYSTEMS) | CHAPTER 8 ALTERATION – LEVEL 2 | |
| CHAPTER 6 REPAIRS–STRUCTURAL REMEDIATION | | 801 | ALL NEW WORK SHALL COMPLY WITH THE REQUIREMENTS OF THE IBC 2015. |
| 602 | NEW MATERIALS SHALL BE CONSISTENT WITH THE REQUIREMENTS OF THE IBC 2015. EXISTING MATERIALS WHICH CREATE AND UNSAFE OR DANGEROUS CONDITION SHALL BE REMOVED. | 802 | NO ALTERATION IS PROPOSED TO THE EXISTING OCCUPANCY AND USE. |
| 603 | THE EXISTING LEVEL OF FIRE PROTECTION SHALL BE MAINTAINED – NO CHANGE. | 803 BUILDING ELEMENTS/MATERIALS | |
| 604 | THE EXISTING MEANS OF EGRESS SHALL BE MAINTAINED – NO CHANGE. | 803.2 | NO ALTERATION TO THE EXISTING BUILDING VERTICAL OPENINGS IS PROPOSED. |
| 605 | THE EXISTING LEVEL OF ACCESSIBILITY SHALL BE MAINTAINED – NO CHANGE. | 803.3 | SMOKE COMPARTMENT CONSTRUCTION DOES NOT COMPLY. |
| 606 | NEW STRUCTURAL ELEMENTS SHALL COMPLY WITH THE REQUIREMENTS OF THE IBC 2015. | 803.4 | NEW INTERIOR FINISHES SHALL COMPLY WITH THE REQUIREMENTS OF THE IBC 2015. |
| 606.2.1 | PROPOSED REPAIRS ARE FOR LESS THAN SUBSTANTIAL STRUCTURAL DAMAGE AND SHALL RESTORE THE WORK TO A PRE-DAMAGED CONDITION. THE AFFECTED COMPONENTS DO NOT SUPPORT MORE THAN 30% OF THE STRUCTURE'S FLOOR. | 803.5 | NO NEW CONSTRUCTION AFFECTING GUARDS IS PROPOSED. |
| 607 | NO ELECTRICAL REPAIRS ARE PROPOSED. | 803.6 | NO CHANGE TO EXISTING FIRE RATINGS IS PROPOSED. |
| 608 | NO MECHANICAL REPAIRS ARE PROPOSED. | 804 | THE EXISTING LEVEL OF FIRE PROTECTION SHALL BE MAINTAINED – NO CHANGE. |
| 609 | NO PLUMBING REPAIRS ARE PROPOSED. | 805 | THE EXISTING MEANS OF EGRESS SHALL BE MAINTAINED – NO CHANGE. |
| CHAPTER 7 ALTERATION – LEVEL 1 | | 806 | THE EXISTING LEVEL OF ACCESSIBILITY SHALL BE MAINTAINED – NO CHANGE PROPOSED TO ACCESSIBLE BUILDING ELEMENTS OR AN AREA OF PRIMARY FUNCTION. THE BUILDING INCLUDES AN EXISTING ACCESSIBLE ROUTE. |
| 702 | ALL NEW WORK SHALL COMPLY WITH THE REQUIREMENTS OF THE IBC, IECC, IMC, AND IPC. | 807 | THE PROPOSED STRUCTURAL REMEDIATION WORK CLASSIFIES AS A REPAIR IN ACCORDANCE WITH CHAPTER 6. |
| 703 | THE EXISTING LEVEL OF FIRE PROTECTION SHALL BE MAINTAINED – NO CHANGE. | 808 | NEW ELECTRICAL WORK SHALL COMPLY WITH THE REQUIREMENTS OF NFPA 70. |
| 704 | THE EXISTING MEANS OF EGRESS SHALL BE MAINTAINED – NO CHANGE. | 809 MECHANICAL | |
| 705 | THE EXISTING LEVEL OF ACCESSIBILITY SHALL BE MAINTAINED – NO CHANGE PROPOSED TO ACCESSIBLE BUILDING ELEMENTS OR AN AREA OF PRIMARY FUNCTION. THE BUILDING INCLUDES AN EXISTING ACCESSIBLE ROUTE. | 809.2 | ALTERED EXISTING SYSTEMS SHALL COMPLY TO PROVIDE MANDATED VENTILATION. |
| 706 | ROOF RE-COVERING IS PROPOSED. | 810 | PLUMBING WORK SHALL COMPLY WITH THE REQUIREMENTS OF THE IPC. |
| 706.1 | MATERIALS AND METHODS OF APPLICATION FOR "RE-COVERING" THE EXISTING ROOF SHALL COMPLY WITH THE IBC. | 811 | NEW SYSTEMS SHALL COMPLY WITH THE IECC. |
| 706.2 | EXISTING STRUCTURAL ROOF COMPONENTS ARE CAPABLE OF SUPPORTING THE NEW ROOF COVERING. | CHAPTER 15 CONSTRUCTION SAFEGUARDS | ALL WORK SHALL COMPLY WITH THE CONSTRUCTION SAFEGUARDS OF THIS CHAPTER. |
| 706.3 | ROOF RE-COVERING IS PROPOSED. | | |
| 706.4 | NO COMBUSTIBLE, CONCEALED SPACE IS PROPOSED. | | |
| 706.5 | NO REINSTALLATION OF MATERIALS IS PROPOSED. | | |
| 706.6 | NEW FLASHINGS SHALL COMPLY WITH THIS SECTION. | | |
| 707 | NO STRUCTURAL WORK IN ACCORDANCE WITH THIS SECTION IS PROPOSED. | | |
| 708 | NO WORK ALTERING THE ENERGY CONSERVATION OR CONSUMPTION IN ACCORDANCE WITH THIS SECTION IS PROPOSED. | | |

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ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE.

REVISIONS

△

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

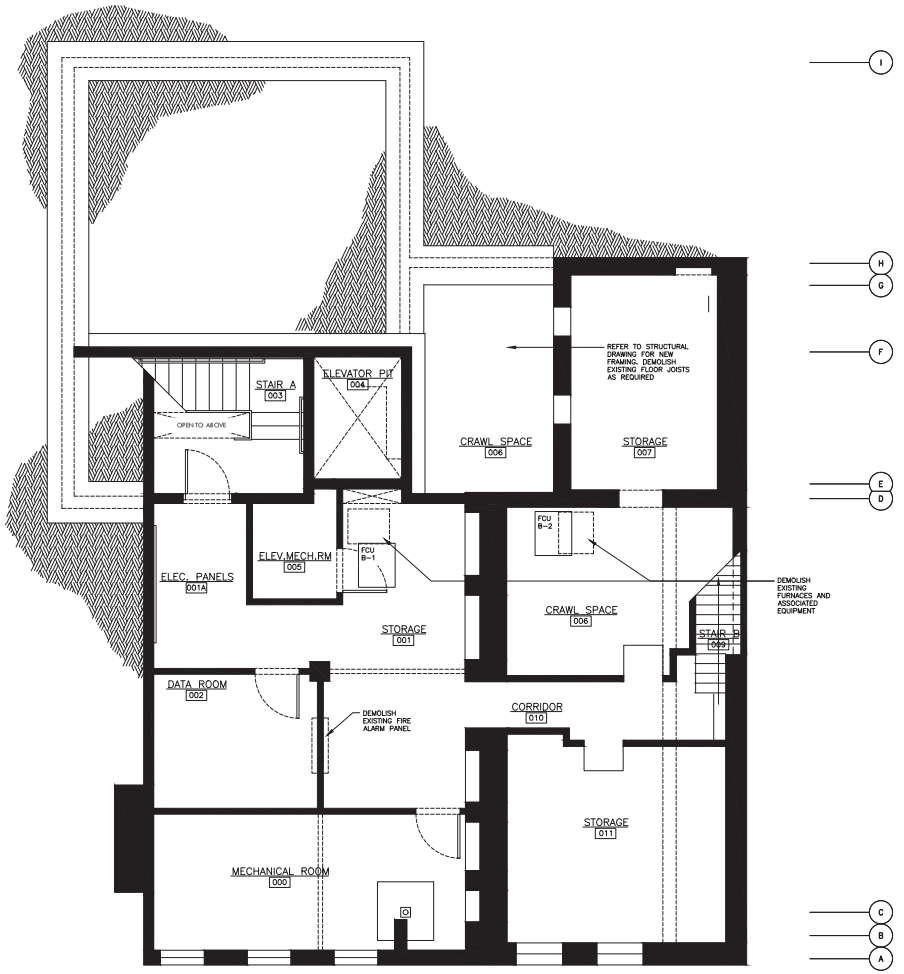
1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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

## CODE SUMMARY

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | △ | G-002 |
| ISSUE DATE 02/15/21 | | |




## BASEMENT DEMOLITION PLAN

SCALE: 1/4"=1'-0"

DEMOLITION GENERAL NOTES:

1.) GENERAL CONTRACTOR SHALL COORDINATE DEMOLITION WITH COMPLETE SCOPE OF WORK AS SHOWN ON THE FULL SET OF CONSTRUCTION DOCUMENTS INCLUDING STRUCTURAL, MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS.
2.) WHERE DEMOLITION IS SHOWN, DEMOLITION SHALL BE AS NECESSARY TO COMPLETE THE ASSOCIATED SCOPE OF NEW WORK. SYSTEMS AND ELEMENTS SHALL BE DEMOLISHED IN THEIR ENTIRETY.
3.) DEMOLITION SHALL NOT RESULT IN A DANGEROUS CONDITION.
4.) WHERE TEMPORARY DEMOLITION OF A SYSTEM SCHEDULED TO REMAIN IS NECESSARY, THE WORK SHALL BE PATCHED TO MATCH SURROUNDING CONSTRUCTION.
5.) WHERE NEW FLOORING IS SCHEDULED IN ACCORDANCE WITH DRAWING A-602, EXISTING FLOORING AND BASE SHALL BE DEMOLISHED.

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PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

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BUILDING #35
PITTSBURGH, PA 15233

GERARD
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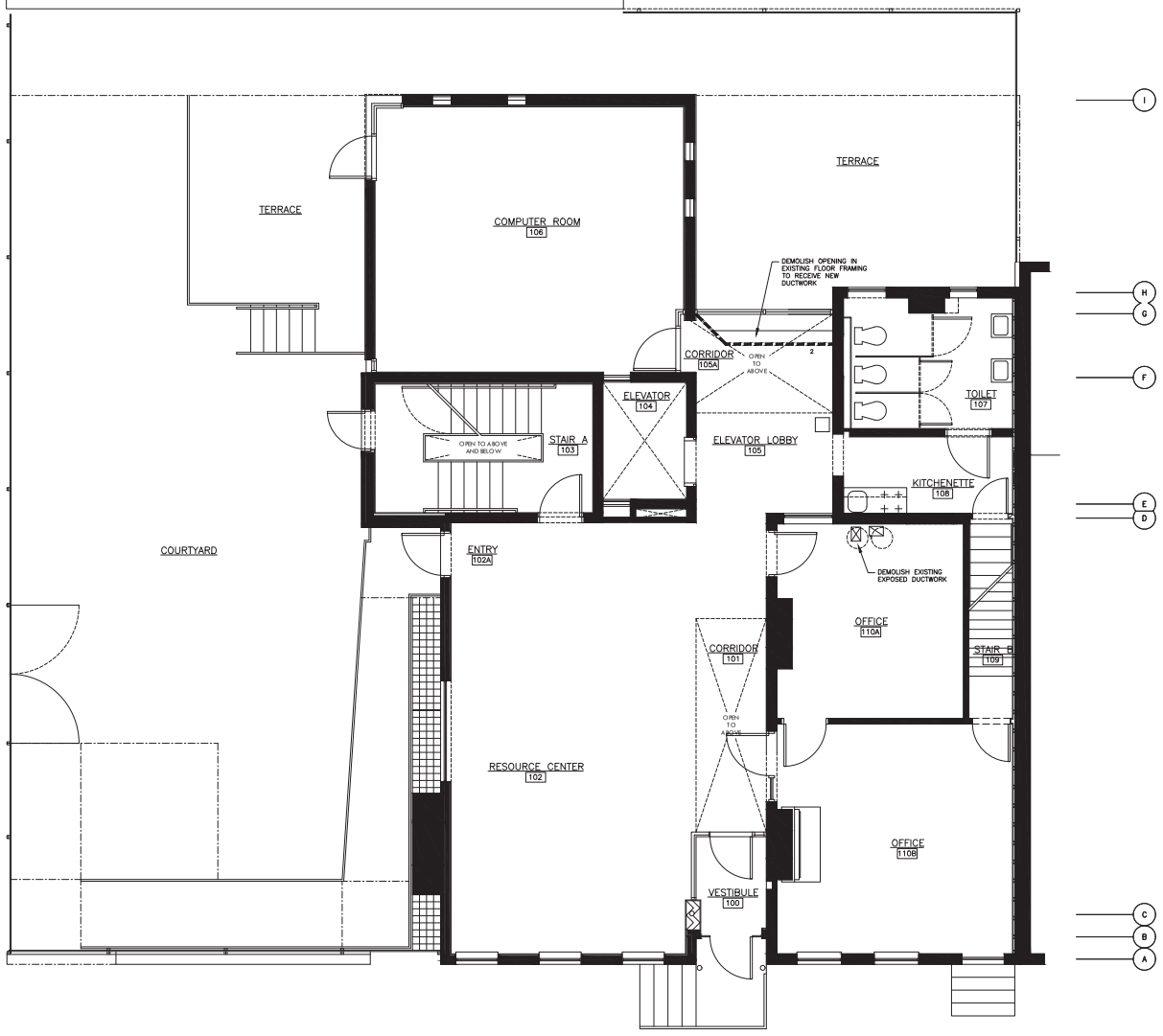
410 FT. PITT COMMONS, 445 FT. PITT BLVD.
PITTSBURGH, PENNSYLVANIA 15219-1333
PHONE: 412-566-1531 FAX: 412-566-1532

DRAWING NAME
BASEMENT DEMOLITION PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | D-100 |
| ISSUE DATE 02/15/21 | | |




## FIRST FLOOR DEMOLITION PLAN

SCALE: 1/4"=1'-0"

DEMOLITION GENERAL NOTES:

1.) GENERAL CONTRACTOR SHALL COORDINATE DEMOLITION WITH COMPLETE SCOPE OF WORK AS SHOWN ON THE FULL SET OF CONSTRUCTION DOCUMENTS INCLUDING STRUCTURAL, MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS.
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PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

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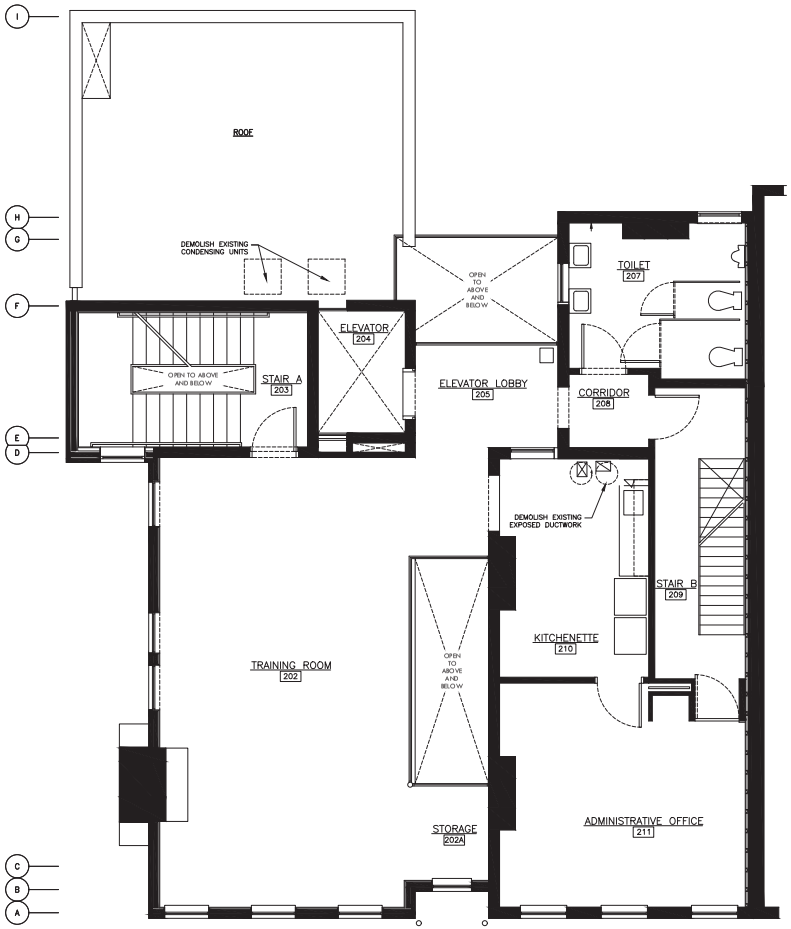
PHONE: 412-566-1531 FAX: 412-566-1532

DRAWING NAME
FIRST FLOOR DEMOLITION PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | △ | D-101 |
| ISSUE DATE 02/15/21 | | |




## SECOND FLOOR DEMOLITION PLAN

SCALE: 1/4"=1'-0"

DEMOLITION GENERAL NOTES:

1.) GENERAL CONTRACTOR SHALL COORDINATE DEMOLITION WITH COMPLETE SCOPE OF WORK AS SHOWN ON THE FULL SET OF CONSTRUCTION DOCUMENTS INCLUDING STRUCTURAL, MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS.
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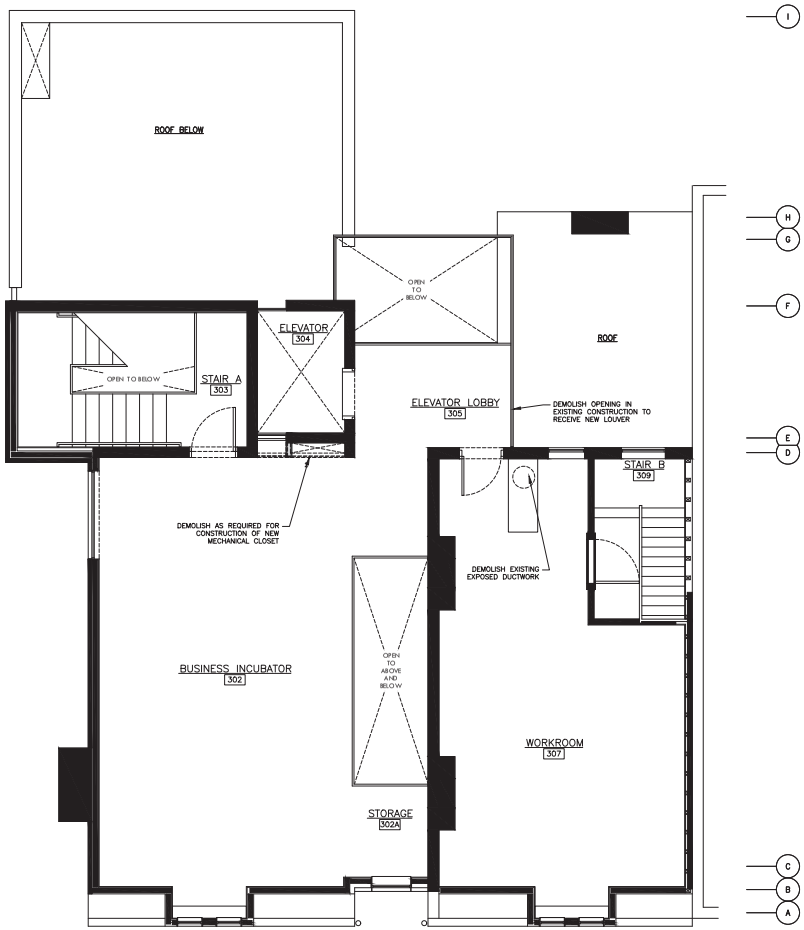


## THIRD FLOOR DEMOLITION PLAN

SCALE: 1/4"=1'-0"

DEMOLITION GENERAL NOTES:

1.) GENERAL CONTRACTOR SHALL COORDINATE DEMOLITION WITH COMPLETE SCOPE OF WORK AS SHOWN ON THE FULL SET OF CONSTRUCTION DOCUMENTS INCLUDING STRUCTURAL, MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS.
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PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

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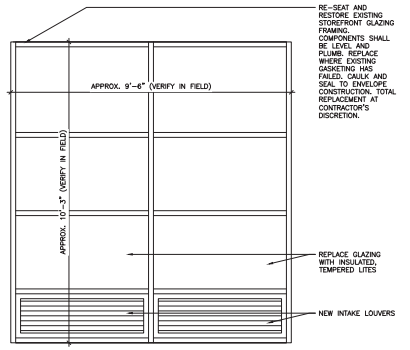
PHONE: 412-566-1531 FAX: 412-566-1532

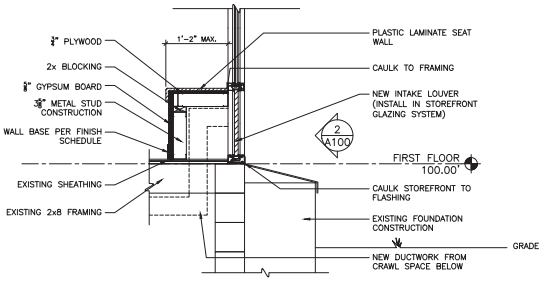
DRAWING NAME
SECOND & THIRD FLOOR DEMOLITION PLAN

| CONN. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | D-102 |
| ISSUE DATE 02/15/21 | | |




GLAZING/STOREFRONT ELEVATION (2/A100)

SCALE: 3/4"=1'-0




WALL SECTION (1/A100)

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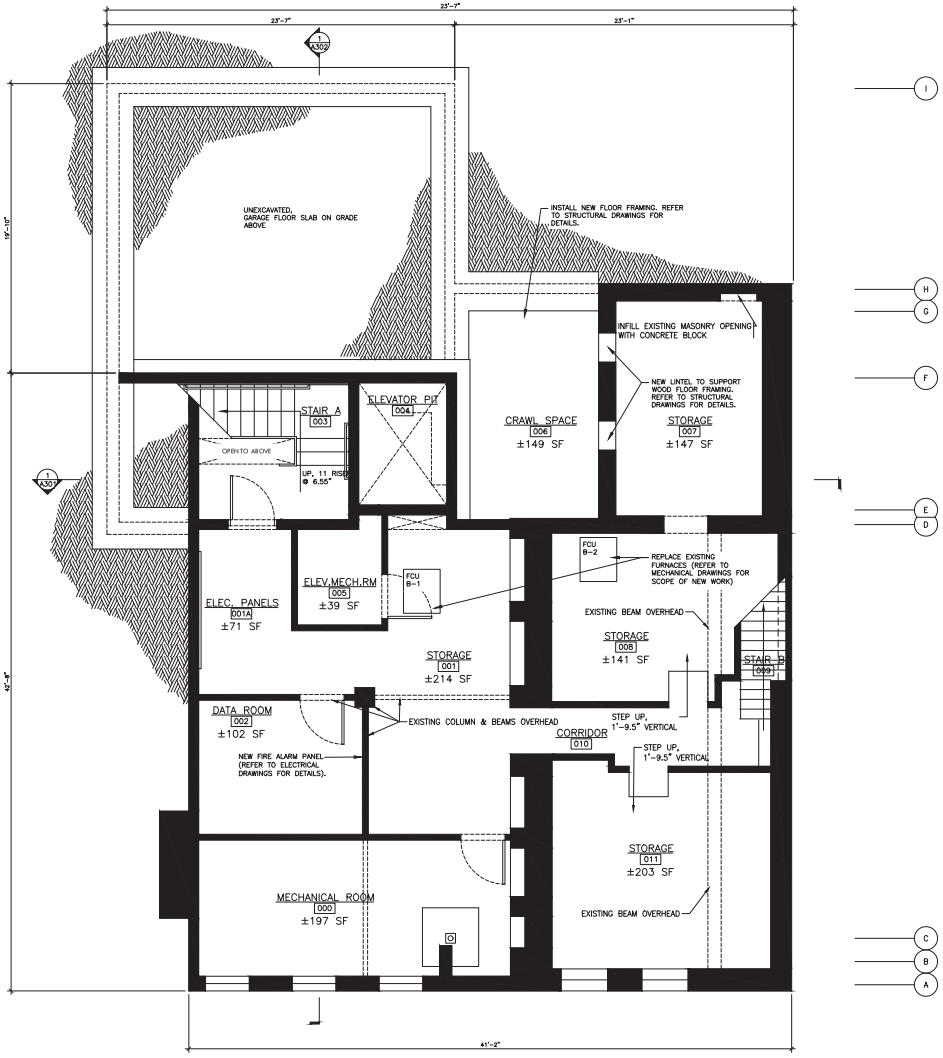


BASEMENT FLOOR PLAN

SCALE: 1/4"=1'-0"

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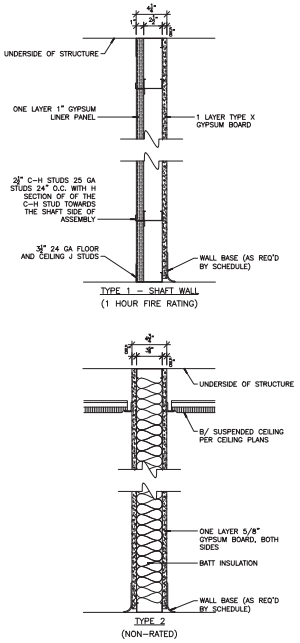
DRAWING NAME

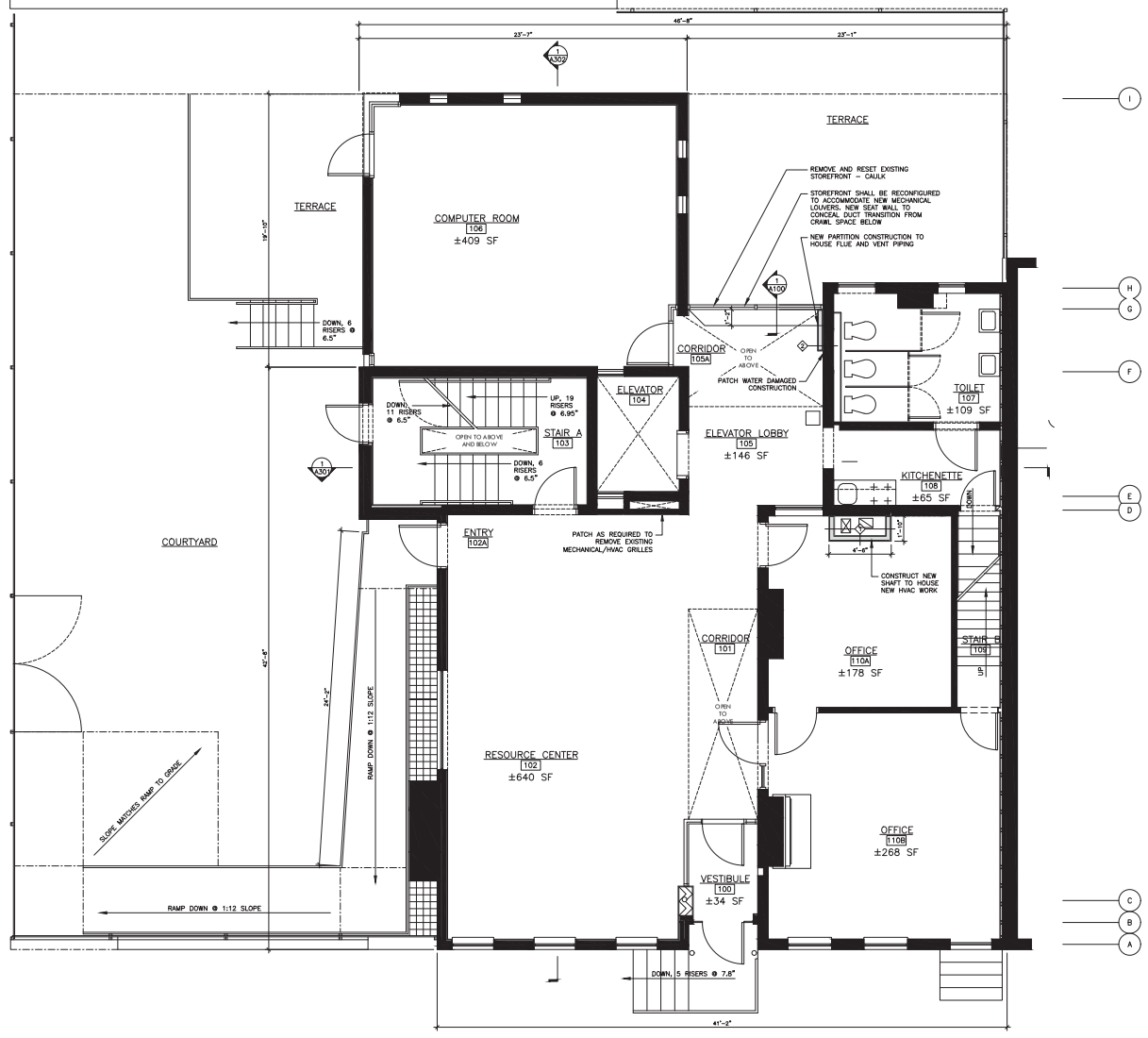
## BASEMENT PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | A-100 |
| ISSUE DATE 02/15/21 | | |




## PARTITION TYPES

SCALE: 1 1/2"=1'-0"




## FIRST FLOOR PLAN

SCALE: 1/4"=1'-0"

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PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

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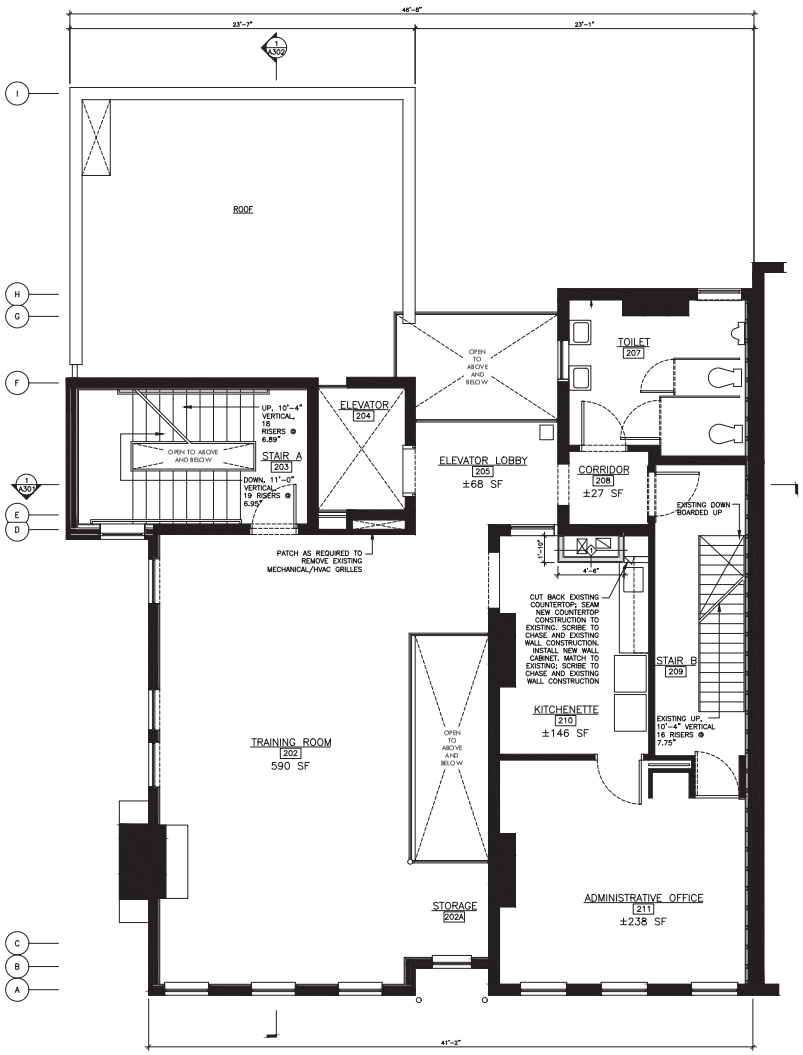
DRAWING NAME

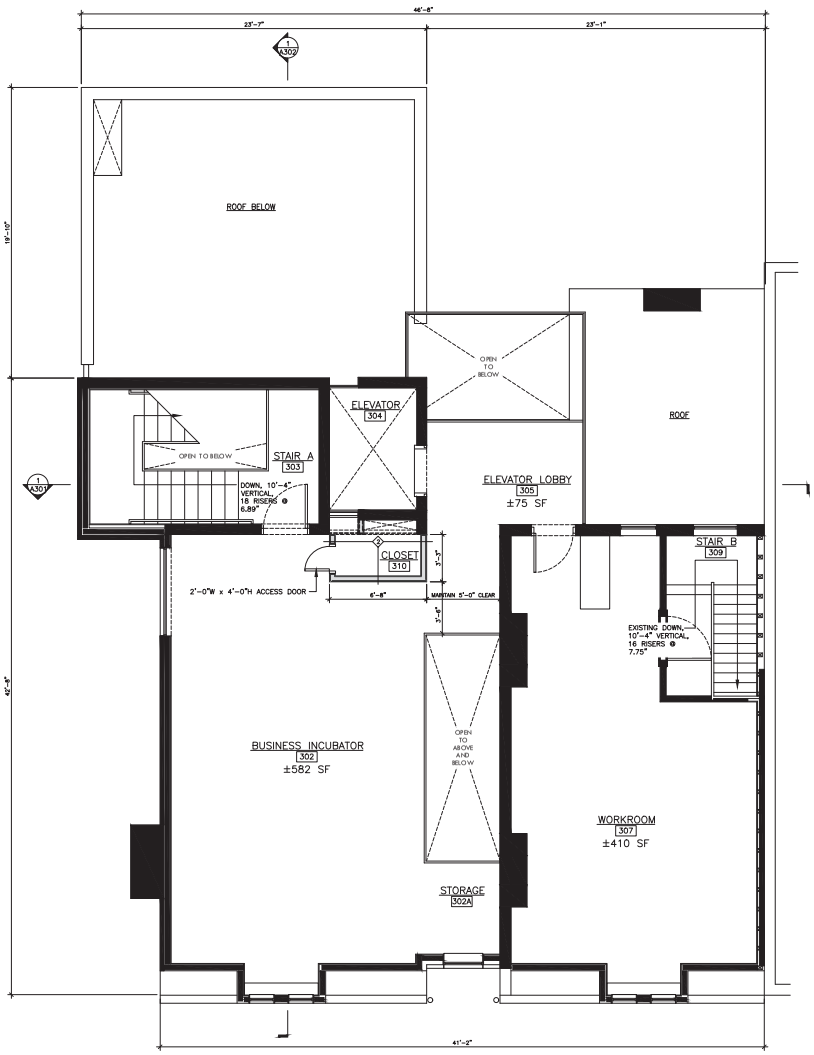
## FIRST FLOOR PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | △ | A-101 |
| ISSUE DATE 02/15/21 | | |




SECOND FLOOR PLAN

SCALE: 1/4"=1'-0"




THIRD FLOOR PLAN

SCALE: 1/4"=1'-0"

1 2 3 4 5 6 7

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PROPERTY REHABILITATION FOR:

## HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

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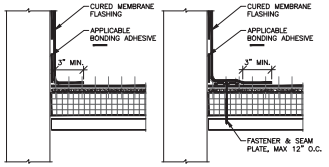
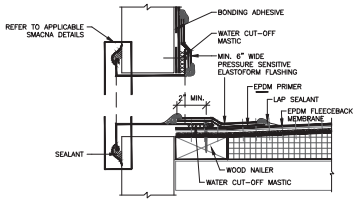
DRAWING NAME
SECOND & THIRD FLOOR PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | A-102 |
| ISSUE DATE 02/15/21 | | |



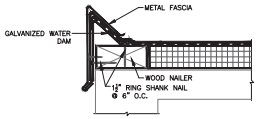

## DETAIL PARAPET W/ CURB

SCALE: 3"=1'-0



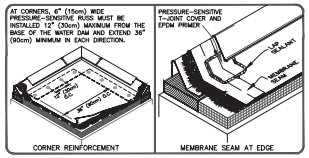

## DETAIL SCUPPER W/ EPDM FLASHING

SCALE: 3"=1'-0



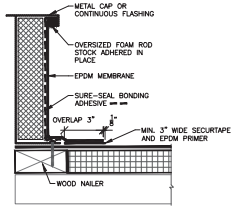

NOTE:

1. MAXIMUM MEMBRANE THICKNESS GOING OVER THE WATER DAM IS 60-MIL. FOR THICKER MEMBRANES, RUN FIELD SHEET UNDER THE WATER DAM AND STRIP-IN WITH MAXIMUM 60-MIL MEMBRANE.



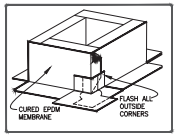

## DETAIL CARLISLE SECUREDGE

SCALE: 3"=1'-0



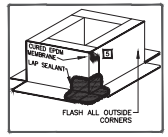

NOTES:

1. LENGTH OF ROD STOCK IS LIMITED TO 4' (1.2m). USE INDIVIDUAL SECTIONS OF ROD STOCK FOR LONGER DIMENSIONS.
2. MEMBRANE SPLICES SHALL INCORPORATE 6" (15cm) WIDE OVERLAP




## DETAIL SELF FLASHING CURB

SCALE: 3"=1'-0



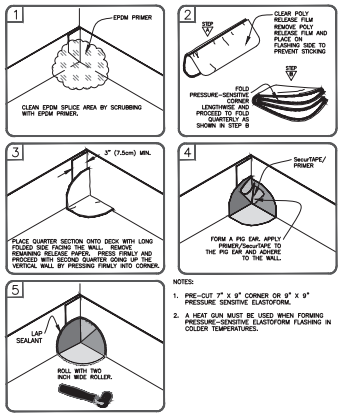

NOTES:

1. WHEN MECHANICAL FASTENERS ARE USED TO PENETRATE THE METAL COUNTER-FLASHING, USE EPDM WASHERS. APPLY WATER CUT-OFF MASTIC UNDER THE COUNTER-FLASHING OR CAULK THE FASTENER HEADS.
2. LAP SEALANT IS REQUIRED ON CUT-EDGES OF REINFORCED MEMBRANE.
3. SEAM PLATES AND FASTENERS MAY BE INSTALLED INTO THE STRUCTURAL DECK AND THEN HP FASTENERS AND POLYMER SEAM PLATES ARE REQUIRED FOR MECHANICALLY-FASTENED ROOFING SYSTEMS OVER STEEL DECKS.
4. MEMBRANE SPLICES SHALL INCORPORATE 6" (15cm) WIDE OVERLAP




## DETAIL CURB FLASHING EPDM MEMBRANE

SCALE: 3"=1'-0

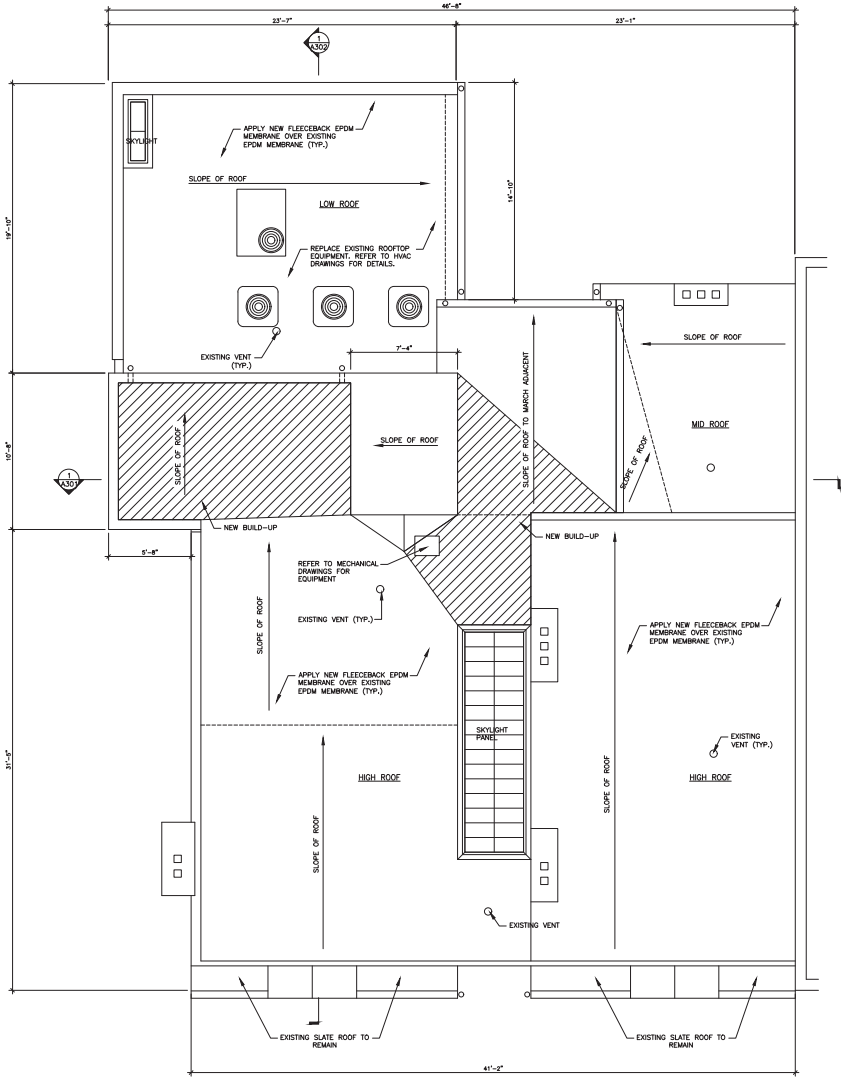



NOTES:

1. PRE-CUT 7" X 9" CORNER OR 9" X 9" PRESSURE SENSITIVE ELASTOFORM.
2. A HEAT GUN MUST BE USED WHEN FORMING PRESSURE-SENSITIVE ELASTOFORM FLASHING IN COLDER TEMPERATURES.

## DETAIL INSIDE CORNER W/ CONT. WALL EPDM

SCALE: 3"=1'-0




## ROOF PLAN

SCALE: 1/4"=1'-0"

DEMOLITION GENERAL NOTES:

1.) GENERAL CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS AND LOCATION OF EXISTING PENETRATIONS PRIOR TO SUBMISSION OF BID.
2.) GENERAL CONTRACTOR SHALL REFER TO MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS FOR COORDINATION WITH NEW ROOFING AND LOCATION OF NEW EQUIPMENT.
3.) SHADED AREA OF PLAN DENOTES NEW INSULATION BUILD-UP TO ELIMINATE PONDING. AVERAGE HEIGHT OF NEW INSULATION IS 4".
4.) CONTRACTOR SHALL DEMOLISH & REPLACE ALL COPING, TERMINATION BARS, FLASHING AND TRIM ASSOCIATED WITH EPDM MEMBRANE. FURNISH AND INSTALL NEW.
5.) CONTRACTOR SHALL BE RESPONSIBLE FOR LIFT ACCESS TO ROOF AND ANY REQUIRED PERMITS ASSOCIATED WITH LIFT.

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ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE.

REVISIONS

| |
|---|
| 1 |

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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

## ROOF PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | A-103 |
| ISSUE DATE 02/15/21 | | |




NORTH ELEVATION

SCALE: 1/4"=1'-0"

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PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
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PITTSBURGH, PA 15233

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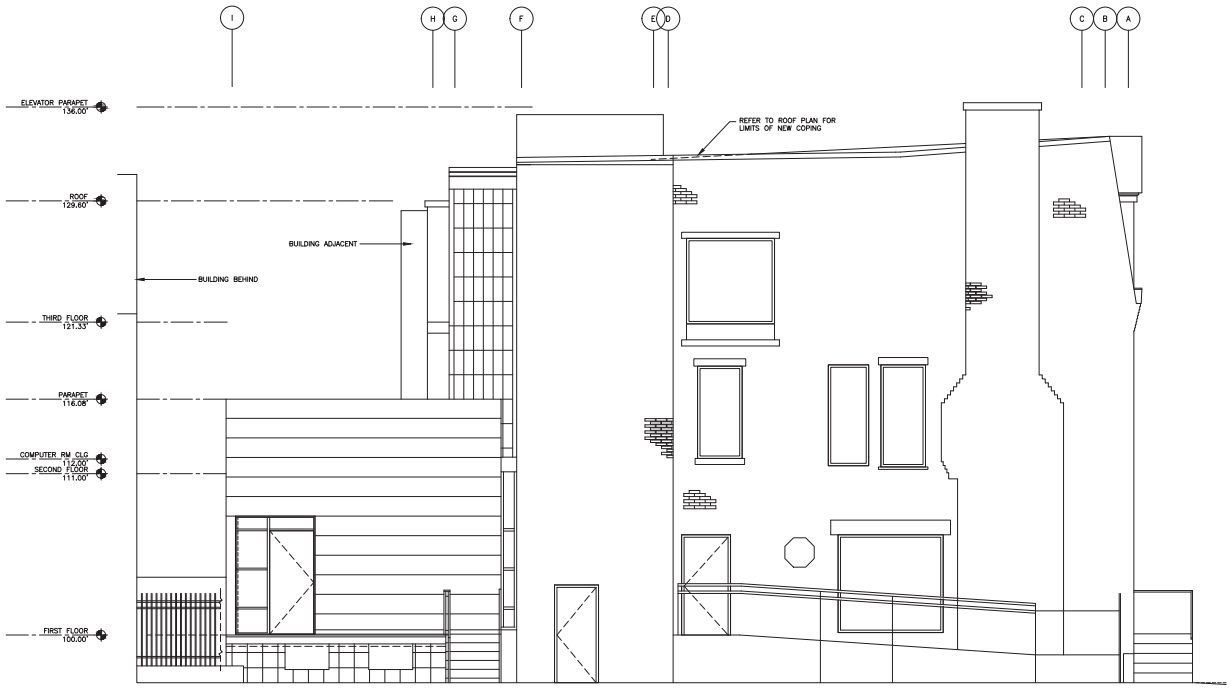
410 FT. PITT COMMONS, 445 FT. PITT BLVD.
PITTSBURGH, PENNSYLVANIA 15219-1333
PHONE: 412-566-1531 FAX: 412-566-1532

DRAWING NAME

NORTH ELEVATION

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | A-201 |
| ISSUE DATE 02/15/21 | | |




EAST ELEVATION

SCALE: 1/4"=1'-0"

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PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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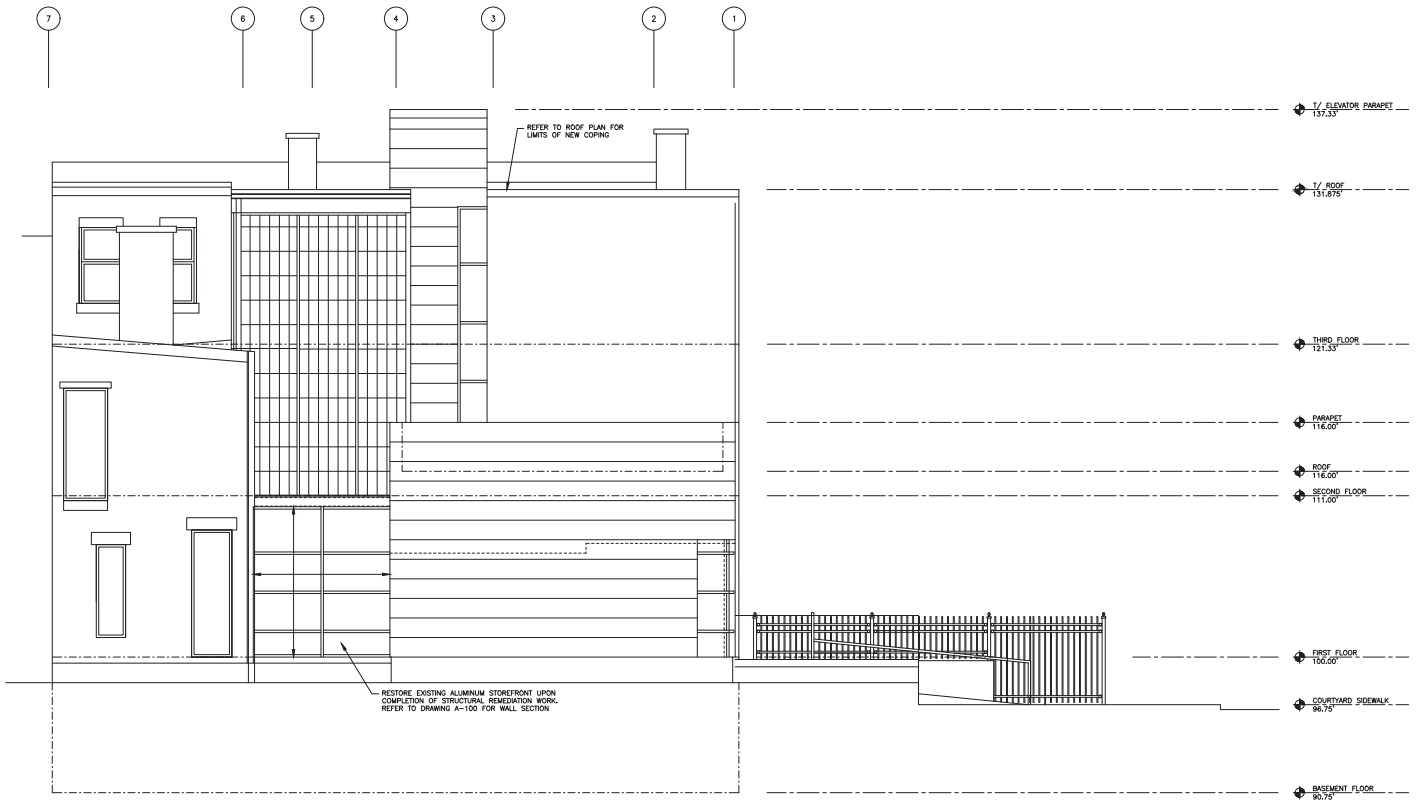
410 FT. PITT COMMONS, 445 FT. PITT BLVD.
PITTSBURGH, PENNSYLVANIA 15219-1333
PHONE: 412-566-1531 FAX: 412-566-1532

DRAWING NAME

EAST ELEVATION

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | △ | A-202 |
| ISSUE DATE 02/15/21 | | |




## SOUTH ELEVATION

SCALE: 1/4"=1'-0"

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| 1 |

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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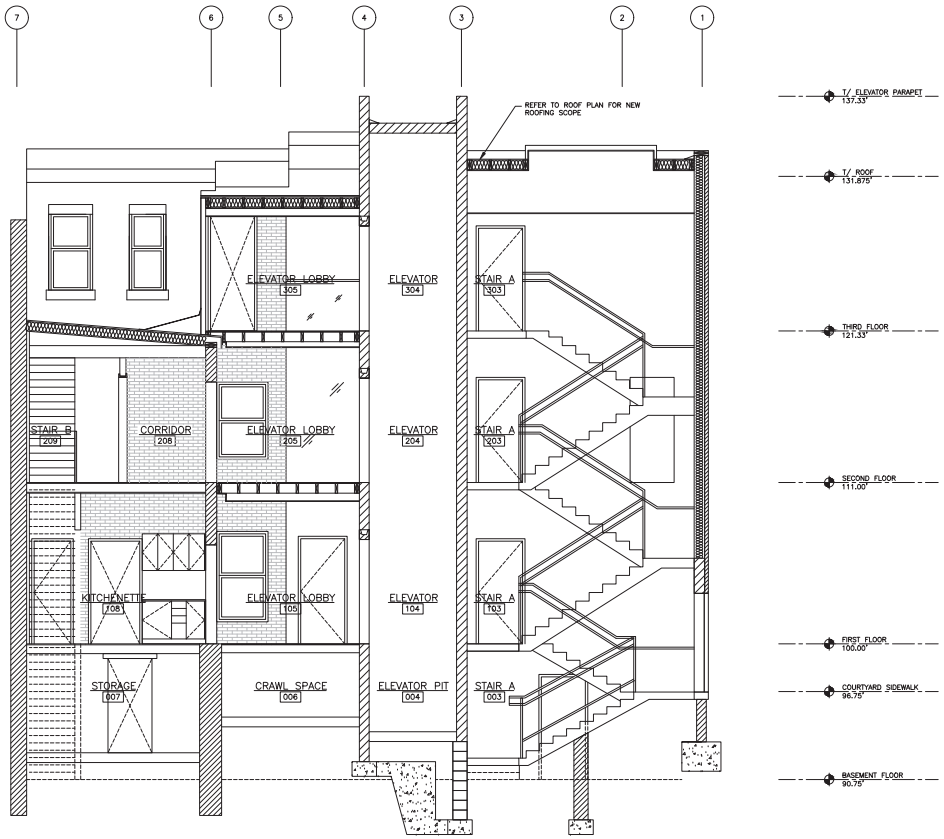
410 FT. PITT COMMONS, 445 FT. PITT BLVD.
PITTSBURGH, PENNSYLVANIA 15219-1333
PHONE: 412-566-1531 FAX: 412-566-1532

DRAWING NAME

SOUTH ELEVATION

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | A-203 |
| ISSUE DATE 02/15/21 | | |




## BUILDING SECTIONS

SCALE: 1/4"=1'-0"

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PROPERTY REHABILITATION FOR:

HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

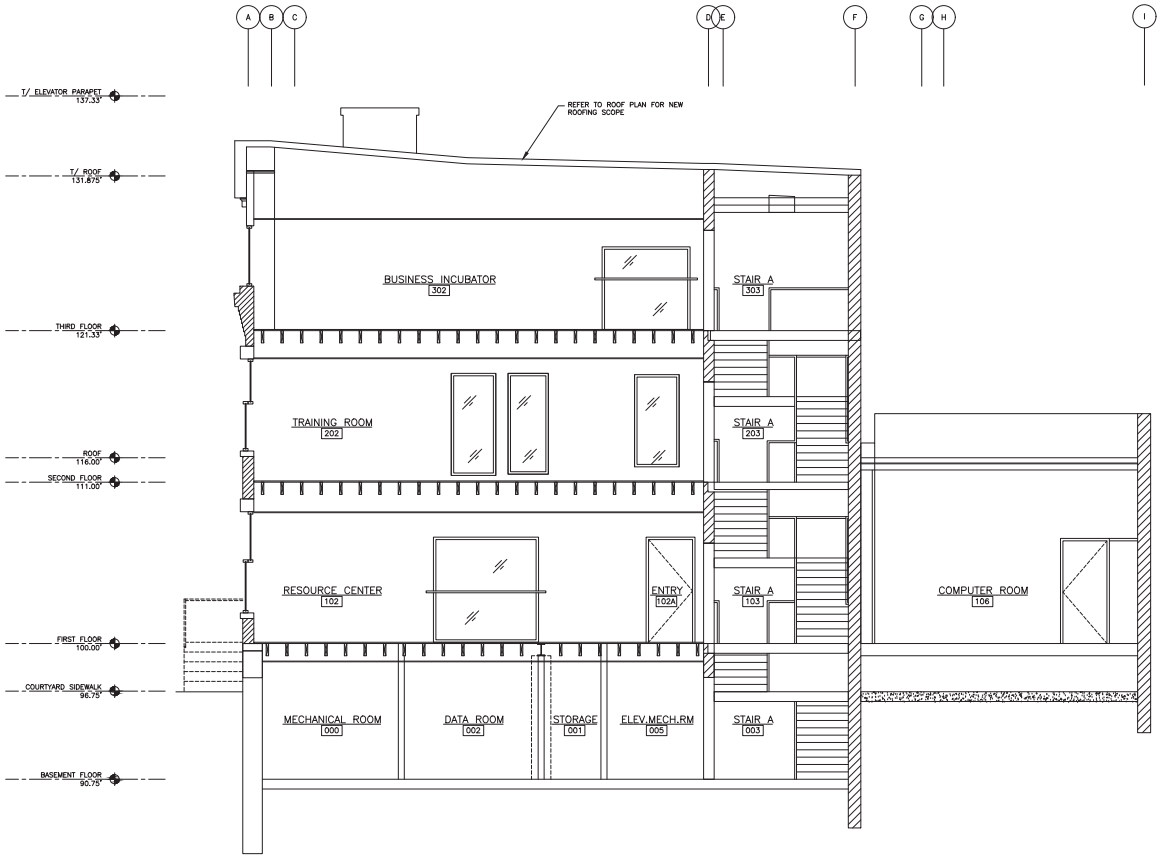
1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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

BUILDING SECTIONS

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | A-301 |
| ISSUE DATE 02/15/21 | | |




## BUILDING SECTIONS

SCALE: 1/4"=1'-0"

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PROPERTY REHABILITATION FOR:

HACP TASK ORDER #35
DEVELOPMENT &
OPPORTUNITIES CENTER
REHAB

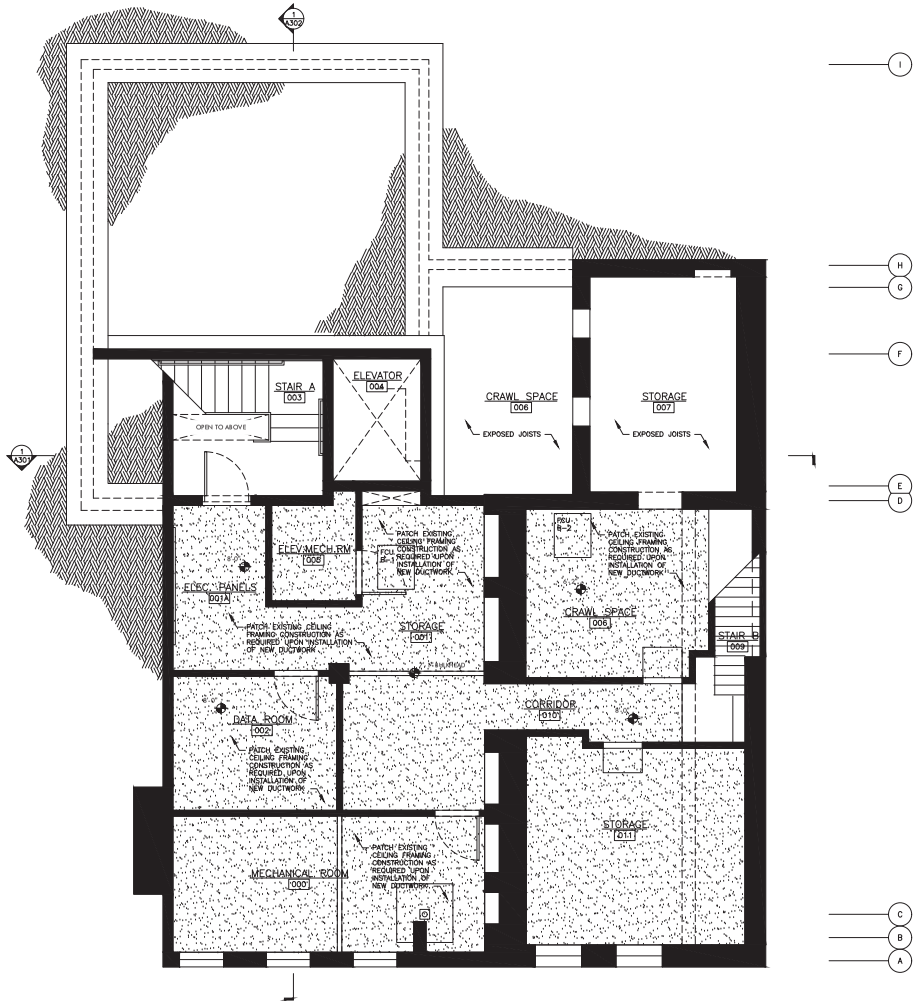
1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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

BUILDING SECTIONS

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | △ | A-302 |
| ISSUE DATE 02/15/21 | | |




## BASEMENT REFLECTED CEILING PLAN

SCALE: 1/4"=1'-0"

GENERAL NOTES:

1.) GENERAL CONTRACTOR SHALL COORDINATE ALL CEILIGN WORK WITH THE COMPLETE SCOPE OF WORK AS SHOWN ON THE FULL SET OF CONSTRUCTION DOCUMENTS INCLUDING STRUCTURAL, MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS.
2.) WHERE PATCH IS REQUIRED UPON INSTALLATION OF NEW WORK, EXISTING CEILING CONSTRUCTION SHALL BE PATCHED TO MATCH.

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REVISIONS

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|---|---|
| 1 | 02.11.2021 INTERIOR DESIGN ISSUE |

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
BASEMENT REFLECTED CEILING PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | A-400 |
| ISSUE DATE 02/15/21 | | |




## FIRST FLOOR REFLECTED CEILING PLAN

SCALE: 1/4"=1'-0"

GENERAL NOTES:

1.) GENERAL CONTRACTOR SHALL COORDINATE ALL CEILIGN WORK WITH THE COMPLETE SCOPE OF WORK AS SHOWN ON THE FULL SET OF CONSTRUCTION DOCUMENTS INCLUDING STRUCTURAL, MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS.
2.) WHERE PATCH IS REQUIRED UPON INSTALLATION OF NEW WORK, EXISTING CEILING CONSTRUCTION SHALL BE PATCHED TO MATCH.

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REVISIONS

1 12-11-2017 INTERIOR DESIGN ISSUE

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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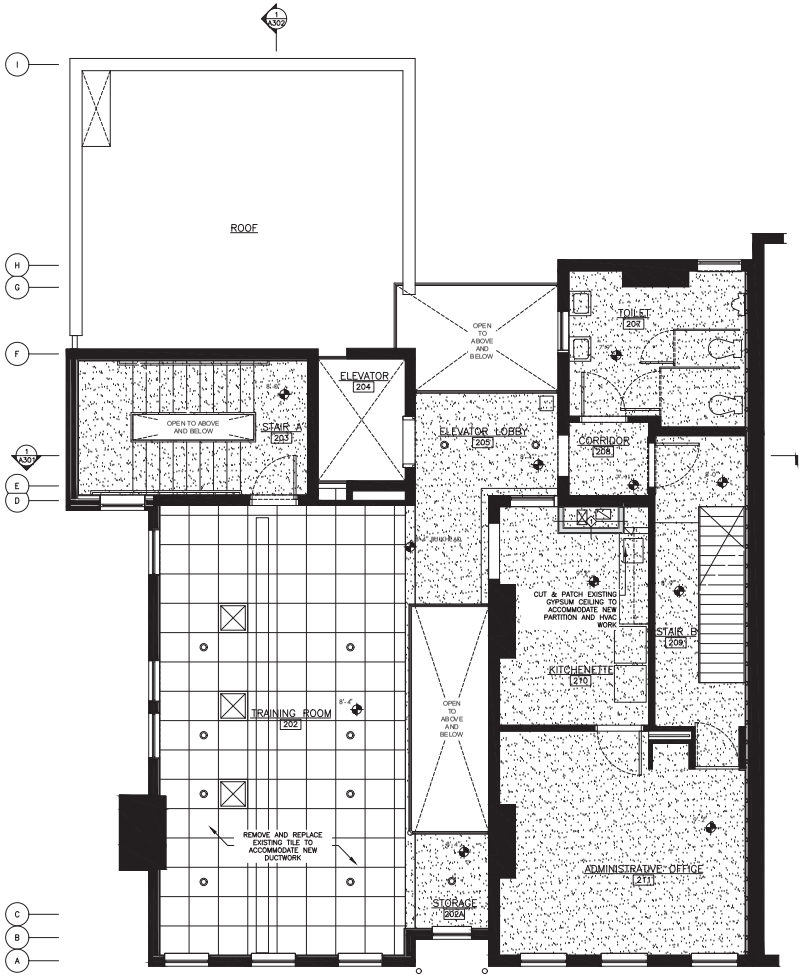
410 FT. PITT COMMONS, 445 FT. PITT BLVD.
PITTSBURGH, PENNSYLVANIA 15219-1333
PHONE: 412-566-1531 FAX: 412-566-1532

DRAWING NAME
FIRST FLOOR REFLECTED CEILING PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | △ | A-401 |
| ISSUE DATE 02/15/21 | | |



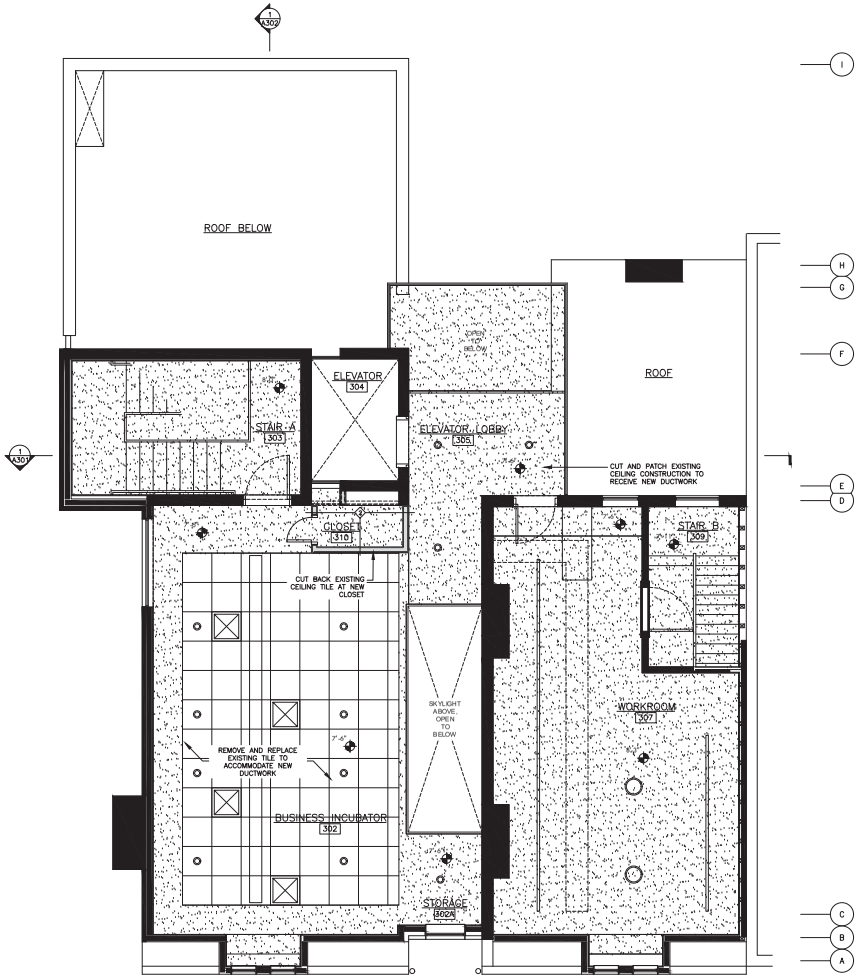

## SECOND FLOOR REFLECTED CEILING PLAN

SCALE: 1/4"=1'-0"

GENERAL NOTES:

1.) GENERAL CONTRACTOR SHALL COORDINATE ALL CEILIGN WORK WITH THE COMPLETE SCOPE OF WORK AS SHOWN ON THE FULL SET OF CONSTRUCTION DOCUMENTS INCLUDING STRUCTURAL, MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS.

2.) WHERE PATCH IS REQUIRED UPON INSTALLATION OF NEW WORK, EXISTING CEILING CONSTRUCTION SHALL BE PATCHED TO MATCH.




## THIRD FLOOR REFLECTED CEILING PLAN

SCALE: 1/4"=1'-0"

GENERAL NOTES:

1.) GENERAL CONTRACTOR SHALL COORDINATE ALL CEILIGN WORK WITH THE COMPLETE SCOPE OF WORK AS SHOWN ON THE FULL SET OF CONSTRUCTION DOCUMENTS INCLUDING STRUCTURAL, MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS.

2.) WHERE PATCH IS REQUIRED UPON INSTALLATION OF NEW WORK, EXISTING CEILING CONSTRUCTION SHALL BE PATCHED TO MATCH.

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REVISIONS

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PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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

SECOND & THIRD FLOOR REFLECTED CEILING PLAN

| CONN. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | A-402 |
| ISSUE DATE 02/15/21 | | |

# FINISH SCHEDULE

| ROOM NUMBER | ROOM NAME | FLOOR | | | | | | | | | | | | BASE | | | | | WALLS | | | | | | | | | | | |

# GENERAL NOTES

1.0 GENERAL

1.1 The structural drawings shall govern the work for structural features, unless otherwise noted. Discrepancies between the architectural and structural drawings shall be reported to the architect and engineer for review and clarification before proceeding with related work.

1.2 In case of conflict between the General Notes, Specifications, and Drawings regarding structural issues, the Contractor shall submit an RFI for clarification.

1.3 Work not indicated on a part of the drawings, but reasonably implied to be similar to that shown at corresponding places, shall be repeated.

1.4 The contractor is responsible for means and methods of construction and construction procedures, fabrication processes, coordination of work with other trades and job site safety.

1.5 Existing building information shown is as indicated on existing building drawings] [and] [from field observation. Information shown may not necessarily reflect actual conditions. The Contractor shall field verify existing building information shown (dimensions, elevations, etc.) and notify the Architect of any discrepancies prior to fabrication of any structural component.

1.6 The structure has been designed for its final/in use condition. Temporary bracing, sheeting, shoring, etc., required to ensure the structural integrity/stability of the structure, adjacent existing structures, sidewalks, utilities, etc., during construction is the Contractor's responsibility and shall be designed by a Registered Professional Engineer employed by the Contractor. Contractor shall be required to demolish owner furnished scaffolding and install temporary shoring upon award of contract.

1.7 Information contained on the hard copy of this drawing retained by Keystone Structural Solutions controls over variances or changes that might be introduced due to plotting by others via electronic document transfer.

1.8 The distribution and/or use of the electronic files of the structural drawings is strictly prohibited unless written authorization is provided by Keystone Structural Solutions.

1.9 The structural construction documents are instruments of professional services and shall remain the property of KSS. The documents are not intended or represented to be suitable for reuse by the Client or others on extensions of this project or on any other project.

2.0 DESIGN CRITERIA

2.1 Design Codes:
a. IBC 2015
b. ANSI/ASCE-7 2010
c. PA Uniform Construction Code (UCC)

2.2 Live Loads:
a. Common Area 100 psf

3.0 STRUCTURAL WOOD

3.1 Design, fabrication and construction of wood framing shall conform with:
a. "Timber Construction Manual", latest edition, as adopted by the American Institute of Timber Construction (AITC), including the "Code of Standard Practice", AITC 106.
b. "National Design Specifications for Wood Construction" (NDS), latest edition.
c. Design Specifications for Metal Plate Connected Wood Trusses" (TPI-85), and for "Parallel Chord Wood Trusses" (PCT-80).
d. Commentary & Recommendations for Handling, Installing and Bracing Metal Plate Connected Wood Trusses" (TPI/HIB-91).

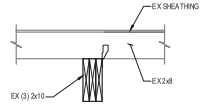
3.2 Sawn lumber shall be Spruce-Pine-Fir (SPF) No.1/No.2 or better, graded in accordance with the NFPA National Design Specification with the following base design values:
a. Fb=875 psi (bending – single member use)
b. Fv=135 psi (horizontal shear)
c. Fc=1150 psi (compression parallel to grain)
d. E=1,400,000 psi (modulus of elasticity)

3.3 Parallel Strand Lumber (PSL) shall be as manufactured by iLevel (Parallam) or equal with the following base design values:
a. Fb=2900 psi (bending)
b. Fv=290 psi (horizontal shear)
c. Fc=2900 psi (compression parallel to grain)
d. E=2,000,000 psi (modulus of elasticity)

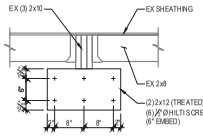
3.4 If alternate manufactured products are used, the contractor is responsible for confirming that those products design properties are equal to or greater than those specified.

3.5 Plywood or OSB sheathing shall be in conformance with American Plywood Association (APA) specifications. Panels should be installed with a 1/8" spacing at all panel end and edge joints. Floor sheathing to be glued and nailed.

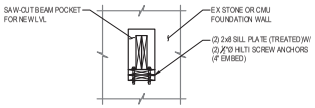
3.6 Wood sills, sleepers, blocking, furring, stripping and similar concealed members in contact with masonry or concrete shall be preservative treated by pressure process in accordance with AWPA UC2




SECTION 1/S1.0
SCALE: 3/4"=1'-0"




SECTION 2/S1.0
SCALE: 3/4"=1'-0"




SECTION 3/S1.0
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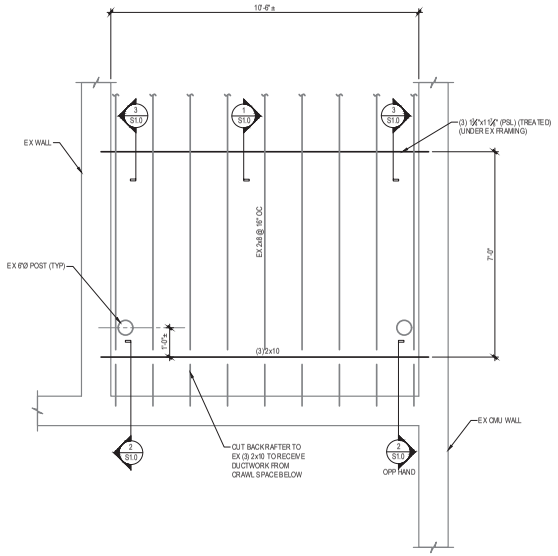


## PARTIAL FIRST FLOOR FRAMING PLAN

SCALE 1/2" = 1'-0"

NOTES:
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## FOR CONSTRUCTION

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ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE.

REVISIONS

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ANTHONY L. MOSCOLLIC ENGINEER PE-041361-E

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

GERARD ASSOCIATES ARCHITECTS
410 FT. PITT COMMONS, 445 FT. PITT BLVD.
PITTSBURGH, PENNSYLVANIA 15219-1333
PHONE: 412-566-1531 FAX: 412-566-1532

Keystone Structural Solutions Consulting Engineers
8150 Perry Highway
Suite 302
Pittsburgh, PA 15237
Phone: 412.369.9020
Fax: 412.369.9021
www.kss-eng.com
20288

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DRAWING NAME
PARTIAL FIRST FLOOR FRAMING PLAN, SECTIONS & GENERAL NOTES

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | | S1.0 |
| ISSUE DATE 02/15/21 | | |

## GENERAL MECHANICAL NOTES (ALL DRAWINGS):

1. MECHANICAL CONTRACTOR SHALL PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE HVAC SYSTEMS AS INDICATED ON THE DRAWINGS, AS SPECIFIED AND REQUIRED BY CODE.
2. THE CONTRACT DOCUMENT DRAWINGS ARE DIAGRAMMATIC ONLY, AND ARE INTENDED TO CONVEY THE SCOPE AND GENERAL ARRANGEMENT OF WORK.
3. ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR BY FIELD INSPECTION PRIOR TO BIDDING. ANY INTERFERENCES TO INSTALLATION SHALL BE NOTED AND THE CONTRACTOR SHALL INCLUDE IN HIS BID PRICE THE COST TO AVOID OR RELOCATE ALL ITEMS, INCLUDING ITEMS OF OTHER TRADES, THAT INTERFERE. ALL WORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED. ALL OFFSETS, RISES, TRANSITIONS AND DROPS IN DUCTS AND PIPING AROUND OBSTRUCTIONS SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
4. VERIFY ALL EQUIPMENT CONNECTIONS WITH MANUFACTURERS' CERTIFIED DRAWINGS. VERIFY AND PROVIDE DUCT TRANSITIONS OR PIPE ADAPTERS TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE ALL DIMENSIONS BEFORE FABRICATION.
5. PROVIDE ACCESS IN WALLS & CEILINGS TO ACCESS ALL EQUIPMENT, VALVES, CONTROL DEVICES, VOLUME DAMPERS, AND FIRE/SMOKE DAMPERS.
6. FOLLOW MANUFACTURE'S RECOMMENDATIONS FOR INSTALLATION OF EQUIPMENT. ALSO REFER TO TYPICAL DETAILS FOR INSTALLATION OF EQUIPMENT.
7. ALL MATERIALS FURNISHED, AND ALL WORK PERFORMED BY THE MECHANICAL CONTRACTOR SHALL BE IN ACCORDANCE WITH ALL APPLICABLE CODES AND REGULATIONS, INCLUDING BUT NOT LIMITED TO THE LATEST APPLICABLE EDITIONS OF NFPA, IEEE, OSHA, SMACNA, INTERNATIONAL MECHANICAL CODE, INTERNATIONAL BUILDING CODE, AND ANY STATE, COUNTY, AND LOCAL CODES.
8. ALL EQUIPMENT, DUCTWORK, ETC., SHALL BE SUPPORTED SUFFICIENTLY AND ANY ADDITIONAL SUPPORT SHALL BE PROVIDED AS REQUIRED TO PROVIDE VIBRATION FREE AND SAFE INSTALLATION. ALL MISCELLANEOUS STEEL REQUIRED AND/OR AS SHOWN IN DETAILS FOR DUCTWORK, AND EQUIPMENT (UNLESS OTHERWISE NOTED) SHALL BE FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR. SUPPORT ALL DUCTWORK, PIPING AND EQUIPMENT MOUNTED ABOVE THE CEILING DIRECTLY FROM THE STRUCTURE. ALL ATTACHMENTS TO BEAMS, TRUSSES, OR JOIST SHALL BE MADE AT PANEL POINTS WITH BEAM CLAMPS MEETING MSS STANDARDS.
9. ALL CONTROL WIRE AND CONDUIT SHALL COMPLY WITH NEC AND ELECTRICAL SPECIFICATIONS FOR THIS PROJECT.

## DUCTWORK GENERAL NOTES (ALL DRAWINGS):

1. ALL DUCTWORK INDICATED IS SCHEMATIC AND SHOW ONLY RELATIVE POSITIONS. PROVIDE OFFSETS, RISES, TRANSITIONS AND ELBOWS AS NEEDED TO INSTALL PROPERLY.
2. PROVIDE ACCESS DOORS IN DUCTWORK FOR OPERATION, ADJUSTMENT, AND MAINTENANCE OF ALL HVAC DEVICES, FANS, DAMPERS, (FIRE, SMOKE, BALANCING) COILS, AND TERMINAL EQUIPMENT.
3. LOCATIONS OF TERMINAL DEVICES, AIR OUTLETS AND INLETS ARE APPROXIMATE. LOCATE PER THE ARCHITECTURAL DRAWINGS AND TO AVOID OTHER TRADE'S WORK. COORDINATE LOCATIONS WITH OTHER TRADES. CONSULT ARCHITECT/ENGINEER FOR CLARIFICATION IF CONFLICTS OCCUR.
4. DUCT DIMENSIONS SHOWN ARE CLEAR INSIDE FACE-TO-FACE DIMENSIONS AND DO NOT INCLUDE DUCT LINER WHERE SPECIFIED. INCREASE DIMENSIONS OF LINED DUCTWORK TO PROVIDE FREE INSIDE AREA EQUAL DIMENSIONS SHOWN. REFER TO THE SPECIFICATIONS FOR LOCATION OF LINED DUCTWORK.
5. FINAL CONNECTIONS FROM HIGH VELOCITY MAIN DUCTS TO AIR TERMINAL UNITS SHALL BE MADE WITH FLEXIBLE DUCTWORK NOT EXCEEDING 3 FEET IN LENGTH. CONNECTIONS BETWEEN LOW VELOCITY DUCTWORK AND/OR TERMINAL UNITS TO AIR INLETS AND OUTLETS SHALL BE MADE WITH FLEXIBLE DUCTWORK NOT EXCEEDING 6 FEET IN LENGTH. LONGER DUCT RUN OUTS SHALL BE CONSTRUCTED OF HARD DUCT OF THE SAME MATERIAL SPECIFIED FOR THE SYSTEM SERVED AND INSULATED AS SPECIFIED FOR THAT SYSTEM. FLEXIBLE DUCTWORK SHALL BE OF THE PRESSURE CLASS AND FACTORY INSULATED AS SPECIFIED FOR THE SYSTEM WHERE INSTALLED.
6. FLEXIBLE DUCTWORK SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS WITHOUT ANY SAGS, SHARP TURNS OR KINKS. AT THE MINIMUM, THE FLEXIBLE DUCTWORK SHALL BE FASTENED TO THE HARD DUCT BY A NYLON STRAP SECURED BY SHEETMETAL SCREWS TO PREVENT SLIPPING OFF FROM COLLAR.
7. PROVIDE VOLUME DAMPERS AT EACH AIR OUTLET, AIR INLET AND TERMINAL DEVICE AND AT EACH BRANCH TAKE-OFF CONNECTION FROM THE MAIN.

## MECHANICAL PIPING GENERAL NOTES (ALL DRAWINGS):

1. ALL PIPING SHOWN HAS BEEN DRAWN SCHEMATICALLY FOR CLARITY AND SHOW ONLY RELATIVE POSITIONS. PROVIDE OFFSETS AND ELBOWS AS NEEDED TO INSTALL PROPERLY AND TO AVOID INTERFERENCES.
2. ALL NEW OR REPLACED HYDRONIC PIPING SHALL BE INSTALLED SO THAT IT CAN BE COMPLETELY VENTED AT HIGH POINTS AND DRAINED AT LOW POINTS. PROVIDE AIR VENTS AT HIGH POINTS, TYPE PER SPECIFICATIONS. PROVIDE 1/2" BALL VALVES WITH HOSE END CONNECTIONS AND CAPS AT LOW POINT. ALL WATER MAINS SHALL BE INSTALLED LEVEL, UNLESS OTHERWISE NOTES.
3. PROVIDE SERVICE VALVES AT EACH BRANCH CONNECTION FROM MAINS AND AT EACH TERMINAL DEVICE OR EQUIPMENT CONNECTION.
4. CONTRACTOR SHALL PROVIDE NEW VALVES ON EXISTING PIPING WHERE THE PIPES ARE TO BE REMOVED SO THAT THE SYSTEM DOES NOT HAVE TO BE DRAINED WHILE REMOVING EXISTING UNITS, INSTALLING NEW UNITS AND MAKING CONNECTIONS TO NEW EQUIPMENT.

## MECHANICAL DUCTWORK & GENERAL SYMBOLS LEGEND

| SYMBOL | ABRV. | DESCRIPTION |
|---|---|---|
| | XTR | EXISTING EQUIPMENT OR DUCTWORK TO REMAIN |
| | RX | EXISTING EQUIPMENT OR DUCTWORK TO BE REMOVED |
| | | NEW EQUIPMENT OR DUCTWORK |
| | | LINED DUCTWORK |
| | | SUPPLY DUCT UP |
| | | SUPPLY DUCT DOWN |
| | | RETURN / EXHAUST DUCT UP |
| | | RETURN / EXHAUST DUCT DOWN |
| | | ROUND DUCT ELBOW UP |
| | | ROUND DUCT ELBOW DOWN |
| | | ELBOW WITH TURNING VANES |
| R | | DUCT OFFSET UP |
| D | | DUCT OFFSET DOWN |
| | | SQUARE / RECTANGULAR DUCT TRANSITION |
| | | SQUARE/RECTANGULAR TO ROUND DUCT TRANSITION |
| | CD | CEILING DIFFUSER. - ROUND NECK - # THROW DIRECTIONS |
| | SD | SUPPLY DIFFUSER - RECTANGULAR - MULTI-DIRECT. |
| | SG/EG | SIDEWALL SUPPLY or RETURN GRILLE - (R = REGISTER) |
| | LD | LINEAR DIFFUSER. SEE SCHEDULE FOR INFORMATION. |
| | RG/EG | RETURN or EXHAUST GRILLE - (R = REGISTER) |
| | | FLEXIBLE DUCT |
| | FLEX | FLEXIBLE DUCT CONNECTION (TO EQUIPMENT) |
| | | SPIN TAP WITH VOLUME CONTROL DAMPER |
| | VD | VOLUME CONTROL DAMPER |
| BDD | BDD | BACKDRAFT DAMPER |
| M | MD | MOTORIZED DAMPER |
| | FD | VERTICAL FIRE DAMPER (WALL) |
| | HFD | HORIZONTAL FIRE DAMPER (FLOOR) |
| | SD | VERTICAL SMOKE DAMPER (WALL) |
| | HSD | HORIZONTAL SMOKE DAMPER (FLOOR) |
| | FD/SD | COMBINATION VERTICAL FIRE & SMOKE DAMPER |
| | HFD/SD | COMBINATION HORIZONTAL FIRE & SMOKE DAMPER |
| DD | DD | DUCT SMOKE DETECTOR |
| T | | THERMOSTAT |
| H | | HUMIDISTAT |
| SP | | STATIC PRESSURE SENSOR |
| CQ | | CARBON DIOXIDE SENSOR |
| CO | | CARBON MONOXIDE SENSOR |
| TAG # | | EQUIPMENT UNIT DESIGNATION |
| TAG CFM | | DIFFUSER, REGISTER & GRILLE UNIT DESIGNATION W/ CFM |
| U | | UNDER CUT DOOR |
| L | | LOUVERED DOOR |
| | | CONNECTION POINT, NEW TO EXISTING |
| | | DISCONNECTION POINT |
| 1 | | DRAWING KEYNOTE |
| 1 | | DEMOLITION DRAWING KEYNOTE |
| 1 | | REVISION NUMBER |
| | RA or EA | RETURN OR EXHAUST AIR |
| | SA or OA | SUPPLY OR OUTSDIE AIR |

## MECHANICAL PIPING SYMBOLS LEGEND

| SYMBOL | ABRV. | DESCRIPTION |
|---|---|---|
| HWS | HWS | HEATING WATER SUPPLY PIPING |
| HWR | HWR | HEATING WATER RETURN PIPING |
| CWS | CWS | CONDENSER WATER SUPPLY PIPING |
| CWR | CWR | CONDENSER WATER RETURN PIPING |
| CHWS | CHWS | CHILLED WATER SUPPLY PIPING |
| CHWR | CHWR | CHILLED WATER RETURN PIPING |
| G | G | NATURAL GAS PIPING |
| D | D | CONDENSATE DRAIN PIPING |
| R | R | REFRIGERANT PIPING |
| LPS | LPS | LOW PRESSURE STEAM SUPPLY PIPING (0-15 PSIG) |
| MPS | MPS | MEDIUM PRESSURE STEAM SUPPLY PIPING (16-60 PSIG) |
| HPS | HPS | HIGH PRESSURE STEAM SUPPLY PIPING (61 TO 200 PSIG) |
| LPR | LPR | LOW PRESSURE STEAM CONDENSATE RETURN |
| MPR | MPR | MEDIUM PRESSURE STEAM CONDENSATE RETURN |
| HPR | HPR | HIGH PRESSURE STEAM CONDENSATE RETURN |
| PC | PC | PUMPED STEAM CONDENSATE |
| V | V | VENT PIPING |
| CW | CW | CITY (DOMESTIC) WATER |
| FOS | FOS | FUEL OIL SUPPLY PIPING |
| FOR | FOR | FUEL OIL RETURN PIPING |
| | | ELBOW TURNED UP |
| | | ELBOW TURNED DOWN |
| | | BOTTOM PIPE CONNECTION |
| | | TOP PIPE CONNECTION |
| | | PIPING CAP |
| | | UNION |
| | | FLANGED CONNECTION |
| | | CONCENTRIC PIPE REDUCER |
| | | ECCENTRIC PIPE REDUCER |
| | | FLOW ARROW |
| | BV | BALL VALVE |
| | BFV | BUTTERFLY VALVE |
| | PV | PLUG VALVE |
| | GV | GATE VALVE |
| | GBV | GLOBE VALVE |
| | CV | CHECK VALVE |
| | | 2-WAY CONTROL VALVE |
| | | 3-WAY CONTROL VALVE |
| | | CIRCUIT SETTER (BALANCING VALVE) |
| | | STRAINER (W/ BALL VALVE AND CAP) |
| | | BACKFLOW PREVENTER |
| | | PRESSURE REGULATING VALVE |
| | | PRESSURE RELIEF VALVE |
| | | TRIPLE DUTY VALVE WITH MEASURING CONNECTIONS |
| | | PRESSURE GAGE W/ SHUT-OFF |
| | | FLEXIBLE CONNECTOR |
| | | AUTOMATIC AIR VENT |
| | | HOSE BIB |

## MECHANICAL ABBREVIATIONS

| ABRV. | DESCRIPTION |
|---|---|
| HVAC | HEATING, VENTILATION AND AIR CONDITIONING |
| MBH | 1000 - BRITISH THERMAL UNITS |
| KW | 1000-WATT (1 KW = 3,412 BTUH) |
| SENS. | SENSIBLE |
| LAT. | LATENT |
| E.A.T. | ENTERING AIR TEMPERATURE |
| L.A.T. | LEAVING AIR TEMPERATURE |
| E.W.T. | ENTERING WATER TEMPERATURE |
| L.W.T. | LEAVING WATER TEMPERATURE |
| DB/WB | DRY BULB / WET BULB |
| IN. W.G. | INCHES WATER GAUGE (AIR) |
| FT. W.G. | FEET WATER GAUGE (HYDRONIC) |
| E.S.P. | EXTERNAL STATIC PRESSURE |
| T.S.P. | TOTAL STATIC PRESSURE |
| TG | TRANSFER GRILLE |
| TR | TOP REGISTER |
| (E) | EXISTING |
| R / R | REMOVE EXISTING ITEM & RELOCATE TO NEW LOCATION |
| UNO | UNLESS NOTED OTHERWISE |
| NTS | NOT TO SCALE |
| NIC | NOT IN CONTRACT |
| Ø OR PH | PHASE |
| Ø | DIAMETER |
| AFF | ABOVE FINISHED FLOOR |
| ELEV. | ELEVATION FROM DATUM |

NOTES:
1. NOT ALL SYMBOLS AND ABBREVIATIONS ARE IN USE FOR THIS PROJECT.

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REVISIONS

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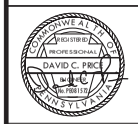



PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

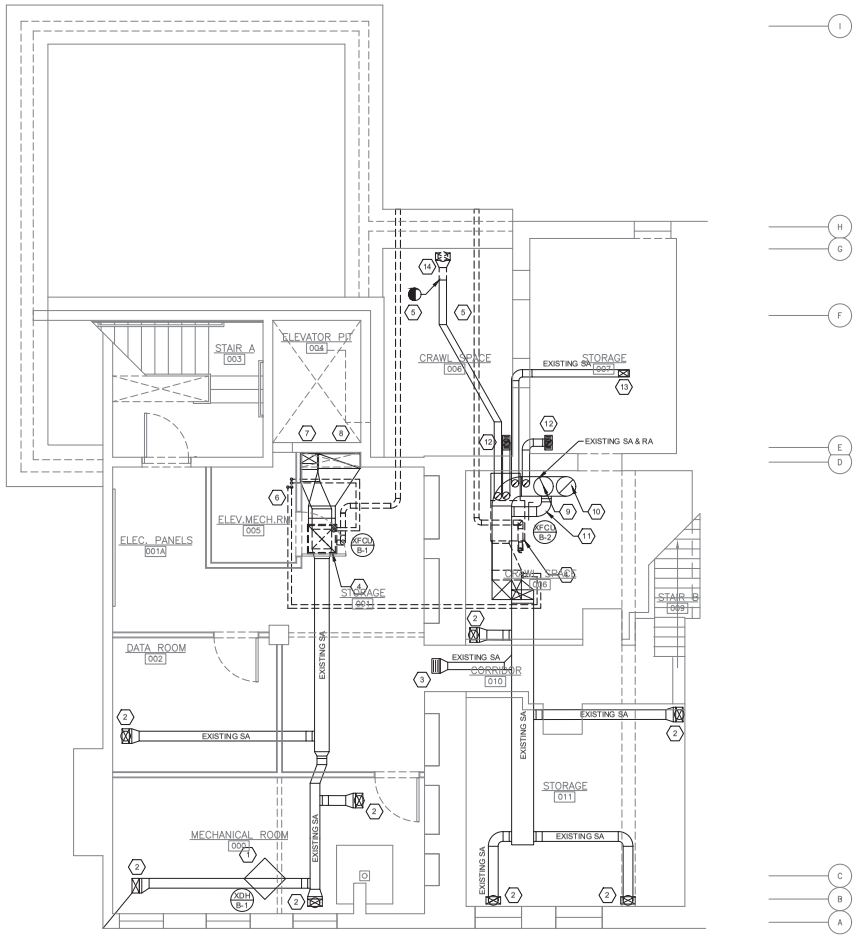
GERARD
ASSOCIATES ARCHITECTS
410 FT. PITT COMMONS, 445 FT. PITT BLVD.
PITTSBURGH, PENNSYLVANIA 15219-1333
PHONE: 412-566-1531 FAX: 412-566-1532

DRAWING NAME
MECHANICAL DATA SHEET

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | △ | M-001 |
| ISSUE DATE 02/15/2021 | | |

Allen + Shariff
MEP Engineering
2 Allegheny Center, Nova Tower 2 - Suite 1001 - Pittsburgh, PA 15212

ASE JOB #2041090




1 BASEMENT MECHANICAL DEMOLITION PLAN
M-100 1/4" = 1'-0"

## MECHANICAL DEMOLITION GENERAL NOTES:

1. MC SHALL VERIFY EXISTING CONDITIONS AND LOCATIONS OF EQUIPMENT, DUCTWORK, PIPING, AND GRILLES, REGISTERS AND DIFFUSERS IN FIELD PRIOR TO BID. MC SHALL VERIFY EQUIPMENT IS IN GOOD WORKING ORDER AND THAT ANY COMPONENTS OF EQUIPMENT THAT REQUIRE REPLACEMENT ARE REPLACED PRIOR TO RE-INSTALLATION. EXISTING GRILLES, REGISTERS AND DIFFUSERS TO REMAIN SHALL BE CLEANED OF DUST AND DEBRIS PRIOR TO FINAL RE-INSTALLATION AND EQUIPMENT STARTUP.
2. ALL MECHANICAL EQUIPMENT, SENSORS AND DAMPERS LOCATED ABOVE HARD CEILINGS OR WITHIN WALLS SHALL BE PROVIDED WITH ACCESS PANELS SIZED IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION REQUIREMENTS AND SUCH THAT THE FULL REMOVAL OF THE EQUIPMENT AND/OR DAMPER IS POSSIBLE. PROVIDE RATED ACCESS PANELS FOR ALL ACCESS PANELS LOCATED WITHIN RATED CEILINGS OR WALLS. ACCESS DOORS SHALL BE TAMPER AND VANDAL PROOF.
3. MC SHALL VERIFY ALL EQUIPMENT TO REMAIN IS FUNCTIONING PROPERLY AND IS IN GOOD WORKING CONDITION.
4. MC SHALL COORDINATE WITH GC TO PATCH ALL EXISTING TO REMAIN WALL, FLOOR AND CEILING PENETRATIONS TO MATCH EXISTING MATERIAL AT ALL DEMOLISHED PIPE, DUCT, AND MECHANICAL SYSTEMS RELATED PENETRATIONS.

## MECHANICAL DEMOLITION KEY NOTES: (#)

1. EXISTING PLUG-IN DEHUMIDIFIER AND ASSOCIATED APPURTENANCES TO REMAIN. VERIFY LOCATION IN FIELD.
2. EXISTING SUPPLY DUCT UP TO FLOOR REGISTER AT FLOOR ABOVE TO REMAIN. VERIFY SIZE AND LOCATION OF DUCTWORK IN FIELD.
3. EXISTING DUCT MOUNTED SUPPLY GRILLE, ASSOCIATED APPURTENANCES AND BRANCH TAP SHALL REMAIN. VERIFY SIZE AND LOCATION OF DUCTWORK IN FIELD.
4. EXISTING FURNACE, ASSOCIATED COOLING COIL, AND ASSOCIATED APPURTENANCES TO BE DEMOLISHED IN THEIR ENTIRETY. VERIFY SIZE AND LOCATION OF ALL EQUIPMENT AND APPURTENANCES IN FIELD.
5. FLUE PIPING ASSOCIATED WITH FURNACE SHALL BE DEMOLISHED IN ITS ENTIRETY. MC SHALL VERIFY ROUTING IN FIELD.
6. (2) SUCTION AND LIQUID REFRIGERANT LINESETS FROM ASSOCIATED FURNACES TO CONDENSING UNITS AND ALL ASSOCIATED APPURTENANCES TO BE DEMOLISHED IN THEIR ENTIRETY. VERIFY EXACT LOCATION AND ROUTING IN FIELD.
7. EXISTING SUPPLY DUCT UP TO FLOOR ABOVE AND ASSOCIATED FIRE/SMOKE DAMPER TO REMAIN. VERIFY SIZE AND LOCATION OF DUCTWORK IN FIELD.
8. EXISTING RETURN DUCT UP TO FLOOR ABOVE AND ASSOCIATED FIRE/SMOKE DAMPER TO REMAIN. VERIFY SIZE AND LOCATION OF DUCTWORK IN FIELD.
9. EXISTING SUPPLY DUCT UP TO FLOOR ABOVE AND ASSOCIATED FIRE/SMOKE DAMPER TO REMAIN. VERIFY SIZE AND LOCATION OF DUCTWORK IN FIELD.
10. EXISTING RETURN DUCT UP TO FLOOR ABOVE AND ASSOCIATED FIRE/SMOKE DAMPER TO REMAIN. VERIFY SIZE AND LOCATION OF DUCTWORK IN FIELD.
11. EXISTING BYPASS DAMPER AND ASSOCIATED APPURTENANCES TO REMAIN. VERIFY SIZE AND LOCATION IN FIELD.
12. EXISTING SUPPLY DIFFUSER AND ASSOCIATED BRANCH DUCTWORK AND APPURTENANCES TO REMAIN. VERIFY SIZE AND LOCATION IN FIELD.
13. EXISTING SUPPLY DUCT UP TO WALL GRILLE AT FLOOR ABOVE TO REMAIN. VERIFY SIZE AND LOCATION OF DUCTWORK IN FIELD.
14. EXISTING SUPPLY DUCTWORK AND TRANSITION UP TO FLOOR GRILLE ABOVE TO BE DISCONNECTED FROM SUPPLY AIR DUCT AND DEMOLISHED.

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REVISIONS

| |
|---|
| 1 |

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

GERARD
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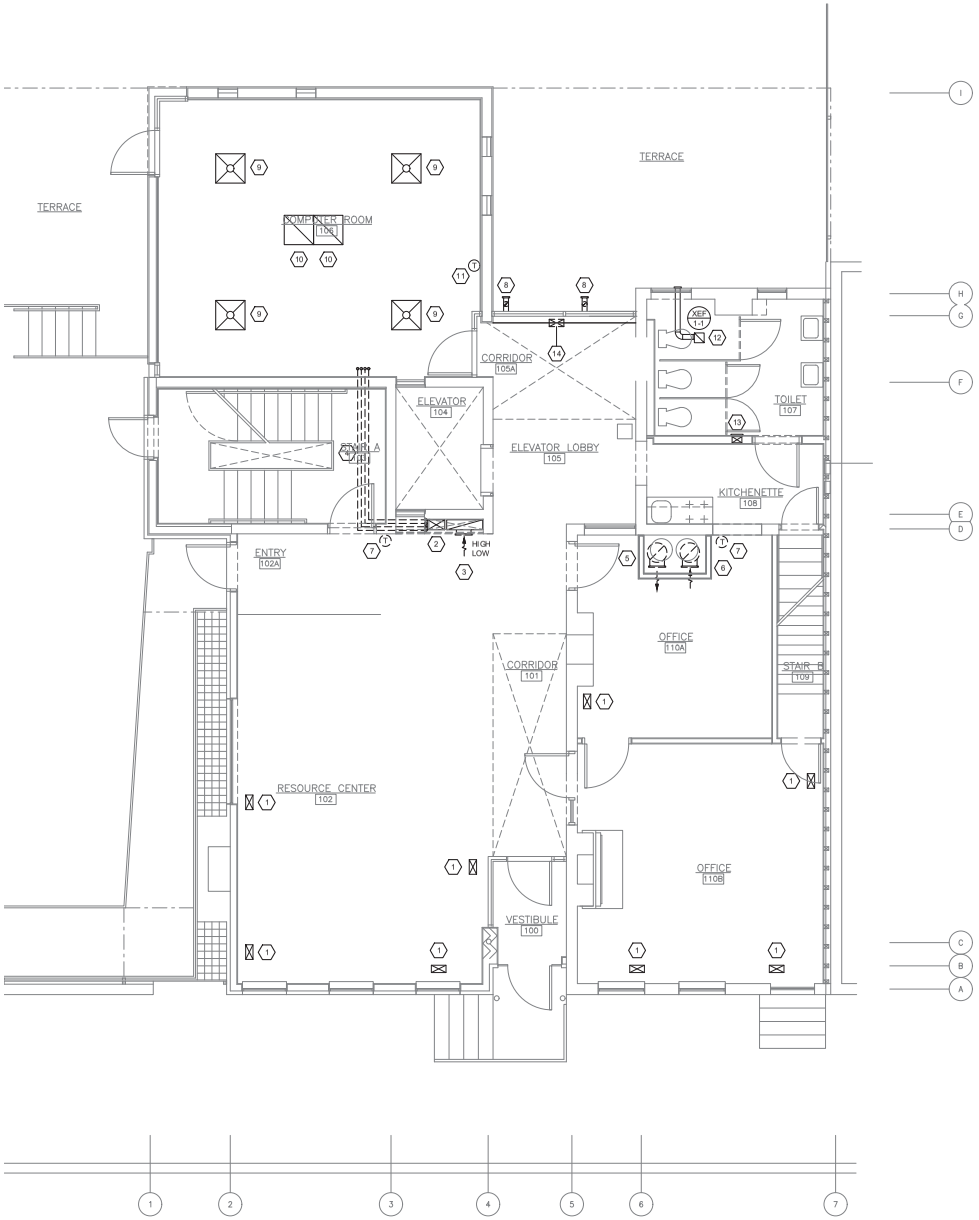
410 FT. PITT COMMONS, 445 FT. PITT BLVD.
PITTSBURGH, PENNSYLVANIA 15219-1333
PHONE: 412-566-1531 FAX: 412-566-1532

DRAWING NAME
BASEMENT MECHANICAL DEMOLITION PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | M-100 |
| ISSUE DATE 02/15/2021 | | |

Allen + Shariff
MEP Engineering
2 Allegheny Center, Nova Tower 2 - Suite 1001 - Pittsburgh, PA 15212
ASE JOB #2041090




1 M-101 FIRST FLOOR MECHANICAL DEMOLITION PLAN
1/4" = 1'-0"

## MECHANICAL DEMOLITION GENERAL NOTES:

1. MC SHALL VERIFY EXISTING CONDITIONS AND LOCATIONS OF EQUIPMENT, DUCTWORK, PIPING, AND GRILLES, REGISTERS AND DIFFUSERS IN FIELD PRIOR TO BID. MC SHALL VERIFY EQUIPMENT IS IN GOOD WORKING ORDER AND THAT ANY COMPONENTS OF EQUIPMENT THAT REQUIRE REPLACEMENT ARE REPLACED PRIOR TO RE-INSTALLATION. EXISTING GRILLES, REGISTERS AND DIFFUSERS TO REMAIN SHALL BE CLEANED OF DUST AND DEBRIS PRIOR TO FINAL RE-INSTALLATION AND EQUIPMENT STARTUP.
2. ALL MECHANICAL EQUIPMENT, SENSORS AND DAMPERS LOCATED ABOVE HARD CEILINGS OR WITHIN WALLS SHALL BE PROVIDED WITH ACCESS PANELS SIZED IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION REQUIREMENTS AND SUCH THAT THE FULL REMOVAL OF THE EQUIPMENT AND/OR DAMPER IS POSSIBLE. PROVIDE RATED ACCESS PANELS FOR ALL ACCESS PANELS LOCATED WITHIN RATED CEILINGS OR WALLS. ACCESS DOORS SHALL BE TAMPER AND VANDAL PROOF.
3. MC SHALL VERIFY ALL EQUIPMENT TO REMAIN IS FUNCTIONING PROPERLY AND IS IN GOOD WORKING CONDITION.
4. MC SHALL COORDINATE WITH GC TO PATCH ALL EXISTING TO REMAIN WALL, FLOOR AND CEILING PENETRATIONS TO MATCH EXISTING MATERIAL AT ALL DEMOLISHED PIPE, DUCT, AND MECHANICAL SYSTEMS RELATED PENETRATIONS.

## MECHANICAL DEMOLITION KEY NOTES: (M)

1. EXISTING SUPPLY FLOOR GRILLE TO REMAIN. VERIFY SIZE AND LOCATION IN FIELD.
2. EXISTING SUPPLY DUCT IN CHASE TO REMAIN. VERIFY SIZE AND LOCATION IN FIELD.
3. EXISTING RETURN DUCT IN CHASE TO REMAIN. RETURN GRILLES LOCATED HIGH AND LOW AT GYPSUM WALL SHALL BE DEMOLISHED. MC SHALL COORDINATE WITH GC TO PATCH WALL TO MATCH EXISTING CONSTRUCTION AND EXISTING FIRE RATING AT GYPSUM WALL ENCLOSURE. VERIFY EXACT LOCATION AND SIZE IN FIELD.
4. (2) SUCTION AND LIQUID REFRIGERANT LINESETS FROM ASSOCIATED FURNACES TO CONDENSING UNITS AND ALL ASSOCIATED APPURTENANCES TO BE DEMOLISHED IN THEIR ENTIRETY. VERIFY EXACT LOCATION AND ROUTING IN FIELD.
5. EXISTING SUPPLY DUCT UP TO FLOOR ABOVE AND DOWN TO FLOOR BELOW TO BE DEMOLISHED. DUCT MOUNTED SUPPLY GRILLE AND BRANCH TAP AT THIS FLOOR SHALL BE DEMOLISHED. VERIFY SIZE AND LOCATION OF DUCTWORK IN FIELD.
6. EXISTING RETURN DUCT UP TO FLOOR ABOVE AND DOWN TO FLOOR BELOW TO BE DEMOLISHED. DUCT MOUNTED RETURN GRILLE AND BRANCH TAP AT THIS FLOOR SHALL BE DEMOLISHED. MC SHALL REPLACE VERTICAL RETURN DUCT SECTION AT WHICH SUPPLY TAP WAS LOCATED IN KIND. VERIFY SIZE AND LOCATION OF DUCTWORK IN FIELD.
7. EXISTING THERMOSTAT FOR FURNACE AND CONDENSING UNIT SYSTEM AND ALL ASSOCIATED CONTROL WIRING TO BE DEMOLISHED. MC SHALL VERIFY ROUTING OF CONTROL WIRING IN FIELD.
8. EXISTING FLUE AND TERMINATION SHALL BE DEMOLISHED IN ITS ENTIRETY. EXTERIOR WALL PENETRATION SHALL BE TEMPORARILY COVERED FOR FUTURE FLUE PIPING INSTALLATION. VERIFY EXACT LOCATION AND ROUTING IN FIELD.
9. EXISTING SUPPLY DIFFUSER AND ASSOCIATED DUCTWORK AND APPURTENANCES TO REMAIN. VERIFY LOCATION IN FIELD.
10. EXISTING RETURN GRILLE AND ASSOCIATED DUCTWORK AND APPURTENANCES TO REMAIN. VERIFY LOCATION IN FIELD.
11. EXISTING THERMOSTAT FOR ROOFTOP UNIT AND ALL ASSOCIATED CONTROL WIRING TO BE REMAIN.
12. EXISTING EXHAUST FAN AND ASSOCIATED DUCTWORK AND TERMINATION TO REMAIN. VERIFY LOCATION IN FIELD.
13. EXISTING WALL MOUNTED SUPPLY DIFFUSER AND ASSOCIATED DUCTWORK TO REMAIN. VERIFY SIZE AND LOCATION IN FIELD.
14. MC SHALL DISCONNECT FLOOR GRILLE AND ASSOCIATED APPURTENANCES AND SHALL DEMOLISHED. VERIFY SIZE AND LOCATION OF DUCT IN FIELD. MC SHALL COORDINATE WITH GC TO PATCH FLOOR TO MATCH EXISTING FLOOR CONSTRUCTION, MATERIAL AND FINISH.

FOR CONSTRUCTION

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
FIRST FLOOR MECHANICAL DEMOLITION PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | M-101 |
| ISSUE DATE 02/15/2021 | | |

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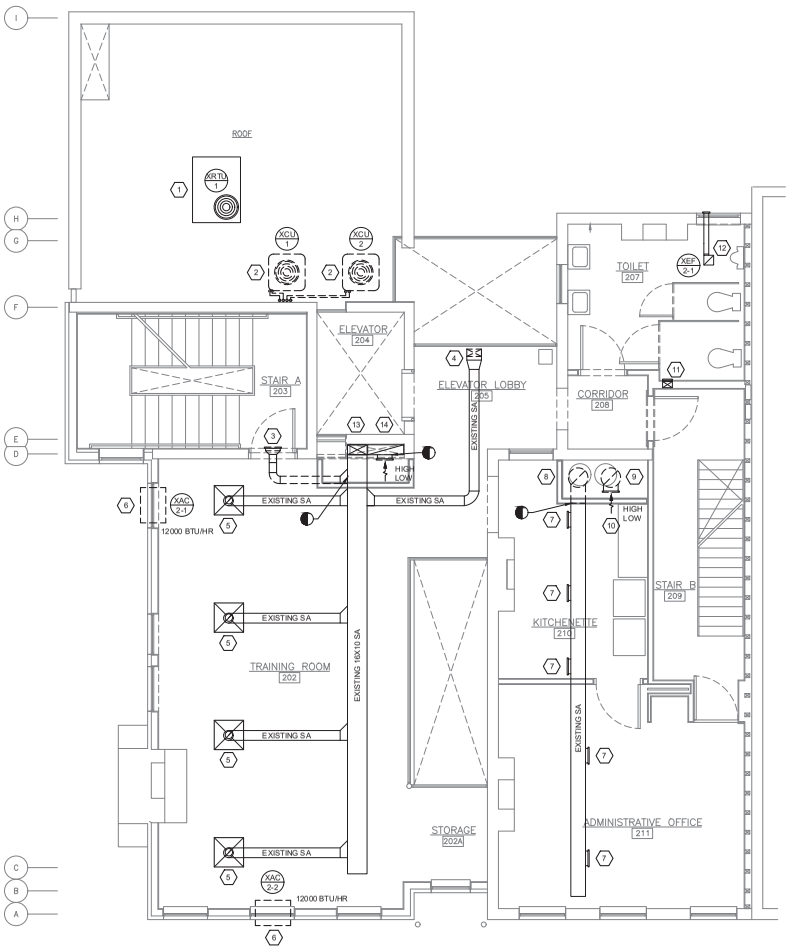
MEP Engineering
2 Allegheny Center, Nova Tower 2 - Suite 1001 - Pittsburgh, PA 15212
ASE JOB #2041090




1 M-102 SECOND FLOOR MECHANICAL DEMOLITION PLAN
1/4" = 1'-0"

## MECHANICAL DEMOLITION GENERAL NOTES:

1. MC SHALL VERIFY EXISTING CONDITIONS AND LOCATIONS OF EQUIPMENT, DUCTWORK, PIPING, AND GRILLES, REGISTERS AND DIFFUSERS IN FIELD PRIOR TO BID. MC SHALL VERIFY EQUIPMENT IS IN GOOD WORKING ORDER AND THAT ANY COMPONENTS OF EQUIPMENT THAT REQUIRE REPLACEMENT ARE REPLACED PRIOR TO RE-INSTALLATION. EXISTING GRILLES, REGISTERS AND DIFFUSERS TO REMAIN SHALL BE CLEANED OF DUST AND DEBRIS PRIOR TO FINAL RE-INSTALLATION AND EQUIPMENT STARTUP.
2. ALL MECHANICAL EQUIPMENT, SENSORS AND DAMPERS LOCATED ABOVE HARD CEILINGS OR WITHIN WALLS SHALL BE PROVIDED WITH ACCESS PANELS SIZED IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION REQUIREMENTS AND SUCH THAT THE FULL REMOVAL OF THE EQUIPMENT AND/OR DAMPER IS POSSIBLE. PROVIDE RATED ACCESS PANELS FOR ALL ACCESS PANELS LOCATED WITHIN RATED CEILINGS OR WALLS. ACCESS DOORS SHALL BE TAMPER AND VANDAL PROOF.
3. MC SHALL VERIFY ALL EQUIPMENT TO REMAIN IS FUNCTIONING PROPERLY AND IS IN GOOD WORKING CONDITION.
4. MC SHALL COORDINATE WITH GC TO PATCH ALL EXISTING TO REMAIN WALL, FLOOR AND CEILING PENETRATIONS TO MATCH EXISTING MATERIAL AT ALL DEMOLISHED PIPE, DUCT, AND MECHANICAL SYSTEMS RELATED PENETRATIONS.

## MECHANICAL DEMOLITION KEY NOTES: (#)

1. EXISTING ROOFTOP UNIT AND ALL ASSOCIATED APPURTENANCES TO REMAIN. VERIFY LOCATION AND SIZE IN FIELD.
2. EXISTING CONDENSING UNIT AND ALL ASSOCIATED APPURTENANCES BE DEMOLISHED. SUCTION AND LIQUID REFRIGERANT LINESETS FROM EACH CONDENSING UNIT TO BE DEMOLISHED. MC SHALL PATCH ROOF TO MATCH EXISTING CONSTRUCTION. VERIFY SIZE, LOCATION AND ROUTING OF REFRIGERANT IN FIELD.
3. EXISTING SUPPLY DIFFUSER AND ASSOCIATED SUPPLY BRANCH DUCTWORK SHALL BE DEMOLISHED. MC SHALL COORDINATE WITH GC TO PATCH STAIRWELL PENETRATION SUCH THAT FIRE RATING OF STAIRWELL IS MAINTAINED. VERIFY SIZE AND LOCATION OF DIFFUSER AND WALL PENETRATION IN FIELD.
4. EXISTING SUPPLY BRANCH DUCTWORK ASSOCIATED WITH SUPPLY FLOOR GRILLE AT FLOOR ABOVE TO BE DISCONNECTED FROM FLOOR GRILLE. VERIFY SIZE AND LOCATION IN FIELD.
5. EXISTING SUPPLY DIFFUSER AND ASSOCIATED FLEXIBLE DUCT CONNECTION TO BE RELOCATED IN ACOUSTIC TILE CEILING. VERIFY LOCATION OF DIFFUSER IN FIELD.
6. EXISTING COOLING ONLY PTAC UNIT SHALL BE REMOVED FROM WINDOW AND RETURNED INTACT AND FULLY OPERATIONAL TO BUILDING OWNER.
7. EXISTING DUCT MOUNTED DIFFUSER TO REMAIN. VERIFY LOCATION IN FIELD.
8. EXISTING VERTICAL SUPPLY DUCTWORK DOWN TO FLOOR BELOW AND UP TO FLOOR ABOVE TO BE DEMOLISHED. BRANCH DUCTWORK SHALL BE DEMOLISHED TO POINT INDICATED ON DRAWINGS. VERIFY EXACT LOCATION AND SIZE IN FIELD.
9. EXISTING VERTICAL RETURN DUCTWORK DOWN TO FLOOR BELOW AND UP TO FLOOR ABOVE AND ASSOCIATED RETURN GRILLES AT THIS FLOOR TO BE DEMOLISHED. VERIFY EXACT LOCATION IN FIELD. VERIFY EXACT LOCATION AND SIZE IN FIELD.
10. EXISTING DUCT MOUNTED RETURN GRILLE HIGH AND LOW TO REMAIN. VERIFY SIZE AND LOCATION IN FIELD.
11. EXISTING SUPPLY GRILLE AND ASSOCIATED DUCTWORK IN WALL TO REMAIN. VERIFY LOCATION IN FIELD.
12. EXISTING EXHAUST FAN AND ASSOCIATED DUCTWORK AND TERMINATION TO REMAIN. VERIFY LOCATION IN FIELD.
13. EXISTING VERTICAL SUPPLY DUCTWORK DOWN TO FLOOR BELOW AND UP TO FLOOR ABOVE TO REMAIN. VERIFY EXACT LOCATION AND SIZE IN FIELD.
14. EXISTING VERTICAL RETURN DUCTWORK DOWN TO FLOOR BELOW AND UP TO FLOOR ABOVE TO REMAIN. RETURN GRILLES LOCATED HIGH AND LOW AT GYPSUM WALL SHALL BE DEMOLISHED. MC SHALL COORDINATE WITH GC TO PATCH WALL TO MATCH EXISTING CONSTRUCTION AND

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

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BUILDING #35
PITTSBURGH, PA 15233

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PITTSBURGH, PENNSYLVANIA 15219-1333
PHONE: 412-566-1531 FAX: 412-566-1532

DRAWING NAME
SECOND FLOOR MECHANICAL DEMOLITION PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | M-102 |
| ISSUE DATE 02/15/2021 | | |

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2 Allegheny Center, Nova Tower 2 - Suite 1001 - Pittsburgh, PA 15212

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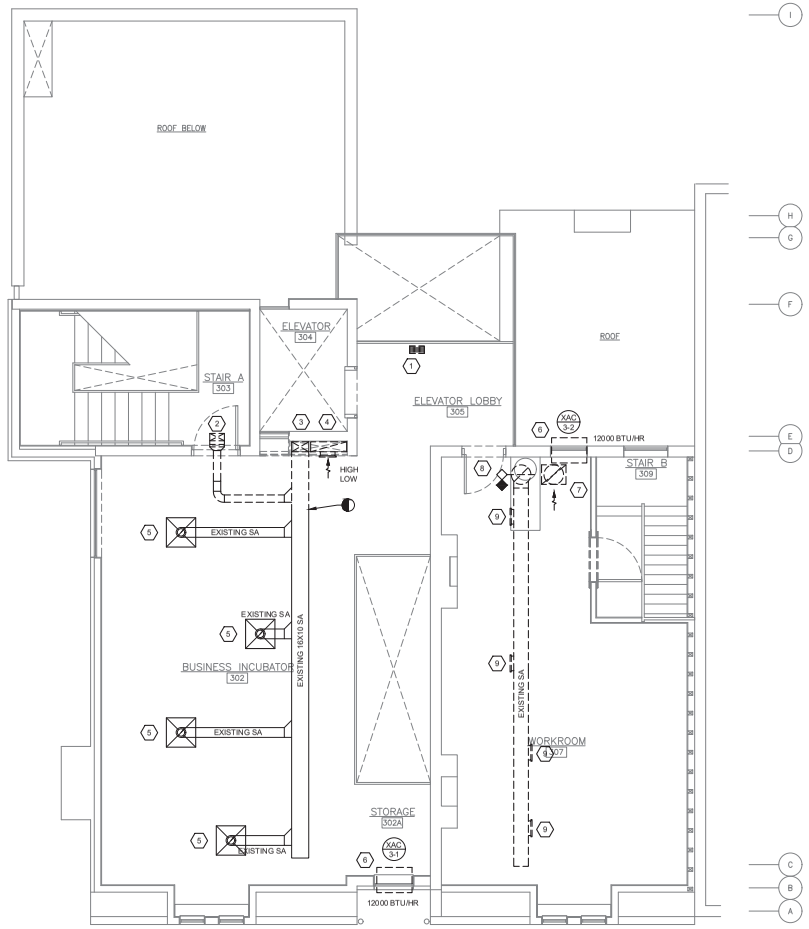


1 M-103 THIRD FLOOR MECHANICAL DEMOLITION PLAN
1/4" = 1'-0"

## MECHANICAL DEMOLITION GENERAL NOTES:

1. MC SHALL VERIFY EXISTING CONDITIONS AND LOCATIONS OF EQUIPMENT, DUCTWORK, PIPING, AND GRILLES, REGISTERS AND DIFFUSERS IN FIELD PRIOR TO BID. MC SHALL VERIFY EQUIPMENT IS IN GOOD WORKING ORDER AND THAT ANY COMPONENTS OF EQUIPMENT THAT REQUIRE REPLACEMENT ARE REPLACED PRIOR TO RE-INSTALLATION. EXISTING GRILLES, REGISTERS AND DIFFUSERS TO REMAIN SHALL BE CLEANED OF DUST AND DEBRIS PRIOR TO FINAL RE-INSTALLATION AND EQUIPMENT STARTUP.
2. ALL MECHANICAL EQUIPMENT, SENSORS AND DAMPERS LOCATED ABOVE HARD CEILINGS OR WITHIN WALLS SHALL BE PROVIDED WITH ACCESS PANELS SIZED IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION REQUIREMENTS AND SUCH THAT THE FULL REMOVAL OF THE EQUIPMENT AND/OR DAMPER IS POSSIBLE. PROVIDE RATED ACCESS PANELS FOR ALL ACCESS PANELS LOCATED WITHIN RATED CEILINGS OR WALLS. ACCESS DOORS SHALL BE TAMPER AND VANDAL PROOF.
3. MC SHALL VERIFY ALL EQUIPMENT TO REMAIN IS FUNCTIONING PROPERLY AND IS IN GOOD WORKING CONDITION.
4. MC SHALL COORDINATE WITH GC TO PATCH ALL EXISTING TO REMAIN WALL, FLOOR AND CEILING PENETRATIONS TO MATCH EXISTING MATERIAL AT ALL DEMOLISHED PIPE, DUCT, AND MECHANICAL SYSTEMS RELATED PENETRATIONS.

## MECHANICAL DEMOLITION KEY NOTES: (#)

1. EXISTING FLOOR GRILLE TO BE DEMOLISHED. MC SHALL VERIFY SIZE AND LOCATION IN FIELD. MC SHALL COORDINATE WITH GC TO PATCH FLOOR TO MATCH EXISTING CONSTRUCTION AND FINISH.
2. EXISTING SUPPLY DIFFUSER AND ASSOCIATED SUPPLY BRANCH DUCTWORK SHALL BE DEMOLISHED. MC SHALL COORDINATE WITH GC TO PATCH STAIRWELL PENETRATION SUCH THAT FIRE RATING OF STAIRWELL IS MAINTAINED. VERIFY SIZE AND LOCATION OF DIFFUSER AND WALL PENETRATION IN FIELD..
3. EXISTING SUPPLY AIR DUCTWORK IN CHASE SHALL BE DISCONNECTED FROM EXISTING 16"X10" SA DUCT TRUNK AND DEMOLISHED DOWN TO FLOOR LEVEL AT THIRD FLOOR. VERTICAL DUCT RISER SHALL BE CAPPED AT THIRD FLOOR AND MC SHALL COORDINATE WITH GC TO PROVIDE PATCHING OF WALL ENCLOSURE. VERIFY SIZE AND LOCATION OF EXISTING SUPPLY DUCT IN FIELD.
4. EXISTING RETURN AIR DUCTWORK IN CHASE SHALL BE DISCONNECTED FROM EXISTING HIGH AND LOW RETURN GRILLES AT WALL AND DEMOLISHED DOWN TO FLOOR LEVEL AT THIRD FLOOR. VERTICAL DUCT RISER SHALL BE CAPPED AT THIRD FLOOR AND MC SHALL COORDINATE WITH GC TO PROVIDE PATCHING OF WALL ENCLOSURE. VERIFY SIZE AND LOCATION OF EXISTING RETURN DUCT IN FIELD.
5. EXISTING SUPPLY DIFFUSER AND ASSOCIATED FLEXIBLE DUCT CONNECTION TO BE RELOCATED IN ACOUSTIC TILE CEILING. VERIFY LOCATION OF DIFFUSER IN FIELD.
6. EXISTING COOLING ONLY PTAC UNIT SHALL BE REMOVED FROM WINDOW AND RETURNED INTACT AND FULLY OPERATIONAL TO BUILDING OWNER.
7. EXISTING VERTICAL RETURN DUCTWORK AND ASSOCIATED FLOOR GRILLE SHALL BE DEMOLISHED DOWN TO AND CAPPED AT FLOOR LEVEL. MC SHALL COORDINATE WITH GC TO PATCH FLOOR TO MATCH EXISTING CONSTRUCTION AND FINISH. VERIFY EXACT LOCATION IN FIELD. VERIFY EXACT LOCATION AND SIZE IN FIELD.
8. EXISTING VERTICAL SUPPLY DUCTWORK SHALL BE DEMOLISHED DOWN TO AND CAPPED AT FLOOR LEVEL. MC SHALL COORDINATE WITH GC TO PATCH FLOOR TO MATCH EXISTING CONSTRUCTION AND FINISH. VERIFY EXACT LOCATION IN FIELD. VERIFY EXACT LOCATION AND SIZE IN FIELD..
9. EXISTING DUCT MOUNTED DIFFUSER AND ALL ASSOCIATED APPURTENANCES TO BE DEMOLISHED. VERIFY LOCATION IN FIELD.

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
THIRD FLOOR MECHANICAL DEMOLITION PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | M-103 |
| ISSUE DATE 02/15/2021 | | |

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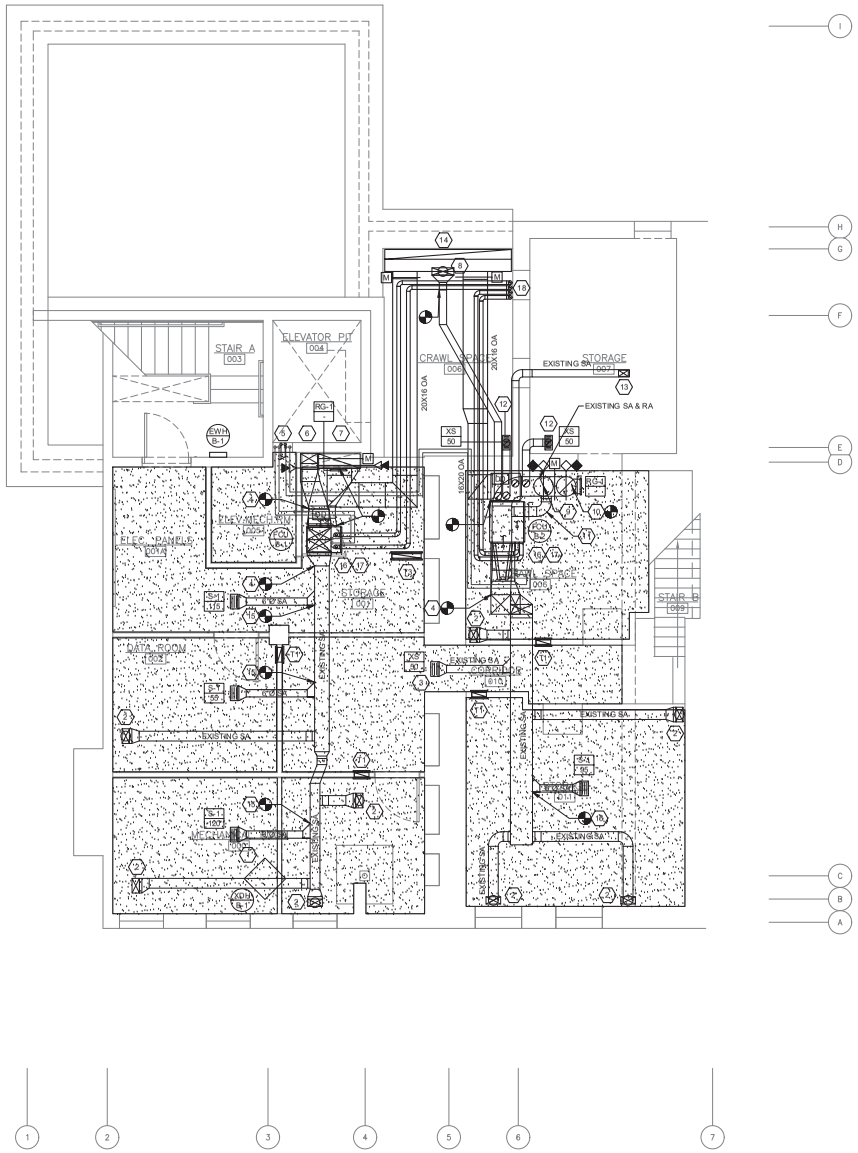
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STORAGE
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20X16 OA
16X08 OA
12X08 OA
EWH B-1
RG-1
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RCU-2
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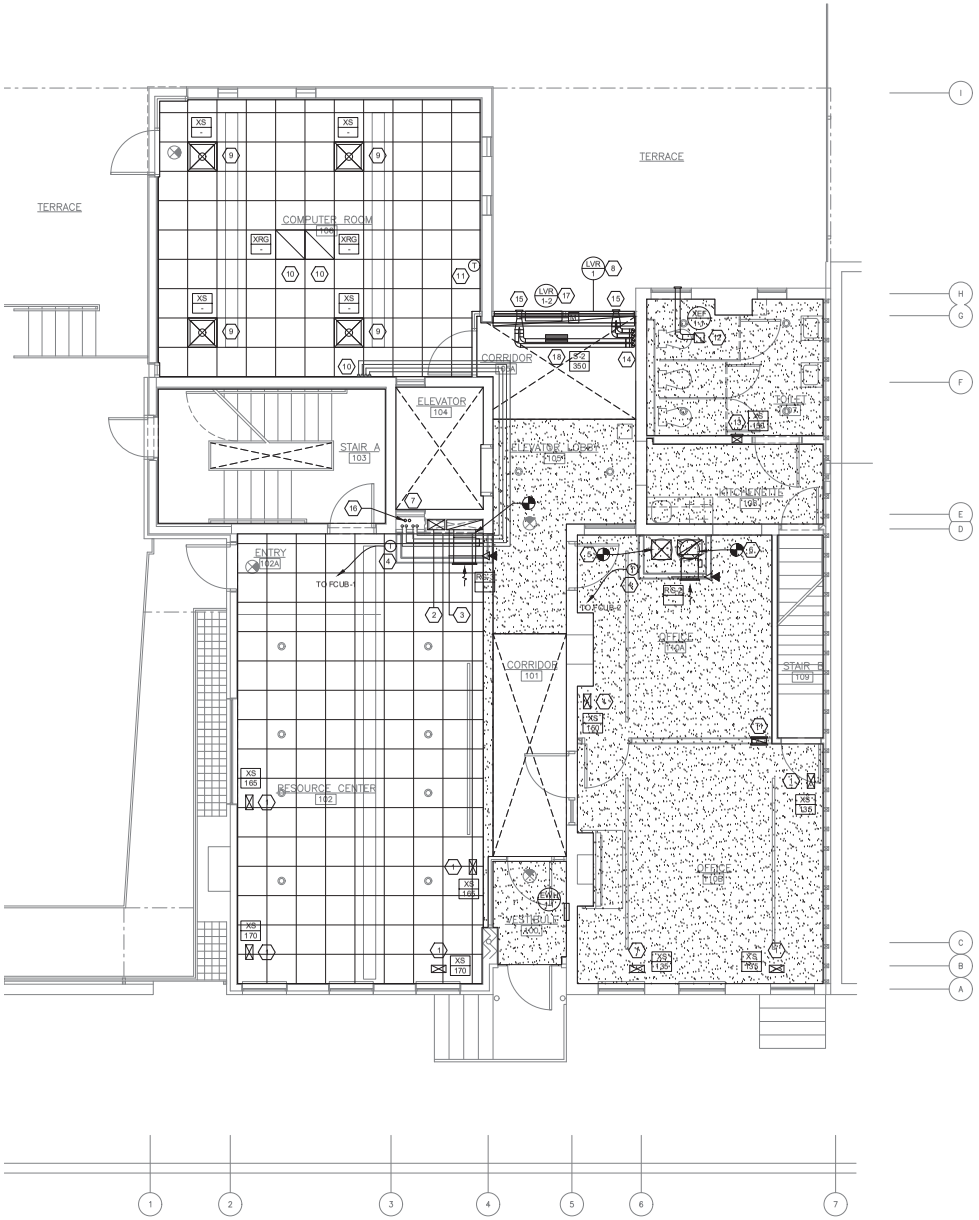


1 M-201 FIRST FLOOR MECHANICAL PLAN
1/4" = 1'-0"

## MECHANICAL GENERAL NOTES:

1. MC SHALL VERIFY EXISTING CONDITIONS AND LOCATIONS OF EQUIPMENT, DUCTWORK, PIPING, AND GRILLES, REGISTERS AND DIFFUSERS IN FIELD PRIOR TO BID. MC SHALL VERIFY EQUIPMENT IS IN GOOD WORKING ORDER AND THAT ANY COMPONENTS OF EQUIPMENT THAT REQUIRE REPLACEMENT ARE REPLACED PRIOR TO RE-INSTALLATION. EXISTING GRILLES, REGISTERS AND DIFFUSERS TO REMAIN SHALL BE CLEANED OF DUST AND DEBRIS PRIOR TO FINAL RE-INSTALLATION AND EQUIPMENT STARTUP.
2. ALL MECHANICAL EQUIPMENT, SENSORS AND DAMPERS LOCATED ABOVE HARD CEILINGS OR WITHIN WALLS SHALL BE PROVIDED WITH ACCESS PANELS SIZED IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION REQUIREMENTS AND SUCH THAT THE FULL REMOVAL OF THE EQUIPMENT AND/OR DAMPER IS POSSIBLE. PROVIDE RATED ACCESS PANELS FOR ALL ACCESS PANELS LOCATED WITHIN RATED CEILINGS OR WALLS. ACCESS DOORS SHALL BE TAMPER AND VANDAL PROOF.
3. MC SHALL VERIFY ALL EQUIPMENT TO REMAIN IS FUNCTIONING PROPERLY AND IS IN GOOD WORKING CONDITION.
4. MC SHALL COORDINATE WITH GC TO PATCH ALL EXISTING TO REMAIN WALL, FLOOR AND CEILING PENETRATIONS TO MATCH EXISTING MATERIAL AT ALL DEMOLISHED PIPE, DUCT, AND MECHANICAL SYSTEMS RELATED PENETRATIONS.
5. MC SHALL COORDINATE WITH GC TO VERIFY FINAL LINTEL SIZE REQUIREMENTS FOR STRUCTURAL PENETRATIONS REQUIRING LINTELS. FINAL LINTEL SIZE SHALL BE VERIFIED TO MATCH DIMENSIONS OF MECHANICAL CONTRACTOR'S APPROVED DUCT SHOP DRAWINGS.
6. CONDENSATE DRAIN PIPING SHALL BE SLOPED NO LESS THAN 1/4" PER LINEAL FOOT OF HORIZONTAL RUN. PIPING SHALL BE SLOPED TOWARDS POINT OF TERMINATION.
7. COMBUSTION AIR AND FLUE PIPING FOR GAS FIRED EQUIPMENT SHALL BE SLOPED NO LESS THAN 1/4" PER LINEAL FOOT OF HORIZONTAL RUN. PIPING SHALL BE SLOPED BACK TOWARDS GAS FIRED EQUIPMENT.
8. THE MC SHALL ENGAGE THE TESTING, ADJUSTING, AND BALANCING AGENT TO RE-BALANCE EXISTING SUPPLY DIFFUSERS TO THE AIRFLOW INDICATED ON THE FLOOR PLANS PROVIDED A NEW AIRFLOW IS SHOWN.

## MECHANICAL KEY NOTES: (#)

1. EXISTING SUPPLY FLOOR GRILLE AND ASSOCIATED DUCTWORK BELOW TO REMAIN. VERIFY LOCATION IN FIELD.
2. EXISTING SUPPLY DUCT UP IN NEW RATED CHASE UP TO FLOOR ABOVE AND DOWN TO FLOOR BELOW.
3. EXISTING RETURN DUCT UP IN NEW RATED CHASE UP TO FLOOR ABOVE AND DOWN TO FLOOR BELOW. MC SHALL PROVIDE NEW RETURN AIR BRANCH TAP 12" BELOW FINISHED CEILING AND NEW SURFACE MOUNTED RETURN GRILLE AT CHASE WALL. MC SHALL PROVIDE NEW COMBINATION FIRE/SMOKE DAMPER AT CHASE WALL.
4. NEW PROGRAMMABLE 7 DAY THERMOSTAT SHALL BE INSTALLED 44" ABOVE FINISHED FLOOR AT CHASE WALL.
5. EXISTING ROUND SUPPLY AIR DUCTWORK IN NEW RATED CHASE DN TO FLOOR BELOW. ROUND SUPPLY DUCTWORK TRANSITIONS AND CONNECTS TO NEW 16"X16" AT FLOOR OPENING. 16"X 16" SA UP IN CHASE TO FLOOR ABOVE.
6. EXISTING ROUND RETURN DUCT DN IN NEW RATED CHASE DOWN TO FLOOR BELOW. ROUND RETURN DUCTWORK TRANSITIONS AND CONNECTS TO NEW 12"X20" RETURN DUCT AT FLOOR OPENING. NEW MC SHALL PROVIDE NEW RETURN AIR BRANCH TAP 12" BELOW FINISHED CEILING AND NEW SURFACE MOUNTED RETURN GRILLE AT CHASE WALL. MC SHALL PROVIDE NEW COMBINATION FIRE/SMOKE DAMPER AT CHASE WALL
7. (2) SETS OF SUCTION AND LIQUID REFRIGERANT PIPING LINESETS DOWN IN CHASE TO FLOOR BELOW. REFRIGERANT LINESETS SHALL BE ROUTED CHASE AND ABOVE CEILING TO COORDINATE ROUTING IN FIELD.
8. NEW LOUVER LVR-1 SHALL BE INSTALLED IN LOWER SECTION OF EXISTING STOREFRONT WINDOW. FINAL SIZE OF LOUVER SHALL BE COORDINATED TO MATCH DIMENSIONS OF EXISTING LOWER SECTION OF STOREFRONT WINDOW. LOUVER CONNECTS TO 120"X8" FRESH AIR DUCTWORK LOCATED WITHIN NEW WINDOW SEAT AND SHALL BE ROUTED DOWN TO FLOOR BELOW.
9. EXISTING SUPPLY GRILLE TO REMAIN. VERIFY LOCATION IN FIELD.
10. EXISTING RETURN GRILLE TO REMAIN. VERIFY LOCATION IN FIELD.
11. EXISTING THERMOSTAT TO REMAIN.
12. EXISTING EXHAUST FAN AND ASSOCIATED DUCTWORK AND TERMINATIONS TO REMAIN. VERIFY LOCATION IN FIELD.
13. EXISTING SUPPLY AIR DUCT IN WALL DN TO FLOOR BELOW AND UP TO FLOOR ABOVE. EXISTING SUPPLY AIR GRILLE IN WALL TO REMAIN. VERIFY SIZE AND LOCATION OF GRILLE AND DUCTWORK IN FIELD.
14. (2) SETS OF 3" COMBUSTION AIR AND VENT FLUE PIPING UP ALONG MASONRY WALL TO CEILING LEVEL. 14 (2) SETS OF 3" COMBUSTION AIR AND VENT FLUE PIPING DN ALONG MASONRY WALL TO FLOOR BELOW. COORDINATE ROUTING IN FIELD.
15. 3" COMBUSTION AIR AND VENT FLUE PIPING TERMINATES AT EXTERIOR WALL VIA 4" CONCENTRIC VENT TERMINATION. INSTALL TERMINATION PER THE MANUFACTURER'S INSTALLATION AND CLEARANCE REQUIREMENTS.
16. (2) 3/4" CONDENSATE DRAINS SHALL BE ROUTED DN IN CHASE TO FLOOR BELOW AND UP TO FLOOR ABOVE. COORDINATE ROUTING IN FIELD. COORDINATE ROUTING IN FIELD.
17. RELIEF AIR LOUVER 1-2 SHALL BE INSTALLED NO LESS THAN 3 FEET ABOVE TOP OF LOUVER 1-1. PROVIDE MOTORIZED DAMPER AT LOUVER AND PROVIDE BIRDSCREEN AT DUCT OPENING TO OCCUPIED SPACE.
18. NEW SUPPLY FLOOR GRILLE SHALL BE INSTALLED IN THIS LOCATION.

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PROPERTY REHABILITATION FOR:

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DRAWING NAME
FIRST FLOOR MECHANICAL PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | M-201 |
| ISSUE DATE 02/15/2021 | | |

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MEP Engineering
2 Allegheny Center, Nova Tower 2 - Suite 1001 - Pittsburgh, PA 15212
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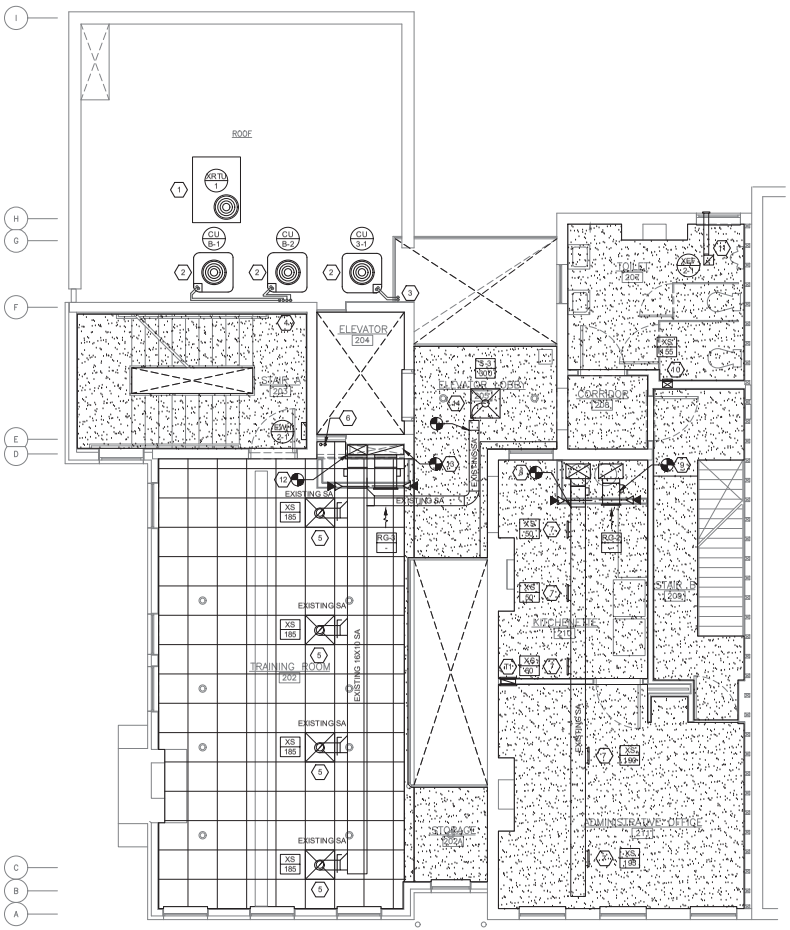
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KITCHEN 201
STORAGE 207
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EXISTING SA
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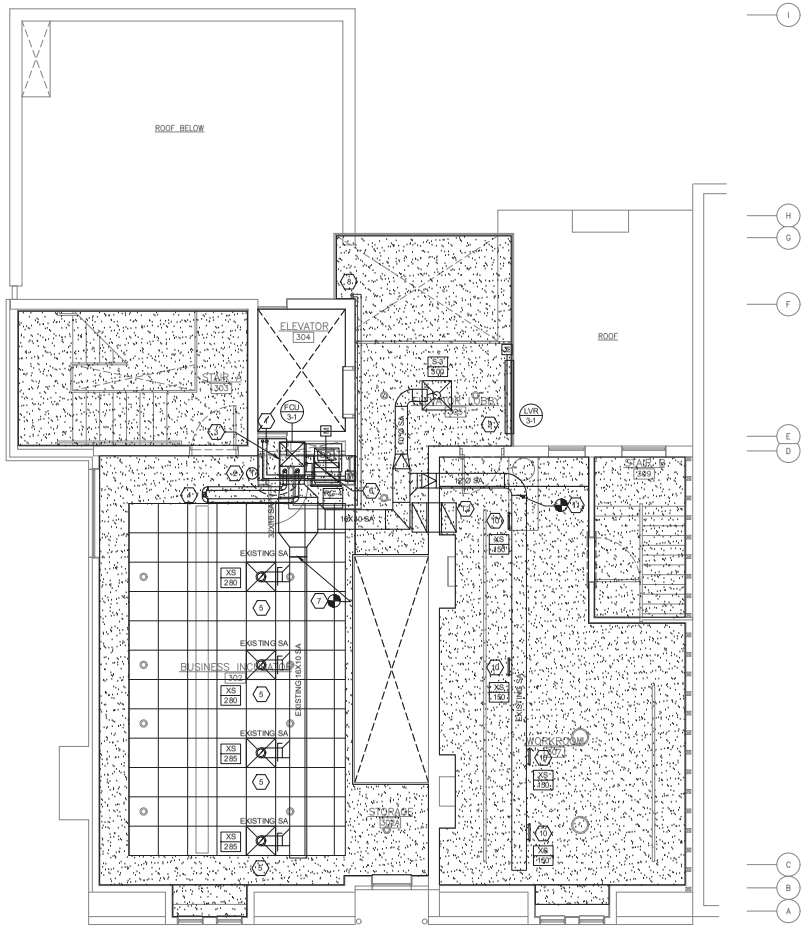


## MECHANICAL GENERAL NOTES:

1. MC SHALL VERIFY EXISTING CONDITIONS AND LOCATIONS OF EQUIPMENT, DUCTWORK, PIPING, AND GRILLES, REGISTERS AND DIFFUSERS IN FIELD PRIOR TO BID. MC SHALL VERIFY EQUIPMENT IS IN GOOD WORKING ORDER AND THAT ANY COMPONENTS OF EQUIPMENT THAT REQUIRE REPLACEMENT ARE REPLACED PRIOR TO RE-INSTALLATION. EXISTING GRILLES, REGISTERS AND DIFFUSERS TO REMAIN SHALL BE CLEANED OF DUST AND DEBRIS PRIOR TO FINAL RE-INSTALLATION AND EQUIPMENT STARTUP.
2. ALL MECHANICAL EQUIPMENT, SENSORS AND DAMPERS LOCATED ABOVE HARD CEILINGS OR WITHIN WALLS SHALL BE PROVIDED WITH ACCESS PANELS SIZED IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION REQUIREMENTS AND SUCH THAT THE FULL REMOVAL OF THE EQUIPMENT AND/OR DAMPER IS POSSIBLE. PROVIDE RATED ACCESS PANELS FOR ALL ACCESS PANELS LOCATED WITHIN RATED CEILINGS OR WALLS. ACCESS DOORS SHALL BE TAMPER AND VANDAL PROOF.
3. MC SHALL VERIFY ALL EQUIPMENT TO REMAIN IS FUNCTIONING PROPERLY AND IS IN GOOD WORKING CONDITION.
4. MC SHALL COORDINATE WITH GC TO PATCH ALL EXISTING TO REMAIN WALL, FLOOR AND CEILING PENETRATIONS TO MATCH EXISTING MATERIAL AT ALL DEMOLISHED PIPE, DUCT, AND MECHANICAL SYSTEMS RELATED PENETRATIONS.
5. MC SHALL COORDINATE WITH GC TO VERIFY FINAL LINTEL SIZE REQUIREMENTS FOR STRUCTURAL PENETRATIONS REQUIRING LINTELS. FINAL LINTEL SIZE SHALL BE VERIFIED TO MATCH DIMENSIONS OF MECHANICAL CONTRACTOR'S APPROVED DUCT SHOP DRAWINGS.
6. CONDENSATE DRAIN PIPING SHALL BE SLOPED NO LESS THAN 1/4" PER LINEAL FOOT OF HORIZONTAL RUN. PIPING SHALL BE SLOPED TOWARDS POINT OF TERMINATION.
7. COMBUSTION AIR AND FLUE PIPING FOR GAS FIRED EQUIPMENT SHALL BE SLOPED NO LESS THAN 1/4" PER LINEAL FOOT OF HORIZONTAL RUN. PIPING SHALL BE SLOPED BACK TOWARDS GAS FIRED EQUIPMENT.
8. THE MC SHALL ENGAGE THE TESTING, ADJUSTING, AND BALANCING AGENT TO RE-BALANCE EXISTING SUPPLY DIFFUSERS TO THE AIRFLOW INDICATED ON THE FLOOR PLANS PROVIDED A NEW AIRFLOW IS SHOWN.

## MECHANICAL KEY NOTES: (#)

1. (2) 3/4" CONDENSATE DRAIN PIPING DOWN IN CHASE TO FLOOR BELOW. COORDINATE ROUTING IN FIELD.
2. NEW PROGRAMMABLE 7 DAY THERMOSTAT SHALL BE INSTALLED 44" ABOVE FINISHED FLOOR AT CHASE WALL.
3. NEW FURNACE SHALL BE INSTALLED ON NEW 4" CONCRETE HOUSEKEEPING PAD WITH NEOPRENE GASKET VIBRATION ISOLATION PADS.
4. 3" COMBUSTION AIR PIPING AND FLUE PIPING SHALL BE ROUTED UP TO CONCENTRIC VENT TERMINATION AT ROOF ABOVE. COORDINATE ROUTING IN FIELD.
5. EXISTING SUPPLY DIFFUSER AND ASSOCIATED SUPPLY DUCTWORK SHALL BE RELOCATED TO THIS LOCATION. COORDINATE ROUTING IN FIELD.
6. 20"x20" RETURN AIR DUCT TRANSITIONS UP TO GRAVITY INTAKE VENTILATOR AT ROOF ABOVE. MC SHALL PROVIDE TRANSITIONS AS NECESSARY TO MAKE CONNECTION.
7. NEW SUPPLY AIR DUCTWORK SHALL CONNECT TO EXISTING SUPPLY MAIN DUCTWORK. MC SHALL PROVIDE TRANSITIONS AS NECESSARY TO MAKE CONNECTION. VERIFY SIZE AND LOCATION OF EXISTING DUCTWORK IN FIELD.
8. (1) SET OF SUCTION AND LIQUID REFRIGERANT PIPING SHALL BE ROUTED DOWN TO FLOOR BELOW. COORDINATE ROUTING IN FIELD.
9. 60"x24" POTTORFF EFD-245 RELIEF AIR LOUVER SHALL BE INSTALLED AT EXTERIOR WALL. MC SHALL PROVIDE MOTORIZED CONTROL DAMPER AND BIRDSCREEN AT LOUVER.
10. EXISTING SUPPLY GRILLE AND ASSOCIATED BRANCH DUCTWORK AND APPURTENANCES TO REMAIN. VERIFY SIZE AND LOCATION IN FIELD.
11. NEW SUPPLY AIR DUCTWORK SHALL CONNECT TO EXISTING SUPPLY MAIN DUCTWORK. MC SHALL PROVIDE TRANSITIONS AS NECESSARY TO MAKE CONNECTION. VERIFY SIZE AND LOCATION OF EXISTING DUCTWORK IN FIELD.

1 THIRD FLOOR MECHANICAL PLAN
M-203 1/4" = 1'-0"

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MEP Engineering
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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
THIRD FLOOR MECHANICAL PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
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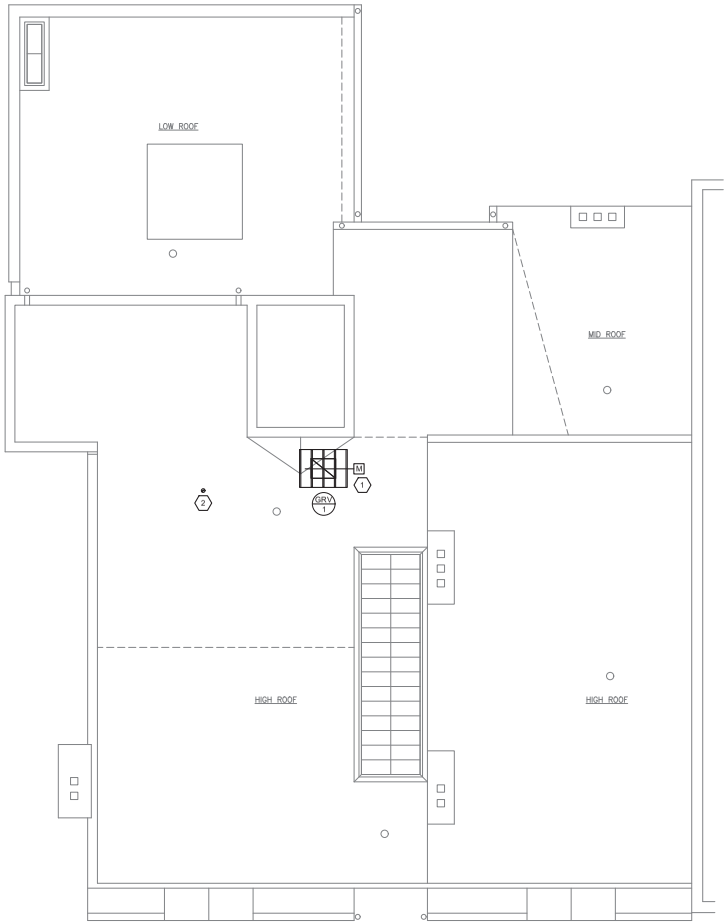
| ISSUE DATE 02/15/2021 | | |




MECHANICAL GENERAL NOTES:

1. NO EQUIPMENT OR CONTROL DEVICES SHALL BE SERVICED OR ACCESSED VIA ROOF.
2. MECHANICAL TERMINATIONS AT ROOF SHALL BE EQUIPPED WITH A 14" HIGH MINIMUM ROOF CURB. ROOF CURB SHALL BE CANTED AS NECESSARY TO COORDINATE WITH ROOF PITCH.
3. MECHANICAL FRESH AIR INTAKES SHALL BE LOCATED NO LESS THAN 10 FEET FROM MECHANICAL EXHAUST OUTLETS. MECHANICAL FRESH AIR INTAKES LOCATED WITHIN 10 FEET OF MECHANICAL EXHAUST OUTLETS SHALL BE INSTALLED NO LESS THAN 3 FEET BELOW SUCH EXHAUST AIR OUTLETS.

MECHANICAL KEY NOTES: (#)

1. GRV-1 SHALL BE INSTALLED ON 14" HIGH INSULATED ROOF CURB. PROVIDE BIRDSCREEN FOR GRAVITY RELIEF VENTILATOR. 20"X 16' FRESH AIR DUCTWORK WITH MOTORIZED CONTROL DAMPER DOWN TO FLOOR BELOW.
2. 3" VERTICAL CONCENTRIC VENT TERMINATION TERMINATES AT 14" INSULATED ROOF CURB AT ROOF. INSTALL TERMINATION PER THE MANUFACTURER'S INSTALLATION REQUIREMENTS.

1 / M-204 ROOF MECHANICAL PLAN
1/4" = 1'-0"

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
ROOF MECHANICAL PLAN

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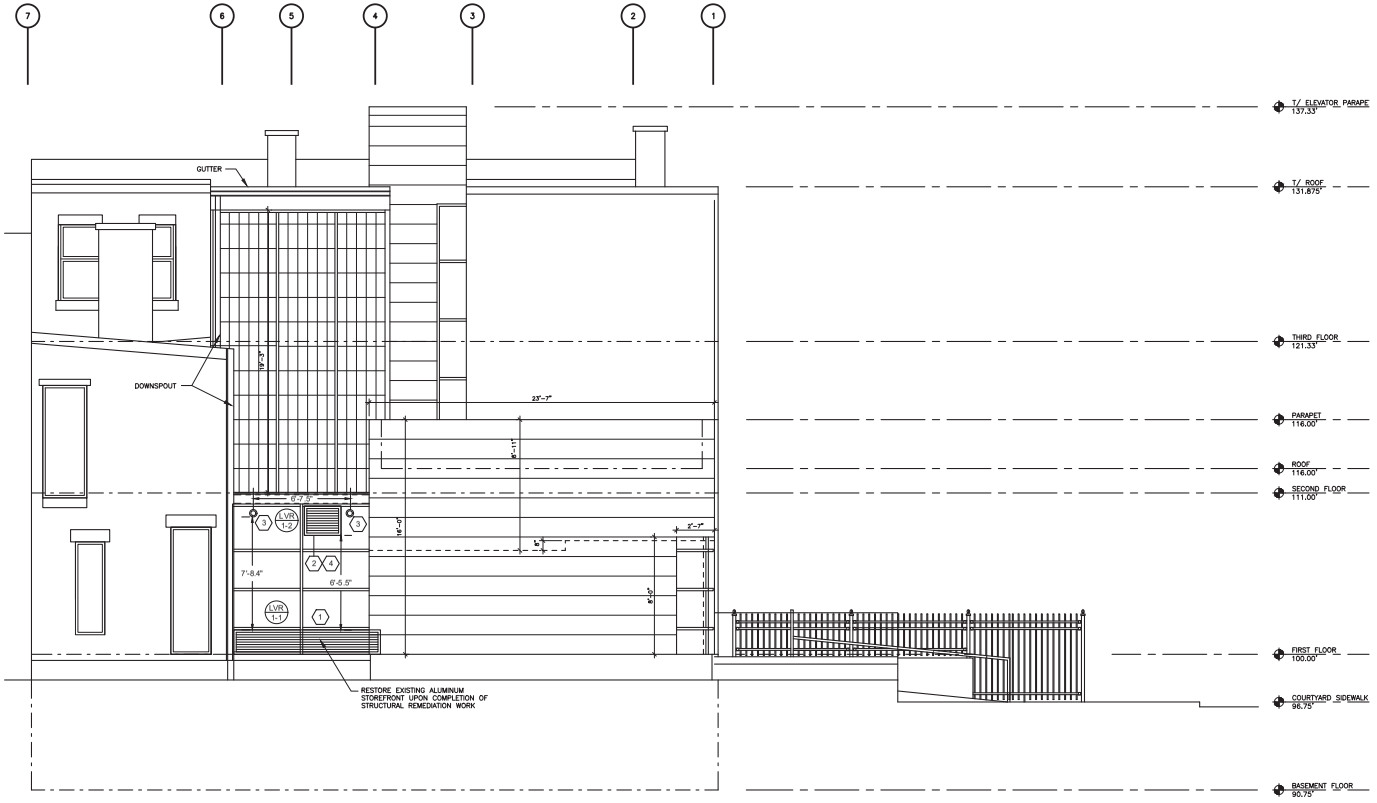


## MECHANICAL GENERAL NOTES:

1. MC SHALL VERIFY EXISTING CONDITIONS AND LOCATIONS OF EQUIPMENT, DUCTWORK, PIPING, AND GRILLES, REGISTERS AND DIFFUSERS IN FIELD PRIOR TO BID. MC SHALL VERIFY EQUIPMENT IS IN GOOD WORKING ORDER AND THAT ANY COMPONENTS OF EQUIPMENT THAT REQUIRE REPLACEMENT ARE REPLACED PRIOR TO RE-INSTALLATION. EXISTING GRILLES, REGISTERS AND DIFFUSERS TO REMAIN SHALL BE CLEANED OF DUST AND DEBRIS PRIOR TO FINAL RE-INSTALLATION AND EQUIPMENT STARTUP.
2. ALL MECHANICAL EQUIPMENT, SENSORS AND DAMPERS LOCATED ABOVE HARD CEILINGS OR WITHIN WALLS SHALL BE PROVIDED WITH ACCESS PANELS SIZED IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION REQUIREMENTS AND SUCH THAT THE FULL REMOVAL OF THE EQUIPMENT AND/OR DAMPER IS POSSIBLE. PROVIDE RATED ACCESS PANELS FOR ALL ACCESS PANELS LOCATED WITHIN RATED CEILINGS OR WALLS. ACCESS DOORS SHALL BE TAMPER AND VANDAL PROOF.
3. MC SHALL VERIFY ALL EQUIPMENT TO REMAIN IS FUNCTIONING PROPERLY AND IS IN GOOD WORKING CONDITION.
4. MC SHALL COORDINATE WITH GC TO PATCH ALL EXISTING TO REMAIN WALL, FLOOR AND CEILING PENETRATIONS TO MATCH EXISTING MATERIAL AT ALL DEMOLISHED PIPE, DUCT, AND MECHANICAL SYSTEMS RELATED PENETRATIONS.
5. MC SHALL COORDINATE WITH GC TO VERIFY FINAL LINTEL SIZE REQUIREMENTS FOR STRUCTURAL PENETRATIONS REQUIRING LINTELS. FINAL LINTEL SIZE SHALL BE VERIFIED TO MATCH DIMENSIONS OF MECHANICAL CONTRACTOR'S APPROVED DUCT SHOP DRAWINGS.
6. CONDENSATE DRAIN PIPING SHALL BE SLOPED NO LESS THAN 1/4" PER LINEAL FOOT OF HORIZONTAL RUN. PIPING SHALL BE SLOPED TOWARDS POINT OF TERMINATION.
7. COMBUSTION AIR AND FLUE PIPING FOR GAS FIRED EQUIPMENT SHALL BE SLOPED NO LESS THAN 1/4" PER LINEAL FOOT OF HORIZONTAL RUN. PIPING SHALL BE SLOPED BACK TOWARDS GAS FIRED EQUIPMENT.

## MECHANICAL KEY NOTES: (#)

1. NEW LOUVER LVR1-1 SHALL BE INSTALLED IN LOWER SECTION OF EXISTING STOREFRONT WINDOW. FINAL SIZE OF LOUVER SHALL BE COORDINATED TO MATCH DIMENSIONS OF EXISTING LOWER SECTION OF STOREFRONT WINDOW. PROVIDE BIRDSCREEN AT LOUVER.
2. NEW LOUVER LVR1-2 SHALL BE INSTALLED IN LOWER SECTION OF EXISTING STOREFRONT WINDOW. FINAL HEIGHT OF LOUVER SHALL BE COORDINATED TO MATCH DIMENSIONS OF EXISTING LOWER SECTION OF STOREFRONT WINDOW. PROVIDE BIRDSCREEN AT LOUVER.
3. 3" COMBUSTION AIR AND VENT FLUE PIPING TERMINATES AT EXTERIOR WALL VIA 4" CONCENTRIC VENT TERMINATION. INSTALL TERMINATION PER THE MANUFACTURER'S INSTALLATION AND CLEARANCE REQUIREMENTS.
4. RELIEF AIR LOUVER LVR1-2 SHALL BE INSTALLED NO LESS THAN 3 FEET ABOVE TOP OF LOUVER LVR1-1. PROVIDE MOTORIZED DAMPER AT LOUVER AND PROVIDE BIRDSCREEN AT DUCT OPENING TO OCCUPIED SPACE.

1 M-205 SOUTH ELEVATION MECHANICAL PLAN
1/4" = 1'-0"

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
SITE MECHANICAL PLAN

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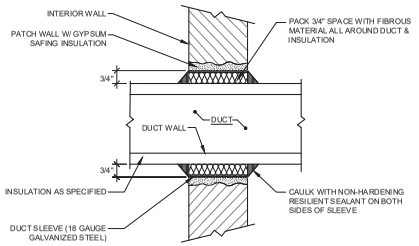
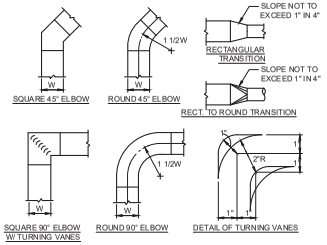
| ISSUE DATE 02/15/2021 | | |




1 M-301 INSULATED DUCT AND DUCT SLEEVE THRU NON-RATED WALL DETAIL

NO SCALE

NOTES:
1. FOR INSTALLATION IN 2 HOUR RATED FIRE WALL CONSTRUCTION, SEE FIRE DAMPER DIAGRAM.
2. FOR INFORMATION ON DUCT SLEEVES THRU RATED WALLS AND FLOORS SEE SPECIFICATIONS SECTION 19055.
3. 3/4" MIN. SPACE IS REQUIRED BETWEEN SLEEVE & DUCT INSULATION IN AREA WHERE DUCT IS SPECIFIED TO BE INSULATED.
4. ONLY 1 HOUR RATED SMOKE PARTITIONS & 2 HOUR RATED FIRE WALLS ARE INDICATED ON HEATING DRAWINGS. FOR ADDITIONAL RATED WALLS SEE ARCHITECTURAL DRAWINGS.
5. CONTRACTOR TO EXTEND FLOOR SLEEVES IN EQUIPMENT ROOMS & OVER HABITABLE SPACES 2 INCHES ABOVE FINISHED FLOOR.

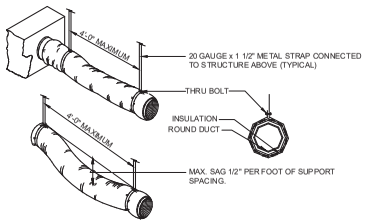



2 M-301 LOW VELOCITY DUCTWORK DIAGRAMS

NO SCALE

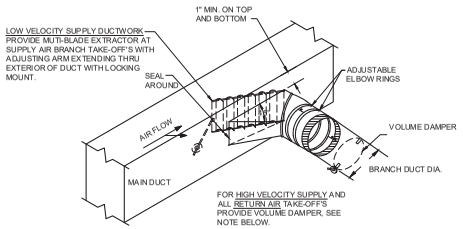
NOTE:
PROVIDE RADIUS ELBOWS, 18" AND LARGER WITH TURNING BLADES AT 1/3 AND 1/2 THE WIDTH OF THE DUCT FROM THE INSIDE RADIUS. TURNING BLADES SHALL BE PROVIDED WITH HEMMED ENDS. (SEE SECTION 233113 OF MECHANICAL SPECIFICATIONS FOR ADDITIONAL DUCT CONSTRUCTION INFORMATION AND RESTRICTIONS.)

NOTES:
1. FLEXIBLE DUCT SHOULD EXTEND STRAIGHT FOR SEVERAL INCHES FROM RECTANGULAR DUCT CONNECTION BEFORE BENDING.
2. FLEXIBLE DUCT SHOULD NOT EXCEED 4'-0" IN LENGTH. USE RIGID ROUND DUCTWORK WHEN RUNOUTS EXCEED 4'-0".

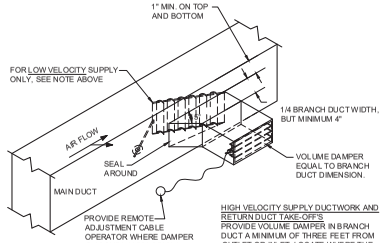



3 M-301 FLEXIBLE DUCT RUN-OUT SUPPORT DETAIL

NO SCALE




ROUND DUCT TAKE-OFF



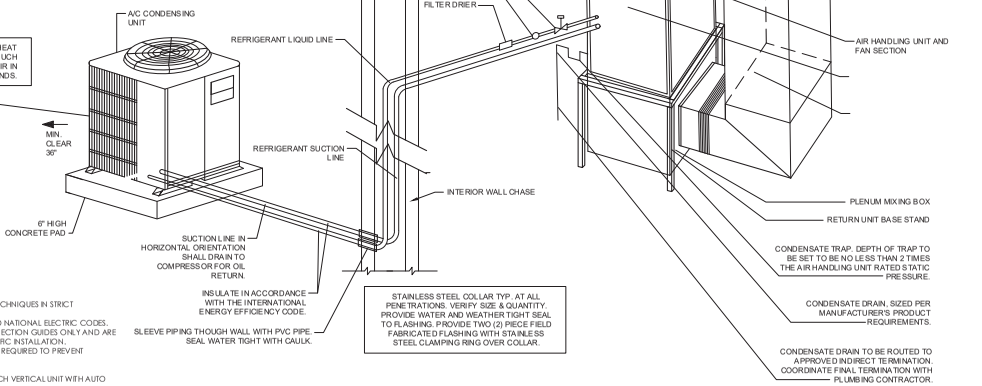

RECTANGULAR DUCT TAKE-OFF

4 M-301 TYPICAL LOW VELOCITY DUCT BRANCH DETAILS

NO SCALE

ORIENTATION OF CONDENSING UNIT/ HEAT PUMP ON ROOF OR GROUND SHALL BE SUCH THAT THE CONDENSER FAN WILL BLOW AIR IN THE DIRECTION OF THE PREVAILING WINDS.

CONDENSING UNIT/HEAT PUMP UNIT SHALL BE SECURED TO SUPPORT RAIL IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. PROVIDE NEOPRENE SPRING ISOLATION AT EACH LEG OF UNIT.




NOTES:
1. ALL PIPING MUST FOLLOW STANDARD REFRIGERANT PIPING TECHNIQUES IN STRICT ACCORDANCE W/ MANUFACTURER'S REQUIREMENTS.
2. ALL WIRING MUST COMPLY WITH THE APPLICABLE LOCAL AND NATIONAL ELECTRIC CODES.
3. WIRING AND PIPING SHOWN ARE GENERAL POINTS-OF-CONNECTION GUIDES ONLY AND ARE NOT INTENDED FOR, OR TO INCLUDE ALL DETAILS, FOR A SPECIFIC INSTALLATION.
4. LIQUID LINE SOLENOID VALVE (SOLENOID DROP CONTROL) IS REQUIRED TO PREVENT REFRIGERANT MIGRATION TO THE COMPRESSOR.
5. TXVs NOT SHOWN. PROVIDE TXVs AS SCHEDULED.
6. CONTRACTOR TO PROVIDE SECONDARY DRAIN PAN FOR EACH VERTICAL UNIT WITH AUTO WATER LEVEL SENSOR OVERFLOW CUTOFF SWITCH.
7. PROVIDE SPRING ISOLATION FOR MOUNTING OF UNIT.

5 M-301 SPLIT SYSTEM CONDENSING UNIT AND FURNACE DETAIL - VERTICAL FURNACE

NO SCALE

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
MECHANICAL DETAILS

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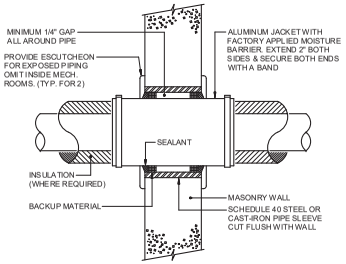
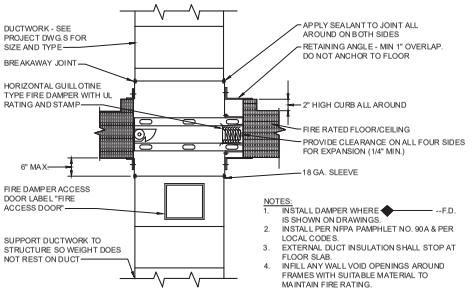
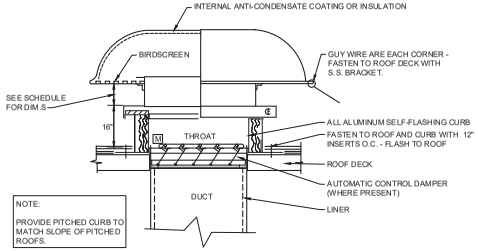



1 M-302 WALL PIPE PENETRATION DETAIL
NO SCALE

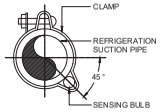



2 M-302 HORIZONTAL FIRE DAMPERS
NO SCALE

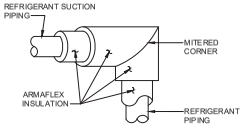



RECTANGULAR ROOF VENTILATOR

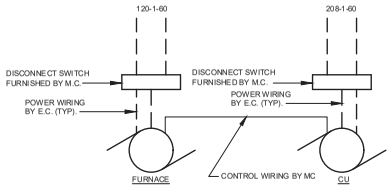
3 M-302 GRAVITY VENTILATOR DETAIL
NO SCALE



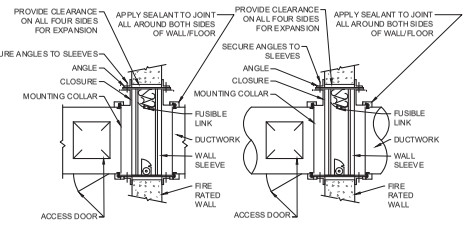

4 M-302 REFRIGERANT SUCTION PIPE SENSING BULB DETAIL
NO SCALE




5 M-302 TYPICAL INSULATED PIPING AND ELBOW DETAIL
NO SCALE

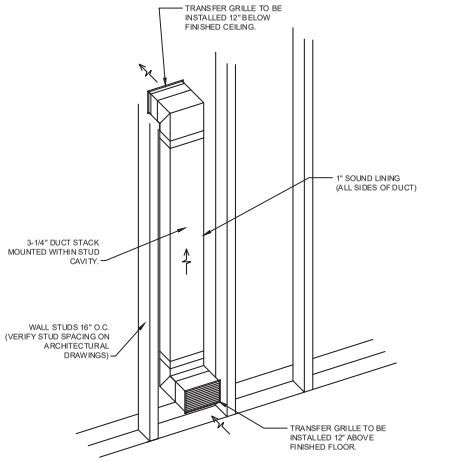



7 M-302 FURNACE / CU WIRING DIAGRAM
NO SCALE




6 M-302 FIRE DAMPERS
NO SCALE

NOTES:
1. ANGLES SHALL BE A MINIMUM OF 1 1/2" x 1 1/2" x 14GA. FASTEN TO COLLAR ONLY, WITH 1/4" DIA. NUTS & BOLTS OR WELDING 8" ON CENTER OR, NO. 10 SHEET METAL SCREWS 8" ON CENTER OR 3/16" STEEL POP RIVETS (SEE NOT 3 FOR CLEARANCE AND OVERLAP).
2. COLLARS SHALL BE OF THE SAME OR HEAVIER GAUGE AS THE DUCT TO WHICH IT IS ATTACHED. GAUGES SHALL CONFORM TO SMACNA OR ASHRAE DUCT STANDARDS.
3. WHEN THE FOLLOWING DUCT COLLARS CONNECTIONS ARE USED, THE MINIMUM GAUGE OF THE COLLAR SHALL BE 16 GAUGE ON DAMPERS NOT EXCEEDING 36"W x 24"H AND 14 GAUGE ON LARGER CURTAIN TYPE DAMPERS.
4. FIRE DAMPERS SHALL HAVE A CLEARANCE OF 1/8" PER FOOT ON HEIGHT AND WIDTH AND ANGLES SHALL INCREASE IN SIZE, PROPORTIONATELY, SO THAT THERE WILL BE A MINIMUM OF 1" OVERLAP ON THE PARTITION.
5. ON TYPE 'C' INSTALLATIONS, THE WALL COLLAR MUST BE 18 GAUGE OR HEAVIER.
6. MAXIMUM SINGLE DAMPER OF MULTIPLE DAMPER ASSEMBLY SHALL BE 40" x 40" IN VERTICAL MOUNTINGS, 4'2"H x 36"H IN HORIZONTAL MOUNTINGS.
7. IN MULTIPLE DAMPER ASSEMBLY, UNITS SHALL BE FASTENED TOGETHER.
8. FIRE DAMPER INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS "NFPA 90A", "UL 555", & "FIRE DAMPER & HEAT STOP GUIDE FOR AIR HANDLING SYSTEMS 1992 EDITION".
9. FIRE DAMPER SLEEVES SHALL HAVE BREAK-AWAY CONNECTIONS AT DUCT ATTACHMENTS.
10. ACCESS DOOR FOR A FIRE DAMPER LOCATED IN A RATED WALL DIRECTLY BEHIND A GRILLE OR REGISTER MAY BE ELIMINATED. THE FUSIBLE LINK MAY BE ACCESSED THRU THE REMOVABLE CORE.
11. FIRE DAMPERS LOCATED IN FIRE RATED FLOORS SHALL BE RATED FOR HORIZONTAL MOUNTING AND SHALL BE INSTALLED IN A SIMILAR MANNER TO THOSE INSTALLED IN FIRE RATED WALLS.
12. NOT REQUIRED ON FUME HOOD EXHAUST DUCTWORK.
13. ACCESS DOORS TO BE DOUBLE WALL INSULATED TYPE IF DUCTWORK IS SPECIFIED TO BE INSULATED TYPE.




8 M-302 RETURN AIR TRANSFER DUCT STACK IN STUD WALL
NOT TO SCALE

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2 Allegheny Center, Nova Tower 2 - Suite 1001 - Pittsburgh, PA 15212
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REVISIONS

1

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE 34E PRICE

PROPERTY REHABILITATION FOR:

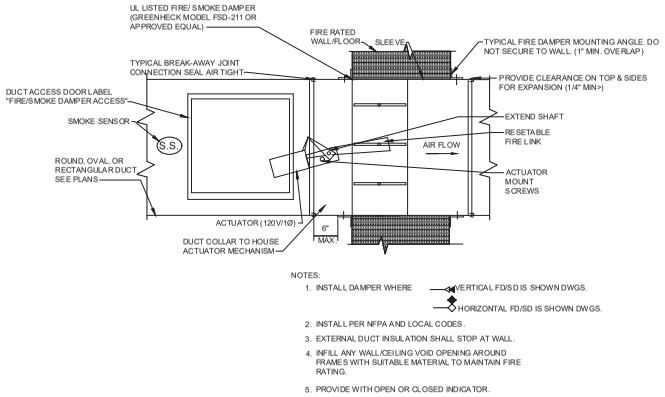
# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

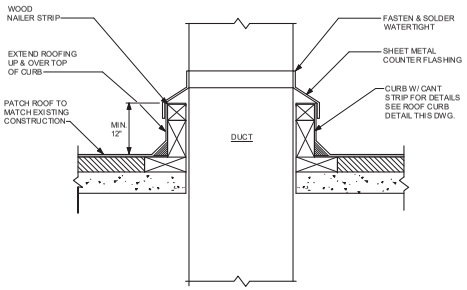
GERARD
ASSOCIATES ARCHITECTS
410 FT. PITT COMMONS, 445 FT. PITT BLVD.
PITTSBURGH, PENNSYLVANIA 15219-1333
PHONE: 412-566-1531 FAX: 412-566-1532

DRAWING NAME
MECHANICAL DETAILS

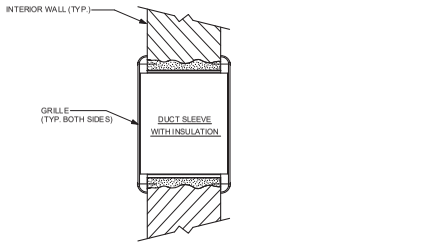
| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | M-302 |
| ISSUE DATE 02/15/2021 | | |



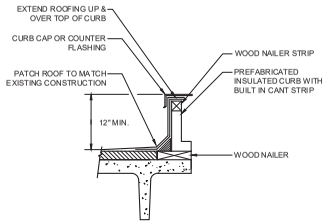

1 M-303 FIRE/SMOKE DAMPER
NOT TO SCALE



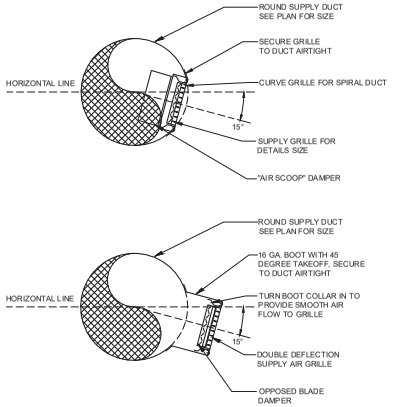

2 M-303 ROOF CURB FLASHING DETAIL
NOT TO SCALE




3 M-303 RETURN AIR TRANSFER W/ GRILLES THRU NON-RATED WALL DETAIL
NOT TO SCALE




4 M-303 PREFABRICATED CURB DIAGRAM
NO SCALE




5 M-303 DUCT MOUNTED SUPPLY AIR GRILLE
NO SCALE

Allen + Shariff
MEP Engineering
2 Allegheny Center, Nova Tower 2 - Suite 1001 - Pittsburgh, PA 15212
ASE JOB #2041090

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REVISIONS

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| 1 |

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

G E R A R D
ASSOCIATES ARCHITECTS
410 FT. PITT COMMONS, 445 FT. PITT BLVD.
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| 2035 | △ | M-303 |
| ISSUE DATE 02/15/2021 | | |

## FURNACE UNIT SCHEDULE

| UNIT DES. | SUPPLY FAN DATA | | | | | HEATING CAPACITY | | | | | | | DX COOLING COIL | | | | | | | | ELECTRICAL DATA | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SUPPLY CFM | MAX OA CFM | E.S.P. IN. WG. | RPM | HP | FUEL TYPE | STAGES | INPUT MBH | OUTPUT MBH | EAT DB DEG F. | LAT DB DEG F. | AFUE | DX COIL MODEL | EAT DB DEG F. | LAT WB DEG F. | LAT DB DEG F. | LAT WB DEG F. | SENS. MBH | TOTAL MBH | SEER | VOLTS/PH | FLA | MOCP | MODEL | WEIGHT | BASIS OF DESIGN | |
| FCUB-1 | 2000 | 397 | 1.0 | - | 1.0 | NAT. GAS | 1 | 110.0 | 107.2 | 56.5 | 105.2 | 96% | CX35-60C-F | 76.9 | 64.4 | 55.0 | 54.0 | 47.5 | 58.3 | 14.5 | 120V/1PH. | 11.5 | 15.0 | ML196UH1 10XE60C | 177 LBS. | LENNOX | 1 THRU 12 |
| FCUB-2 | 2000 | 271 | 1.0 | - | 1.0 | NAT. GAS | 1 | 110.0 | 107.2 | 60.8 | 109.5 | 96% | CX35-60C-F | 76.0 | 63.6 | 55.0 | 54.0 | 45.4 | 56.3 | 14.5 | 120V/1PH. | 11.5 | 15.0 | ML196UH1 10XE60C | 177 LBS. | LENNOX | 1 THRU 12 |
| FCU3-1 | 2030 | 182 | 1.0 | - | 1.0 | NAT. GAS | 1 | 110.0 | 107.2 | 63.9 | 111.9 | 96% | CX35-60C-F | 75.3 | 62.9 | 55.0 | 54.0 | 44.6 | 55.6 | 14.5 | 120V/1PH. | 11.5 | 15.0 | ML196UH1 10XE60C | 177 LBS. | LENNOX | 1 THRU 12 |

REMARKS:
1. PROVIDE APPROPRIATE CLEARANCE TO COMBUSTIBLES.
2. PROVIDE (2) NEW 3/4" CONDENSATE DRAINS. PROVIDE HORIZONTAL DRAIN PAN BENEATH UNIT WITH AUTO WATER LEVEL SENSOR CUTOFF DEVICE.
3. PROVIDE NEW MERV 8 FILTER AND FILTER RACK FOR RETURN AIR INLET.
4. PROVIDE NEW VIBRATION ISOLATION PADS.
5. PROVIDE THERMAL EXPANSION VALVE (TXV).
6. PROVIDE PRESSURE SWITCH.
7. PROVIDE FLUE CONDENSATE TRAP ASSEMBLY.
8. PROVIDE GAS CONTROL VALVE.
9. PROVIDE CONCENTRIC VENT TERMINATION KIT.
10. REMOTE OUTDOOR TEMPERATURE SENSOR AND HUMIDITY SENSOR FOR ECONOMIZER OPERATION.
11. PROVIDE 7 DAY PROGRAMMABLE THERMOSTAT.
12. PROVIDE HIGH PERFORMANCE ECONOMIZER OPTION.

## AIR COOLED CONDENSING UNIT SCHEDULE

| UNIT DES. | SERVES | NO. OF STAGES | NOMINAL CAPACITY | | COOLING EFF. | HEAT COP | NOM. CONN. CAP. % | EAT DEG F. | | ELECTRICAL | | | REFRIGERANT LINESET | | SOUND PRESS. DBA | WEIGHT | MANUF. | MODEL | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | COOL MBTUH | HEAT MBTUH | SEER | | | COOL -ING | HEAT -ING | VOLTS/PH. | MCA | rfs | SUCTION | LIQUID | | | | | |
| CUB-1 | FCUB-1 | 1 | 60 | N/A | 14.0 | N/A | 97.1 | 89 | N/A | 208V/1PH. | 34.8 | 60 | 1-1/8" | 3/8" | 80 | 238 | LENNOX | ACX14060-230-1 | 1 THRU 17 |
| CUB-2 | FCUB-2 | 1 | 60 | N/A | 14.0 | N/A | 93.8 | 89 | N/A | 208V/1PH. | 34.8 | 60 | 1-1/8" | 3/8" | 80 | 238 | LENNOX | ACX14060-230-1 | 1 THRU 17 |
| CU3-1 | FCU3-1 | 1 | 60 | N/A | 14.0 | N/A | 92.7 | 89 | N/A | 208V/1PH. | 34.8 | 60 | 1-1/8" | 3/8" | 80 | 238 | LENNOX | ACX14060-230-1 | 1 THRU 17 |

NOTES:
1. MCA - MINIMUM CIRCUIT AMPACITY, RFS - RECOMMENDED FUSE SIZE, MFS- MAXIMUM FUSE SIZE
2. PROVIDE DISCONNECT.
3. MOUNT UNIT ON 6" CONCRETE OUTDOOR PAD WITH EQUIPMENT SUPPORT RAIL AND VIBRATION ISOLATION PADS.
4. PROVIDE LIQUID LINE SOLENOID VALVE KIT.
5. PROVIDE LONG LINE APPLICATION KIT FOR REFRIGERANT LINE RUNS GREATER THAN 80 FEET IN TOTAL LENGTH.
6. FREEZE PROTECTION KIT.
7. LOW AMBIENT KIT.
8. FILTER DRIER.
9. HIGH AND LOW PRESSURE SWITCHES.
10. THERMOSTATIC EXPANSION VALVE.
11. BRASS SUCTION AND LIQUID SERVICE VALVES WITH SWEAT CONNECTIONS AND SERVICE PORTS.
12. CRANKCASE HEATER.
13. COMPRESSOR SOUND JACKET.
14. PROVIDE FUSED DISCONNECT.
15. SIGHT GLASS.
16. HARD START KIT.
17. REMOTE OUTDOOR TEMPERATURE SENSOR AND HUMIDITY SENSOR FOR ECONOMIZER OPERATION.

## PIPE INSULATION THICKNESS SCHEDULE

| FLUID OPERATING TEMPERATURE AND USAGE (°F) | INSULATION CONDUCTIVITY | | NOMINAL PIPE OR TUBE SIZE (IN) | | | | |
|---|---|---|---|---|---|---|---|
| | CONDUCTIVITY BTU·IN./(h·ft²·°F) | MEAN RATING TEMPERATURE (°F) | < 1 | 1 to < 1½ | 1½ < 4 | 4 to < 8 | ≥ 8 |
| > 350 | 0.32 - 0.34 | 250 | 4.5 | 5.0 | 5.0 | 5.0 | 5.0 |
| 251 - 350 | 0.29 - 0.32 | 200 | 3.0 | 4.0 | 4.5 | 4.5 | 4.5 |
| 201 - 250 | 0.27 - 0.30 | 150 | 2.5 | 2.5 | 2.5 | 3.0 | 3.0 |
| 141 - 200 | 0.25 - 0.29 | 125 | 1.5 | 1.5 | 2.0 | 2.0 | 2.0 |
| 105 - 140 | 0.21 - 0.28 | 100 | 1.0 | 1.0 | 1.5 | 1.5 | 1.5 |
| 40 - 60 | 0.21 - 0.27 | 75 | 0.5 | 0.5 | 1.0 | 1.0 | 1.0 |
| 40 | 0.20 - 0.26 | 50 | 0.5 | 1.0 | 1.0 | 1.0 | 1.5 |

REMARKS:

PIPING SERVING AS PART OF A HEATING OR COOLING SYSTEM SHALL BE THERMALLY INSULATED IN ACCORDANCE WITH TABLE ABOVE (IECC 2015 TABLE C403.2.10) WITH THE FOLLOWING EXCEPTIONS:
1. FACTORY-INSTALLED PIPING WITHIN HVAC EQUIPMENT TESTED AND RATED IN ACCORDANCE WITH A TEST PROCEDURE REFERENCED BY THIS CODE.
2. FACTORY-INSTALLED PIPING WITHIN ROOM FAN-COILS AND UNIT VENTILATORS TESTED AND RATED ACCORDING TO AHRI 330 (EXCEPT THAT THE SAMPLING AND VARIATION PROVISIONS OF SECTION 6.5 SHALL NOT APPLY) AND AHRI 840, RESPECTIVELY.
3. PIPING THAT CONVEYS FLUIDS THAT HAVE A DESIGN OPERATING TEMPERATURE RANGE BETWEEN 60°F AND 105°F.
4. PIPING THAT CONVEYS FLUIDS THAT HAVE NOT BEEN HEATED OR COOLED THROUGH THE USE OF FOSSIL FUELS OR ELECTRIC POWER.
5. STRAINERS, CONTROL VALVES, AND BALANCE VALVES ASSOCIATED WITH PIPING 1 INCH OR LESS IN DIAMETER.
6. DIRECT BURIED PIPING THAT CONVEYS FLUIDS AT OR BELOW 60°F.

## THERMAL INSULATION SCHEDULE

| SYSTEM | SYSTEM- LOCATION | OPERATING TEMPERATURE | MATERIAL | SMACNA CLASS | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | TYPE | THICKNESS IN.S | DENSITY LB/CU. FT. | INSTALLED "R" VALUE/ CONDUCTIVITY | JACKET | |
| DUCT | SUPPLY AIR DUCT - INDOOR CONCEALED, ACCESSIBLE, | 40-120 | MINERAL-FIBER | BLANKET | 2.0" | 0.75 | 5.0 | FSK | 1, 5 |
| DUCT | SUPPLY AIR DUCT - INDOOR CONCEALED, INACCESSIBLE | 40-120 | MINERAL-FIBER | BOARD | 1.5" | 2.25 | 6.5 | FSK | 2 |
| DUCT | SUPPLY AIR DUCT - INDOOR EXPOSED | 40-120 | MINERAL-FIBER | LINER | 1.0" | 4.0 | 4.3 | - | 8 |
| DUCT | RETURN AIR DUCT - INDOOR CONCEALED | 40-120 | MINERAL-FIBER | LINED | 1.0" | 2.25 | 4.0 | - | 2 |
| DUCT | RETURN AIR DUCT - INDOOR EXPOSED | 40-120 | MINERAL-FIBER | LINED | 1.0" | 2.25 | 4.0 | - | 8 |
| DUCT | TRANSFER AIR DUCT - INDOOR | 40-120 | MINERAL-FIBER | LINED | 1.0" | 2.25 | 4.0 | - | 8 |
| DUCT | EXHAUST DUCT WITHIN 10 FEET OF EXTERIOR OPENING - INDOOR | 40-120 | MINERAL-FIBER | BOARD | 1.0" | 2.25 | 4.3 | FSK | 7 |
| DUCT | OUTSIDE AIR DUCT - INDOOR | 0-100 | MINERAL-FIBER | BOARD | 3.0" | 2.25 | 12.0 | FSK | 7 |
| | | | | | | | | | |
| PIPING | REFRIGERANT - CONDITIONED SPACE | 40-60 | MINERAL-FIBER | PRE-MOLDED | REFER TO PIPING INSULATION THICKNESS SCHEDULE | | | ASJ+SSL | 6 |
| PIPING | REFRIGERANT - UNCONDITIONED SPACE | 40-60 | MINERAL-FIBER WICKING | PRE-MOLDED | | | | ASJ+SSL | 6 |
| PIPING | COLD CONDENSATE DRAIN - INDOOR, ONLY ON METAL PIPE | 40-60 | MINERAL-FIBER | PRE-MOLDED | | | | ASJ+SSL | 7 |
| PIPING | OUTDOOR PIPING EXPOSED TO FREEZING (HEAT TRACED PIPE) | 40-100 | MINERAL-FIBER | PRE-MOLDED | | | | ALUM. | |

NOTES:
1. CONCEALED, ACCESSIBLE LOCATIONS - ABOVE LAY-IN OR ACCESSIBLE CEILINGS, ACCESSIBLE MECHANICAL SHAFTS.
2. CONCEALED, INACCESSIBLE LOCATIONS - ABOVE HARD CEILINGS, (DRY WALL, PLASTER), MECHANICAL SHAFTS, BEHIND WALLS.
3. FOR DUCTS LOCATED OUTDOORS PROVIDE WATERPROOF CONSTRUCTION WITH WATER & UV RESISTANT MASTIC ON ALL JOINTS. INTERNALLY LINE WITH ACOUSTICAL DUCT LINER. CROSS-BREAK TOP TO SHED WATER.
4. CONSTRUCT PER NFPA 96 STANDARDS FOR KITCHEN EXHAUST. WHERE LOCATED WITH 3" OF COMBUSTIBLE PROTECT COMBUSTIBLE MATERIALS, WRAP EXTERIOR WITH FIRE RESISTANT INSULATION.
5. DO NOT INSULATE:
   - MAKE-UP AIR DUCTWORK OPERATING AT SURROUNDING AMBIENT CONDITIONS
   - TRANSFER AIR DUCTWORK (ACOUSTICALLY LINE DUCT)
   - EXPOSED SUPPLY DUCTWORK LOCATED IN CONDITIONED SPACE. (DOES NOT INCLUDE RETURN AIR PLENUM)
6. COVER ALL EXPOSED PIPING LOCATED BELOW 7' 0" ABOVE FINISHED FLOOR WITH PVC JACKET.
7. MULTIPLE INSULATION METHODS MAY BE USED TO ACHIEVE THE TOTAL REQUIRED R-VALUE.
8. DUCTWORK SHALL BE PAINTED WHERE EXPOSED OR VISIBLE TO OCCUPANTS. COLOR TO BE SELECTED BY ARCHITECT.

Allen + Shariff
MEP Engineering
2 Allegheny Center, Nova Tower 2 - Suite 1001 - Pittsburgh, PA 15212
ASE JOB #2041090

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PROPERTY REHABILITATION FOR:

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DRAWING NAME
MECHANICAL SCHEDULES

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | M-401 |
| ISSUE DATE 02/15/2021 | | |

## ELECTRIC WALL HEATER SCHEDULE

| TAG | TYPE | KW | ELEC. VOLT/PH | AMPS | BASIS OF DESIGN | MODEL | REMARKS |
|---|---|---|---|---|---|---|---|
| EWH B-1 | WALL | 3.0 | 208/1 | 14.5 | BERKO | FRA4024F | 2,3,4,5 |
| EWH 1-1 | WALL | 3.0 | 208/1 | 14.5 | BERKO | FRA4024F | 1,3,4,5 |
| EWH 2-1 | WALL | 3.0 | 208/1 | 14.5 | BERKO | FRA4024F | 2,3,4,5 |

REMARKS:
1. FULLY RECESSED ELECTRIC WALL HEATER.
2. SURFACE MOUNTED ELECTRIC WALL HEATER.
3. INTEGRAL DISCONNECT.
4. TAMPER PROOF COVER.
5. INTEGRAL THERMOSTAT.

## HVAC LOUVERS

| TAG | MAKE/MODEL | MAX AIR FLOW CFM | INTAKE OR EXH. | SIZE | | | FREE AREA VEL. FPM | P.D. IN W.C. | MATERIAL | FRAME TYPE | BLADE TYPE | FINISH/COLOR | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | W | H | D | | | | | | | |
| LVR1-1 | POTTORFF EFD-245 | 2000 | INTAKE | 110" (FV) | 20" (FV) | 2" | 900 | 0.08 | ALUMINUM | CHANNEL, DRAINABLE HEAD | 45 DEG. | BY ARCHITECT | 1 |
| LVR1-2 | POTTORFF EFD-245 | 2000 | RELIEF | 30" | 24" | 2" | 950 | 0.08 | ALUMINUM | CHANNEL, DRAINABLE HEAD | 45 DEG. | BY ARCHITECT | 1 |
| LVR3-1 | POTTORFF EFD-245 | 4000 | RELIEF | 60" | 24 | 2" | 950 | 0.08 | ALUMINUM | CHANNEL, DRAINABLE HEAD | 45 DEG. | BY ARCHITECT | 1 |

NOTES:
1. PROVIDE BIRD SCREEN ON INSIDE FACE OF LOUVER.

## VENTILATION SCHEDULE (PHASE I)

| AIR HANDLING UNIT | AREA SERVED | SPACE DESIGNATION | AREA RATE | | | PEOPLE RATE | | | | TOTAL REQ'D VENT @ ROOM (CFM) | VENT EFFECTIVENESS (%) | TOTAL REQ'D VENT @ AHU INLET (CFM) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | AREA (SQFT) | REQ'D VENT (CFM/SQFT) | REQ'D VENT (CFM) | PEOPLE | REQ'D VENT (CFM/PERSON) | DIVERSITY | REQ'D VENT (CFM) | | | | |
| | 000 MECHANICAL ROOM | MECHANICAL ROOM | 197 | 0.0 | 0 | 0 | 0.0 | 1.0 | 0 | 0 | 0.8 | 0.0 | |
| | 001/010 STORAGE/CORRIDOR | CORRIDOR | 162 | 0.06 | 10 | 0 | 0.0 | 1.0 | 0 | 10 | 0.8 | 12.2 | |
| | 001A - ELECTRICAL PANEL AREA | ELECTRICAL EQUIPMENT AREA | 287 | 0.0 | 0 | 0 | 0.0 | 1.0 | 0 | 0 | 0.8 | 0.0 | |
| | 002 DATA ROOM | ELECTRICAL EQUIPMENT AREA | 103 | 0.0 | 0 | 0 | 0.0 | 1.0 | 0 | 0 | 0.8 | 0.0 | |
| | 005 ELEVATOR MECHANICAL ROOM | ELECTRICAL EQUIPMENT AREA | 40 | 0.0 | 0 | 0 | 0.0 | 1.0 | 0 | 0 | 0.8 | 0.0 | |
| | 100 ENTRY VESTIBULE | VESTIBULE | 36 | 0.0 | 0 | 0 | 0.0 | 1.0 | 0 | 0 | 0.8 | 0.0 | |
| | 102 RESOURCE CENTER | OFFICE | 645 | 0.06 | 39 | 6 | 5.0 | 1.0 | 32 | 71 | 0.8 | 88.7 | |
| | 202 TRAINING | LECTURE CLASSROOM | 687 | 0.06 | 41 | 25 | 7.5 | 1.0 | 188 | 229 | 0.8 | 285.9 | |
| | 205 ELEVATOR LOBBY | CORRIDOR | 142 | 0.06 | 9 | 0 | 0.0 | 1.0 | 0 | 9 | 0.8 | 10.7 | |
| | | | | | | | | | | | | 397.4 | TOTAL FOR FCUB-1 |
| | 106 COMPUTER ROOM | COMPUTER (NOT PRINTING) | 413 | 0.06 | 25 | 2 | 5.0 | 1.0 | 10 | 35 | 0.8 | 43.9 | |
| | | | | | | | | | | | | | |
| | 007 STORAGE | STORAGE - DRY MATERIALS | 150 | 0.12 | 18 | 0 | 0.0 | 1.0 | 0 | 18 | 0.8 | 22.5 | |
| | 006 STORAGE | STORAGE - DRY MATERIALS | 141 | 0.12 | 17 | 0 | 0.0 | 1.0 | 0 | 17 | 0.8 | 21.1 | |
| | 011 STORAGE | STORAGE - DRY MATERIALS | 203 | 0.12 | 24 | 0 | 0.0 | 1.0 | 0 | 24 | 0.8 | 30.4 | |
| | 105 ELEVATOR LOBBY | CORRIDOR | 150 | 0.06 | 9 | 0 | 0.0 | 1.0 | 0 | 9 | 0.8 | 11.3 | |
| | 107 TOILET | RESTROOM | 115 | - | - | 0 | 0.0 | 1.0 | 0 | - | - | 150 CFM CONTINUOUS EXHAUST | EXHAUST - EXISTING |
| | 108 KITCHENETTE | BREAK ROOM | 72 | 0.12 | 9 | 4 | 5.0 | 1.0 | 18 | 27 | 0.8 | 33.3 | |
| | 110A OFFICE | OFFICE | 177 | 0.06 | 11 | 1 | 5.0 | 1.0 | 4 | 15 | 0.8 | 18.8 | |
| | 110B OFFICE | OFFICE | 293 | 0.06 | 18 | 1 | 5.0 | 1.0 | 7 | 25 | 0.8 | 31.1 | |
| | 207 TOILET | RESTROOM | 155 | - | - | 0 | 0.0 | 1.0 | 0 | - | - | 150 CFM CONTINUOUS EXHAUST | EXHAUST - EXISTING |
| | 208 CORRIDOR | CORRIDOR | 28 | 0.06 | 2 | 0 | 0.0 | 1.0 | 0 | 2 | 0.8 | 2.1 | |
| | 210 KITCHENETTE | BREAK ROOM | 157 | 0.12 | 19 | 8 | 5.0 | 1.0 | 39 | 58 | 0.8 | 72.6 | |
| | 211 ADMINISTRATIVE OFFICE | OFFICE | 263 | 0.06 | 16 | 1 | 5.0 | 1.0 | 7 | 22 | 0.8 | 27.9 | |
| | | | | | | | | | | | | 271.2 | TOTAL FOR FCU3-2 |
| | 302 BUSINESS INCUBATER | OFFICE | 674 | 0.06 | 40 | 10 | 5.0 | 1.0 | 50 | 90 | 0.8 | 113.1 | |
| | 305 ELEVATOR LOBBY | CORRIDOR | 165 | 0.06 | 10 | 0 | 0.0 | 1.0 | 0 | 10 | 0.8 | 12.4 | |
| | 307 WORKROOM | OFFICE | 430 | 0.06 | 26 | 4 | 5.0 | 1.0 | 20 | 46 | 0.8 | 57.3 | |
| | | | | | | | | | | | | 182.7 | TOTAL FOR FCU3-1 |

REMARKS:
1. CALCULATIONS WERE PERFORMED BASED ON IMC-2015 SECTIONS 402 & 403. MINIMUM OA FOR FURNACE UNITS ARE SCHEDULED ON M-401 EXCEPT FOR EXISTING ROOFTOP UNIT, FOR WHICH IT HAS BEEN ASSUMED THAT AVAILABLE FRESH AIR VOLUME FOR THE EXISTING UNIT IS NO GREATER THAN 20% OF THE DESIGN SUPPLY FLOW.

## GRILLE, REGISTER & DIFFUSER SCHEDULE (PHASE 1)

| TAG | FACE SIZE (SLOT WIDTH) | # SLOTS/ BAR, GRID SPACE | DEFLECTION/ THROW | CONN. SIZE | MAX CFM | P.D. IN. W.C. | MAX. NC | BASIS OF DESIGN | MODEL | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| S-1 | 14/8 | N/A | 2-WAY | 12/6 | 310 | 0.17 | 23 | PRICE | 520D | 1,2,3 |
| S-2 | 20/8 | N/A | 1-WAY | 18/6 | 350 | 0.11 | 29 | PRICE | LFG-15A | 1,2,3,4,5,6 |
| S-3 | 24/24 | N/A | 4-WAY | 8"Ø | 314 | 0.06 | 22 | PRICE | SCD | 1,2,3 |
| RG-1 | 14/8 | 1/2" | 0° | 12/6 | 312 | 0.18 | 32 | PRICE | 530D | 1,2,3 |
| RG-2 | 16/14 | 1/2" | 0° | 14/12 | 749 | 0.14 | 33 | PRICE | 530D | 1,2,3 |
| RG-3 | 20/16 | 1/2" | 0° | 18/14 | 1120 | 0.14 | 35 | PRICE | 530D | 1,2,3 |
| RG-4 | 26/22 | 1/2" | 0° | 24/20 | 2000 | 0.12 | 33 | PRICE | 530D | 1,2,3 |

REMARKS:
1. SEE ARCHITECTURAL REFLECTED CEILING PLAN FOR CEILING TYPES AND MOUNTING REQUIREMENTS.
2. COLOR SELECTED BY ARCHITECT.
3. PROVIDE OPPOSED BLADE DAMPERS AT DIFFUSERS, GRILLES, OR REGISTERS IF INSTALLED IN HARD CEILING OR WALL.
4. HEAVY DUTY LINEAR FLOOR GRILLE.
5. PROVIDE INSULATED PLENUM BOX FOR SUPPLY DUCT CONNECTION.
6. PROVIDE BUTTERFLY DAMPER AT ROUND SUPPLY DUCT OPENING.

## TRANSFER AIR DUCT SCHEDULE

| DESIGNATION | DUCT SIZE | CFM RANGE | DETAIL |
|---|---|---|---|
| T1 | 12 x 6 | 0-300 | #8/M-302 |
| T2 | 24 x 12 | 0-1200 | - |
| T3 | 24 x 12 | 0-1200 | #3/M-303 |

NOTES:
1. SIZING BASED ON 0.05"/100 FT. P.D. – 700 FPM
2. REFER TO DETAIL FOR DUCT CONFIGURATION.
3. PROVIDE 1" THICK ACOUSTICAL LINER.
4. EACH END OF TRANSFER DUCT SHALL BE EQUIPPED WITH LOUVERED SINGE DEFLECTION RETURN GRILLE OF EQUAL SIZE (MODEL PRICE 530D).

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REVISIONS

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE PE-083172 ENGINEER

PROPERTY REHABILITATION FOR:

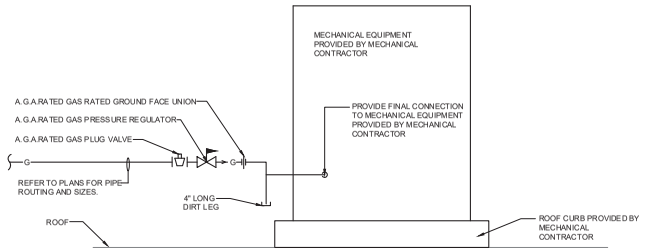
# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
MECHANICAL SCHEDULES

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | M-402 |
| ISSUE DATE 02/15/2021 | | |




1 / P001 TYPICAL GAS EQUIPMENT CONNECTION DETAIL

NOT TO SCALE

PLUMBING LEGEND

| SYMBOL | ABRV. | DESCRIPTION |
|---|---|---|
| SAN | SAN | SANITARY PIPING |
| KW | KW | KITCHEN WASTE PIPING (TO GREASE INTERCEPTOR) |
| ST | ST | STORM PIPING (PRIMARY) |
| OD | OD | SECONDARY / OVERFLOW DRAIN PIPING |
| V | V | VENT PIPING |
| CW | CW | COLD WATER PIPING |
| HW | HW | HOT WATER PIPING |
| HWR | HWR | HOT WATER RETURN PIPING |
| TP | TP | TRAP PRIMER PIPING |
| G | G | GAS PIPING (NATURAL OR PROPANE) |
| FO | FO | FUEL OIL PIPING |
| S | S | SPRINKLER PIPING |
| CD | CD | CONDENSATE DRAIN PIPING |
| | | PIPING ROUTED BELOW GRADE / SLAB (LINE TYPE INDICATES SERVICE TYPE UNO) |
| EX (X) | EX | EXISTING PIPING TO REMAIN - (X) DESIGNATES SERVICE |
| RX (X) | RX | EXISTING PIPING TO BE REMOVED - (X) DESIGNATES SERVICE |

| SYMBOL | ABRV. | DESCRIPTION |
|---|---|---|
| | | PIPE UP |
| | | PIPE DOWN |
| | | PIPE TEE DOWN |
| | | PIPE UNION |
| | | PIPE CAP |
| | | PIPE TRAP |
| | | BALL VALVE |
| | | BALL VALVE OR SHUTOFF VALVE IN RISE |
| | | GLOBE VALVE |
| | | BUTTERFLY VALVE |
| | | GATE VALVE |
| | | GAS COCK |
| | MV | MIXING VALVE |
| | | VACUUM RELIEF VALVE |
| | VB | VACUUM BREAKER |
| | | GAS SOLENOID VALVE |
| | BV | BALANCING VALVE |
| | PRV | PRESSURE REDUCING VALVE |
| | PRV | PRESSURE REGULATING VALVE |
| | CV | CHECK VALVE |
| | | STRAINER |
| | T&P | TEMPERATURE AND PRESSURE RELIEF VALVE |
| | BFP | BACK FLOW PREVENTER |
| | PG | PRESSURE GAUGE |
| | | THERMOMETER |
| | | AQUASTAT |
| | | HOT WATER RECIRC. PUMP |
| | | INTERIOR HOSE BIBB OR HOSE END DRAIN VALVE |
| | | EXTERNAL WALL HYDRANT |
| X | | DOMESTIC SHOCK ABSORBER/WATER HAMMER ARRESTER; TEXT DENOTES SIZE (PDI: A ~ F) |
| | FCO | CLEAN OUT, FLOOR |
| | CO | CLEAN OUT, EXPOSED |
| | FD | FLOOR DRAIN |
| | RD | ROOF DRAIN |
| | | FLOOR DRAIN WITH TRAP PRIMER |
| | | FLOOR SINK/RECEPTOR WITH HALF GRATE |
| | OS&Y | OS&Y VALVE |
| | T.S. | OS&Y VALVE WITH TAMPER SWITCH |
| | | FIRE DEPARTMENT SIAMESE CONNECTION |
| | | FIRE PUMP TEST HEADER |
| | FHV | FIRE HOSE VALVE CABINET |
| I.E. XX.XX | | INVERT ELEVATION B.F.F. (IN FEET) |
| XX | | KITCHEN EQUIPMENT DESIGNATION; REFER TO KITCHEN EQUIPMENT DRAWINGS FOR DETAILS |
| | | UTILITY METER |
| | | CONNECT TO EXISTING |
| | | DISCONNECT FROM EXISTING |
| | | FLEXIBLE PIPE CONNECTION |

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE PE-085110 ENGINEER

PROPERTY REHABILITATION FOR:

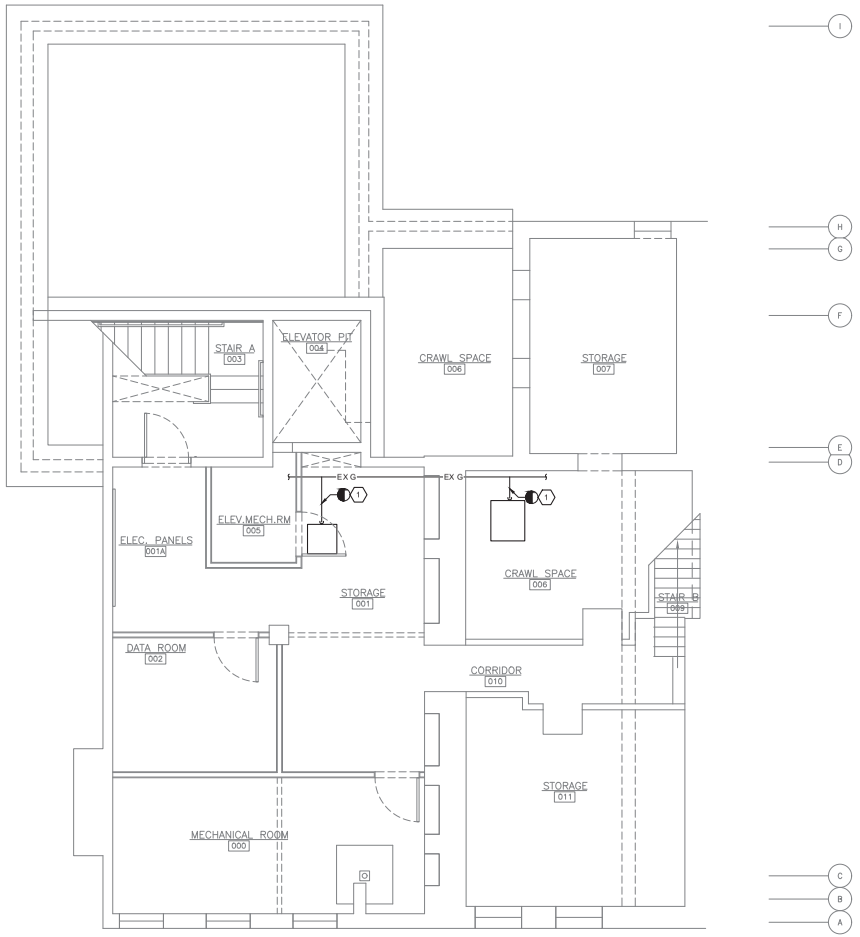
# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
PLUMBING DATA SHEET

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | △ | P-001 |
| ISSUE DATE 02/15/2021 | | |




PLUMBING DEMOLITION GENERAL NOTES:

1. COORDINATE SERVICE SHUTDOWNS WITH BUILDING OWNER'S MAINTENANCE PERSONNEL AND UTILITY COMPANY.
2. MECHANICAL EQUIPMENT IS SHOWN FOR REFERENCE ONLY.

PLUMBING DEMOLITION KEY NOTES: (#)

1. REMOVE EXISTING GAS CONNECTION FROM MECHANICAL EQUIPMENT AND CAP.

1 / P-100 BASEMENT PLUMBING DEMOLITION PLAN
1/4" = 1'-0"

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COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C. PRICE
ENGINEER

PROPERTY REHABILITATION FOR:

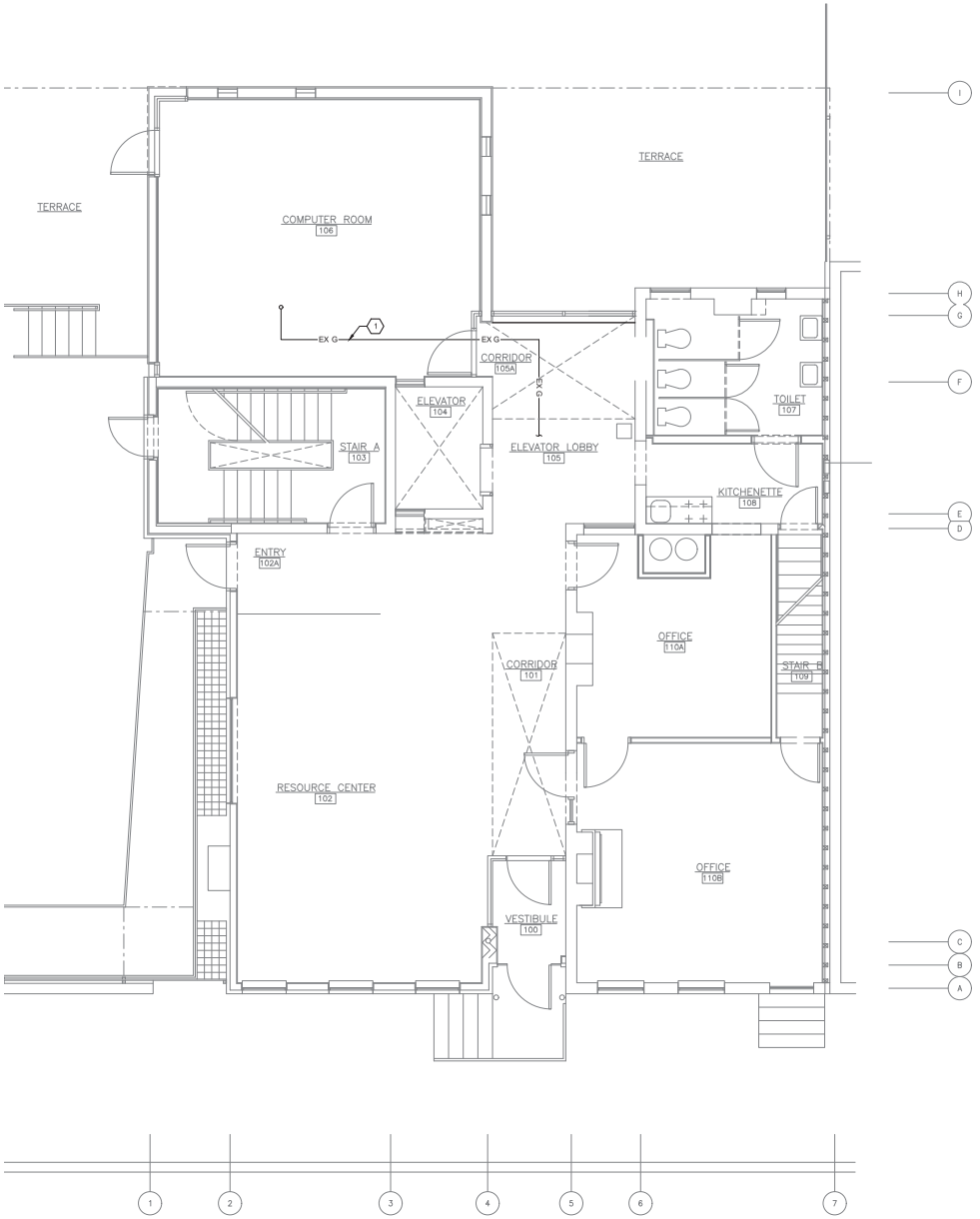
# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
BASEMENT PLUMBING DEMOLITION PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | P-100 |
| ISSUE DATE 02/15/2021 | | |




1 P-101 FIRST FLOOR PLUMBING DEMOLITION PLAN
1/4" = 1'-0"

PLUMBING DEMOLITION GENERAL NOTES:

1. COORDINATE SERVICE SHUTDOWNS WITH BUILDING OWNER'S MAINTENANCE PERSONNEL AND UTILITY COMPANY.

PLUMBING DEMOLITION KEY NOTES: (#)

1. EXISTING GAS PIPING SHALL REMAIN AND CONTINUE IN USE.

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE

PROPERTY REHABILITATION FOR:

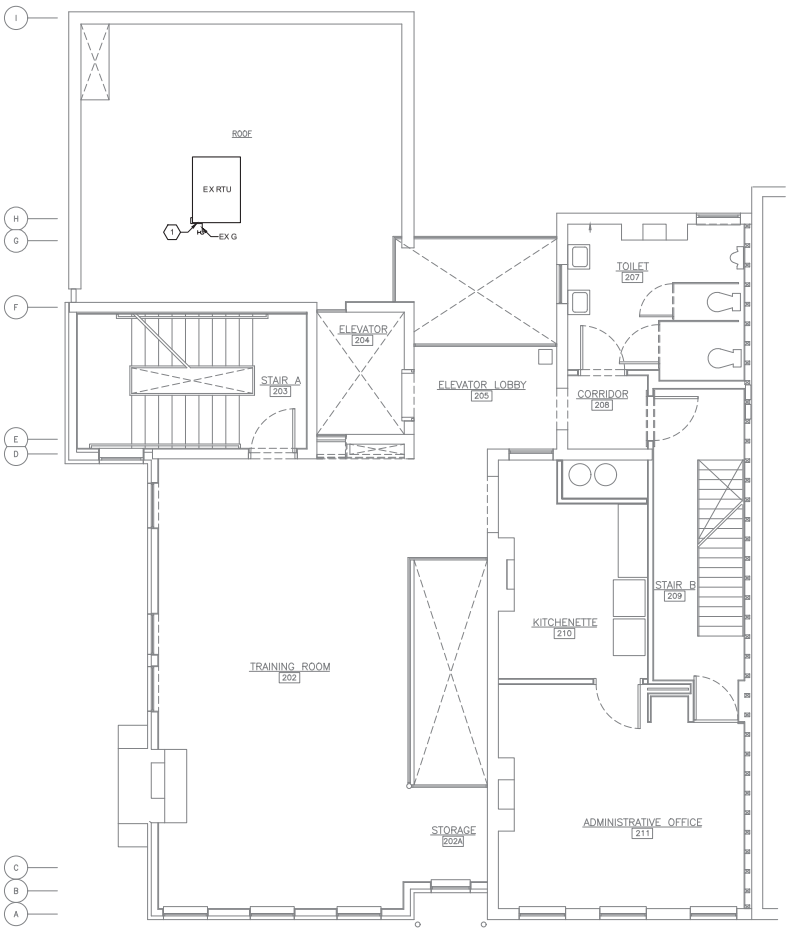
# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
FIRST FLOOR PLUMBING DEMOLITION PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | P-101 |
| ISSUE DATE 02/15/2021 | | |




1 P-102 SECOND FLOOR PLUMBING DEMOLITION PLAN
1/4" = 1'-0"

PLUMBING DEMOLITION GENERAL NOTES:

1. COORDINATE SERVICE SHUTDOWNS WITH BUILDING OWNER'S MAINTENANCE PERSONNEL AND UTILITY COMPANY.
2. MECHANICAL EQUIPMENT IS SHOWN FOR REFERENCE ONLY

PLUMBING DEMOLITION KEY NOTES: (#)

1. EXISTING GAS PIPING AND CONNECTION TO EXISTING ROOFTOP UNIT SHALL REMAIN AND CONTINUE IN USE.

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PROPERTY REHABILITATION FOR:

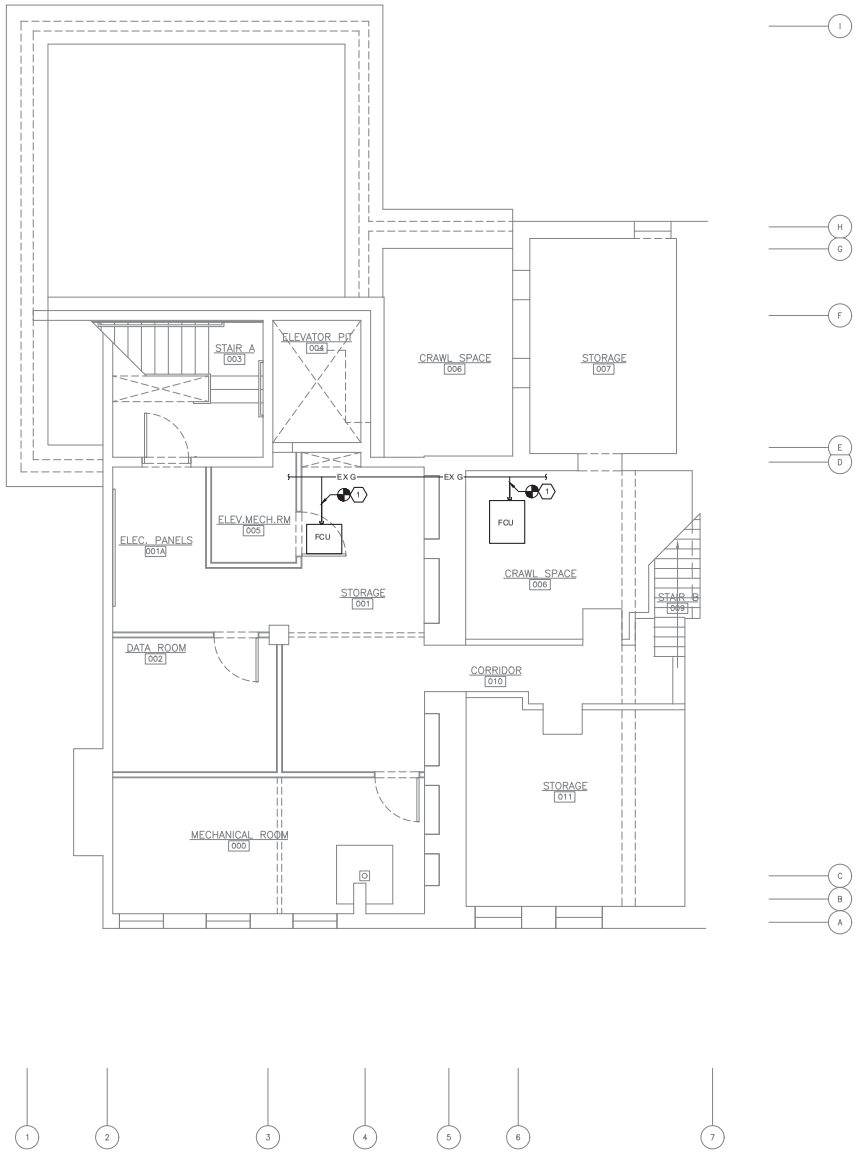
# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
SECOND FLOOR PLUMBING DEMOLITION PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | △ | P-102 |
| ISSUE DATE 02/15/2021 | | |




PLUMBING GENERAL NOTES:

1. COORDINATE LOCATIONS OF PIPING AND FIXTURES WITH ARCHITECT.
2. MECHANICAL EQUIPMENT IS SHOWN FOR REFERENCE ONLY.

PLUMBING KEY NOTES: (#)

1. PROVIDE GAS CONNECTION TO MECHANICAL EQUIPMENT AT THIS APPROXIMATE LOCATION. REFER TO DETAIL 1 ON SHEET P-001 FOR WORK REQUIRED. CONNECT TO GAS PIPING CAPPED DURING DEMOLTION.

1 / P-200 BASEMENT PLUMBING PLAN
1/4" = 1'-0"

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COMMONWEALTH OF PENNSYLVANIA — REGISTERED PROFESSIONAL — DAVID C. PRICE — ENGINEER

PROPERTY REHABILITATION FOR:

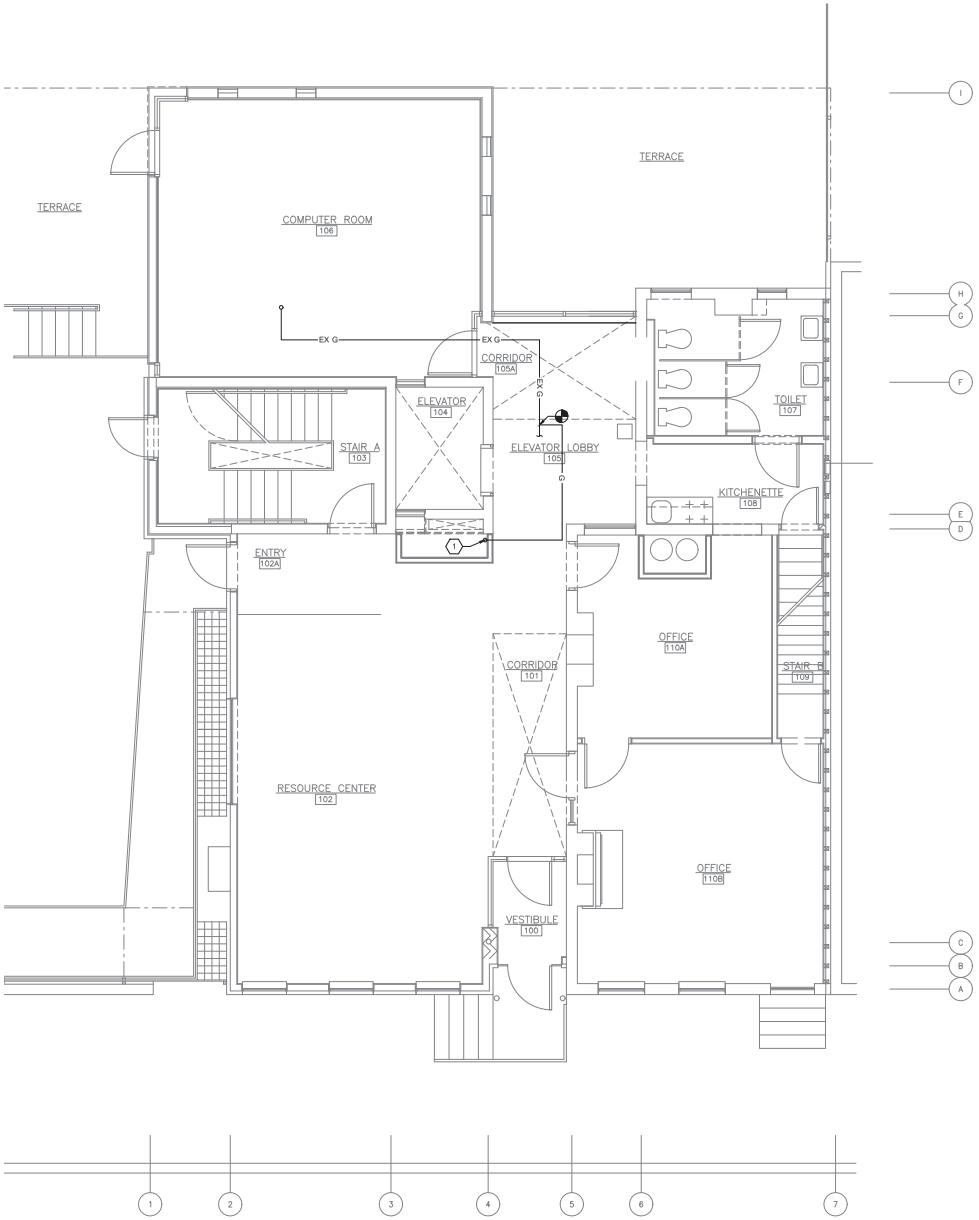
# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
BASEMENT PLUMBING PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | P-200 |
| ISSUE DATE 02/15/2021 | | |




1 P-201 FIRST FLOOR PLUMBING PLAN
1/4" = 1'-0"

PLUMBING GENERAL NOTES:

1. COORDINATE LOCATIONS OF PIPING AND FIXTURES WITH ARCHITECT.

PLUMBING KEY NOTES: (#)

1. PROVIDE GAS PIPING UP TO SERVE NEW MECHANICAL EQUIPMENT ON 3RD FLOOR.

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
FIRST FLOOR
PLUMBING PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | △ | P-201 |
| ISSUE DATE 02/15/2021 | | |

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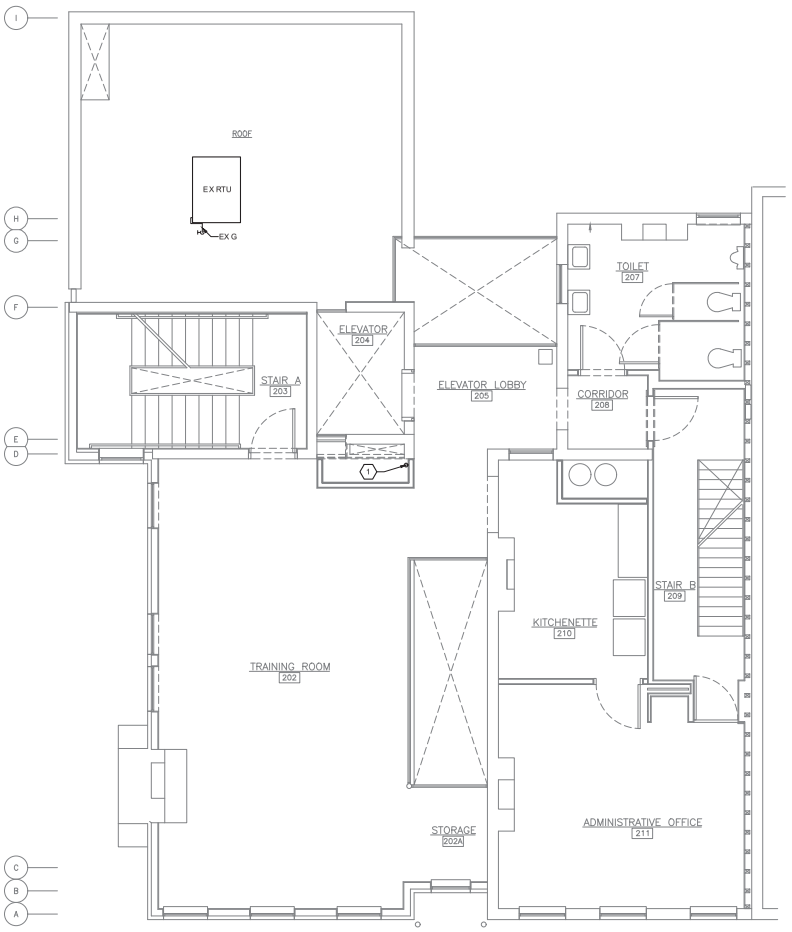


1 P-202 SECOND FLOOR PLUMBING PLAN
1/4" = 1'-0"

PLUMBING GENERAL NOTES:

1. COORDINATE LOCATIONS OF PIPING AND FIXTURES WITH ARCHITECT.
2. MECHANICAL EQUIPMENT IS SHOWN FOR REFERENCE ONLY.

PLUMBING KEY NOTES: (#)

1. PROVIDE GAS PIPING UP TO SERVE NEW MECHANICAL EQUIPMENT ON THE 3RD FLOOR.

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
SECOND FLOOR PLUMBING PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | △ | P-202 |
| ISSUE DATE 02/15/2021 | | |

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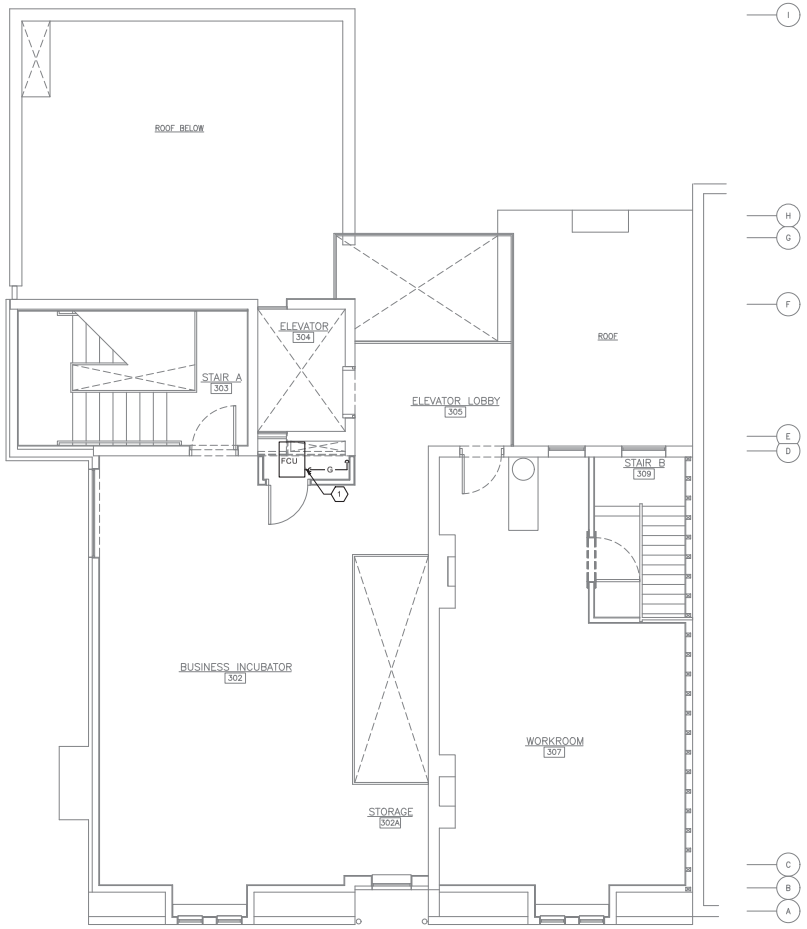


1 P-203 THIRD FLOOR PLUMBING PLAN
1/4" = 1'-0"

PLUMBING GENERAL NOTES:

1. COORDINATE LOCATIONS OF PIPING AND FIXTURES WITH ARCHITECT.
2. MECHANICAL EQUIPMENT IS SHOWN FOR REFERENCE ONLY.

PLUMBING KEY NOTES: (#)

1. PROVIDE GAS CONNECTION TO MECHANICAL EQUIPMENT AT THIS APPROXIMATE LOCATION. REFER TO DETAIL 1 ON SHEET P001 FOR WORK REQUIRED. COORDINATE WITH MECHANICAL CONTRACTOR.

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
THIRD FLOOR
PLUMBING PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | △ | P-203 |
| ISSUE DATE 02/15/2021 | | |

## GENERAL ELECTRICAL NOTES:

GENERAL: UNLESS SPECIFICALLY INDICATED OTHERWISE, ALL WORK SHOWN ON THE ELECTRICAL DRAWINGS IS NEW WORK TO BE PROVIDED UNDER THIS CONTRACT.

DEMOLITION: SEE "ELECTRICAL GENERAL DEMOLITION NOTES FOR ADDITIONAL DEMOLITION REQUIREMENTS.

COORDINATION: COORDINATE AND COOPERATE WITH ALL TRADES ON THE PROJECT.

RECORD DRAWINGS: SECURE AN EXTRA SET OF ELECTRICAL DRAWINGS TO BE KEPT ON SITE AND MARK DAILY, THE DRAWINGS IN RED AS THE PROJECT PROGRESSES IN ORDER TO KEEP AN ACCURATE RECORD OF ALL DEVIATIONS BETWEEN THE WORK SHOWN ON THE DRAWINGS AND THE WORK WHICH IS ACTUALLY INSTALLED. THESE MARKED DRAWINGS SHALL REFLECT ANY AND ALL CHANGES AND REVISIONS TO THE ORIGINAL DESIGN WHICH EXISTS IN THE COMPLETED WORK. DELIVER THE MARKED DRAWINGS TO THE ARCHITECT OR ENGINEER AT PROJECT CLOSE-OUT.

TESTS: TEST ALL WIRING FOR CONTINUITY AND GROUNDS BEFORE CONNECTING ANY FIXTURES OR DEVICES. PERFORM INSULATION RESISTANCE TESTS ON ALL WIRING #8 OR LARGER TO ENSURE THAT ALL PORTIONS ARE FREE FROM SHORT-CIRCUITS AND GROUNDS.

INSPECTIONS: ARRANGE ALL NECESSARY INSPECTIONS. DELIVER ALL REQUIRED INSPECTION CERTIFICATES TO THE OWNER.

GROUNDING: PROVIDE GROUNDING IN ACCORDANCE WITH THE NEC FOR THE ELECTRICAL SYSTEM, INCLUDING EQUIPMENT FRAMES CONDUITS, SWITCHES, CONTROLLERS, WIRE-WAYS, NEUTRAL CONDUCTORS AND OTHER EQUIPMENT. PROVIDE A GROUNDING CONDUCTOR IN ALL CIRCUITS.

LABELS: PROVIDE LABELS FOR ALL PANELBOARDS, CABINETS, SAFETY SWITCHES, MOTOR-DISCONNECT SWITCHES, AND MOTOR CONTROLLERS. LABELS SHALL BE MACHINE ENGRAVED, LAMINATED PLASTIC.

J-BOX LABELING: LABEL ALL JUNCTION BOXES WITH PERMANENT MARKER IDENTIFYING CIRCUIT NUMBER AND PANELBOARD OF CIRCUITS WITHIN.

PANEL DIRECTORY: PROVIDE TYPEWRITTEN PANELBOARD DIRECTORY CARD IN EACH PANELBOARD, INCLUDING EXISTING PANELBOARDS MODIFIED FOR THIS PROJECT, WITH CIRCUIT LOAD INFORMATION AND ROOM NUMBER CLEARLY IDENTIFIED. USE ACTUAL ROOM NUMBERS IN THE BUILDING, NOT THE ROOM NUMBERS SHOWN ON THE CONTRACT DRAWINGS, AS THEY ARE OFTEN DIFFERENT.

MOTOR COORDINATION: MOTORS, MOTOR STARTERS, CONTROLLERS, INTEGRAL DISCONNECT SWITCHES, AND CONTACTORS SHALL BE PROVIDED WITH THEIR RESPECTIVE PIECES OF EQUIPMENT BY THE EQUIPMENT SUPPLIER. COMMUNICATE WITH THE TRADES PROVIDING THE EQUIPMENT, VERIFYING ALL REQUIREMENTS. PROVIDE ALL ELECTRICAL CONNECTIONS REQUIRED THEREIN AND INSTALL MOTOR STARTERS.

MOTOR DISCONNECTS: ALL MOTORS SHALL HAVE DISCONNECTING MEANS.

MOTOR FUSE PROTECTION: WHERE FUSE PROTECTION IS SPECIFICALLY REQUIRED BY THE EQUIPMENT MANUFACTURER, PROVIDE FUSIBLE SWITCHES IN LIEU OF NON-FUSIBLE SWITCHES OR FUSIBLE ENCLOSED CIRCUIT BREAKERS OR OTHER DEVICES INDICATED.

CONNECTION DETAILS: SECURE APPROVED SHOP DRAWINGS SHOWING WIRING DIAGRAMS, ROUGH-IN AND HOOK UP DETAILS FOR EQUIPMENT WHICH MUST BE CONNECTED ELECTRICALLY.

EQUIPMENT DETAILS: MECHANICAL EQUIPMENT WILL BE FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR. THE LOCATIONS SHOWN ON THE ELECTRICAL DRAWINGS ARE APPROXIMATE. COORDINATE WITH THE MECHANICAL CONTRACTOR TO DETERMINE THE EXACT LOCATION OF EACH PIECE OF EQUIPMENT AND DETERMINE THE EXACT ROUGH-IN AND CONNECTION REQUIREMENTS.

STARTER MOUNTING: WHERE AN INDIVIDUALLY MOUNTED SAFETY SWITCH, STARTER OR CIRCUIT BREAKER IS SHOWN ADJACENT TO ITS RESPECTIVE LOAD AND NOT MOUNTED ON A WALL, PROVIDE ALL SUPPORTS, BRACKETS, ANCHORING, ETC. NECESSARY TO PROPERLY SUPPORT THE DEVICE.

LIGHTING ARRANGEMENT: ARRANGE LIGHTING FIXTURES IN ACCORDANCE WITH THE ARCHITECTURAL REFLECTED CEILING PLANS.

LIGHTING COORDINATION: COORDINATE LIGHTING FIXTURES WITH GRILLES, DIFFUSERS, SPRINKLER HEADS, ACCESS PANELS, ETC.

MATERIAL COORDINATION: VERIFY CEILING AND WALL CONSTRUCTION AND MATERIAL PRIOR TO ORDERING LIGHT FIXTURES OR OTHER DEVICES TO ENSURE PROPER FIXTURES OR DEVICES ARE FURNISHED TO MATCH CONSTRUCTION.

MOUNTING HEIGHTS: MOUNTING HEIGHTS INDICATED ARE FROM THE FINISHED FLOOR TO THE CENTERLINE OF THE WIRING DEVICE UNLESS OTHERWISE NOTED. MOUNTING HEIGHTS OF LIGHTING FIXTURES AND FIRE ALARM DEVICES ARE TO THE BOTTOM OF THE FIXTURE OR DEVICE UNLESS OTHERWISE NOTED.

DEVICE LOCATIONS: COORDINATE LOCATIONS OF SWITCHES, RECEPTACLES, AND TELE/DATA OUTLETS WITH OTHER WALL MOUNTED DEVICES SUCH AS THERMOSTATS AND CONTROL STATIONS. DO NOT MOUNT WIRING DEVICES BACK TO BACK.

EWC RECEPTACLES: RECEPTACLES FOR ELECTRIC WATER COOLERS (EWC) SHALL BE INSTALLED OUT OF VIEW AND BEHIND THE EWC ENCLOSURE. VERIFY THE MOUNTING HEIGHT WITH THE EQUIPMENT SUPPLIER PRIOR TO ROUGH-IN.

DEVICE COORDINATION: THOROUGHLY REVIEW AND COORDINATE ALL CASEWORK, DOOR SWINGS, AND CABINET DRAWINGS AND ARCHITECTURAL ELEVATIONS WITH DEVICE LOCATIONS PRIOR TO ROUGH-IN OF OUTLET BOXES.

BARRIERS: WHERE A MULTIPLE GANG BOX HAS CIRCUITS OF DIFFERENT VOLTAGES OR SYSTEMS WHICH ARE REQUIRED TO BE SEPARATED, PROVIDE THE CODE-REQUIRED SEPARATION, USING A FULL HEIGHT AND DEPTH BARRIER PLATE.

FIRE PROOFING: FOR ANY WALL OR FLOOR PENETRATIONS THROUGH FIRE RATED STRUCTURES, PROVIDE FIRE-PROOFING TO SEAL ALL THE PENETRATIONS AFTER THE CONDUIT HAS BEEN INSTALLED. FIRE PROOFING FOR PENETRATIONS SHALL BE UL APPROVED PER THE THE PENETRATION MADE IN ORDER TO MAINTAIN FIRE RATED INTEGRITY OF THE STRUCTURE.

CLEAN UP: ON PROJECT CLOSE-OUT, CLEAN ALL ELECTRICAL DEVICES, LIGHTING FIXTURES, LAMPS AND LENSES, AND REMOVE ALL PAINT SPATTERS FROM DEVICES, FIXTURES, AND PLATES. REPLACE ALL INOPERATIVE LAMPS.

OWNER FURNISHED EQUIPMENT: CONTRACTOR SHALL OBTAIN CUT SHEETS, INSTALLATION DATA, AND ROUGH-IN REQUIREMENTS FOR OWNER FURNISHED, CONTRACTOR INSTALLED EQUIPMENT AND COORDINATE ROUGH-IN AND POWER REQUIREMENTS WITH THE OWNER'S REPRESENTATIVE PRIOR TO STARTING ANY ASSOCIATED WORK.

CONDUIT ROUTING: ALL CONDUIT RUN OVERHEAD SHALL BE RUN AT THE BOTTOM OF THE FLOOR, ROOF STRUCTURE, OR LOWEST CHORD OF JOIST SPACE (AS APPLICABLE) ABOVE IN ORDER TO AVOID CONFLICTS WITH OTHER TRADES.

WIRING DEVICES: ALL RECEPTACLES AND SWITCHES SHALL BE LABELED WITH CLEAR PLASTIC LAMINATED LABEL WITH BLACK TEXT, NOTING PANELBOARD DESIGNATION AND CIRCUIT NUMBER FROM WHICH IT IS FED.

EQUIPMENT DEMONSTRATION: PROVIDE A DEMONSTRATION OF THE OPERATION OF ALL ELECTRICAL COMPONENTS.

CEILING AND MECHANICAL ROOM PLENUM: ALL WIRING THAT WILL NOT BE RUN IN METAL CONDUIT SHALL BE PLENUM RATED.

Allen + Shariff
MEP Engineering
2 Allegheny Center, Nova Tower 2 · Suite 1001 · Pittsburgh, PA 15212
ASE JOB #2041090

## ELECTRICAL GENERAL DEMOLITION NOTES:

GENERAL: DEMOLITION DRAWINGS ARE BASED ON EXISTING PLANS AND FIELD INVESTIGATION PRIOR TO DEMOLITION. VISIT THE EXISTING BUILDING PRIOR TO BID IN ORDER TO BECOME FAMILIAR WITH THE EXISTING CONDITIONS AND IN ORDER TO AVOID CONFLICTS.

DASHED ITEMS: ALL ITEMS SHOWN DASHED ON DEMOLITION PLANS ARE EXISTING AND SHALL BE REMOVED COMPLETE INCLUDING BOXES, CONDUIT, WIRE, FASTENERS, AND ASSOCIATED APPURTENANCES UON.

SOLID ITEMS: ALL ITEMS SHOWN SOLID ON DEMOLITION PLANS ARE EXISTING TO REMAIN.

CIRCUITING TO REMAIN: WHERE AFFECTED BY NEW WORK, EXISTING CIRCUITING TO REMAIN SHALL BE REROUTED OR RECONNECTED AS REQUIRED, IN ORDER TO MAINTAIN CONTINUITY OF CIRCUIT.

REUSE OF EXISTING CIRCUITRY: EXISTING CIRCUITS SHALL BE REUSED WHERE CONVENIENT TO SERVE THE NEW LAYOUT. PROVIDE CIRCUIT MODIFICATIONS INDICATED OR REQUIRED TO MAINTAIN CONTINUITY OF EXISTING CIRCUITS THAT REMAIN.

EXISTING CONDUIT: ALL EXISTING CONDUITS AND WIRING THAT WILL NOT BE REUSED SHALL BE REMOVED. EXISTING CONDUIT TO REMAIN CONCEALED IN WALLS SHALL BE ABANDONED. EXISTING CONDUIT TO REMAIN BELOW FLOOR SLAB SHALL BE CUT OFF ONE INCH BELOW ROUGH FLOOR AND GROUTED FLUSH. ALL EXISTING WIRING IN CONDUITS TO BE ABANDONED SHALL BE DISCONNECTED FROM POWER SOURCE AND REMOVED.

REPAIR DAMAGE: EXERCISE CARE IN REMOVAL OF DEMOLITION ITEMS. REPAIR, AT NO ADDITIONAL COST TO OWNER, ANY DAMAGE CAUSED TO EXISTING CONSTRUCTION AND/OR EQUIPMENT TO REMAIN.

ASSOCIATED APPURTENANCES: REMOVE ALL ELECTRICAL APPURTENANCES (DISCONNECTS, STARTERS, WIRING, CONDUIT, ETC.) ASSOCIATED WITH EQUIPMENT TO BE REMOVED BY OTHERS.

KNOCKOUT PLUGS AND COVERS: ALL CONDUIT REMOVED SHALL BE REMOVED IN ITS ENTIRETY, INCLUDING FITTINGS, MOUNTING DEVICES, MOUNTING HARDWARE, ETC. PROVIDE CONDUIT PLUGS AND BLANKS FOR ALL OPENINGS CREATED BY THE REMOVAL OF CONDUIT. PROVIDE BLANK COVER PLATES FOR ALL OPENED OUTLET BOXES CREATED BY THE REMOVAL OF THE EQUIPMENT AND/OR DEVICES.

DEMOLISHED MATERIALS: ALL MATERIALS REMOVED UNDER DEMOLITION, NOT TO BE RELOCATED OR DESIGNATED TO BE TURNED OVER TO THE OWNER, SHALL BECOME PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED COMPLETELY FROM THE SITE.

SCHEDULE OUTAGES: ALL WORK AND ALL POWER OUTAGES SHALL BE SCHEDULED AT TIMES CONVENIENT TO THE OWNER.

NOTIFICATION: NOTIFY THE OWNER PRIOR TO TURNING OFF ANY CIRCUITS.

EXISTING CIRCUITS: IF DURING THE COURSE OF CONSTRUCTION, IT IS DETERMINED BY THE CONTRACTOR THAT AN EXISTING CIRCUIT BECOMES SPARE, THE CONTRACTOR SHALL UPDATE THE PANELBOARD DIRECTORY TO INDICATE SUCH, EVEN IF IT IS NOT EXPLICITLY MARKED ON THE ELECTRICAL PLANS.

## GENERAL SPECIAL SYSTEM NOTES:

TELEPHONE AND DATA SYSTEMS

THE TELEPHONE AND DATA SYSTEMS WILL BE FURNISHED AND INSTALLED THROUGH THE OWNER'S VENDOR (THE VENDOR) UNDER A SEPARATE CONTRACT. ALL CABLING AND WIRING (EXCEPT FOR POWER WIRING), J-HOOKS, JACKS, COVER PLATE COMPATIBLE WITH THE EQUIPMENT, DEVICES, RACKS, AND COMPONENT EQUIPMENT WILL BE PROVIDED BY THE VENDOR, UNLESS INDICATED OTHERWISE. THE VENDOR WILL PROVIDE INSTALLATION DURING CONSTRUCTION. THE ELECTRICAL CONTRACTOR (THE CONTRACTOR) SHALL COORDINATE ALL ROUGH-IN, BOX SIZES AND CONFIGURATIONS, CONDUIT SIZES AND ROUTING WITH THE VENDOR PRIOR TO INSTALLATION OF THE RACEWAY SYSTEM.

THE CONTRACTOR SHALL PROVIDE ALL CONDUIT WITH PULL WIRE, AND 4"X4"X2 1/4"BOX WITH SINGLE GANG PLASTER RING UNLESS OTHERWISE NOTED. ELECTRICAL CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND ELECTRICAL REQUIREMENTS WITH THE VENDOR PRIOR TO ROUGH-IN.

STUB ALL CONDUITS WITH PULL WIRE FOR COMMUNICATIONS DEVICES TO ABOVE AN ACCESSIBLE CORRIDOR CEILING AND TERMINATE WITH INSULATED NYLON BUSHING. THE VENDOR WILL PROVIDE J-HOOKS ABOVE THE CEILING FROM THE STUB OUT TO EQUIPMENT LOCATION AS REQUIRED FOR HIS CABLING AND TERMINATE WITH INSULATED NYLON BUSHING. WHERE A WALL SEPARATES THE CONDUIT STUB OUT FROM THE EQUIPMENT LOCATION, PROVIDE A 1" MINIMUM SLEEVE THROUGH THE WALL, ABOVE AN ACCESSIBLE CEILING, TO ACCOMMODATE THE CABLING. ALL CONDUITS AND SLEEVES PENETRATING RATED FIRE OR SMOKE WALLS SHALL BE PROVIDED WITH APPROVED FIRE RETARDANT TO PROVIDE A UL RATED WALL PENETRATION ASSEMBLY. MAINTAIN VENDOR RECOMMENDED SEPARATION BETWEEN WIRING OF DIFFERENT SYSTEMS AND FROM INTERFERENCE PRODUCING ELECTRICAL DEVICES SUCH AS FLUORESCENT LIGHTS, BALLAST, TRANSFORMERS, RELAYS, MOTOR CONTROLS, ETC.

PROVIDE POWER CIRCUITS FOR TELECOMMUNICATIONS EQUIPMENT AS INDICATED.

THE CONTRACTOR SHALL PROVIDE ALL BACKBOXES, CONDUIT, GROUNDING AND SHALL INSTALL ALL SPECIAL BOXES WITH PLASTER RING FURNISHED BY THE VENDOR FOR THE TELECOMMUNICATIONS SYSTEMS IN ACCORDANCE WITH THE APPLICABLE CODES.

THE CONTRACTOR SHALL INSTALL ALL COMMUNICATIONS SLEEVES AND CONDUIT IN ACCORDANCE WITH DRAWINGS, ELECTRICAL SPECIFICATIONS, VENDOR WIRING DIAGRAMS, AND ALL APPLICABLE CODES.

THE GENERAL CONTRACTOR SHALL PROVIDE IN-WALL REINFORCEMENT AS NECESSARY FOR ALL COMMUNICATIONS CABINETS, SHELVES, BRACKETS, FURNITURE MOUNTS, ETC. AND SHALL MOUNT CABINETS, SHELVES, BRACKETS, AND FURNITURE MOUNTS IN ACCORDANCE WITH DRAWINGS, VENDOR SUBMITTALS, AND ALL APPLICABLE CODES.

COORDINATE FINAL LOCATIONS AND ELEVATIONS OF ALL TELECOMMUNICATIONS DEVICES AND OUTLETS WITH ARCHITECTURAL PLANS, CASEWORK AND ELEVATIONS, AND VENDOR REQUIREMENTS.

THE CONTRACTOR SHALL PROVIDE A COMPLETION SCHEDULE BROKEN DOWN BY PROJECT PHASES, FOR TURNOVER OF COMPLETED COMMUNICATIONS ROUGH-IN FOR VENDOR FINISH WORK. THE CONTRACTOR SHALL COORDINATE TURNOVER WITH VENDORS, AND SHALL TURNOVER AREAS FOR VENDOR FINISH WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY EXTRA VENDOR COST RESULTING FROM INCORRECT COMMUNICATIONS ROUGH-IN.

## POWER

| | |
|---|---|
| WP | DUPLEX RECEPTACLE, GROUND FAULT INTERRUPTING TYPE, 20A, 120V, WITH COOPER MODEL WIU-1D (OR EQUAL) "WHILE-IN-USE" WEATHERPROOF COVER, 18"AFG UON. |
| J | JUNCTION BOX - ABOVE CEILINGS OR FLUSH IN WALLS. |
| | ELECTRICAL PANELBOARD |
| | ELECTRICAL CIRCUIT RUN IN CONDUIT AND CIRCUIT HOMERUN TO PANELBOARD (PANEL AND CIRCUIT DESIGNATION AS INDICATED). AS A MINIMUM CONDITION, EACH SINGLE PHASE CIRCUIT SHALL HAVE 1 #12 PHASE CONDUCTOR, 1 #12 NEUTRAL CONDUCTOR, AND 1 #12 GROUNDING CONDUCTOR IN 3/4" CONDUIT. PROVIDE ADDITIONAL PHASE CONDUCTORS AS REQUIRED FOR "MULTIPLE PHASED" ELECTRICAL LOADS. PROVIDE ADDITIONAL "SWITCH LEG" CONDUCTORS TO PROVIDE THE LIGHT FIXTURE CONTROL INDICATED. MULTIPLE SINGLE PHASE CONDUCTORS SHALL BE GROUPED TOGETHER IN A COMMON CONDUIT IN ACCORDANCE WITH THE NEC AND AT THE CONTRACTOR'S DISCRETION. NEUTRAL AND GROUNDING CONDUCTORS SHALL BE SHARED AS ALLOWED BY THE NEC. CONDUIT LARGER THAN 3/4" AND CONDUCTORS LARGER THAN #12 SHALL BE AS INDICATED. |

## FIRE ALARM

| | |
|---|---|
| FACP | FIRE ALARM CONTROL PANEL, SURFACE MOUNTED, TOP 5'-9" AFF. |
| FAAP | FIRE ALARM ANNUNCIATOR PANEL, RECESSED, TOP 5'-0" AFF. |
| NACP | FIRE ALARM NOTIFICATION APPLIANCE CIRCUIT EXTENDER PANEL, SURFACE MOUNTED, TOP, 5'-9" AFF. |
| F | FIRE ALARM MANUAL PULL STATION, 44"AFF TO ACTUATING ARM, UON. |
| SD | ADDRESSABLE FIRE ALARM SYSTEM PHOTO-ELECTRIC SMOKE DETECTOR, CEILING MOUNTED. |
| DD | DUCT MOUNTED ADDRESSABLE FIRE ALARM SYSTEM PHOTO-ELECTRIC SMOKE DETECTOR. |
| MM | FIRE ALARM SYSTEM MONITOR MODULE. |
| CM | FIRE ALARM SYSTEM CONTROL MODULE. |
| 30 | FIRE ALARM VISUAL (STROBE) APPLIANCE, CEILING MOUNTED. SUBSCRIPT INDICATES MINIMUM CANDELA RATING. |
| 30 | FIRE ALARM SYSTEM VISUAL (STROBE) APPLIANCE, WALL MOUNTED AT 80" AFF TO BOTTOM OF LENS, OR 6" BELOW FINISHED CEILING, WHICHEVER IS LOWER, UON. SUBSCRIPT INDICATES MINIMUM CANDELA RATING. |
| AV 30 | FIRE ALARM AUDIO/VISUAL (HORN/STROBE) APPLIANCE, CEILING MOUNTED. SUBSCRIPT INDICATES MINIMUM CANDELA RATING. |
| AV 30 | FIRE ALARM SYSTEM AUDIO/VISUAL (HORN/STROBE), WALL MOUNTED AT 80" AFF TO BOTTOM OF LENS, OR 6" BELOW FINISHED CEILING, WHICHEVER IS LOWER, UON. SUBSCRIPT INDICATES MINIMUM CANDELA RATING. |
| MFSD | SMOKE DAMPER CONNECTION, 120V. REFER TO DETAIL 2/E-501 FOR MORE INFORMATION. |
| RT | FIRE ALARM SYSTEM ADDRESSABLE REMOTE TEST SWITCH. |

## GENERAL

| | |
|---|---|
| 1 | KEYNOTE. |

## LINEWEIGHTS

| | |
|---|---|
| ——— | NEW |
| ——— | EXISTING |
| – – – – | REMOVE EXISTING |

## LIGHTING

| | |
|---|---|
| | LIGHTING FIXTURE. |
| | DOWNLIGHT FIXTURE. |
| | WALL MOUNTED LIGHTING FIXTURE. |
| | LIGHTING FIXTURE WITH EMERGENCY BATTERY. TYPICAL ALL FIXTURE TYPES. |
| | EMERGENCY LIGHTING REMOTE UNIT, CONNECT AHEAD OF LOCAL CONTROLS. |
| | EMERGENCY BATTERY LIGHTING UNIT, CONNECT AHEAD OF LOCAL CONTROLS. |
| | EXIT LIGHTING FIXTURE WITH EMERGENCY HEADS AND DIRECTIONAL ARROWS AS INDICATED ON DRAWINGS. CONNECT TO LIGHTING CIRCUIT AHEAD OF LOCAL CONTROLS. SHADED AREA DENOTES LIGHTED FACE. |
| $a | SINGLE POLE SWITCH, 20A, 120/277V, 44"AFF UON. SUBSCRIPT "a" INDICATES ASSOCIATED FIXTURES TO BE CONTROLLED. |
| $L1a | LOW VOLTAGE SWITCH FOR ON/OFF CONTROL OF A SINGLE ZONE, 44" AFF UON. SUBSCRIPT "a", WHERE USED, INDICATES ASSOCIATED FIXTURES TO BE CONTROLLED. PROVIDE GREENMAX MODEL #DRKDN-C2X OR APPROVED EQUAL. |
| $D1a | LOW VOLTAGE SWITCH FOR ON/OFF AND RAISE/LOWER CONTROL OF A SINGLE ZONE, 44" AFF UON. SUBSCRIPT "a", WHERE USED, INDICATES ASSOCIATED FIXTURES TO BE CONTROLLED. PROVIDE GREENMAX MODEL #DRKDN-C4X OR APPROVED EQUAL. |
| $D2a,b | LOW VOLTAGE SWITCH FOR ON/OFF AND RAISE/LOWER CONTROL OF A TWO ZONES, 44" AFF UON. SUBSCRIPT "a,b", WHERE USED, INDICATES ASSOCIATED FIXTURES TO BE CONTROLLED. PROVIDE GREENMAX MODEL #DRKDN-C8X OR APPROVED EQUAL. |
| $VSa | LINE VOLTAGE DUAL TECHNOLOGY WALL SWITCH VACANCY SENSOR WITH ON/OFF CONTROL (MANUAL ON), 44" AFF UON. SUBSCRIPT "a", WHERE USED, INDICATES ASSOCIATED FIXTURES TO BE CONTROLLED. PROVIDE GREENGATE MODEL #VNW-D OR APPROVED EQUAL. |
| VS a | ANALOG 360-DEGREE MULTI-TECHNOLOGY VACANCY SENSOR. SUBSCRIPT "a", WHERE USED, INDICATES ASSOCIATED FIXTURES TO BE CONTROLLED. PROVIDE LEVITON MODEL #OSC10-M0W OR APPROVED EQUAL. PROVIDE COMPATIBLE SMART PACK FOR EACH CONTROL ZONE. PROVIDE COMPATIBLE 2-PORT ANALOG INTERFACE. |
| OS a | ANALOG 360-DEGREE MULTI-TECHNOLOGY OCCUPANCY SENSOR. SUBSCRIPT "a", WHERE USED, INDICATES ASSOCIATED FIXTURES TO BE CONTROLLED. PROVIDE LEVITON MODEL #OSC10-M0W OR APPROVED EQUAL. PROVIDE COMPATIBLE SMART PACK FOR EACH CONTROL ZONE. PROVIDE COMPATIBLE 2-PORT ANALOG INTERFACE. (NOTE: SAME PRODUCT AS "VACANCY" SENSOR, NOTED DIFFERENTLY TO INDICATE CONTROL STRATEGY) |
| SP a | GREENMAX DRC SMART PACK MODEL #DRD07-EDO OR APPROVED EQUAL. SUBCRIPT "a", WHERE USED, INDICATES ASSOCIATED FIXTURES TO BE CONTROLLED. |
| 2P | LEVITON 2-PORT ANALOG INTERFACE MODEL #DRIDO-CB2 OR APPROVED EQUAL. |
| RC | GREENMAX DRC LINE VOLTAGE ROOM CONTROLLER MODEL # DRC07-EDO OR APPROVED EQUAL. |

## LIGHTING FIXTURE KEY

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|---|---|
| Aa NL | 1. LETTER "A" DENOTES FIXTURE TYPE. REFER TO LIGHTING FIXTURE SCHEDULE.<br>2. ASSOCIATED LETTER "a", WHERE USED, INDICATES LIGHTING FIXTURE CONTROL DEVICE DESIGNATION.<br>3. "NL" INDICATES A NIGHT LIGHT FIXTURE CIRCUITED AHEAD OF LOCAL CONTROLS. |

## ELECTRICAL ABBREVIATIONS

| | |
|---|---|
| A | AMPERE |
| AFF | ABOVE FINISHED FLOOR |
| AFG | ABOVE FINISHED GRADE |
| AHU | AIR HANDLING UNIT |
| AIC | AMPERE INTERRUPTING CURRENT |
| ATS | AUTOMATIC TRANSFER SWITCH |
| AV | AUDIO/VISUAL |
| BFG | BELOW FINISHED GRADE |
| C | CONDUIT |
| CB | CIRCUIT BREAKER |
| CKT | CIRCUIT |
| EBU | EMERGENCT BATTERY UNIT |
| EC | EMPTY CONDUIT |
| EC | ELECTRICAL CONTRACTOR |
| ECB | ENCLOSED CIRCUIT BREAKER |
| EF | EXHAUST FAN |
| ETR | EXISTING TO REMAIN |
| EWC | ELECTRIC WATER COOLER |
| EWH | ELECTRIC WATER HEATER |
| EX | EXISTING |
| FLA | FULL LOAD AMPS |
| GC | GENERAL CONTRACTOR |
| GFCI | GROUND FAULT CIRCUIT INTERRUPTER |
| GND | GROUND |
| HID | HIGH INTENSITY DISCHARGE |
| HP | HORSE POWER/HEAT PUMP |
| HVAC | HEATING, VENTILATING, AND AIR CONDITIONING |
| IG | ISOLATED GROUND |
| JB | JUNCTION BOX |
| KVA | KILO-VOLT AMPERE |
| KW | KILO-WATT |
| LC | LIGHTING CONTACTOR |
| LTG | LIGHTING |
| MAU | MAKE UP AIR UNIT |
| MCA | MINIMUM CIRUIT AMPS |
| MC | MECHANICAL CONTRACTOR |
| MC | METAL CLAD |
| MCB | MAIN CIRCUIT BREAKER |
| MFR | MANUFACTURER |
| MLO | MAIN LUGS ONLY |
| NEC | NATIONAL ELECTRICAL CODE |
| NF | NON-FUSED |
| NL | NIGHT LIGHT |
| NTS | NOT TO SCALE |
| OC | ON CENTER |
| OFCI | OWNER FURNISHED CONTRACTOR INSTALLED |
| P | POLE |
| PC | PLUMBING CONTRACTOR |
| PCP | PUMP CONTROL PANEL |
| PF | POWER FACTOR |
| PNL | PANEL |
| PNLBD | PANELBOARD |
| Ø | PHASE |
| PRI | PRIMARY |
| RTU | ROOF TOP UNIT |
| SEC | SECONDARY |
| TBB | TELEPHONE BACKBOARD |
| TR | TAMPER RESISTANT |
| TYP | TYPICAL |
| UON | UNLESS OTHERWISE NOTED |
| V | VOLTS |
| VAC | VOLTS ALTERNATING CURRENT |
| VAV | VARIABLE AIR VOLUME |
| VDC | VOLTS DIRECT CURRENT |
| VFD | VARIABLE REQUENCY DRIVE |
| W | WATTS/WIRE |
| WP | WEATHERPROOF |
| XFMR | TRANSFORMER |

# FOR CONSTRUCTION

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ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE.

REVISIONS

1

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C. PRICE
ENGINEER
No. PE081572

PROPERTY REHABILITATION FOR:

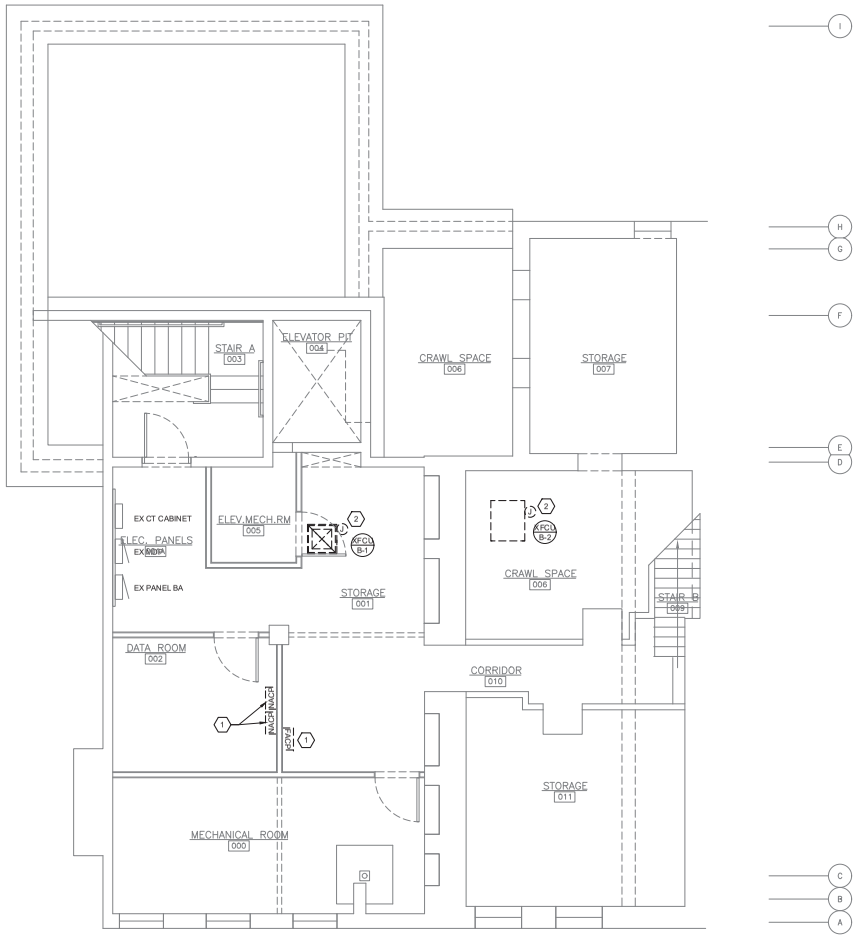
## HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

G E R A R D
ASSOCIATES ARCHITECTS
410 FT. PITT COMMONS, 445 FT. PITT BLVD.
PITTSBURGH, PENNSYLVANIA 15219-1333
PHONE: 412-566-1531 FAX: 412-566-1532

DRAWING NAME
ELECTRICAL DATA SHEET

COMM. NO. 2035
ISSUE DATE 02/15/2021
REVISION NO.
DWG NO. E-001




1 BASEMENT ELECTRICAL DEMOLITION PLAN
E-100 1/4" = 1'-0"

ALTERNATE:

CONTRACTOR SHALL PRICE SEPARATELY ALL WORK, INCLUSIVE OF ALL LABOR, MATERIALS, TAX, OVERHEAD AND PROFIT, ASSOCIATED WITH THE DEMOLITION OF THE EXISTING LIGHTING AND LIGHTING CONTROLS. ALL WORK ASSOCIATED WITH THE REPLACEMENT OF EXISTING FIXTURES SHALL BE INCLUDED IN THE DEDUCT ALTERNATE INCLUDING BUT NOT LIMITED TO FIXTURES, SWITCHES, WIRING, CONTROLS, CONTROL PANELS, PROGRAMMING, GENERAL CEILING AND WALL PATCHING. DO NOT INCLUDE IN THE DEDUCT ANY WORK ASSOCIATED WITH SALVAGING AND REINSTALLING EXISTING DEVICES TO ALLOW FOR THE NEW MECHANICAL CHASE.

ELECTRICAL DEMOLITION GENERAL NOTES:

1. ELECTRICAL DISTRIBUTION EQUIPMENT IS EXISTING TO REMAIN, UNLESS OTHERWISE NOTED.
2. FIXTURES AND DEVICES NOTED WITH "EX" ARE EXISTING TO REMAIN. MAINTAIN EXISTING CIRCUITRY UNLESS OTHERWISE NOTED ON NEW WORK PLANS.
3. ALL HOLES IN WALLS, COLUMN ENCLOSURES, CEILINGS AND FLOORS FROM CONDUIT PENETRATIONS, JUNCTION BOXES OR WIRING DEVICES SHALL BE PATCHED AND PAINTED PER THE ARCHITECT.
4. ALL DEVICES ON WALLS THAT ARE SCHEDULED FOR DEMOLITION, WHETHER REPRESENTED ON THIS PLAN OR NOT, SHALL BE DISCONNECTED AND REMOVED. INTERCEPT AND EXTEND CIRCUITS AS REQUIRED TO MAINTAIN CONTINUITY OF POWER TO EXISTING DEVICES.
5. NOT ALL DEVICES ON WALLS THAT ARE SCHEDULED AS EXISTING TO REMAIN ARE REPRESENTED ON THIS PLAN. ELECTRICAL CONTRACTOR SHALL FIELD VERIFY AND CONSULT WITH ARCHITECT AND BUILDING OWNER ABOUT WHETHER DEVICE SHOULD BE REMOVED OR NOT.
6. ALL EXISTING LIGHTING FIXTURES, EMERGENCY BATTERY HEADS, EMERGENCY LIGHTING INVERTERS, EXIT SIGNS AND ASSOCIATED CONTROL DEVICES SHALL BE DEMOLISHED, UNLESS OTHERWISE NOTED. THE MAJORITY OF LIGHTING EQUIPMENT IS NOT REPRESENTED ON THIS PLAN. ELECTRICAL CONTRACTOR SHALL FIELD SURVEY TO UNDERSTAND THE DEMOLITION SCOPE. REFER TO ALTERNATE NOTE ON THIS SHEET FOR MORE INFORMATION.
7. ALL EXISTING FIRE ALARM NOTIFICATION AND INITIATING DEVICES ARE EXISTING TO REMAIN. THE MAJORITY OF FIRE ALARM EQUIPMENT IS NOT REPRESENTED ON THIS PLAN. ELECTRICAL CONTRACTOR SHALL FIELD SURVEY TO UNDERSTAND THE DEMOLITION SCOPE.

ELECTRICAL DEMOLITION KEY NOTES: (#)

1. DEMOLISH EXISTING FIRE ALARM HEAD-END EQUIPMENT INCLUDING BUT NOT LIMITED TO FACP, NACP, DACT, FAAP, ETC. MAINTAIN ALL EXISTING FIRE ALARM CIRCUITS TO EXISTING TO REMAIN FIRE ALARM NOTIFICATION AND INITIATING DEVICES FOR CONNECTION TO NEW FACP. REFER TO NEW FIRE ALARM WORK PLANS FOR MORE INFORMATION.
2. DISCONNECT AND REMOVE ELECTRICAL CONNECTION TO EXISTING FURNACE. MAINTAIN EXISTING CIRCUIT FOR CONNECTION TO NEW FURNACE. REFER TO NEW BASEMENT POWER WORK PLAN FOR MORE INFORMATION.

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ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE.

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
BASEMENT ELECTRICAL DEMOLITION PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-100 |
| ISSUE DATE 02/15/2021 | | |

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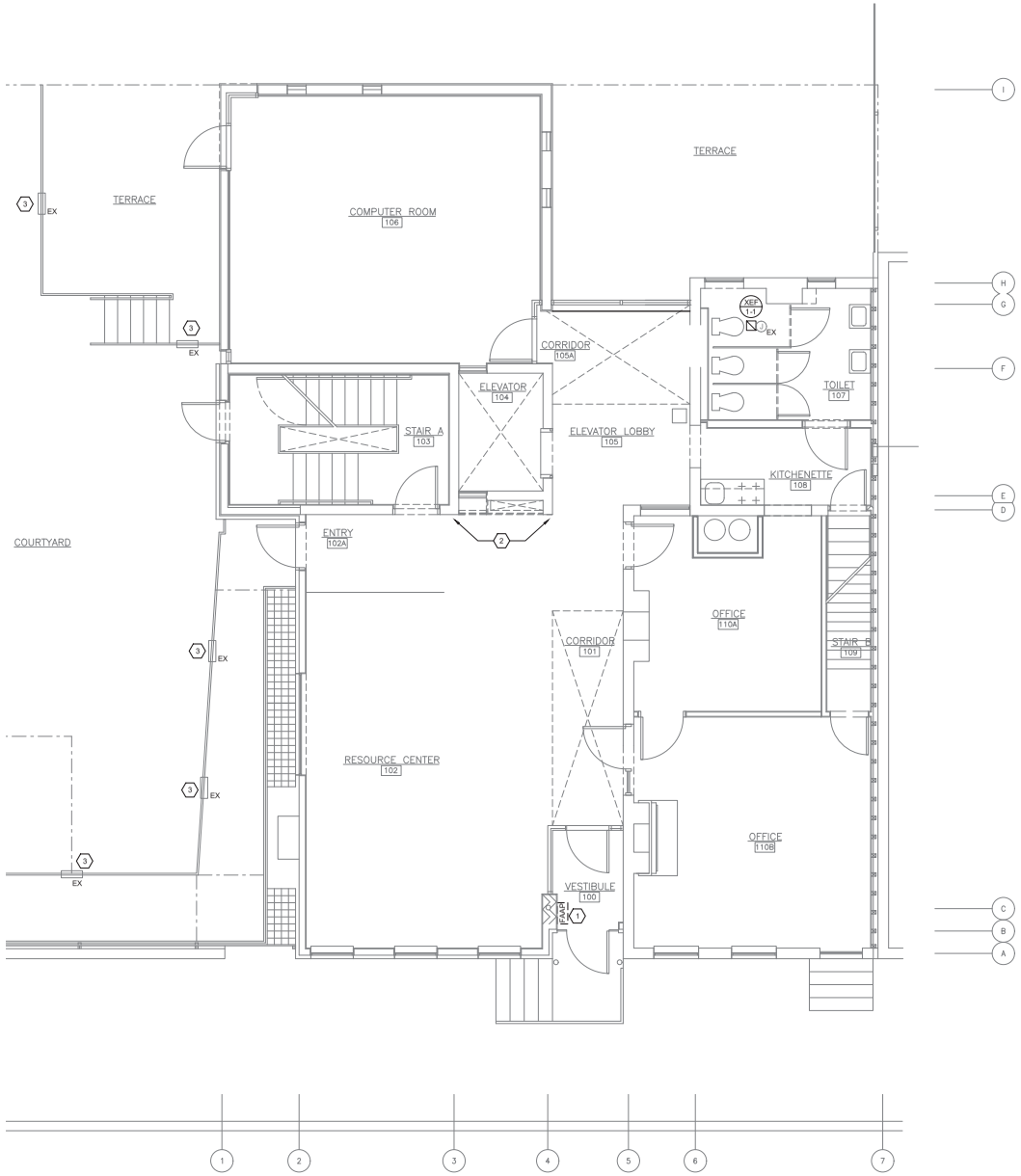
MEP Engineering
2 Allegheny Center, Nova Tower 2 - Suite 1001 - Pittsburgh, PA 15212

ASE JOB #2041090




ALTERNATE:

CONTRACTOR SHALL PRICE SEPARATELY ALL WORK, INCLUSIVE OF ALL LABOR, MATERIALS, TAX, OVERHEAD AND PROFIT, ASSOCIATED WITH THE DEMOLITION OF THE EXISTING LIGHTING AND LIGHTING CONTROLS. ALL WORK ASSOCIATED WITH THE REPLACEMENT OF EXISTING FIXTURES SHALL BE INCLUDED IN THE DEDUCT ALTERNATE INCLUDING BUT NOT LIMITED TO FIXTURES, SWITCHES, WIRING, CONTROLS, CONTROL PANELS, PROGRAMMING, GENERAL CEILING AND WALL PATCHING. DO NOT INCLUDE IN THE DEDUCT ANY WORK ASSOCIATED WITH SALVAGING AND REINSTALLING EXISTING DEVICES TO ALLOW FOR THE NEW MECHANICAL CHASE.

## ELECTRICAL DEMOLITION GENERAL NOTES:

1. ELECTRICAL DISTRIBUTION EQUIPMENT IS EXISTING TO REMAIN, UNLESS OTHERWISE NOTED.
2. FIXTURES AND DEVICES NOTED WITH "EX" ARE EXISTING TO REMAIN. MAINTAIN EXISTING CIRCUITRY UNLESS OTHERWISE NOTED ON NEW WORK PLANS.
3. ALL HOLES IN WALLS, COLUMN ENCLOSURES, CEILINGS AND FLOORS FROM CONDUIT PENETRATIONS, JUNCTION BOXES OR WIRING DEVICES SHALL BE PATCHED AND PAINTED PER THE ARCHITECT.
4. ALL DEVICES ON WALLS THAT ARE SCHEDULED FOR DEMOLITION, WHETHER REPRESENTED ON THIS PLAN OR NOT, SHALL BE DISCONNECTED AND REMOVED. INTERCEPT AND EXTEND CIRCUITS AS REQUIRED TO MAINTAIN CONTINUITY OF POWER TO EXISTING DEVICES.
5. NOT ALL DEVICES ON WALLS THAT ARE SCHEDULED AS EXISTING TO REMAIN ARE REPRESENTED ON THIS PLAN. ELECTRICAL CONTRACTOR SHALL FIELD VERIFY AND CONSULT WITH ARCHITECT AND BUILDING OWNER ABOUT WHETHER DEVICE SHOULD BE REMOVED OR NOT.
6. ALL EXISTING LIGHTING FIXTURES, EMERGENCY BATTERY HEADS, EMERGENCY LIGHTING INVERTERS, EXIT SIGNS AND ASSOCIATED CONTROL DEVICES SHALL BE DEMOLISHED, UNLESS OTHERWISE NOTED. THE MAJORITY OF LIGHTING EQUIPMENT IS NOT REPRESENTED ON THIS PLAN. ELECTRICAL CONTRACTOR SHALL FIELD SURVEY TO UNDERSTAND THE DEMOLITION SCOPE. REFER TO ALTERNATE NOTE ON THIS SHEET FOR MORE INFORMATION.
7. ALL EXISTING FIRE ALARM NOTIFICATION AND INITIATION DEVICES ARE EXISTING TO REMAIN. THE MAJORITY OF FIRE ALARM EQUIPMENT IS NOT REPRESENTED ON THIS PLAN. ELECTRICAL CONTRACTOR SHALL FIELD SURVEY TO UNDERSTAND THE DEMOLITION SCOPE.

## ELECTRICAL DEMOLITION KEY NOTES: (#)

1. DEMOLISH EXISTING FIRE ALARM ANNUNCIATOR PANEL.
2. DISCONNECT AND REMOVE ALL DEVICES THAT CONFLICT WITH THE NEW MECHANICAL CHASE. CONFIRM LOCATION OF NEW CHASE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS. COORDINATE WITH ARCHITECT WHICH DEVICES SHALL BE SALVAGED FOR REINSTALLATION AND WHICH DEVICES SHALL BE DEMOLISHED. REFER TO NEW WORK PLANS FOR MORE INFORMATION.
3. EXTERIOR STEP LIGHT IS EXISTING TO REMAIN. MAINTAIN EXISTING LIGHTING CIRCUIT(S) AND CONTROL DEVICE(S).

1 E-101 FIRST FLOOR ELECTRICAL DEMOLITION PLAN
1/4" = 1'-0"

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MEP Engineering
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ASE JOB #2041090

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE PE-088137 ENGINEER

PROPERTY REHABILITATION FOR:

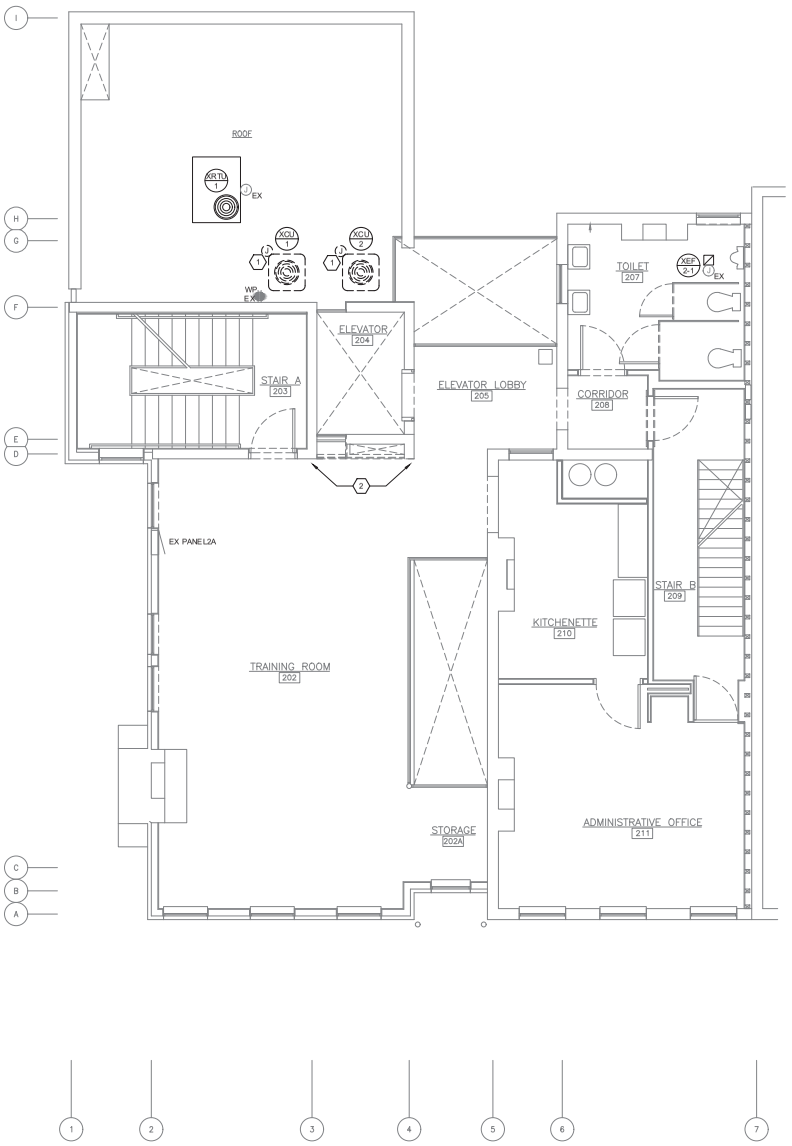
# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
FIRST FLOOR ELECTRICAL DEMOLITION PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | △ | E-101 |
| ISSUE DATE 02/15/2021 | | |




1 E-102 SECOND FLOOR ELECTRICAL DEMOLITION PLAN
1/4" = 1'-0"

ALTERNATE:

CONTRACTOR SHALL PRICE SEPARATELY ALL WORK, INCLUSIVE OF ALL LABOR, MATERIALS, TAX, OVERHEAD AND PROFIT, ASSOCIATED WITH THE DEMOLITION OF THE EXISTING LIGHTING AND LIGHTING CONTROLS. ALL WORK ASSOCIATED WITH THE REPLACEMENT OF EXISTING FIXTURES SHALL BE INCLUDED IN THE DEDUCT ALTERNATE INCLUDING BUT NOT LIMITED TO FIXTURES, SWITCHES, WIRING, CONTROLS, CONTROL PANELS, PROGRAMMING, GENERAL CEILING AND WALL PATCHING. DO NOT INCLUDE IN THE DEDUCT ANY WORK ASSOCIATED WITH SALVAGING AND REINSTALLING EXISTING DEVICES TO ALLOW FOR THE NEW MECHANICAL CHASE.

ELECTRICAL DEMOLITION GENERAL NOTES:

1. ELECTRICAL DISTRIBUTION EQUIPMENT IS EXISTING TO REMAIN, UNLESS OTHERWISE NOTED.
2. FIXTURES AND DEVICES NOTED WITH "EX" ARE EXISTING TO REMAIN. MAINTAIN EXISTING CIRCUITRY UNLESS OTHERWISE NOTED ON NEW WORK PLANS.
3. ALL HOLES IN WALLS, COLUMN ENCLOSURES, CEILINGS AND FLOORS FROM CONDUIT PENETRATIONS, JUNCTION BOXES OR WIRING DEVICES SHALL BE PATCHED AND PAINTED PER THE ARCHITECT.
4. ALL DEVICES ON WALLS THAT ARE SCHEDULED FOR DEMOLITION, WHETHER REPRESENTED ON THIS PLAN OR NOT, SHALL BE DISCONNECTED AND REMOVED. INTERCEPT AND EXTEND CIRCUITS AS REQUIRED TO MAINTAIN CONTINUITY OF POWER TO EXISTING DEVICES.
5. NOT ALL DEVICES ON WALLS THAT ARE SCHEDULED AS EXISTING TO REMAIN ARE REPRESENTED ON THIS PLAN. ELECTRICAL CONTRACTOR SHALL FIELD VERIFY AND CONSULT WITH ARCHITECT AND BUILDING OWNER ABOUT WHETHER DEVICE SHOULD BE REMOVED OR NOT.
6. ALL EXISTING LIGHTING FIXTURES, EMERGENCY BATTERY HEADS, EMERGENCY LIGHTING INVERTERS, EXIT SIGNS AND ASSOCIATED CONTROL DEVICES SHALL BE DEMOLISHED, UNLESS OTHERWISE NOTED. THE MAJORITY OF LIGHTING EQUIPMENT IS NOT REPRESENTED ON THIS PLAN. ELECTRICAL CONTRACTOR SHALL FIELD SURVEY TO UNDERSTAND THE DEMOLITION SCOPE. REFER TO ALTERNATE NOTE ON THIS SHEET FOR MORE INFORMATION.
7. ALL EXISTING FIRE ALARM NOTIFICATION AND INITIATION DEVICES ARE EXISTING TO REMAIN. THE MAJORITY OF FIRE ALARM EQUIPMENT IS NOT REPRESENTED ON THIS PLAN. ELECTRICAL CONTRACTOR SHALL FIELD SURVEY TO UNDERSTAND THE DEMOLITION SCOPE.

ELECTRICAL DEMOLITION KEY NOTES: (W)

1. DEMOLISH ELECTRICAL CONNECTION TO EXISTING CONDENSING UNIT BACK TO SOURCE. DEMOLISH ANY AND ALL ASSOCIATED CONDUIT, WIRING, AND DISCONNECTS, ETC.
2. DISCONNECT AND REMOVE ALL DEVICES THAT CONFLICT WITH THE NEW MECHANICAL CHASE. CONFIRM LOCATION OF NEW CHASE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS. COORDINATE WITH ARCHITECT WHICH DEVICES SHALL BE SALVAGED FOR REINSTALLATION AND WHICH DEVICES SHALL BE DEMOLISHED. REFER TO NEW WORK PLANS FOR MORE INFORMATION.

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
SECOND FLOOR ELECTRICAL DEMOLITION PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | △ | E-102 |
| ISSUE DATE 02/15/2021 | | |

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MEP Engineering
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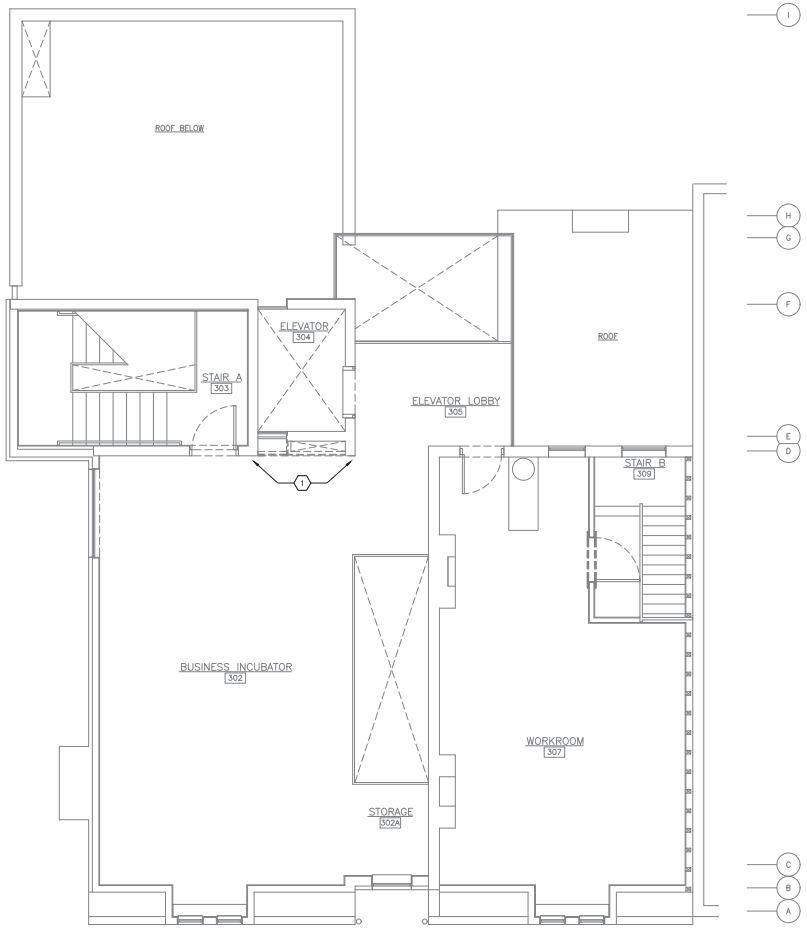
ASE JOB #2041090




1 E-103 THIRD FLOOR ELECTRICAL DEMOLITION PLAN
1/4" = 1'-0"

ALTERNATE:

CONTRACTOR SHALL PRICE SEPARATELY ALL WORK, INCLUSIVE OF ALL LABOR, MATERIALS, TAX, OVERHEAD AND PROFIT, ASSOCIATED WITH THE DEMOLITION OF THE EXISTING LIGHTING AND LIGHTING CONTROLS. ALL WORK ASSOCIATED WITH THE REPLACEMENT OF EXISTING FIXTURES SHALL BE INCLUDED IN THE DEDUCT ALTERNATE INCLUDING BUT NOT LIMITED TO FIXTURES, SWITCHES, WIRING, CONTROLS, CONTROL PANELS, PROGRAMMING, GENERAL CEILING AND WALL PATCHING. DO NOT INCLUDE IN THE DEDUCT ANY WORK ASSOCIATED WITH SALVAGING AND REINSTALLING EXISTING DEVICES TO ALLOW FOR THE NEW MECHANICAL CHASE.

ELECTRICAL DEMOLITION GENERAL NOTES:

1. ELECTRICAL DISTRIBUTION EQUIPMENT IS EXISTING TO REMAIN, UNLESS OTHERWISE NOTED.
2. FIXTURES AND DEVICES NOTED WITH "EX" ARE EXISTING TO REMAIN. MAINTAIN EXISTING CIRCUITRY UNLESS OTHERWISE NOTED ON NEW WORK PLANS.
3. ALL HOLES IN WALLS, COLUMN ENCLOSURES, CEILINGS AND FLOORS FROM CONDUIT PENETRATIONS, JUNCTION BOXES OR WIRING DEVICES SHALL BE PATCHED AND PAINTED PER THE ARCHITECT.
4. ALL DEVICES ON WALLS THAT ARE SCHEDULED FOR DEMOLITION, WHETHER REPRESENTED ON THIS PLAN OR NOT, SHALL BE DISCONNECTED AND REMOVED. INTERCEPT AND EXTEND CIRCUITS AS REQUIRED TO MAINTAIN CONTINUITY OF POWER TO EXISTING DEVICES.
5. NOT ALL DEVICES ON WALLS THAT ARE SCHEDULED AS EXISTING TO REMAIN ARE REPRESENTED ON THIS PLAN. ELECTRICAL CONTRACTOR SHALL FIELD VERIFY AND CONSULT WITH ARCHITECT AND BUILDING OWNER ABOUT WHETHER DEVICE SHOULD BE REMOVED OR NOT.
6. ALL EXISTING LIGHTING FIXTURES, EMERGENCY BATTERY HEADS, EMERGENCY LIGHTING INVERTERS, EXIT SIGNS AND ASSOCIATED CONTROL DEVICES SHALL BE DEMOLISHED, UNLESS OTHERWISE NOTED. THE MAJORITY OF LIGHTING EQUIPMENT IS NOT REPRESENTED ON THIS PLAN. ELECTRICAL CONTRACTOR SHALL FIELD SURVEY TO UNDERSTAND THE DEMOLITION SCOPE. REFER TO ALTERNATE NOTE ON THIS SHEET FOR MORE INFORMATION.
7. ALL EXISTING FIRE ALARM NOTIFICATION AND INITIATION DEVICES ARE EXISTING TO REMAIN. THE MAJORITY OF FIRE ALARM EQUIPMENT IS NOT REPRESENTED ON THIS PLAN. ELECTRICAL CONTRACTOR SHALL FIELD SURVEY TO UNDERSTAND THE DEMOLITION SCOPE.

ELECTRICAL DEMOLITION KEY NOTES: (#)

1. DISCONNECT AND REMOVE ALL DEVICES THAT CONFLICT WITH THE NEW MECHANICAL CHASE. CONFIRM LOCATION OF NEW CHASE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS. COORDINATE WITH ARCHITECT WHICH DEVICES SHALL BE SALVAGED FOR REINSTALLATION AND WHICH DEVICES SHALL BE DEMOLISHED. REFER TO NEW WORK PLANS FOR MORE INFORMATION.

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
THIRD FLOOR ELECTRICAL DEMOLITION PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | △ | E-103 |
| ISSUE DATE 02/15/2021 | | |

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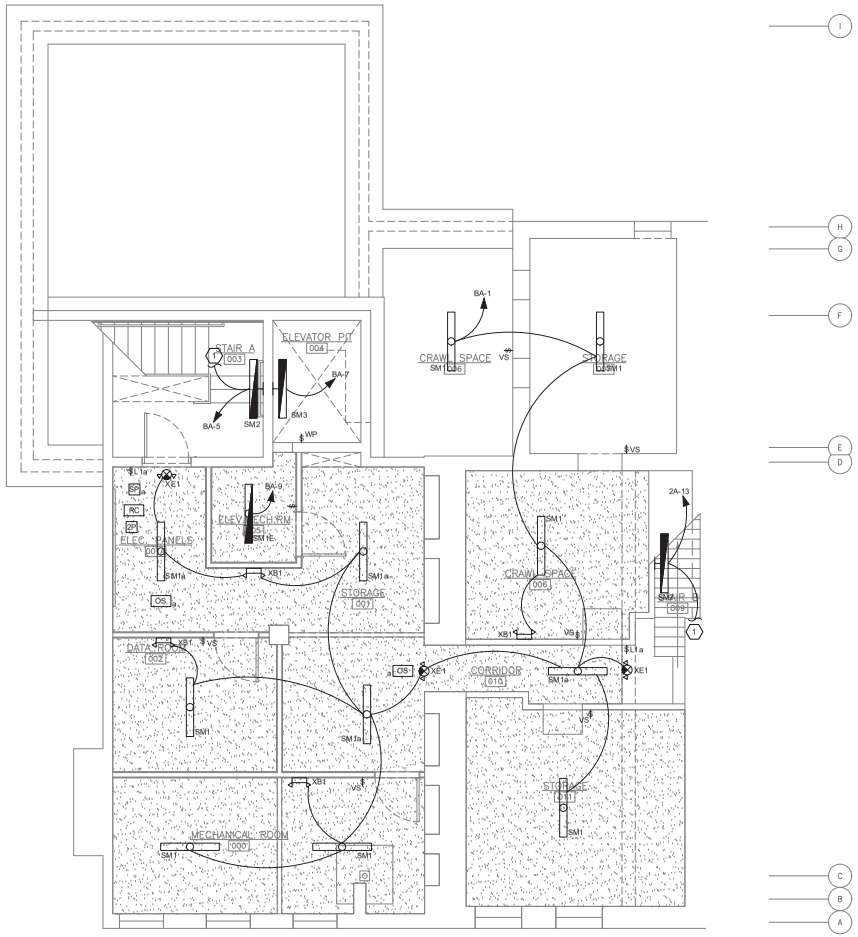
2 Allegheny Center, Nova Tower 2 - Suite 1001 - Pittsburgh, PA 15212
ASE JOB #2041090




## LIGHTING GENERAL NOTES:

1. FIRE STOP ALL FIRE RATED FLOORS,CEILINGS, AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
2. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL PLANS.
3. WHERE EXPOSED, BRANCH CIRCUITS SHALL BE RUN IN EMT CONDUIT ROUTED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE. WHERE CONCEALED WITHIN WALLS OR ABOVE CEILING, MC CABLE IS PERMISSIBLE. EXPOSED CONDUIT SHALL BE PAINTED PER ARCHITECT.
4. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES AND EXACT LIGHTING FIXTURE LOCATIONS AND DIMENSIONAL INFORMATION.
5. EXIT SIGNS AND EMERGENCY WALL PACKS SHALL BE CIRCUITED TO AN UNSWITCHED HOT LEG OF THE CIRCUIT NOTED AHEAD OF LOCAL CONTROLS.
6. OCCUPANCY / VACANCY SENSORS HAVE BEEN LOCATED PER THE RECOMMENDED SPACING OF THE BASIS OF DESIGN PRODUCTS. THE EXACT LOCATIONS AND QUANTITY OF SENSORS SHALL BE VERIFIED BY THE MANUFACTURER FOR PRODUCTS SUBMITTED AS EQUALS.

## LIGHTING KEY NOTES: (#)

1. CIRCUIT SHALL EXTEND TO ALL LIGHTING FIXTURES IN ENTIRE STAIRWELL.

## ALTERNATE:

CONTRACTOR SHALL PRICE SEPARATELY ALL WORK, INCLUSIVE OF ALL LABOR, MATERIALS, TAX, OVERHEAD AND PROFIT, ASSOCIATED WITH THE DEMOLITION OF THE EXISTING LIGHTING AND LIGHTING CONTROLS. ALL WORK ASSOCIATED WITH THE REPLACEMENT OF EXISTING FIXTURES SHALL BE INCLUDED IN THE DEDUCT ALTERNATE INCLUDING BUT NOT LIMITED TO FIXTURES, SWITCHES, WIRING, WIRELESS AND WIRED CONTROLS, CONTROL PANELS, PROGRAMMING, GENERAL CEILING AND WALL PATCHES. DO NOT INCLUDE IN THE DEDUCT ANY WORK ASSOCIATED WITH THE SALVAGING AND REINSTALLATION OF EXISTING DEVICES TO ALLOW FOR THE NEW MECHANICAL CHASE.

1 / E-200 BASEMENT LIGHTING PLAN
1/4" = 1'-0"

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COMMONWEALTH OF PENNSYLVANIA — REGISTERED PROFESSIONAL — DAVID C. PRICE — ENGINEER

PROPERTY REHABILITATION FOR:

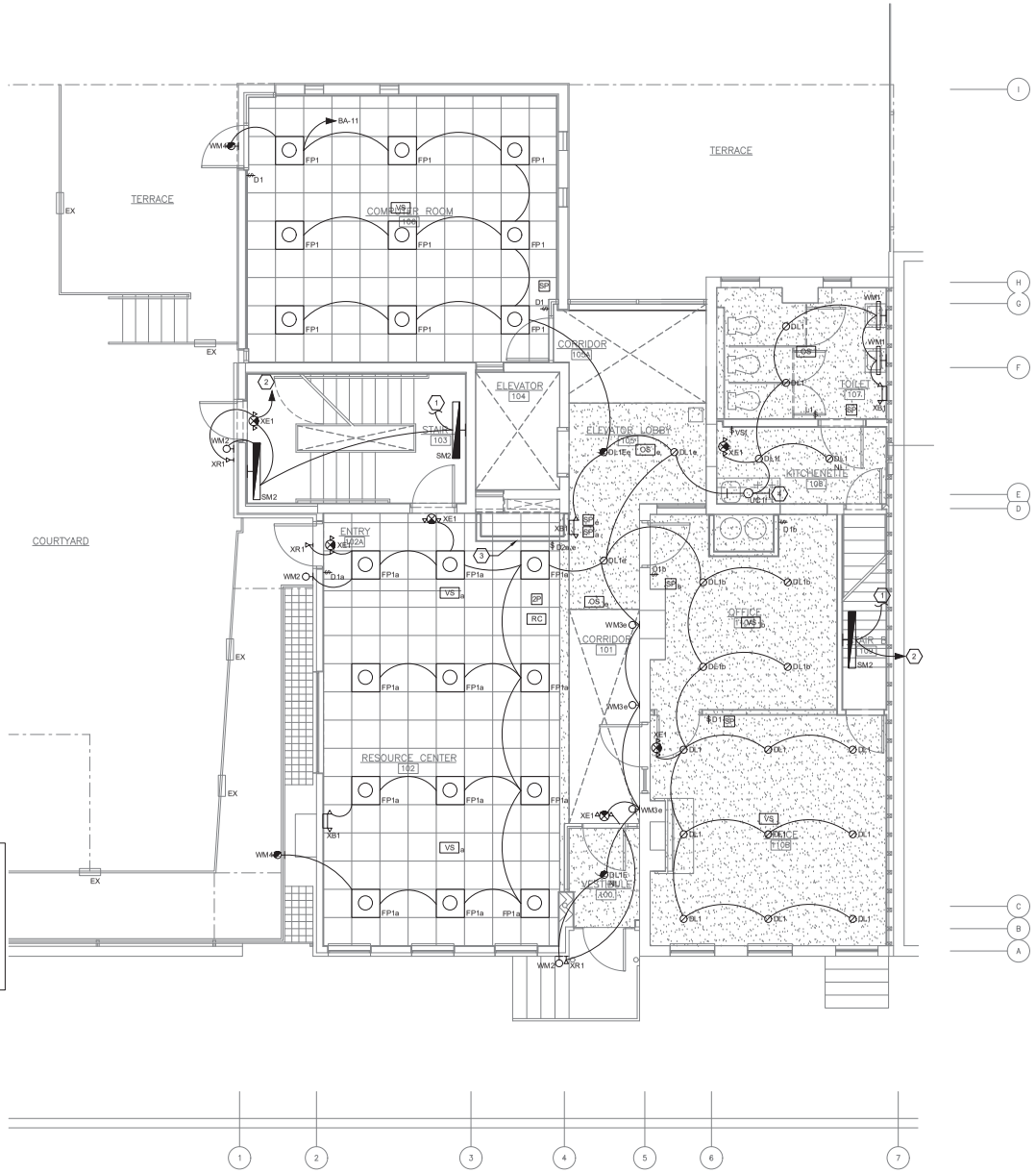
# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
BASEMENT LIGHTING PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-200 |
| ISSUE DATE 02/15/2021 | | |




## ALTERNATE:

CONTRACTOR SHALL PRICE SEPARATELY ALL WORK, INCLUSIVE OF ALL LABOR, MATERIALS, TAX, OVERHEAD AND PROFIT, ASSOCIATED WITH THE DEMOLITION OF THE EXISTING LIGHTING AND LIGHTING CONTROLS. ALL WORK ASSOCIATED WITH THE REPLACEMENT OF EXISTING FIXTURES SHALL BE INCLUDED IN THE DEDUCT ALTERNATE INCLUDING BUT NOT LIMITED TO FIXTURES, SWITCHES, WIRING, WIRELESS AND WIRED CONTROLS, CONTROL PANELS, PROGRAMMING, GENERAL CEILING AND WALL PATCHES. DO NOT INCLUDE IN THE DEDUCT ANY WORK ASSOCIATED WITH THE SALVAGING AND REINSTALLATION OF EXISTING DEVICES TO ALLOW FOR THE NEW MECHANICAL CHASE.

## LIGHTING GENERAL NOTES:

1. FIRE STOP ALL FIRE RATED FLOORS CEILINGS , AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
2. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL PLANS.
3. WHERE EXPOSED, BRANCH CIRCUITS SHALL BE RUN IN EMT CONDUIT ROUTED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE. WHERE CONCEALED WITHIN WALLS OR ABOVE CEILING, MC CABLE IS PERMISSIBLE. EXPOSED CONDUIT SHALL BE PAINTED PER ARCHITECT.
4. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES AND EXACT LIGHTING FIXTURE LOCATIONS AND DIMENSIONAL INFORMATION.
5. EXIT SIGNS AND EMERGENCY WALL PACKS SHALL BE CIRCUITED TO AN UNSWITCHED HOT LEG OF THE CIRCUIT NOTED AHEAD OF LOCAL CONTROLS.
6. OCCUPANCY / VACANCY SENSORS HAVE BEEN LOCATED PER THE RECOMMENDED SPACING OF THE BASIS OF DESIGN PRODUCTS. THE EXACT LOCATIONS AND QUANTITY OF SENSORS SHALL BE VERIFIED BY THE MANUFACTURER FOR PRODUCTS SUBMITTED AS EQUALS.

## LIGHTING KEY NOTES: (#)

1. CIRCUIT SHALL EXTEND TO ALL LIGHTING FIXTURES IN ENTIRE STAIRWELL.
2. CIRCUIT LIGHTING FIXTURES TO CIRCUIT SERVING THIS STAIRWELL. REFER TO BASEMENT LIGHTING PLAN E-200 FOR CIRCUIT DESIGNATION.
3. REINSTALL DEVICES ON THIS WALL THAT WERE SALVAGED THROUGH DEMOLITION AND CONFLICTED WITH THE NEW MECHANICAL CHASE. CONFIRM LOCATION OF NEW CHASE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS . COORDINATE WITH ARCHITECT WHICH DEVICES SHALL BE REINSTALLED AND WHICH DEVICES SHALL BE DEMOLISHED. EXTEND CIRCUITS AS REQUIRED.
4. INSTALL (1) UNDERCABINET LIGHT FIXTURE. FIELD VERIFY TO DETERMINE THE EXACT LENGTH OF FIXTURE NEEDED.

1 E-201 FIRST FLOOR LIGHTING PLAN
1/4" = 1'-0"

Allen + Shariff
MEP Engineering
2 Allegheny Center, Nova Tower 2 - Suite 1901 - Pittsburgh, PA 15212
ASE JOB #2041090

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER

PROPERTY REHABILITATION FOR:

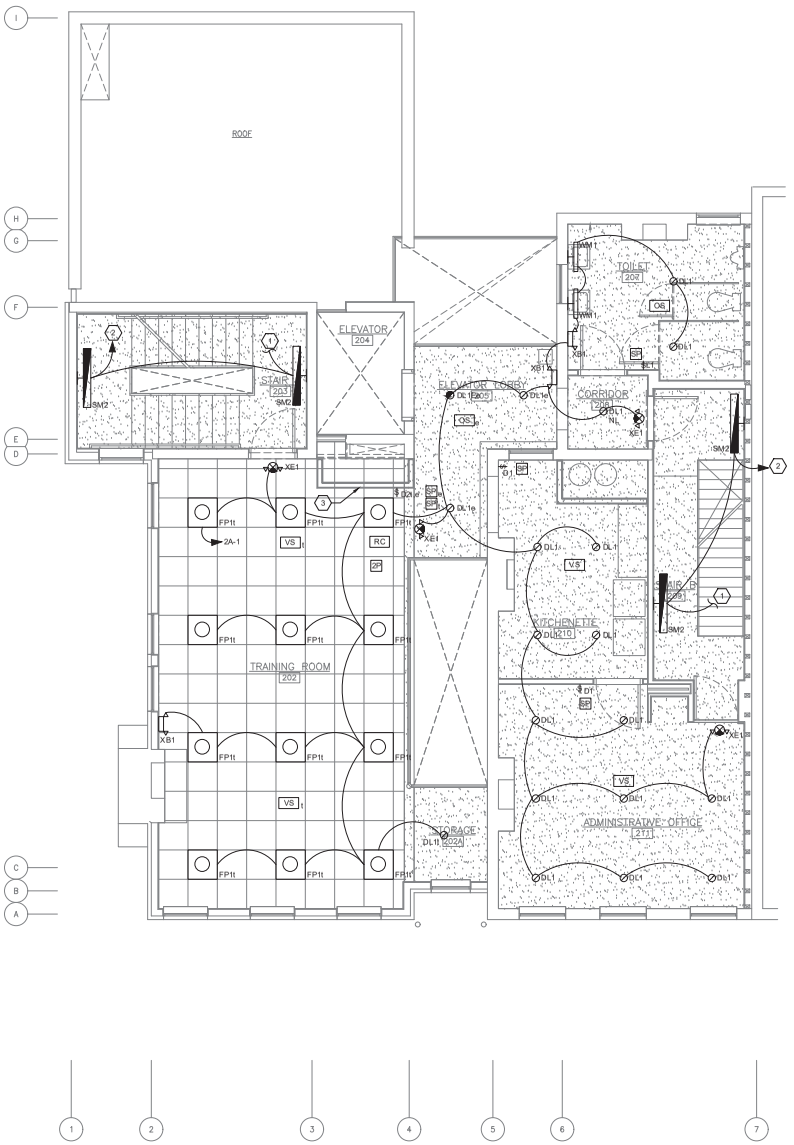
# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
FIRST FLOOR LIGHTING PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-201 |
| ISSUE DATE 02/15/2021 | | |




1 E-202 SECOND FLOOR LIGHTING PLAN
1/4" = 1'-0"

## LIGHTING GENERAL NOTES:

1. FIRE STOP ALL FIRE RATED FLOORS,CEILINGS, AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
2. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL PLANS.
3. WHERE EXPOSED, BRANCH CIRCUITS SHALL BE RUN IN EMT CONDUIT ROUTED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE. WHERE CONCEALED WITHIN WALLS OR ABOVE CEILING, MC CABLE IS PERMISSIBLE. EXPOSED CONDUIT SHALL BE PAINTED PER ARCHITECT.
4. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES AND EXACT LIGHTING FIXTURE LOCATIONS AND DIMENSIONAL INFORMATION.
5. EXIT SIGNS AND EMERGENCY WALL PACKS SHALL BE CIRCUITED TO AN UNSWITCHED HOT LEG OF THE CIRCUIT NOTED AHEAD OF LOCAL CONTROLS.
6. OCCUPANCY / VACANCY SENSORS HAVE BEEN LOCATED PER THE RECOMMENDED SPACING OF THE BASIS OF DESIGN PRODUCTS. THE EXACT LOCATIONS AND QUANTITY OF SENSORS SHALL BE VERIFIED BY THE MANUFACTURER FOR PRODUCTS SUBMITTED AS EQUALS.

## LIGHTING KEY NOTES: (#)

1. CIRCUIT SHALL EXTEND TO ALL LIGHTING FIXTURES IN ENTIRE STAIRWELL.
2. CIRCUIT LIGHTING FIXTURES TO CIRCUIT SERVING THIS STAIRWELL. REFER TO BASEMENT LIGHTING PLAN E-200 FOR CIRCUIT DESIGNATION.
3. REINSTALL DEVICES ON THIS WALL THAT WERE SALVAGED THROUGH DEMOLITION AND CONFLICTED WITH THE NEW MECHANICAL CHASE. CONFIRM LOCATION OF NEW CHASE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS. COORDINATE WITH ARCHITECT WHICH DEVICES SHALL BE REINSTALLED AND WHICH DEVICES SHALL BE DEMOLISHED.

## ALTERNATE:

CONTRACTOR SHALL PRICE SEPARATELY ALL WORK, INCLUSIVE OF ALL LABOR, MATERIALS, TAX, OVERHEAD AND PROFIT, ASSOCIATED WITH THE DEMOLITION OF THE EXISTING LIGHTING AND LIGHTING CONTROLS. ALL WORK ASSOCIATED WITH THE REPLACEMENT OF EXISTING FIXTURES SHALL BE INCLUDED IN THE DEDUCT ALTERNATE INCLUDING BUT NOT LIMITED TO FIXTURES, SWITCHES, WIRING, WIRELESS AND WIRED CONTROLS, CONTROL PANELS, PROGRAMMING, GENERAL CEILING AND WALL PATCHES. DO NOT INCLUDE IN THE DEDUCT ANY WORK ASSOCIATED WITH THE SALVAGING AND REINSTALLATION OF EXISTING DEVICES TO ALLOW FOR THE NEW MECHANICAL CHASE.

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ASE JOB #2041090

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ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE.

REVISIONS

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER

PROPERTY REHABILITATION FOR:

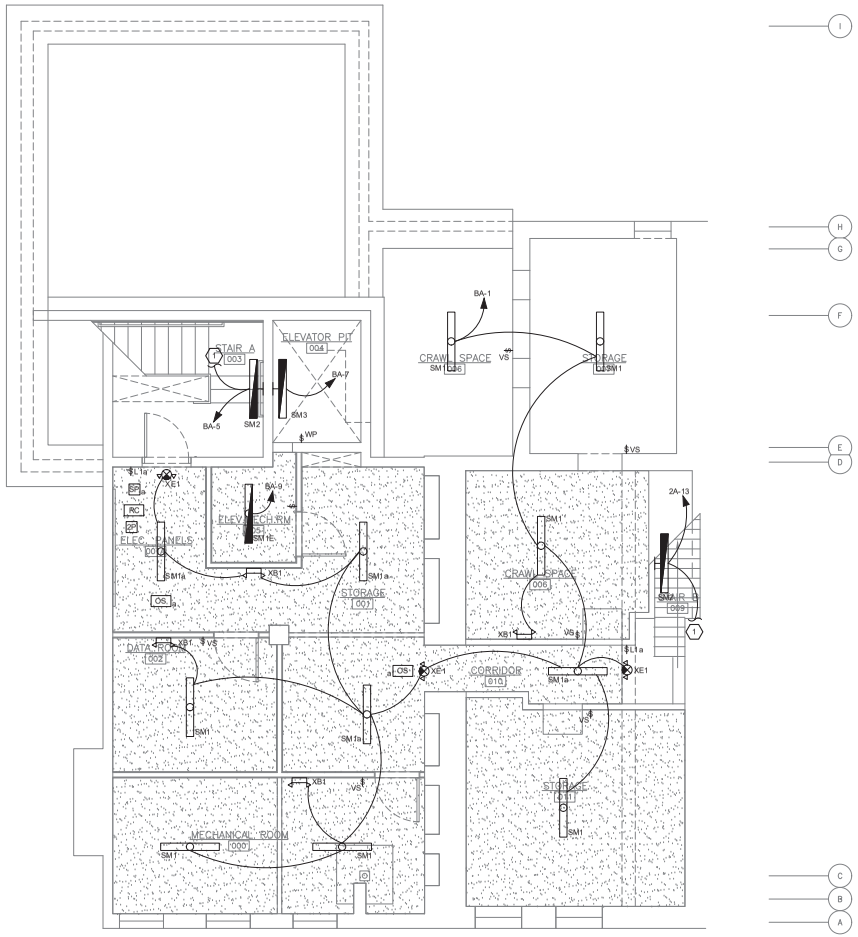
# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
SECOND FLOOR LIGHTING PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-202 |
| ISSUE DATE 02/15/2021 | | |




1 2 3 4 5 6 7

I H G F E D C B A

1 E-200 BASEMENT LIGHTING PLAN
1/4" = 1'-0"

**ALTERNATE:**

CONTRACTOR SHALL PRICE SEPARATELY ALL WORK, INCLUSIVE OF ALL LABOR, MATERIALS, TAX, OVERHEAD AND PROFIT, ASSOCIATED WITH THE DEMOLITION OF THE EXISTING LIGHTING AND LIGHTING CONTROLS. ALL WORK ASSOCIATED WITH THE REPLACEMENT OF EXISTING FIXTURES SHALL BE INCLUDED IN THE DEDUCT ALTERNATE INCLUDING BUT NOT LIMITED TO FIXTURES, SWITCHES, WIRING, WIRELESS AND WIRED CONTROLS, CONTROL PANELS, PROGRAMMING, GENERAL CEILING AND WALL PATCHES. DO NOT INCLUDE IN THE DEDUCT ANY WORK ASSOCIATED WITH THE SALVAGING AND REINSTALLATION OF EXISTING DEVICES TO ALLOW FOR THE NEW MECHANICAL CHASE.

**LIGHTING GENERAL NOTES:**

1. FIRE STOP ALL FIRE RATED FLOORS,CEILINGS, AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
2. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL PLANS.
3. WHERE EXPOSED, BRANCH CIRCUITS SHALL BE RUN IN EMT CONDUIT ROUTED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE. WHERE CONCEALED WITHIN WALLS OR ABOVE CEILING, MC CABLE IS PERMISSIBLE. EXPOSED CONDUIT SHALL BE PAINTED PER ARCHITECT.
4. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES AND EXACT LIGHTING FIXTURE LOCATIONS AND DIMENSIONAL INFORMATION.
5. EXIT SIGNS AND EMERGENCY WALL PACKS SHALL BE CIRCUITED TO AN UNSWITCHED HOT LEG OF THE CIRCUIT NOTED AHEAD OF LOCAL CONTROLS.
6. OCCUPANCY / VACANCY SENSORS HAVE BEEN LOCATED PER THE RECOMMENDED SPACING OF THE BASIS OF DESIGN PRODUCTS. THE EXACT LOCATIONS AND QUANTITY OF SENSORS SHALL BE VERIFIED BY THE MANUFACTURER FOR PRODUCTS SUBMITTED AS EQUALS.

**LIGHTING KEY NOTES:** (#)

1. CIRCUIT SHALL EXTEND TO ALL LIGHTING FIXTURES IN ENTIRE STAIRWELL.

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COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C. PRICE
ENGINEER

PROPERTY REHABILITATION FOR:

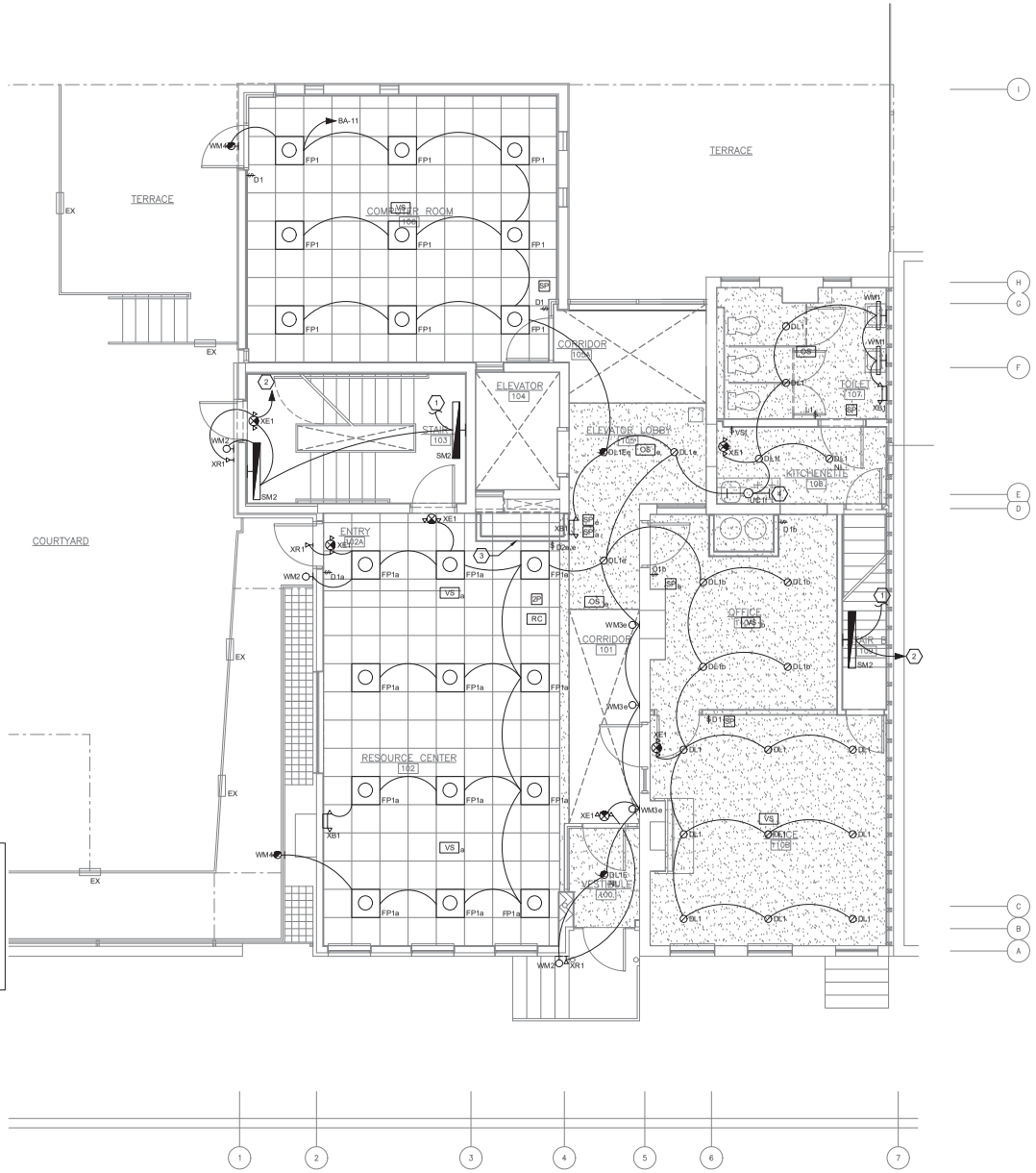
# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
BASEMENT LIGHTING PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-200 |
| ISSUE DATE 02/15/2021 | | |




## ALTERNATE:

CONTRACTOR SHALL PRICE SEPARATELY ALL WORK, INCLUSIVE OF ALL LABOR, MATERIALS, TAX, OVERHEAD AND PROFIT, ASSOCIATED WITH THE DEMOLITION OF THE EXISTING LIGHTING AND LIGHTING CONTROLS. ALL WORK ASSOCIATED WITH THE REPLACEMENT OF EXISTING FIXTURES SHALL BE INCLUDED IN THE DEDUCT ALTERNATE INCLUDING BUT NOT LIMITED TO FIXTURES, SWITCHES, WIRING, WIRELESS AND WIRED CONTROLS, CONTROL PANELS, PROGRAMMING, GENERAL CEILING AND WALL PATCHES. DO NOT INCLUDE IN THE DEDUCT ANY WORK ASSOCIATED WITH THE SALVAGING AND REINSTALLATION OF EXISTING DEVICES TO ALLOW FOR THE NEW MECHANICAL CHASE.

## LIGHTING GENERAL NOTES:

1. FIRE STOP ALL FIRE RATED FLOORS CEILINGS , AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
2. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL PLANS.
3. WHERE EXPOSED, BRANCH CIRCUITS SHALL BE RUN IN EMT CONDUIT ROUTED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE. WHERE CONCEALED WITHIN WALLS OR ABOVE CEILING, MC CABLE IS PERMISSIBLE. EXPOSED CONDUIT SHALL BE PAINTED PER ARCHITECT.
4. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES AND EXACT LIGHTING FIXTURE LOCATIONS AND DIMENSIONAL INFORMATION.
5. EXIT SIGNS AND EMERGENCY WALL PACKS SHALL BE CIRCUITED TO AN UNSWITCHED HOT LEG OF THE CIRCUIT NOTED AHEAD OF LOCAL CONTROLS.
6. OCCUPANCY / VACANCY SENSORS HAVE BEEN LOCATED PER THE RECOMMENDED SPACING OF THE BASIS OF DESIGN PRODUCTS. THE EXACT LOCATIONS AND QUANTITY OF SENSORS SHALL BE VERIFIED BY THE MANUFACTURER FOR PRODUCTS SUBMITTED AS EQUALS.

## LIGHTING KEY NOTES: (#)

1. CIRCUIT SHALL EXTEND TO ALL LIGHTING FIXTURES IN ENTIRE STAIRWELL.
2. CIRCUIT LIGHTING FIXTURES TO CIRCUIT SERVING THIS STAIRWELL. REFER TO BASEMENT LIGHTING PLAN E-200 FOR CIRCUIT DESIGNATION.
3. REINSTALL DEVICES ON THIS WALL THAT WERE SALVAGED THROUGH DEMOLITION AND CONFLICTED WITH THE NEW MECHANICAL CHASE. CONFIRM LOCATION OF NEW CHASE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS . COORDINATE WITH ARCHITECT WHICH DEVICES SHALL BE REINSTALLED AND WHICH DEVICES SHALL BE DEMOLISHED. EXTEND CIRCUITS AS REQUIRED.
4. INSTALL (1) UNDERCABINET LIGHT FIXTURE. FIELD VERIFY TO DETERMINE THE EXACT LENGTH OF FIXTURE NEEDED.

1 E-201 FIRST FLOOR LIGHTING PLAN
1/4" = 1'-0"

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER

PROPERTY REHABILITATION FOR:

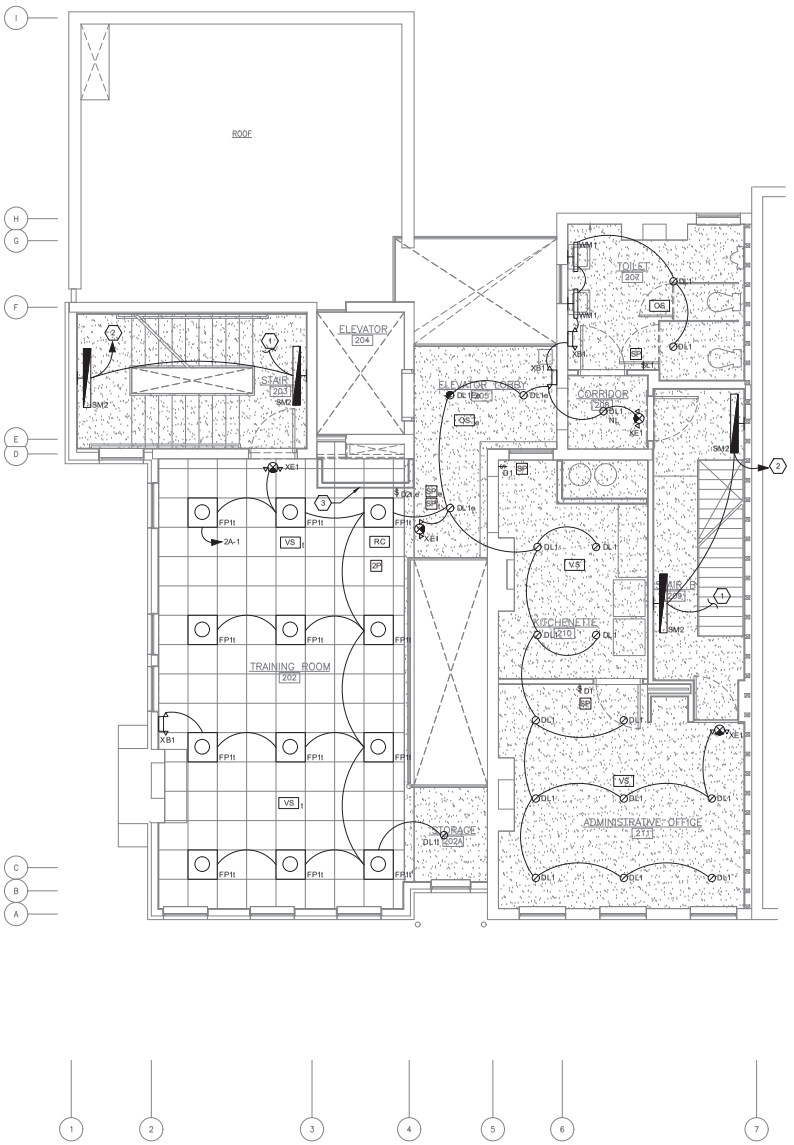
# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
FIRST FLOOR LIGHTING PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-201 |
| ISSUE DATE 02/15/2021 | | |




1 E-202 SECOND FLOOR LIGHTING PLAN
1/4" = 1'-0"

## LIGHTING GENERAL NOTES:

1. FIRE STOP ALL FIRE RATED FLOORS,CEILINGS, AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
2. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL PLANS.
3. WHERE EXPOSED, BRANCH CIRCUITS SHALL BE RUN IN EMT CONDUIT ROUTED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE. WHERE CONCEALED WITHIN WALLS OR ABOVE CEILING, MC CABLE IS PERMISSIBLE. EXPOSED CONDUIT SHALL BE PAINTED PER ARCHITECT.
4. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES AND EXACT LIGHTING FIXTURE LOCATIONS AND DIMENSIONAL INFORMATION.
5. EXIT SIGNS AND EMERGENCY WALL PACKS SHALL BE CIRCUITED TO AN UNSWITCHED HOT LEG OF THE CIRCUIT NOTED AHEAD OF LOCAL CONTROLS.
6. OCCUPANCY / VACANCY SENSORS HAVE BEEN LOCATED PER THE RECOMMENDED SPACING OF THE BASIS OF DESIGN PRODUCTS. THE EXACT LOCATIONS AND QUANTITY OF SENSORS SHALL BE VERIFIED BY THE MANUFACTURER FOR PRODUCTS SUBMITTED AS EQUALS.

## LIGHTING KEY NOTES: (#)

1. CIRCUIT SHALL EXTEND TO ALL LIGHTING FIXTURES IN ENTIRE STAIRWELL.
2. CIRCUIT LIGHTING FIXTURES TO CIRCUIT SERVING THIS STAIRWELL. REFER TO BASEMENT LIGHTING PLAN E-200 FOR CIRCUIT DESIGNATION.
3. REINSTALL DEVICES ON THIS WALL THAT WERE SALVAGED THROUGH DEMOLITION AND CONFLICTED WITH THE NEW MECHANICAL CHASE. CONFIRM LOCATION OF NEW CHASE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS. COORDINATE WITH ARCHITECT WHICH DEVICES SHALL BE REINSTALLED AND WHICH DEVICES SHALL BE DEMOLISHED.

## ALTERNATE:

CONTRACTOR SHALL PRICE SEPARATELY ALL WORK, INCLUSIVE OF ALL LABOR, MATERIALS, TAX, OVERHEAD AND PROFIT, ASSOCIATED WITH THE DEMOLITION OF THE EXISTING LIGHTING AND LIGHTING CONTROLS. ALL WORK ASSOCIATED WITH THE REPLACEMENT OF EXISTING FIXTURES SHALL BE INCLUDED IN THE DEDUCT ALTERNATE INCLUDING BUT NOT LIMITED TO FIXTURES, SWITCHES, WIRING, WIRELESS AND WIRED CONTROLS, CONTROL PANELS, PROGRAMMING, GENERAL CEILING AND WALL PATCHES. DO NOT INCLUDE IN THE DEDUCT ANY WORK ASSOCIATED WITH THE SALVAGING AND REINSTALLATION OF EXISTING DEVICES TO ALLOW FOR THE NEW MECHANICAL CHASE.

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE

PROPERTY REHABILITATION FOR:

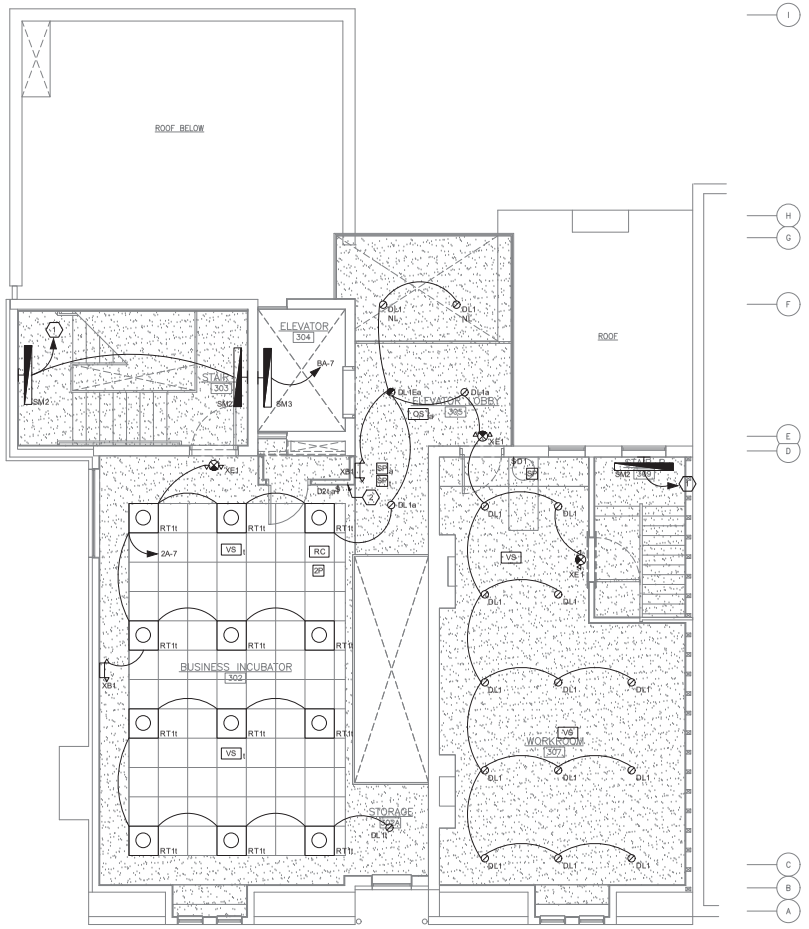
# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
SECOND FLOOR LIGHTING PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-202 |
| ISSUE DATE 02/15/2021 | | |




## LIGHTING GENERAL NOTES:

1. FIRE STOP ALL FIRE RATED FLOORS,CEILINGS, AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
2. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL PLANS.
3. WHERE EXPOSED, BRANCH CIRCUITS SHALL BE RUN IN EMT CONDUIT ROUTED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE. WHERE CONCEALED WITHIN WALLS OR ABOVE CEILING, MC CABLE IS PERMISSIBLE. EXPOSED CONDUIT SHALL BE PAINTED PER ARCHITECT.
4. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES AND EXACT LIGHTING FIXTURE LOCATIONS AND DIMENSIONAL INFORMATION.
5. EXIT SIGNS AND EMERGENCY WALL PACKS SHALL BE CIRCUITED TO AN UNSWITCHED HOT LEG OF THE CIRCUIT NOTED AHEAD OF LOCAL CONTROLS.
6. OCCUPANCY / VACANCY SENSORS HAVE BEEN LOCATED PER THE RECOMMENDED SPACING OF THE BASIS OF DESIGN PRODUCTS. THE EXACT LOCATIONS AND QUANTITY OF SENSORS SHALL BE VERIFIED BY THE MANUFACTURER FOR PRODUCTS SUBMITTED AS EQUALS.

## LIGHTING KEY NOTES: (#)

1. CIRCUIT LIGHTING FIXTURES TO CIRCUIT SERVING THIS STAIRWELL. REFER TO BASEMENT LIGHTING PLAN E-200 FOR CIRCUIT DESIGNATION.
2. REINSTALL DEVICES ON THIS WALL THAT WERE SALVAGED THROUGH DEMOLITION AND CONFLICTED WITH THE NEW MECHANICAL CHASE. CONFIRM LOCATION OF NEW CHASE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS. COORDINATE WITH ARCHITECT WHICH DEVICES SHALL BE REINSTALLED AND WHICH DEVICES SHALL BE DEMOLISHED.

## ALTERNATE:

CONTRACTOR SHALL PRICE SEPARATELY ALL WORK, INCLUSIVE OF ALL LABOR, MATERIALS, TAX, OVERHEAD AND PROFIT, ASSOCIATED WITH THE DEMOLITION OF THE EXISTING LIGHTING AND LIGHTING CONTROLS. ALL WORK ASSOCIATED WITH THE REPLACEMENT OF EXISTING FIXTURES SHALL BE INCLUDED IN THE DEDUCT ALTERNATE INCLUDING BUT NOT LIMITED TO FIXTURES, SWITCHES, WIRING, WIRELESS AND WIRED CONTROLS, CONTROL PANELS, PROGRAMMING, GENERAL CEILING AND WALL PATCHES. DO NOT INCLUDE IN THE DEDUCT ANY WORK ASSOCIATED WITH THE SALVAGING AND REINSTALLATION OF EXISTING DEVICES TO ALLOW FOR THE NEW MECHANICAL CHASE.

1 / E-203 THIRD FLOOR LIGHTING PLAN
1/4" = 1'-0"

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ASE JOB #2041090

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ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE.

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER

PROPERTY REHABILITATION FOR:

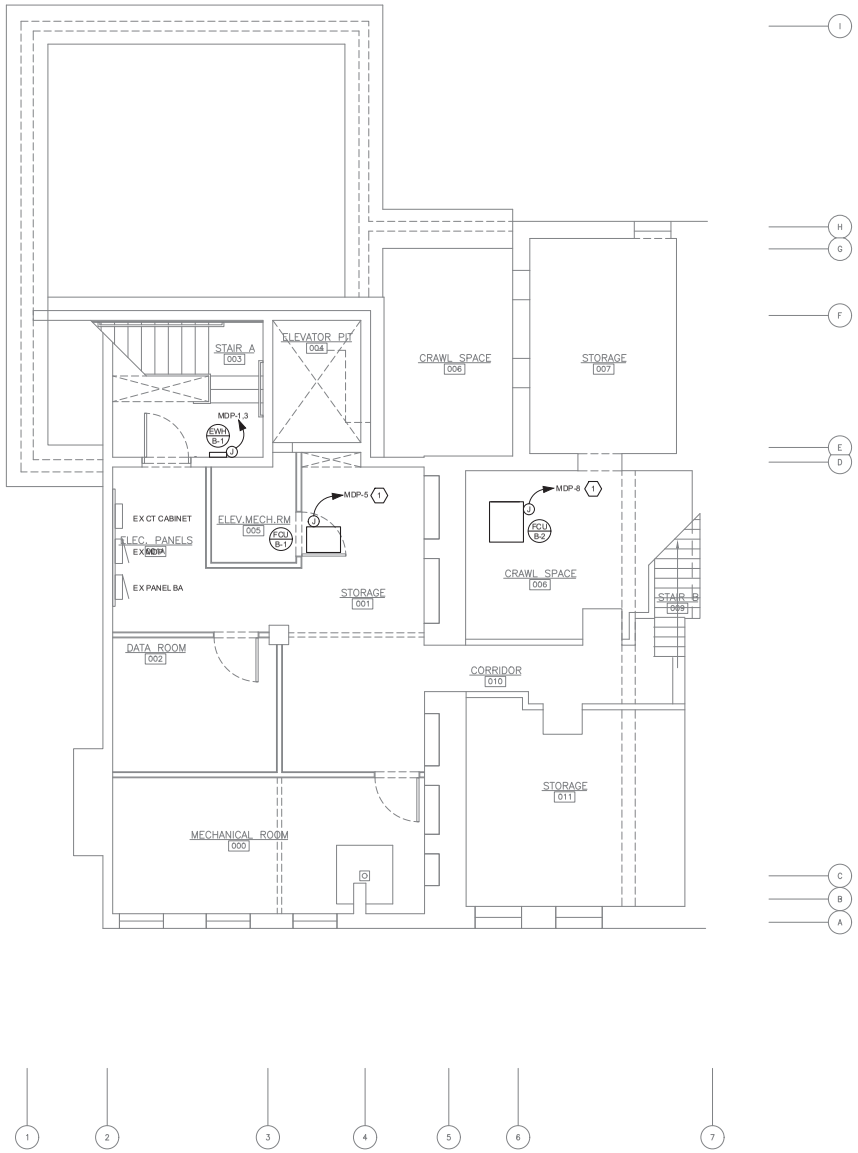
# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
THIRD FLOOR LIGHTING PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-203 |
| ISSUE DATE 02/15/2021 | | |




1 E-300 BASEMENT POWER PLAN
1/4" = 1'-0"

POWER GENERAL NOTES:

1. FIRE STOP ALL FIRE RATED FLOORS, CEILINGS, AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
2. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL PLANS.
3. WHERE EXPOSED, BRANCH CIRCUITS SHALL BE RUN IN EMT CONDUIT ROUTED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE. WHERE CONCEALED WITHIN WALLS OR ABOVE CEILING, MC CABLE IS PERMISSIBLE. EXPOSED CONDUIT SHALL BE PAINTED PER ARCHITECT.
4. E.C SHALL NOT HAVE MORE THAN THREE CURRENT CARRYING CONDUCTORS IN A CONDUIT WITHOUT DERATING AMPACITIES PER THE NEC.
5. VERIFY EXACT LOCATIONS OF ALL DEVICES WITH ARCHITECTURAL PLANS PRIOR TO ROUGH-IN.
6. WHERE DEVICES ARE DIMENSIONED ON ARCHITECTURAL DRAWINGS, INSTALL DEVICES PER THOSE DIMENSIONS. WHERE DEVICE LOCATIONS ARE NOT DIMENSIONED ON ARCHITECTURAL DRAWINGS, INSTALL IN ACCORDANCE WITH DEFAULT LOCATIONS IN ELECTRICAL SPECIFICATIONS.
7. ALL ELECTRICAL DEVICES SHALL BE INSTALLED PER ADA.
8. COORDINATE EXACT LOCATIONS OF MECHANICAL EQUIPMENT WITH DIVISION 23. MECHANICAL EQUIPMENT DISCONNECTS AND VARIABLE FREQUENCY DRIVES SHALL BE FURNISHED BY DIVISION 23, INSTALLED AND WIRED BY EC, UNLESS NOTED OTHERWISE. THESE DISCONNECTS HAVE NOT BEEN SHOWN ON THIS PLAN.

POWER KEY NOTES: (#)

1. REUSE EXISTING CIRCUIT SALVAGED FROM DEMOLISHED MECHANICAL EQUIPMENT. EXTEND CIRCUIT AS REQUIRED TO NEW FURNACE.

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
BASEMENT POWER PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-300 |
| ISSUE DATE 02/15/2021 | | |

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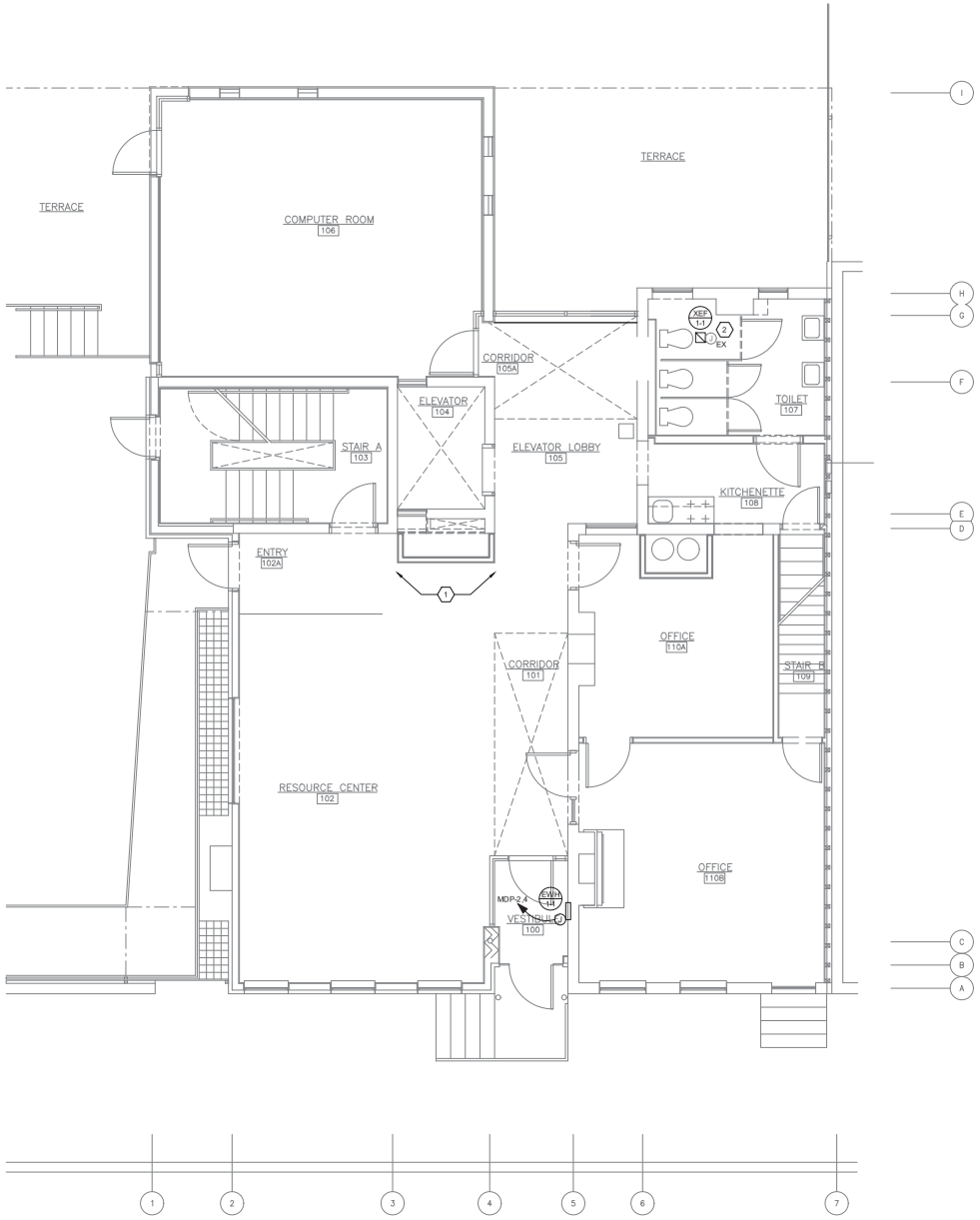


1 E-301 FIRST FLOOR POWER PLAN

1/4" = 1'-0"

POWER GENERAL NOTES:

1. FIRE STOP ALL FIRE RATED FLOORS, CEILINGS, AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
2. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL PLANS.
3. WHERE EXPOSED, BRANCH CIRCUITS SHALL BE RUN IN EMT CONDUIT ROUTED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE. WHERE CONCEALED WITHIN WALLS OR ABOVE CEILING, MC CABLE IS PERMISSIBLE. EXPOSED CONDUIT SHALL BE PAINTED PER ARCHITECT.
4. EC SHALL NOT HAVE MORE THAN THREE CURRENT CARRYING CONDUCTORS IN A CONDUIT WITHOUT DERATING AMPACITIES PER THE NEC.
5. VERIFY EXACT LOCATIONS OF ALL DEVICES WITH ARCHITECTURAL PLANS PRIOR TO ROUGH-IN.
6. WHERE DEVICES ARE DIMENSIONED ON ARCHITECTURAL DRAWINGS, INSTALL DEVICES PER THOSE DIMENSIONS. WHERE DEVICE LOCATIONS ARE NOT DIMENSIONED ON ARCHITECTURAL DRAWINGS, INSTALL IN ACCORDANCE WITH DEFAULT LOCATIONS IN ELECTRICAL SPECIFICATIONS.
7. ALL ELECTRICAL DEVICES SHALL BE INSTALLED PER ADA.
8. COORDINATE EXACT LOCATIONS OF MECHANICAL EQUIPMENT WITH DIVISION 23. MECHANICAL EQUIPMENT DISCONNECTS AND VARIABLE FREQUENCY DRIVES SHALL BE FURNISHED BY DIVISION 23, INSTALLED AND WIRED BY EC, UNLESS NOTED OTHERWISE. THESE DISCONNECTS HAVE NOT BEEN SHOWN ON THIS PLAN.

POWER KEY NOTES: (#)

1. REINSTALL DEVICES ON THIS WALL THAT WERE SALVAGED THROUGH DEMOLITION AND CONFLICTED WITH THE NEW MECHANICAL CHASE. CONFIRM LOCATION OF NEW CHASE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS. COORDINATE WITH ARCHITECT WHICH DEVICES SHALL BE REINSTALLED AND WHICH DEVICES SHALL BE DEMOLISHED.
2. EXISTING EXHAUST FAN SHALL BE CONTROLLED BY NEW LIGHTING SWITCH SHOWN ON 1ST FLOOR LIGHTING PLAN. CIRCUIT THROUGH LIGHTING POWER PACK/ROOM CONTROLLER FOR CONTROL THROUGH SWITCH AND OCCUPANCY SENSOR. REFER TO LIGHTING PLAN FOR CIRCUIT ASSIGNMENT.

FOR CONSTRUCTION

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ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE.

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
FIRST FLOOR POWER PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-301 |
| ISSUE DATE 02/15/2021 | | |

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2 Allegheny Center, Nova Tower 2 - Suite 1001 - Pittsburgh, PA 15212

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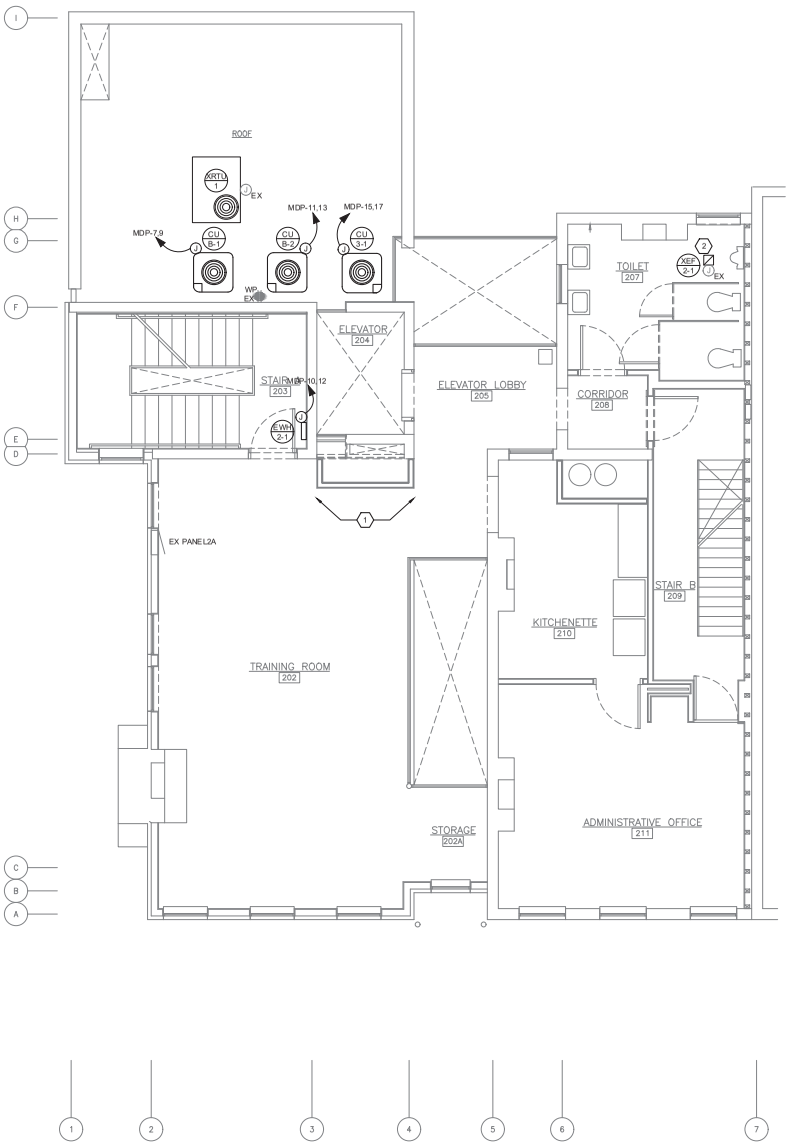


1 E-302 SECOND FLOOR POWER PLAN
1/4" = 1'-0"

POWER GENERAL NOTES:

1. FIRE STOP ALL FIRE RATED FLOORS, CEILINGS, AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
2. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL PLANS.
3. WHERE EXPOSED, BRANCH CIRCUITS SHALL BE RUN IN EMT CONDUIT ROUTED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE. WHERE CONCEALED WITHIN WALLS OR ABOVE CEILING, MC CABLE IS PERMISSIBLE. EXPOSED CONDUIT SHALL BE PAINTED PER ARCHITECT.
4. EC SHALL NOT HAVE MORE THAN THREE CURRENT CARRYING CONDUCTORS IN A CONDUIT WITHOUT DERATING AMPACITIES PER THE NEC.
5. VERIFY EXACT LOCATIONS OF ALL DEVICES WITH ARCHITECTURAL PLANS PRIOR TO ROUGH-IN.
6. WHERE DEVICES ARE DIMENSIONED ON ARCHITECTURAL DRAWINGS, INSTALL DEVICES PER THOSE DIMENSIONS. WHERE DEVICE LOCATIONS ARE NOT DIMENSIONED ON ARCHITECTURAL DRAWINGS, INSTALL IN ACCORDANCE WITH DEFAULT LOCATIONS IN ELECTRICAL SPECIFICATIONS.
7. ALL ELECTRICAL DEVICES SHALL BE INSTALLED PER ADA.
8. COORDINATE EXACT LOCATIONS OF MECHANICAL EQUIPMENT WITH DIVISION 23. MECHANICAL EQUIPMENT DISCONNECTS AND VARIABLE FREQUENCY DRIVES SHALL BE FURNISHED BY DIVISION 23, INSTALLED AND WIRED BY EC, UNLESS NOTED OTHERWISE. THESE DISCONNECTS HAVE NOT BEEN SHOWN ON THIS PLAN.

POWER KEY NOTES:

1. RE-INSTALL DEVICES ON THIS WALL THAT WERE SALVAGED THROUGH DEMOLITION AND CONFLICTED WITH THE NEW MECHANICAL CHASE. CONFIRM LOCATION OF NEW CHASE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS. COORDINATE WITH ARCHITECT WHICH DEVICES SHALL BE RE-INSTALLED AND WHICH DEVICES SHALL BE DEMOLISHED.
2. EXISTING EXHAUST FAN SHALL BE CONTROLLED BY NEW LIGHTING SWITCH SHOWN ON 2ND FLOOR LIGHTING PLAN. CIRCUIT THROUGH LIGHTING POWER PACK/ROOM CONTROLLER FOR CONTROL THROUGH SWITCH AND OCCUPANCY SENSOR. REFER TO LIGHTING PLAN FOR CIRCUIT ASSIGNMENT.

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE E-035121 ENGINEER

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
SECOND FLOOR POWER PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-302 |
| ISSUE DATE 02/15/2021 | | |

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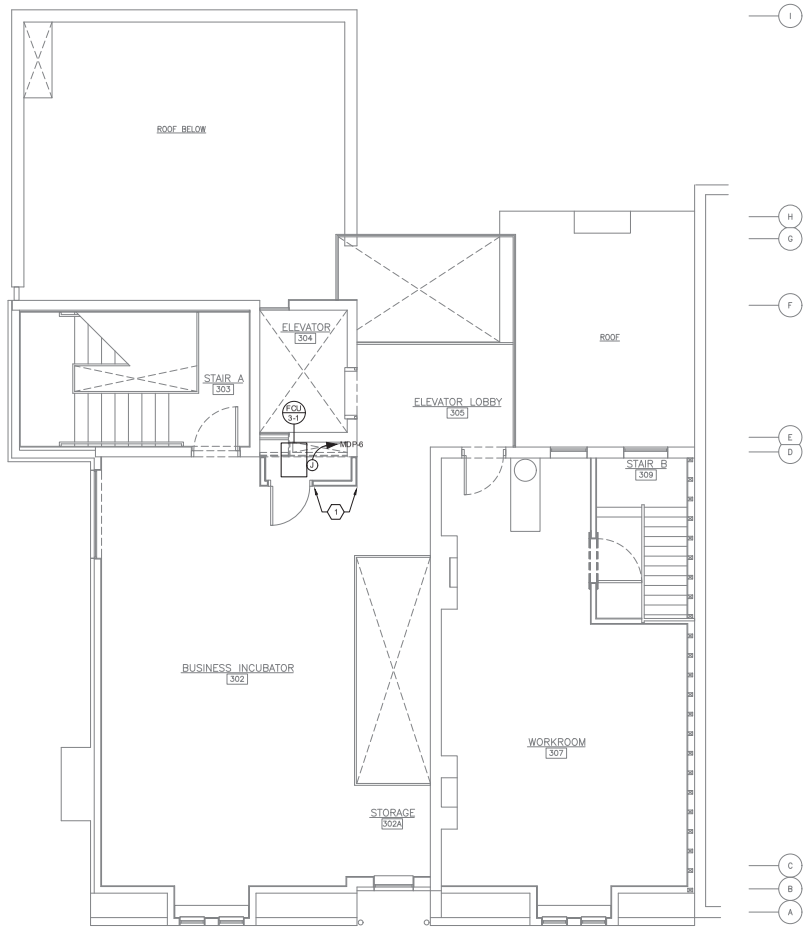


1 E-303 THIRD FLOOR POWER PLAN
1/4" = 1'-0"

POWER GENERAL NOTES:

1. FIRE STOP ALL FIRE RATED FLOORS, CEILINGS, AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
2. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL PLANS.
3. WHERE EXPOSED, BRANCH CIRCUITS SHALL BE RUN IN EMT CONDUIT ROUTED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE. WHERE CONCEALED WITHIN WALLS OR ABOVE CEILING, MC CABLE IS PERMISSIBLE. EXPOSED CONDUIT SHALL BE PAINTED PER ARCHITECT.
4. EC SHALL NOT HAVE MORE THAN THREE CURRENT CARRYING CONDUCTORS IN A CONDUIT WITHOUT DERATING AMPACITIES PER THE NEC.
5. VERIFY EXACT LOCATIONS OF ALL DEVICES WITH ARCHITECTURAL PLANS PRIOR TO ROUGH-IN.
6. WHERE DEVICES ARE DIMENSIONED ON ARCHITECTURAL DRAWINGS, INSTALL DEVICES PER THOSE DIMENSIONS. WHERE DEVICE LOCATIONS ARE NOT DIMENSIONED ON ARCHITECTURAL DRAWINGS, INSTALL IN ACCORDANCE WITH DEFAULT LOCATIONS IN ELECTRICAL SPECIFICATIONS.
7. ALL ELECTRICAL DEVICES SHALL BE INSTALLED PER ADA.
8. COORDINATE EXACT LOCATIONS OF MECHANICAL EQUIPMENT WITH DIVISION 23. MECHANICAL EQUIPMENT DISCONNECTS AND VARIABLE FREQUENCY DRIVES SHALL BE FURNISHED BY DIVISION 23, INSTALLED AND WIRED BY EC, UNLESS NOTED OTHERWISE. THESE DISCONNECTS HAVE NOT BEEN SHOWN ON THIS PLAN.

POWER KEY NOTES: (#)

1. REINSTALL DEVICES ON THIS WALL THAT WERE SALVAGED THROUGH DEMOLITION AND CONFLICTED WITH THE NEW MECHANICAL CHASE. CONFIRM LOCATION OF NEW CHASE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS. COORDINATE WITH ARCHITECT WHICH DEVICES SHALL BE REINSTALLED AND WHICH DEVICES SHALL BE DEMOLISHED.

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
THIRD FLOOR POWER PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-303 |
| ISSUE DATE 02/15/2021 | | |

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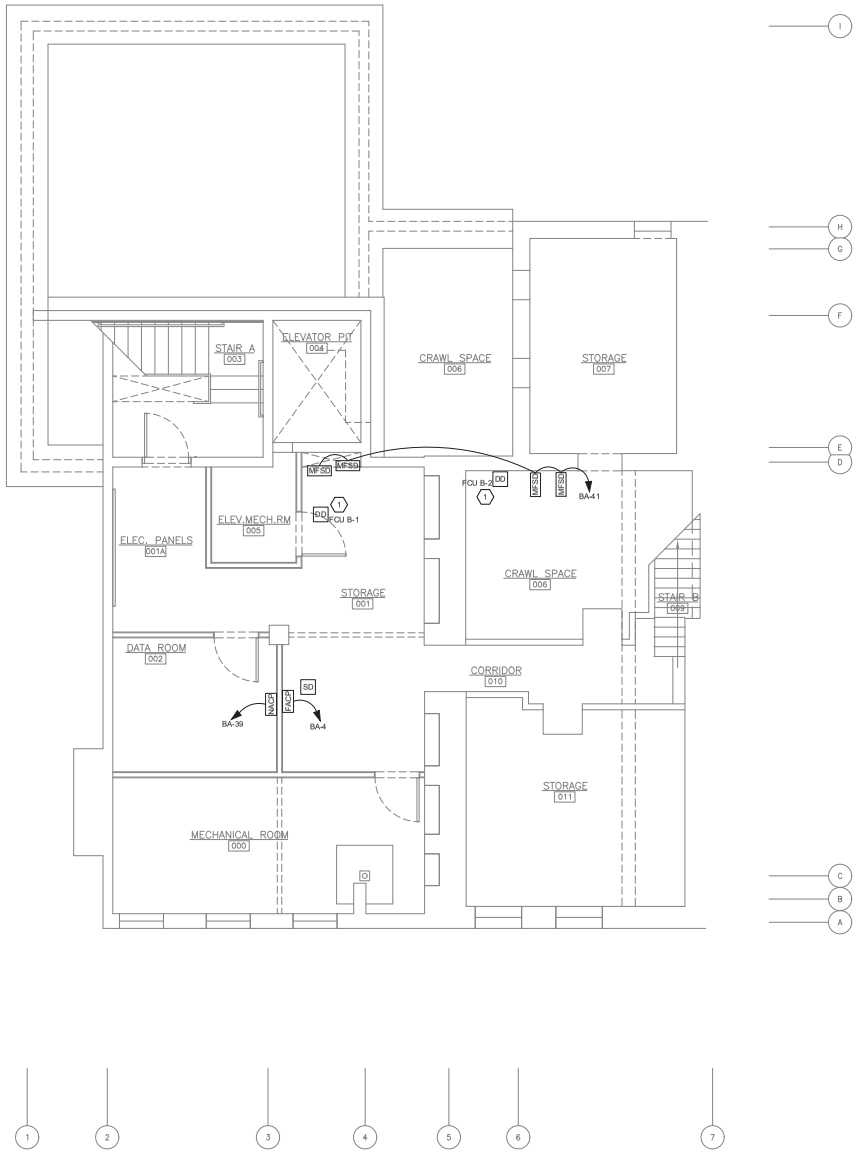


1 E-400 BASEMENT FIRE ALARM PLAN
1/4" = 1'-0"

FIRE ALARM GENERAL NOTES:

1. REFER TO PARTIAL FIRE ALARM RISER DIAGRAM 1/E-601 FOR GENERAL FIRE ALARM SYSTEM NOTES.
2. FIRE STOP ALL FIRE RATED FLOORS,CEILINGS, AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
3. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL PLANS.
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5. THE EXACT LOCATION OF ALL DEVICES AND ASSOCIATED EQUIPMENT SHALL BE LOCATED PER NFPA, ADA, AND ALL OTHER CODES HAVING JURISDICTION.

FIRE ALARM KEY NOTES: (#)

1. ELECTRICAL CONTRACTOR SHALL FURNISH DUCT DETECTOR, DIVISION 23 SHALL INSTALL, AND ELECTRICAL CONTRACTOR SHALL PROVIDE FIRE ALARM SYSTEM CONNECTION.

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
BASEMENT FIRE ALARM PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | △ | E-400 |
| ISSUE DATE 02/15/2021 | | |

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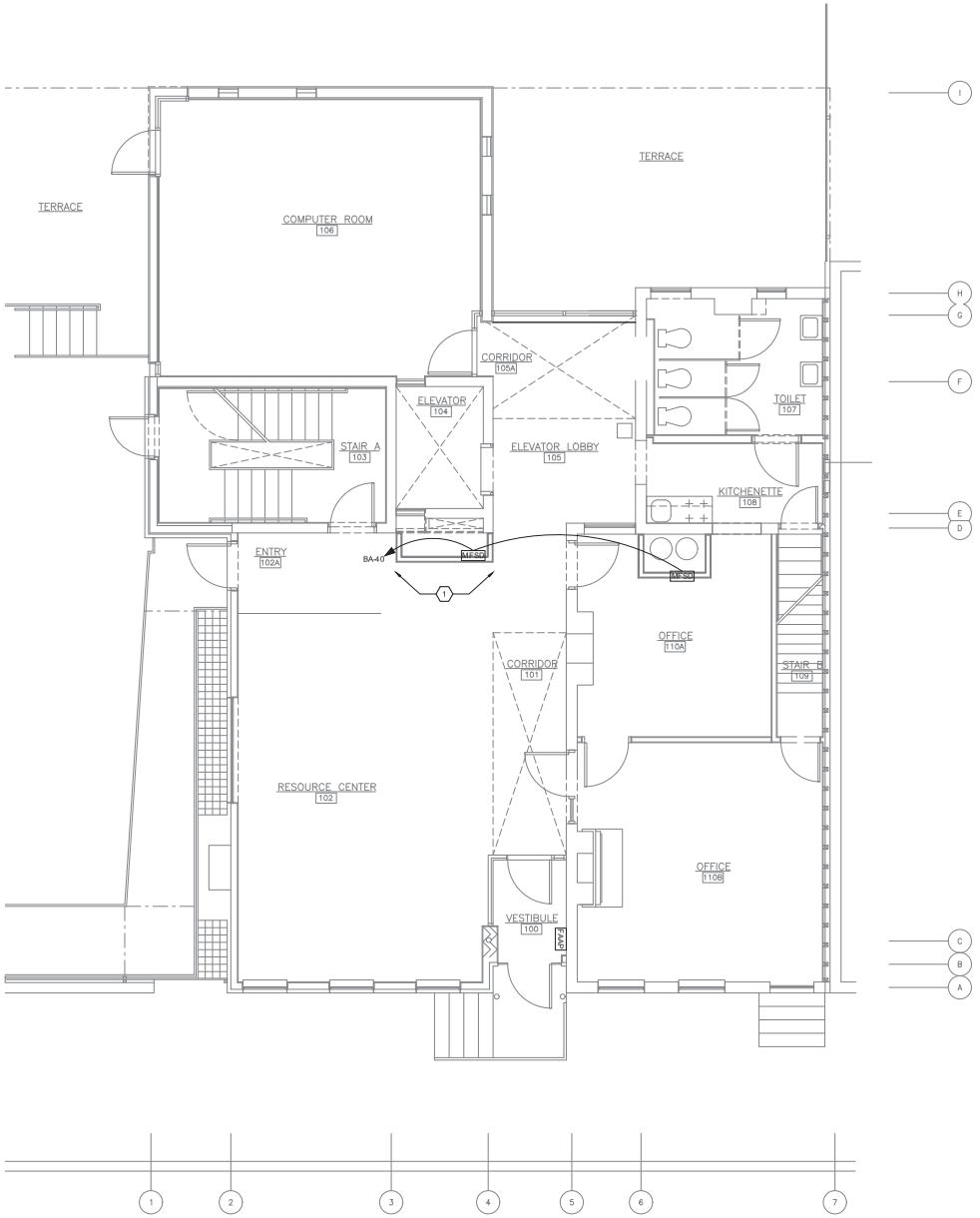
ASE JOB #2041090




1 E-401 FIRST FLOOR FIRE ALARM PLAN
1/4" = 1'-0"

FIRE ALARM GENERAL NOTES:

1. REFER TO PARTIAL FIRE ALARM RISER DIAGRAM 1/E-601 FOR GENERAL FIRE ALARM SYSTEM NOTES.
2. FIRE STOP ALL FIRE RATED FLOORS,CEILINGS , AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
3. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL PLANS.
4. WHERE EXPOSED, BRANCH CIRCUITS SHALL BE RUN IN EMT CONDUIT ROUTED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE. WHERE CONCEALED WITHIN WALLS OR ABOVE CEILING, MC CABLE IS PERMISSIBLE. EXPOSED CONDUIT SHALL BE PAINTED PER ARCHITECT.
5. THE EXACT LOCATION OF ALL DEVICES AND ASSOCIATED EQUIPMENT SHALL BE LOCATED PER NFPA, ADA, AND ALL OTHER CODES HAVING JURISDICTION.

FIRE ALARM KEY NOTES: (#)

1. REINSTALL DEVICES ON THIS WALL THAT WERE SALVAGED THROUGH DEMOLITION AND CONFLICTED WITH THE NEW MECHANICAL CHASE. CONFIRM LOCATION OF NEW CHASE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS. COORDINATE WITH ARCHITECT WHICH DEVICES SHALL BE REINSTALLED AND WHICH DEVICES SHALL BE DEMOLISHED.

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
FIRST FLOOR FIRE ALARM PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-401 |
| ISSUE DATE 02/15/2021 | | |

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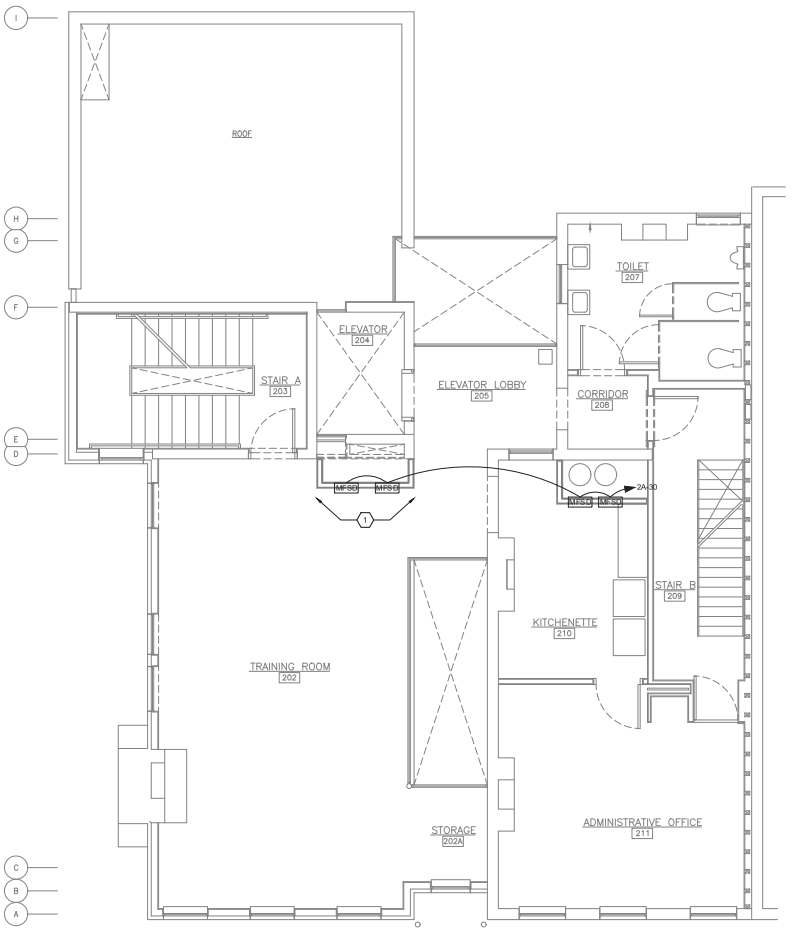


1 E-402 SECOND FLOOR FIRE ALARM PLAN
1/4" = 1'-0"

FIRE ALARM GENERAL NOTES:

1. REFER TO PARTIAL FIRE ALARM RISER DIAGRAM 1/E-601 FOR GENERAL FIRE ALARM SYSTEM NOTES.
2. FIRE STOP ALL FIRE RATED FLOORS,CEILINGS, AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
3. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL PLANS.
4. WHERE EXPOSED, BRANCH CIRCUITS SHALL BE RUN IN EMT CONDUIT ROUTED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE. WHERE CONCEALED WITHIN WALLS OR ABOVE CEILING, MC CABLE IS PERMISSIBLE. EXPOSED CONDUIT SHALL BE PAINTED PER ARCHITECT.
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FIRE ALARM KEY NOTES: (#)

1. REINSTALL DEVICES ON THIS WALL THAT WERE SALVAGED THROUGH DEMOLITION AND CONFLICTED WITH THE NEW MECHANICAL CHASE. CONFIRM LOCATION OF NEW CHASE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS. COORDINATE WITH ARCHITECT WHICH DEVICES SHALL BE REINSTALLED AND WHICH DEVICES SHALL BE DEMOLISHED.

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PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
SECOND FLOOR FIRE ALARM PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-402 |
| ISSUE DATE 02/15/2021 | | |

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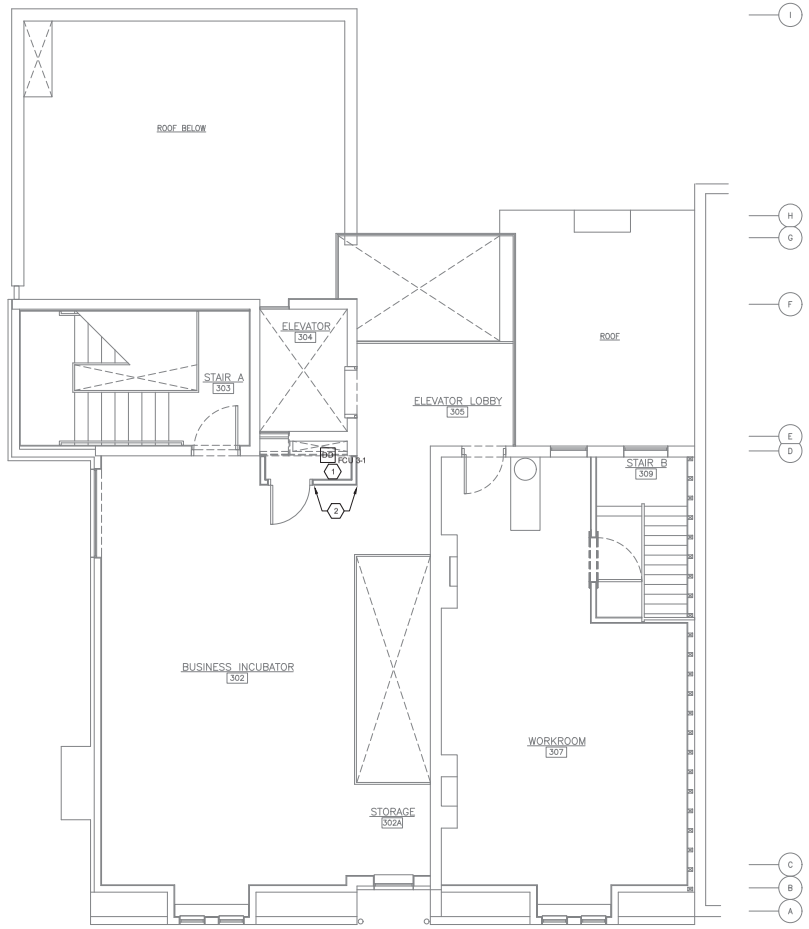


1 E-403 THIRD FLOOR FIRE ALARM PLAN
1/4" = 1'-0"

FIRE ALARM GENERAL NOTES:

1. REFER TO PARTIAL FIRE ALARM RISER DIAGRAM 1/E-601 FOR GENERAL FIRE ALARM SYSTEM NOTES.
2. FIRE STOP ALL FIRE RATED FLOORS,CEILINGS, AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
3. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL PLANS.
4. WHERE EXPOSED, BRANCH CIRCUITS SHALL BE RUN IN EMT CONDUIT ROUTED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE. WHERE CONCEALED WITHIN WALLS OR ABOVE CEILING, MC CABLE IS PERMISSIBLE. EXPOSED CONDUIT SHALL BE PAINTED PER ARCHITECT.
5. THE EXACT LOCATION OF ALL DEVICES AND ASSOCIATED EQUIPMENT SHALL BE LOCATED PER NFPA, ADA, AND ALL OTHER CODES HAVING JURISDICTION.

FIRE ALARM KEY NOTES: (#)

1. ELECTRICAL CONTRACTOR SHALL FURNISH DUCT DETECTOR, DIVISION 23 SHALL INSTALL, AND ELECTRICAL CONTRACTOR SHALL PROVIDE FIRE ALARM SYSTEM CONNECTION.
2. REINSTALL DEVICES ON THIS WALL THAT WERE SALVAGED THROUGH DEMOLITION AND CONFLICTED WITH THE NEW MECHANICAL CHASE. CONFIRM LOCATION OF NEW CHASE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS. COORDINATE WITH ARCHITECT WHICH DEVICES SHALL BE REINSTALLED AND WHICH DEVICES SHALL BE DEMOLISHED.

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE

PROPERTY REHABILITATION FOR:

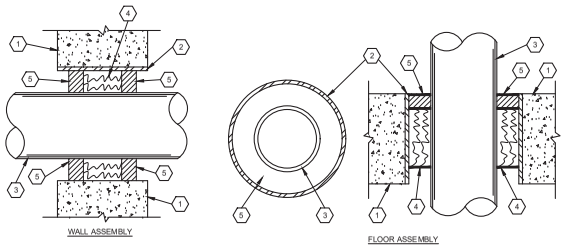
# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
THIRD FLOOR FIRE ALARM PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-403 |
| ISSUE DATE 02/15/2021 | | |




KEYED NOTES: (#)

1. FLOOR OR WALL ASSEMBLY MINIMUM 5" THICK NORMAL WEIGHT CONCRETE FLOOR OR WALL OR MINIMUM 7-5/8" THICK MASONRY WALL HAVING A MINIMUM 2 HOUR FIRE RESISTIVE RATING WITH A NOMINAL 6" DIAMETER OPENING.

2. STEEL PIPE SLEEVE (OPTIONAL) NOMINAL 6" DIAMETER SCHEDULE 40 OR HEAVIER STEEL PIPE SLEEVE. (2 TRADE SIZES LARGER THAN CONDUIT).

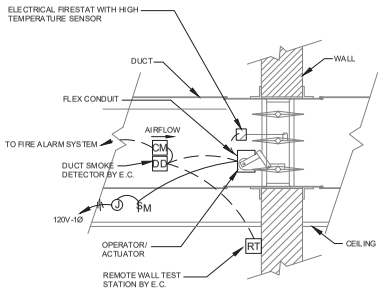
3. STEEL OR EMT CONDUIT NOMINAL 4" DIAMETER CENTERED THROUGH THE OPENING.

4. FORMING MATERIAL MINERAL WOOL, MINIMUM DENSITY OF 4.4 PCF FIRMLY PACKED WITHIN THE OPENING TO A NOMINAL THICKNESS OF 3" FOR FLOORS. FOR WALLS, THE MINERAL WOOL SHALL BE CENTERED IN THE OPENING.

5. FILL, VOID OR CAVITY MATERIAL* - FILL MATERIAL THAT IS TROWELED INTO THE OPENING TO A MINIMUM THICKNESS OF 1/2" IN ACCORDANCE WITH THE ACCOMPANYING INSTALLATION INSTRUCTIONS. IN WALLS, THE FILL MATERIAL SHALL BE INSTALLED ON BOTH SURFACES OF THE OPENING.

* BEARING THE "UL" CLASSIFICATION MARKING

1 / E-501 FIRE STOP DETAIL
N.T.S.




NOTE: ALL WIRING BY E.C. COORDINATE INSTALLATION WITH M.C.

NOTES:

1. MOTORIZED FIRE SMOKE DAMPER (MFSD), FRA C. HP, 120V-1Ø.

2. PROVIDE A DUCT TYPE SMOKE DETECTOR WITH A REMOTE TEST STATION AND AUXILIARY RELAY CONTACTS TO OPERATE THE DAMPER. COORDINATE THE ROUGH-IN LOCATION WITH MECHANICAL DETAILS AND MECHANICAL CONTRACTOR.

3. PROVIDE A JUNCTION BOX ABOVE THE CEILING FOR ALL LINE VOLTAGE POWER WIRING. PROVIDE A MANUAL MOTOR STARTER TOGGLE-STYLE SWITCH AS A DISCONNECTING MEANS FOR THE MFSD AS REQUIRED.

4. PROVIDE 2#12,1#12(G)-3/4"C. FROM THE JUNCTION BOX TO THE DISCONNECTING MEANS AND HOMERUN TO A 20A, 120V CIRCUIT BREAKER, TYING A MAXIMUM OF FOUR MFSD'S TO A 20A/1P CIRCUIT BREAKER.

5. PROVIDE ALL REQUIRED FIRE ALARM SYSTEM TIE-IN WIRING AND PROGRAM FIRE ALARM SYSTEM TO PERFORM THE MECHANICAL SEQUENCE OF OPERATION.

2 / E-501 MOTORIZED FIRE/SMOKE DAMPER DETAIL "MFSD"
N.T.S.

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ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE.

REVISIONS

| |
|---|
| 1 |

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
ELECTRICAL DETAILS

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-501 |
| ISSUE DATE 02/15/2021 | | |

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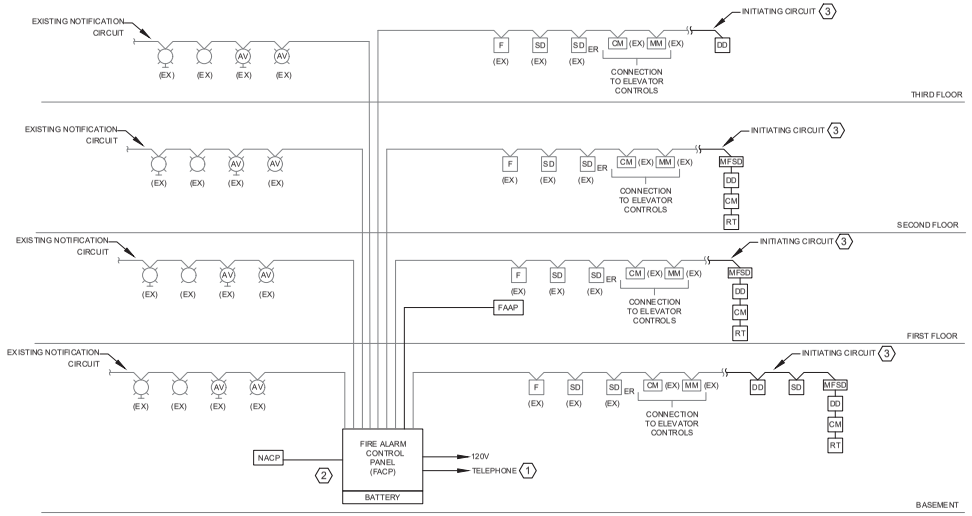
MEP Engineering
2 Allegheny Center, Nova Tower 2 - Suite 1001 - Pittsburgh, PA 15212
ASE JOB #2041090




1 E-601 PARTIAL FIRE ALARM RISER DIAGRAM

NOT TO SCALE

## GENERAL FIRE ALARM SYSTEM NOTES:

1. THE EXISTING FIRE ALARM SYSTEM IS MANUFACTURED BY SIMPLEX. NEW EQUIPMENT AND DEVICES SHALL BE COMPATIBLE WITH THE EXISTING SYSTEM.
2. REFER TO FLOOR PLAN FOR QUANTITY AND LOCATION OF SYSTEM COMPONENTS. EXACT ARRANGEMENT AND QUANTITY OF DEVICES SHALL BE INDICATED ON THE SHOP DRAWINGS. PROVIDE COMPLETE RISER DIAGRAM AS PART OF SHOP DRAWINGS.
3. VERIFY WIRING SIZES WITH THE FIRE ALARM SYSTEM MANUFACTURER AND INSTALL AS DIRECTED. DO NOT LOAD ANY CIRCUIT BEYOND 80% OF RATED CAPACITY. SUBMIT CALCULATIONS TO SUBSTANTIATE. ADD ADDITIONAL CIRCUITS AS REQUIRED.
4. FIRE ALARM WIRING SHALL BE ROUTED VIA A SEPARATE CONDUIT SYSTEM (3/4" MINIMUM). FIRE RATED MC CABLE IS ACCEPTABLE WHERE CONCEALED. MC CABLE SHALL BE COLORED RED. PROVIDE CONDUIT SLEEVES WITH ESCUTCHEON PLATES WHERE PASSING THROUGH WALLS, FLOOR, OR CEILINGS.
5. THIS CONTRACTOR SHALL PROVIDE ALL ADDITIONAL POWER SUPPLIES, BATTERIES, EXTENDER PANELS, ETC. AS REQUIRED FOR A COMPLETE AND OPERATIONAL SYSTEM.
6. THIS CONTRACTOR SHALL PROVIDE BATTERY CALCULATIONS, WIRING DIAGRAMS, EQUIPMENT CUTS, ETC. AS PART OF THE SHOP DRAWING SUBMITTAL.
7. CANDELA RATING SHALL BE PER NFPA 72 CHAPTER 18 REQUIREMENTS. ALL VISUAL AND AUDIO DEVICES SHALL BE SYNCHRONIZED.
8. AUDIBLE ALARM SYSTEM SOUND PRESSURE LEVEL SHALL COMPLY WITH IBC 907.5.2.1.
9. THE COMPLETED FIRE ALARM SYSTEM SHALL BE FULLY TESTED IN ACCORDANCE WITH NFPA 72, AND LOCAL FIRE DEPARTMENT REQUIREMENTS BY THE INSTALLER, IN THE PRESENCE OF THE OWNER'S REPRESENTATIVE AND THE LOCAL FIRE MARSHALL. UPON COMPLETE ON A SUCCESSFUL TEST, THE INSTALLER SHALL SO CERTIFY, IN WRITING, TO THE OWNER AND GENERAL CONTRACTOR.
10. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS, PRODUCTS, EXECUTION, AND INSTALLATION OF THE FIRE ALARM SYSTEM.
11. WIRING SHALL BE INSTALLED IN THE APPROPRIATE RACEWAY TO MEET THE SURVIVABILITY REQUIREMENTS OF THE CITY OF PITTSBURGH CODE ENFORCEMENT.
12. PROVIDE REMOTE TEST SWITCHES AND ASSOCIATED CONTROL MODULES FOR ALL FIRE SMOKE AND SMOKE DAMPERS. COORDINATE EXACT LOCATION OF ALL TEST SWITCHES WITH OWNER PRIOR TO ROUGH-IN. THESE SHALL BE LOCATED IN UTILITY/BACK-OF-HOUSESPACES.
13. EXISTING DUCT DETECTORS, DAMPERS AND RELATED EQUIPMENT (NOT SHOWN) SHALL REMAIN IN PLACE, IN SERVICE. WHERE REQUIRED, EC SHALL RELOCATE ALL TEST SWITCHES ASSOCIATED WITH EXISTING EQUIPMENT TO MAINTAIN ACCESSIBILITY IN NEW CEILING. EXTEND FIRE ALARM CIRCUIT AS REQUIRED.

## KEY NOTES: (#)

1. IN ORDER TO PROVIDE DIAL OUT TO FIRE DEPARTMENT, TWO SOURCES SHALL BE PROVIDED TO THE DACT WITHIN THE FIRE ALARM SYSTEM PER NFPA 26.6.3.2.1.4. THE SYSTEM SHALL EMPLOY ONE PHONE LINE AND AN ADDITIONAL TRANSMISSION MEANS AS ALLOWABLE UNDER THAT CODE SECTION AND DEEMED AVAILABLE AT THE SITE. THE OWNER MAY ALSO CHOOSE TO EMPLOY AN ALTERNATE TRANSMISSION MEANS APPROVED BY NFPA IN PLACE OF THE SECOND TELEPHONE LINE. COORDINATE WITH OWNER WHETHER DACT SHOULD DIAL DIRECTLY TO FIRE DEPARTMENT OR TO THIRD PARTY 24/7 MONITORING SERVICE CONTRACTED BY OWNER.
2. ELECTRICAL CONTRACTOR SHALL FIELD VERIFY THE EXISTING FIRE ALARM SYSTEM AND PROVIDE A NEW FACP THAT IS COMPATIBLE WITH THE EXISTING INITIATING AND NOTIFICATION DEVICES. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL NECESSARY DEVICES FOR THE NEW FACP TO COMMUNICATE WITH THE OLD DEVICES.
3. PROVIDE EXTENSION OF EXISTING FIRE ALARM CIRCUITS TO SUPPLY NEW FIRE ALARM DEVICES. WHERE EXISTING CIRCUITS ARE NOT SIZED TO ACCOMMODATE ADDITIONAL FIRE ALARM DEVICES, PROVIDE NEW FIRE ALARM CIRCUIT TO SERVE FLOOR. THIS CONTRACTOR SHALL PROVIDE ALL ADDITIONAL POWER SUPPLIES, BATTERIES, EXTENDER PANELS, ETC. AS REQUIRED FOR A COMPLETE AND OPERATIONAL SYSTEM. All FIRE ALARM DEVICES SHALL BE FULLY COMPATIBLE WITH EXISTING SYSTEM.

THE FIRE ALARM SCOPE INCLUDES THE REPLACEMENT OF THE EXISTING FIRE ALARM CONTROL PANEL AND THE ADDITION OF INITIATING DEVICES WHERE NOTED ON THE FIRE ALARM NEW WORK PLANS. THE NEW FIRE ALARM CONTROL PANEL SHALL BE FULLY COMPATIBLE AND FUNCTIONAL WITH THE EXISTING INITIATING AND NOTIFICATION DEVICES. ALL EXISTING WIRING AND CONDUIT TO DEVICES SHALL BE REUSED UNDER THIS SCOPE.

THE BASIS OF DESIGN FOR THE FIRE ALARM CONTROL PANEL (FACP) IS A SIMPLEX 4100ES PANEL. CONTACT SIMPLEX REPRESENTATIVE JEFF GASPARIK, (724) 741-3474, WITH QUESTIONS REGARDING THE COMPATIBILITY OF THE NEW PANEL WITH THE EXISTING NOTIFICATION AND INITIATING DEVICES.

FIRE ALARM PERMIT NOTE (CITY OF PITTSBURGH):

THE E.C. BID SHALL INCLUDE THE COST FOR AN INDEPENDENT THIRD PARTY PROFESSIONAL ENGINEER TO SIGN, DATE, AND SEAL ALL FIRE ALARM DOCUMENTS REQUIRED FOR BUILDING PERMIT. THE FIRE ALARM DOCUMENTS INCLUDED WITH THE E-SERIES DRAWINGS ARE PROVIDED FOR FIRE ALARM DESIGN INTENT WITHIN THE CITY OF PITTSBURGH. THE CITY OF PITTSBURGH WILL REQUIRE SIGNED/SEALED MANUFACTURER SHOP DRAWINGS (BY THE INDEPENDENT THIRD PARTY) FOR PERMIT APPROVAL BEYOND THE DOCUMENTS CONTAINED IN THE E-SERIES DRAWINGS.

THE FIRE ALARM SHOP DRAWINGS SHALL INCLUDE AT A MINIMUM FIRE ALARM FLOOR PLANS AND A RISER DIAGRAM. EACH PLAN OR RISER SHALL INDICATE THE NUMBER AND TYPES OF FIRE ALARM DEVICES INSTALLED ON EACH CIRCUIT, DEVICE ADDRESSES, CONDUCTOR TYPES AND SIZES, FIRE ALARM ZONES, PRIMARY AND SECONDARY POWER SUPPLIES (AS NECESSARY), AND ALL NEW FIRE ALARM DEVICES AS ADDED TO EXISTING CIRCUITS. DOCUMENTS SHALL ALSO CONTAIN BATTERY AND VOLTAGE DROP CALCULATIONS.

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MEP Engineering
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REVISIONS

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
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410 FT. PITT COMMONS, 445 FT. PITT BLVD.
PITTSBURGH, PENNSYLVANIA 15219-1333
PHONE: 412-566-1531 FAX: 412-566-1532

DRAWING NAME
FIRE ALARM RISER DIAGRAM

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-601 |
| ISSUE DATE 02/15/2021 | | |

## Existing Panel: MDP

**Location:** MAIN ELECTRICAL ROOM
**Supply From:** EXISTING UTILITY SERVICE
**Mounting:** SURFACE
**Enclosure:** TYPE 1

**Volts:** 208/120V
**Phases:** 3
**Wires:** 4

**A.I.C. Rating:** EXISTING KAIC
**Mains Type:** MCB
**Mains Rating:** 400
**MCB Rating:** 400

| CKT | Circuit Description | Wire Size | Trip | Pole | LOAD (VA) A | LOAD (VA) B | LOAD (VA) C | Pole | Trip | Wire Size | Circuit Description | CKT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **EWH B-1 (NOTE 4)** | **3#12, 1#12G - 3/4"C** | **20** | **2** | 1500 | 1500 | | **2** | **20** | **3#12, 1#12G - 3/4"C** | **EWH 1-1 (NOTE 4)** | 2 |
| 3 | | | | | | 1500 | 1500 | | | | | 4 |
| 5 | **FCU B-1 (NOTE 3)** | **2#12, 1#12G - 3/4"C** | 20 | 1 | | | 1380 | 1380 | **1** | **15** | **2#12, 1#12G - 3/4"C** | **FCU 3-1 (NOTE 4)** | 6 |
| 7 | **CU B-1 (NOTE 4)** | **3#4, 1#10G - 1"C** | **60** | **2** | 3619 | 1380 | | | 1 | 20 | **2#12, 1#12G - 3/4"C** | **FCU B-2 (NOTE 3)** | 8 |
| 9 | | | | | | | 3619 | 1500 | | | | | 10 |
| 11 | **CU B-2 (NOTE 4)** | **3#4, 1#10G - 1"C** | **60** | **2** | | | | 3619 | 1500 | **2** | **20** | **3#12, 1#12G - 3/4"C** | **EWH 2-1 (NOTE 4)** | 12 |
| 13 | | | | | 3619 | | | | | | | | | 14 |
| 15 | **CU 3-1 (NOTE 4)** | **3#4, 1#10G - 1"C** | **60** | **2** | | | 3619 | | | 3 | 40 | EXISTING | EX CONDENSING UNIT #3 | 16 |
| 17 | | | | | | | | 3619 | | | | | | 18 |
| 19 | | | | | | | | | | | | | | 20 |
| 21 | EX PANEL 2A | EXISTING | 100 | 3 | | | | | | 3 | 60 | EXISTING | EX SPARE | 22 |
| 23 | | | | | | | | | | | | | | 24 |
| 25 | | | | | | | | | | | | | | 26 |
| 27 | EX ELEVATOR | EXISTING | 150 | 3 | | | | | | 3 | 150 | EXISTING | EX PANEL BA | 28 |
| 29 | | | | | | | | | | | | | | 30 |
| | | **Total Load:** | | | **11618** | | **11738** | | | **11498** | | | | |
| | | **Panel Amps:** | | | | | **96.7** | | | | | | | |

NOTES:
1. UNLESS OTHERWISE NOTED, ALL BRANCH CIRCUIT BREAKERS ARE EXISTING TO REMAIN.
2. LOADS IN BOLD ARE NEW LOADS ON EXISTING PANEL.
3. (WHERE NOTED) REUSE EXISTING CIRCUIT BREAKER THAT PREVIOUSLY SERVED DEMOLISHED MECHANCAL EQUIPMENT.
4. (WHERE NOTED) PROVIDE NEW CIRCUIT BREAKER SIZED AS SHOWN. MATCH THE MANUFACTURER, MODEL, AND AIC RATING OF EXISTING BREAKERS.

## Existing Branch Panel: BA

**Location:** MAIN ELECTRICAL ROOM
**Supply From:** MDP
**Mounting:** SURFACE
**Enclosure:** TYPE 1

**Volts:** 208/120V
**Phases:** 3
**Wires:** 4

**A.I.C. Rating:** EXISTING KAIC
**Mains Type:** MLO
**Mains Rating:** 150
**MCB Rating:** -

| CKT | Circuit Description | Wire Size | Trip | Pole | LOAD (VA) A | LOAD (VA) B | LOAD (VA) C | Pole | Trip | Wire Size | Circuit Description | CKT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **LTG BASEMENT** | **2#12, 1#12G - 3/4"C** | 20 | 1 | 520 | | | 1 | 20 | EXISTING | EX REC BASEMENT | 2 |
| 3 | EX EM BATTERY UNIT | EXISTING | 20 | 1 | | 500 | | 1 | 20 | **2#12, 1#12G - 3/4"C** | **FACP (NOTE 3)** | 4 |
| 5 | **LTG STAIRWELL A** | **2#12, 1#12G - 3/4"C** | 20 | 1 | | | 293 | 1 | 20 | EXISTING | EX LTG ELEV CAB LTS | 6 |
| 7 | **LTG ELEVATOR PIT** | **2#12, 1#12G - 3/4"C** | 20 | 1 | 102 | | | 1 | 20 | EXISTING | EX REC ELEVATOR | 8 |
| 9 | **LTG ELEV MACHINE RM** | **2#12, 1#12G - 3/4"C** | 20 | 1 | | 46 | | 1 | 20 | EXISTING | EX REC TELEPHONE REC | 10 |
| 11 | **LTG 1ST FLOOR** | **2#12, 1#12G - 3/4"C** | 20 | 1 | | | 1550 | 1 | 20 | EXISTING | EX REC SECURITY REC | 12 |
| 13 | EX LTG ATRIUM | EXISTING | 20 | 1 | | | | 1 | 20 | EXISTING | EX REC COMPUTER ROOM | 14 |
| 15 | EX LTG 1ST FLOOR | EXISTING | 20 | 1 | | | | 1 | 20 | EXISTING | EX REC COMPUTER ROOM | 16 |
| 17 | EX LTG 1ST FLOOR | EXISTING | 20 | 1 | | | | 1 | 20 | EXISTING | EX REC COMPUTER ROOM | 18 |
| 19 | EX CIRCUIT | EXISTING | 20 | 1 | | | | 1 | 20 | EXISTING | EX REC COMPUTER ROOM | 20 |
| 21 | EX CIRCUIT | EXISTING | 20 | 1 | | | | 1 | 20 | EXISTING | EX REC COMPUTER ROOM | 22 |
| 23 | EX WATER FOUNTAIN | EXISTING | 20 | 1 | | | | 1 | 20 | EXISTING | EX REC COMPUTER ROOM | 24 |
| 25 | EX REC 1ST FLOOR | EXISTING | 20 | 1 | | | | 1 | 20 | EXISTING | EX REC COMPUTER ROOM | 26 |
| 27 | EX REC 1ST FLOOR | EXISTING | 20 | 1 | | | | 1 | 20 | EXISTING | EX REC COMPUTER ROOM | 28 |
| 29 | EX REC 1ST FLOOR | EXISTING | 20 | 1 | | | | 1 | 20 | EXISTING | EX REC COMPUTER ROOM | 30 |
| 31 | EX REC 1ST FLOOR | EXISTING | 20 | 1 | | | | 1 | 20 | EXISTING | EX REC BASEMENT | 32 |
| 33 | EX REC EXTERIOR | EXISTING | 20 | 1 | | | | 1 | 20 | EXISTING | EX REC BASEMENT | 34 |
| 35 | EX REC EXTERIOR | EXISTING | 20 | 1 | | | | 1 | 20 | EXISTING | EX SNOW MELT | 36 |
| 37 | EX LTG EXTERIOR | EXISTING | 20 | 1 | | | | 1 | 20 | EXISTING | EX 1ST FLR BATH & STAIR | 38 |
| 39 | **NACP (NOTE 3)** | **2#12, 1#12G - 3/4"C** | 20 | 1 | | 500 | 500 | 1 | 20 | **2#12, 1#12G - 3/4"C** | **1ST FL MFSD'S** | 40 |
| 41 | **BASEMENT MFSD'S** | **2#12, 1#12G - 3/4"C** | 20 | 1 | | | 1000 | 1 | 20 | | EX SPARE | 42 |
| | | **Total Load:** | | | **622** | **1546** | **2843** | | | | | |
| | | **Panel Amps:** | | | | **13.9** | | | | | | |

NOTES:
1. UNLESS OTHERWISE NOTED, ALL BRANCH CIRCUIT BREAKERS ARE EXISTING TO REMAIN.
2. LOADS IN BOLD ARE NEW LOADS ON EXISTING PANEL.
3. PROVIDE LOCKING DEVICE ON EXISTING BREAKER.

## Existing Branch Panel: 2A

**Location:** 2ND FLOOR TRAINING ROOM
**Supply From:** MDP
**Mounting:** RECESSED
**Enclosure:** TYPE 1

**Volts:** 208/120V
**Phases:** 3
**Wires:** 4

**A.I.C. Rating:** EXISTING KAIC
**Mains Type:** MLO
**Mains Rating:** 100
**MCB Rating:** -

| CKT | Circuit Description | Wire Size | Trip | Pole | LOAD (VA) A | LOAD (VA) B | LOAD (VA) C | Pole | Trip | Wire Size | Circuit Description | CKT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **LTG 2ND FLOOR** | **2#12, 1#12G - 3/4"C** | 20 | 1 | 963 | | | 1 | 20 | EXISTING | EX REC 2ND FLOOR | 2 |
| 3 | EX LTG 2ND FLOOR | EXISTING | 20 | 1 | | | | 1 | 20 | EXISTING | EX REC 2ND FLOOR | 4 |
| 5 | EX LTG 2ND FLOOR | EXISTING | 20 | 1 | | | | 1 | 20 | EXISTING | EX REC 2ND FLOOR | 6 |
| 7 | **LTG 3RD FLOOR** | **2#12, 1#12G - 3/4"C** | 20 | 1 | 934 | | | 1 | 20 | EXISTING | EX REC 2ND FLOOR | 8 |
| 9 | EX LTG 3RD FLOOR | EXISTING | 20 | 1 | | | | 1 | 20 | EXISTING | EX REC 2ND FLOOR | 10 |
| 11 | EX LTG 3RD FLOOR | EXISTING | 20 | 1 | | | | 1 | 20 | EXISTING | EX REC 3RD FLOOR | 12 |
| 13 | **LTG STAIRWELL B** | **2#12, 1#12G - 3/4"C** | 20 | 1 | 190 | | | 1 | 20 | EXISTING | EX REC 3RD FLOOR | 14 |
| 15 | EX REC ROOFTOP GFI | EXISTING | 20 | 1 | | | | 1 | 20 | EXISTING | EX REC 3RD FLOOR | 16 |
| 17 | EX STEREO | EXISTING | 20 | 1 | | | | 1 | 20 | EXISTING | EX REC 3RD FLOOR | 18 |
| 19 | EX WATER FOUNTAIN | EXISTING | 20 | 1 | | | | 1 | 20 | EXISTING | EX LTG 3RD FLOOR | 20 |
| 21 | EX LTG 2ND FLOOR | EXISTING | 20 | 1 | | | | 1 | 20 | EXISTING | EX REC BATHROOM GFI | 22 |
| 23 | EX REFRIGERATOR | EXISTING | 20 | 1 | | | | 2 | 50 | EXISTING | EX RANGE | 24 |
| 25 | EX RIGHT KITCHEN GFI | EXISTING | 20 | 1 | | | | | | | | 26 |
| 27 | EX DISHWASHER | EXISTING | 20 | 1 | | | | 1 | 20 | EXISTING | EX CUBICLES | 28 |
| 29 | EX MICROWAVE | EXISTING | 20 | 1 | | | 1000 | 1 | 20 | **2#12, 1#12G - 3/4"C** | **2ND FL MFSD'S** | 30 |
| | | **Total Load:** | | | **2087** | **0** | **1000** | | | | | |
| | | **Panel Amps:** | | | | **8.6** | | | | | | |

NOTES:
1. UNLESS OTHERWISE NOTED, ALL BRANCH CIRCUIT BREAKERS ARE EXISTING TO REMAIN.
2. LOADS IN BOLD ARE NEW LOADS ON EXISTING PANEL.

Allen + Shariff
MEP Engineering
2 Allegheny Center, Nova Tower 2 - Suite 1001 - Pittsburgh, PA 15212
ASE JOB #2041090

## LIGHTING FIXTURE SCHEDULE

| TYPE | FIXTURE DESCRIPTION | MANUFACTURER | MODEL | LAMP(S) LAMP # | LAMP(S) LAMP TYPE | DRIVER/ BALLAST | INPUT WATTS | VOLTS | MOUNTING | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|
| DL1 | 6" RECESSED DOWNLIGHT | HALO | FRAME: HC6-20-D010<br>LED MODULE: HMI6-12-835<br>REFLECTOR: 61-MD-H | -- | LED, 3500K, 2000LM | 0-10V, DIM TO 1% | 21 | 120 | RECESSED, CEILING | |
| DL1E | 6" RECESSED DOWNLIGHT WITH EMERGENCY BATTERY | HALO | FRAME: HC6-20-D010-REM14<br>LED MODULE: HMI6-12-835<br>REFLECTOR: 61-MD-H | -- | LED, 3500K, 2000LM | 0-10V, DIM TO 1% | 21 | 120 | RECESSED, CEILING | |
| FP1 | 2'X2' FLAT PANEL | METALUX | 22-FPX-42-L835-HCD | -- | LED, 3500K, 4200LM | 0-10V, DIM TO 1% | 42 | 120 | RECESSED, CEILING | |
| SM1 | 4'-0" SURFACE MOUNTED STRIP FIXTURE W/ ROUND LENS | METALUX | 4SNLED-LD5-50SL-LW-UNV-L835-CD1-U | -- | LED, 3500K, 5000LM | 0-10V, DIM TO 10% | 46 | 120 | SURFACE, CEILING | WHERE CEILING CONDITIONS DO NOT ALLOW FOR SURFACE MOUNTING, PROVIDE AIRCRAFT CABLE SUSPENSION MOUNTING. EC SHALL FIELD COORDINATE. |
| SM1E | 4'-0" SURFACE MOUNTED STRIP FIXTURE W/ ROUND LENS AND EMERGENCY BATTERY | METALUX | 4SNLED-LD5-50SL-LW-UNV-EL14W-L835-CD1-U | -- | LED, 3500K, 5000LM | 0-10V, DIM TO 10% | 46 | 120 | SURFACE, CEILING | WHERE CEILING CONDITIONS DO NOT ALLOW FOR SURFACE MOUNTING, PROVIDE AIRCRAFT CABLE SUSPENSION MOUNTING. EC SHALL FIELD COORDINATE. |
| SM2 | 4'-0" WALL MOUNTED STAIR FIXTURE W/ EMERGENCY BATTERY AND INTEGRAL OCCUPANCY SENSOR | METALUX | 4SWLED-40SL-LW-UNV-EL14W-L835-CD1-SVPD2-U | -- | LED, 3500K, 4000LM | 0-10V | 38 | 120 | SURFACE, WALL | OCCUPANCY SENSOR SHALL OPERATE TO TURN LIGHTS ON TO 100% LIGHT OUTPUT WHEN STAIRWELL IS OCCUPIED AND 0% WHEN UNOCCUPIED. |
| SM3 | 4'-0" SURFACE MOUNTED, WET LISTED VAPORTIGHT STRIP FIXTURE WITH EMERGENCY BATTERY | METALUX | 4VT2-LD5-8-FR50-UNV-EL10W-L835-CD1-WL-U | -- | LED, 3500K, 6000LM | 0-10V | 51 | 120 | SURFACE, WALL | |
| WM1 | 2' WALL MOUNTED VANITY FIXTURE | METALUX | 2BCLED-LD4-20SL-F-UNV-L835-CD-1-U | -- | LED, 3500K, 2000LM | 0-10V | 23 | 120 | SURFACE, WALL | |
| WM2 | EXTERIOR WALL SCONCE WITH PHOTOCELL | ASL | BCJA-W24-ND-30K-H21-PC-XX | -- | LED, 3000K, 2800LM | LED | 24 | 120 | SURFACE, WALL | |
| WM3 | INTERIOR DECORATIVE WALL SCONCE | ASL | BCRBA-W24-DVD-35K-H20-XX | -- | LED, 3500K, 2800LM | 0-10V | 24 | 120 | SURFACE, WALL | |
| WM4 | EXTERIOR WALL SCONCE WITH EMERGENCY BATTERY AND PHOTOCELL | ASL | DSKE-W24-ND-30K-W4-EMG-PC-XX | -- | LED, 3000K, 2800LM | LED | 24 | 120 | SURFACE, WALL | |
| UC1 | 3' UNDERCABINET FIXTURE | HALO | HU30-BSC-36-P | -- | LED, 3500K, 850LM | LED | 14 | 120 | SURFACE, UNDERCABINET | COORDINATE MOUNTING WITH CASEWORK PROVIDER. CONCEAL WHERE POSSIBLE. PROVIDE ALL MOUNTING AND CONNECTION ACCESSORIES. |
| XB1 | EMERGENCY BATTERY UNIT WITH SELF-DIAGNOSTICS | EXITRONIX | LED-95-WH-G2 | 2 | LED | -- | 2 | 120 | SURFACE, WALL | |
| XE1 | THERMOPLASTIC LED EXIT SIGN WITH BATTERY BACKUP, EMERGENCY LIGHTING HEADS, SELF-DIAGNOSTICS, AND REMOTE HEAD CAPABILITY | EXITRONIX | VLEDC-51-WH-G2-R4 | 2 | LED | -- | 2 | 120 | UNIVERSAL | PROVIDE NUMBER OF FACES AND DIRECTIONAL CHEVRONS AS SHOWN ON PLANS. |
| XR1 | WET LOCATION LED EMERGENCY REMOTE LAMPS | EXITRONIX | RL1-WP-GR | 1 | LED | -- | 1 | -- | SURFACE, WALL | |

NOTES:
1. ARCHITECT SHALL SPECIFY / VERIFY ALL FINISH SELECTIONS.
2. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES.
3. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL MOUNTING ACCESSORIES.

GENERAL CIRCUITING NOTE:

CIRCUIT BREAKERS IN EXISTING PANELS MDP, BA, AND 2A WILL BECOME SPARE FOLLOWING DEMOLITION OF THE EXISTING SPACE. THE LOAD ASSIGNMENTS NOTED HERE ARE ARBITRARY, AND THE EC SHALL UTILIZE ANY EXISTING SPARE BREAKERS AND ANY BREAKERS MADE SPARE THROUGH DEMOLITION IN THESE PANELS. WHERE NO SPARE BREAKER IS AVAILABLE, EC SHALL INSTALL NEW BREAKER IN AN EXISTING PROVISIONAL SPACE. NEW BREAKER SHALL MATCH THE MANUFACTURER, MODEL, & AIC RATING OF EXISTING BREAKERS. ALL BASE BUILDING LOADS AND CIRCUITS SERVING DEVICES THAT ARE EXISTING TO REMAIN SHALL BE MAINTAINED. THE EC SHALL ADJUST CIRCUIT ASSIGNMENTS AS REQUIRED AND PROVIDE NEW PANEL SCHEDULES TO REFLECT THE INSTALLATION AT PROJECT CLOSEOUT.

ALTERNATE:

CONTRACTOR SHALL PRICE SEPARATELY ALL WORK, INCLUSIVE OF ALL LABOR, MATERIALS, TAX, OVERHEAD AND PROFIT, ASSOCIATED WITH THE DEMOLITION OF THE EXISTING LIGHTING AND LIGHTING CONTROLS. ALL WORK AS SOCIATED WITH THE REPLACEMENT OF EXISTING FIXTURES SHALL BE INCLUDED IN THE DEDUCT ALTERNATE INCLUDING BUT NOT LIMITED TO FIXTURES, SWITCHES, WIRING, WIRELESS AND WIRED CONTROLS, CONTROL PANELS, PROGRAMMING, GENERAL CEILING AND WALL PATCHES.

FOR CONSTRUCTION

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ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE.

REVISIONS

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
ELECTRICAL SCHEDULES

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-701 |
| ISSUE DATE 02/15/2021 | | |

## GENERAL ELECTRICAL NOTES:

GENERAL: UNLESS SPECIFICALLY INDICATED OTHERWISE, ALL WORK SHOWN ON THE ELECTRICAL DRAWINGS IS NEW WORK TO BE PROVIDED UNDER THIS CONTRACT.

DEMOLITION: SEE "ELECTRICAL GENERAL DEMOLITION NOTES FOR ADDITIONAL DEMOLITION REQUIREMENTS.

COORDINATION: COORDINATE AND COOPERATE WITH ALL TRADES ON THE PROJECT.

RECORD DRAWINGS: SECURE AN EXTRA SET OF ELECTRICAL DRAWINGS TO BE KEPT ON SITE AND MARK DAILY, THE DRAWINGS IN RED AS THE PROJECT PROGRESSES IN ORDER TO KEEP AN ACCURATE RECORD OF ALL DEVIATIONS BETWEEN THE WORK SHOWN ON THE DRAWINGS AND THE WORK WHICH IS ACTUALLY INSTALLED. THESE MARKED DRAWINGS SHALL REFLECT ANY AND ALL CHANGES AND REVISIONS TO THE ORIGINAL DESIGN WHICH EXISTS IN THE COMPLETED WORK. DELIVER THE MARKED DRAWINGS TO THE ARCHITECT OR ENGINEER AT PROJECT CLOSE-OUT.

TESTS: TEST ALL WIRING FOR CONTINUITY AND GROUNDS BEFORE CONNECTING ANY FIXTURES OR DEVICES. PERFORM INSULATION RESISTANCE TESTS ON ALL WIRING #8 OR LARGER TO ENSURE THAT ALL PORTIONS ARE FREE FROM SHORT-CIRCUITS AND GROUNDS.

INSPECTIONS: ARRANGE ALL NECESSARY INSPECTIONS. DELIVER ALL REQUIRED INSPECTION CERTIFICATES TO THE OWNER.

GROUNDING: PROVIDE GROUNDING IN ACCORDANCE WITH THE NEC FOR THE ELECTRICAL SYSTEM, INCLUDING EQUIPMENT FRAMES CONDUITS, SWITCHES, CONTROLLERS, WIRE-WAYS, NEUTRAL CONDUCTORS AND OTHER EQUIPMENT. PROVIDE A GROUNDING CONDUCTOR IN ALL CIRCUITS.

LABELS: PROVIDE LABELS FOR ALL PANELBOARDS, CABINETS, SAFETY SWITCHES, MOTOR-DISCONNECT SWITCHES, AND MOTOR CONTROLLERS. LABELS SHALL BE MACHINE ENGRAVED, LAMINATED PLASTIC.

J-BOX LABELING: LABEL ALL JUNCTION BOXES WITH PERMANENT MARKER IDENTIFYING CIRCUIT NUMBER AND PANELBOARD OF CIRCUITS WITHIN.

PANEL DIRECTORY: PROVIDE TYPEWRITTEN PANELBOARD DIRECTORY CARD IN EACH PANELBOARD, INCLUDING EXISTING PANELBOARDS MODIFIED FOR THIS PROJECT, WITH CIRCUIT LOAD INFORMATION AND ROOM NUMBER CLEARLY IDENTIFIED. USE ACTUAL ROOM NUMBERS IN THE BUILDING, NOT THE ROOM NUMBERS SHOWN ON THE CONTRACT DRAWINGS, AS THEY ARE OFTEN DIFFERENT.

MOTOR COORDINATION: MOTORS, MOTOR STARTERS, CONTROLLERS, INTEGRAL DISCONNECT SWITCHES, AND CONTACTORS SHALL BE PROVIDED WITH THEIR RESPECTIVE PIECES OF EQUIPMENT BY THE EQUIPMENT SUPPLIER. COMMUNICATE WITH THE TRADES PROVIDING THE EQUIPMENT, VERIFYING ALL REQUIREMENTS. PROVIDE ALL ELECTRICAL CONNECTIONS REQUIRED THEREIN AND INSTALL MOTOR STARTERS.

MOTOR DISCONNECTS: ALL MOTORS SHALL HAVE DISCONNECTING MEANS.

MOTOR FUSE PROTECTION: WHERE FUSE PROTECTION IS SPECIFICALLY REQUIRED BY THE EQUIPMENT MANUFACTURER, PROVIDE FUSIBLE SWITCHES IN LIEU OF NON-FUSIBLE SWITCHES OR FUSIBLE ENCLOSED CIRCUIT BREAKERS OR OTHER DEVICES INDICATED.

CONNECTION DETAILS: SECURE APPROVED SHOP DRAWINGS SHOWING WIRING DIAGRAMS, ROUGH-IN AND HOOK UP DETAILS FOR EQUIPMENT WHICH MUST BE CONNECTED ELECTRICALLY.

EQUIPMENT DETAILS: MECHANICAL EQUIPMENT WILL BE FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR. THE LOCATIONS SHOWN ON THE ELECTRICAL DRAWINGS ARE APPROXIMATE. COORDINATE WITH THE MECHANICAL CONTRACTOR TO DETERMINE THE EXACT LOCATION OF EACH PIECE OF EQUIPMENT AND DETERMINE THE EXACT ROUGH-IN AND CONNECTION REQUIREMENTS.

STARTER MOUNTING: WHERE AN INDIVIDUALLY MOUNTED SAFETY SWITCH, STARTER OR CIRCUIT BREAKER IS SHOWN ADJACENT TO ITS RESPECTIVE LOAD AND NOT MOUNTED ON A WALL, PROVIDE ALL SUPPORTS, BRACKETS, ANCHORING, ETC. NECESSARY TO PROPERLY SUPPORT THE DEVICE.

LIGHTING ARRANGEMENT: ARRANGE LIGHTING FIXTURES IN ACCORDANCE WITH THE ARCHITECTURAL REFLECTED CEILING PLANS.

LIGHTING COORDINATION: COORDINATE LIGHTING FIXTURES WITH GRILLES, DIFFUSERS, SPRINKLER HEADS, ACCESS PANELS, ETC.

MATERIAL COORDINATION: VERIFY CEILING AND WALL CONSTRUCTION AND MATERIAL PRIOR TO ORDERING LIGHT FIXTURES OR OTHER DEVICES TO ENSURE PROPER FIXTURES OR DEVICES ARE FURNISHED TO MATCH CONSTRUCTION.

MOUNTING HEIGHTS: MOUNTING HEIGHTS INDICATED ARE FROM THE FINISHED FLOOR TO THE CENTERLINE OF THE WIRING DEVICE UNLESS OTHERWISE NOTED. MOUNTING HEIGHTS OF LIGHTING FIXTURES AND FIRE ALARM DEVICES ARE TO THE BOTTOM OF THE FIXTURE OR DEVICE UNLESS OTHERWISE NOTED.

DEVICE LOCATIONS: COORDINATE LOCATIONS OF SWITCHES, RECEPTACLES, AND TELE/DATA OUTLETS WITH OTHER WALL MOUNTED DEVICES SUCH AS THERMOSTATS AND CONTROL STATIONS. DO NOT MOUNT WIRING DEVICES BACK TO BACK.

EWC RECEPTACLES: RECEPTACLES FOR ELECTRIC WATER COOLERS (EWC) SHALL BE INSTALLED OUT OF VIEW AND BEHIND THE EWC ENCLOSURE. VERIFY THE MOUNTING HEIGHT WITH THE EQUIPMENT SUPPLIER PRIOR TO ROUGH-IN.

DEVICE COORDINATION: THOROUGHLY REVIEW AND COORDINATE ALL CASEWORK, DOOR SWINGS, AND CABINET DRAWINGS AND ARCHITECTURAL ELEVATIONS WITH DEVICE LOCATIONS PRIOR TO ROUGH-IN OF OUTLET BOXES.

BARRIERS: WHERE A MULTIPLE GANG BOX HAS CIRCUITS OF DIFFERENT VOLTAGES OR SYSTEMS WHICH ARE REQUIRED TO BE SEPARATED, PROVIDE THE CODE-REQUIRED SEPARATION, USING A FULL HEIGHT AND DEPTH BARRIER PLATE.

FIRE PROOFING: FOR ANY WALL OR FLOOR PENETRATIONS THROUGH FIRE RATED STRUCTURES, PROVIDE FIRE-PROOFING TO SEAL ALL THE PENETRATIONS AFTER THE CONDUIT HAS BEEN INSTALLED. FIRE PROOFING FOR PENETRATIONS SHALL BE UL APPROVED PER THE THE PENETRATION MADE IN ORDER TO MAINTAIN FIRE RATED INTEGRITY OF THE STRUCTURE.

CLEAN UP: ON PROJECT CLOSE-OUT, CLEAN ALL ELECTRICAL DEVICES, LIGHTING FIXTURES, LAMPS AND LENSES, AND REMOVE ALL PAINT SPATTERS FROM DEVICES, FIXTURES, AND PLATES. REPLACE ALL INOPERATIVE LAMPS.

OWNER FURNISHED EQUIPMENT: CONTRACTOR SHALL OBTAIN CUT SHEETS, INSTALLATION DATA, AND ROUGH-IN REQUIREMENTS FOR OWNER FURNISHED, CONTRACTOR INSTALLED EQUIPMENT AND COORDINATE ROUGH-IN AND POWER REQUIREMENTS WITH THE OWNER'S REPRESENTATIVE PRIOR TO STARTING ANY ASSOCIATED WORK.

CONDUIT ROUTING: ALL CONDUIT RUN OVERHEAD SHALL BE RUN AT THE BOTTOM OF THE FLOOR, ROOF STRUCTURE, OR LOWEST CHORD OF JOIST SPACE (AS APPLICABLE) ABOVE IN ORDER TO AVOID CONFLICTS WITH OTHER TRADES.

WIRING DEVICES: ALL RECEPTACLES AND SWITCHES SHALL BE LABELED WITH CLEAR PLASTIC LAMINATED LABEL WITH BLACK TEXT, NOTING PANELBOARD DESIGNATION AND CIRCUIT NUMBER FROM WHICH IT IS FED.

EQUIPMENT DEMONSTRATION: PROVIDE A DEMONSTRATION OF THE OPERATION OF ALL ELECTRICAL COMPONENTS.

CEILING AND MECHANICAL ROOM PLENUM: ALL WIRING THAT WILL NOT BE RUN IN METAL CONDUIT SHALL BE PLENUM RATED.

## ELECTRICAL GENERAL DEMOLITION NOTES:

GENERAL: DEMOLITION DRAWINGS ARE BASED ON EXISTING PLANS AND FIELD INVESTIGATION PRIOR TO DEMOLITION. VISIT THE EXISTING BUILDING PRIOR TO BID IN ORDER TO BECOME FAMILIAR WITH THE EXISTING CONDITIONS AND IN ORDER TO AVOID CONFLICTS.

DASHED ITEMS: ALL ITEMS SHOWN DASHED ON DEMOLITION PLANS ARE EXISTING AND SHALL BE REMOVED COMPLETE INCLUDING BOXES, CONDUIT, WIRE, FASTENERS, AND ASSOCIATED APPURTENANCES U.O.N.

SOLID ITEMS: ALL ITEMS SHOWN SOLID ON DEMOLITION PLANS ARE EXISTING TO REMAIN.

CIRCUITING TO REMAIN: WHERE AFFECTED BY NEW WORK, EXISTING CIRCUITING TO REMAIN SHALL BE REROUTED OR RECONNECTED AS REQUIRED, IN ORDER TO MAINTAIN CONTINUITY OF CIRCUIT.

REUSE OF EXISTING CIRCUITRY: EXISTING CIRCUITS SHALL BE REUSED WHERE CONVENIENT TO SERVE THE NEW LAYOUT. PROVIDE ADDITIONAL PHASE CONDUCTORS AS INDICATED OR REQUIRED TO MAINTAIN CONTINUITY OF EXISTING CIRCUITS THAT REMAIN.

EXISTING CONDUIT: ALL EXISTING CONDUITS AND WIRING THAT WILL NOT BE REUSED SHALL BE REMOVED. EXISTING CONDUIT TO REMAIN CONCEALED IN WALLS SHALL BE ABANDONED. EXISTING CONDUIT TO REMAIN BELOW FLOOR SLAB SHALL BE CUT OFF ONE INCH BELOW ROUGH FLOOR AND GROUTED FLUSH. ALL EXISTING WIRING IN CONDUITS TO BE ABANDONED SHALL BE DISCONNECTED FROM POWER SOURCE AND REMOVED.

REPAIR DAMAGE: EXERCISE CARE IN REMOVAL OF DEMOLITION ITEMS. REPAIR, AT NO ADDITIONAL COST TO OWNER, ANY DAMAGE CAUSED TO EXISTING CONSTRUCTION AND/OR EQUIPMENT TO REMAIN.

ASSOCIATED APPURTENANCES: REMOVE ALL ELECTRICAL APPURTENANCES (DISCONNECTS, STARTERS, WIRING, CONDUIT, ETC.) ASSOCIATED WITH EQUIPMENT TO BE REMOVED BY OTHERS.

KNOCKOUT PLUGS AND COVERS: ALL CONDUIT REMOVED SHALL BE REMOVED IN ITS ENTIRETY, INCLUDING FITTINGS, MOUNTING DEVICES, MOUNTING HARDWARE, ETC. PROVIDE CONDUIT PLUGS AND BLANKS FOR ALL OPENINGS CREATED BY THE REMOVAL OF CONDUIT. PROVIDE BLANK COVER PLATES FOR ALL OPENED OUTLET BOXES CREATED BY THE REMOVAL OF THE EQUIPMENT AND/OR DEVICES.

DEMOLISHED MATERIALS: ALL MATERIALS REMOVED UNDER DEMOLITION, NOT TO BE RELOCATED OR DESIGNATED TO BE TURNED OVER TO THE OWNER, SHALL BECOME PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED COMPLETELY FROM THE SITE.

SCHEDULE OUTAGES: ALL WORK AND ALL POWER OUTAGES SHALL BE SCHEDULED AT TIMES CONVENIENT TO THE OWNER.

NOTIFICATION: NOTIFY THE OWNER PRIOR TO TURNING OFF ANY CIRCUITS.

EXISTING CIRCUITS: IF DURING THE COURSE OF CONSTRUCTION, IT IS DETERMINED BY THE CONTRACTOR THAT AN EXISTING CIRCUIT BECOMES SPARE, THE CONTRACTOR SHALL UPDATE THE PANELBOARD DIRECTORY TO INDICATE SUCH, EVEN IF IT IS NOT EXPLICITLY MARKED ON THE ELECTRICAL PLANS.

## GENERAL SPECIAL SYSTEM NOTES:

TELEPHONE AND DATA SYSTEMS

THE TELEPHONE AND DATA SYSTEMS WILL BE FURNISHED AND INSTALLED THROUGH THE OWNER'S VENDOR (THE VENDOR) UNDER A SEPARATE CONTRACT. ALL CABLING AND WIRING (EXCEPT FOR POWER WIRING), J-HOOKS, JACKS, COVER PLATE COMPATIBLE WITH THE EQUIPMENT, DEVICES, RACKS, AND COMPONENT EQUIPMENT WILL BE PROVIDED BY THE VENDOR, UNLESS INDICATED OTHERWISE. THE VENDOR WILL PROVIDE INSTALLATION DURING CONSTRUCTION. THE ELECTRICAL CONTRACTOR (THE CONTRACTOR) SHALL COORDINATE ALL ROUGH-IN, BOX SIZES AND CONFIGURATIONS, CONDUIT SIZES AND ROUTING WITH THE VENDOR PRIOR TO INSTALLATION OF THE RACEWAY SYSTEM.

THE CONTRACTOR SHALL PROVIDE ALL CONDUIT WITH PULL WIRE, AND 4"X4"X2 1/4"BOX WITH SINGLE GANG PLASTER RING UNLESS OTHERWISE NOTED. ELECTRICAL CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND ELECTRICAL REQUIREMENTS WITH THE VENDOR PRIOR TO ROUGH-IN.

STUB ALL CONDUITS WITH PULL WIRE FOR COMMUNICATIONS DEVICES TO ABOVE AN ACCESSIBLE CORRIDOR CEILING AND TERMINATE WITH INSULATED NYLON BUSHING. THE VENDOR WILL PROVIDE J-HOOKS ABOVE THE CEILING FROM THE STUB OUT TO EQUIPMENT LOCATION AS REQUIRED FOR HIS CABLING AND TERMINATE WITH INSULATED NYLON BUSHING. WHERE A WALL SEPARATES THE CONDUIT STUB OUT FROM THE EQUIPMENT LOCATION, PROVIDE A 1" MINIMUM SLEEVE THROUGH THE WALL, ABOVE AN ACCESSIBLE CEILING, TO ACCOMMODATE THE CABLING. ALL CONDUITS AND SLEEVES PENETRATING RATED FIRE OR SMOKE WALLS SHALL BE PROVIDED WITH APPROVED FIRE RETARDANT TO PROVIDE A UL RATED WALL PENETRATION ASSEMBLY. MAINTAIN VENDOR RECOMMENDED SEPARATION BETWEEN WIRING OF DIFFERENT SYSTEMS AND FROM INTERFERENCE PRODUCING ELECTRICAL DEVICES SUCH AS FLUORESCENT LIGHTS, BALLAST, TRANSFORMERS, RELAYS, MOTOR CONTROLS, ETC.

PROVIDE POWER CIRCUITS FOR TELECOMMUNICATIONS EQUIPMENT AS INDICATED.

THE CONTRACTOR SHALL PROVIDE ALL BACKBOXES, CONDUIT, GROUNDING AND SHALL INSTALL ALL SPECIAL BOXES WITH PLASTER RING FURNISHED BY THE VENDOR FOR THE TELECOMMUNICATIONS SYSTEMS IN ACCORDANCE WITH THE APPLICABLE CODES.

THE CONTRACTOR SHALL INSTALL ALL COMMUNICATIONS SLEEVES AND CONDUIT IN ACCORDANCE WITH DRAWINGS, ELECTRICAL SPECIFICATIONS, VENDOR WIRING DIAGRAMS, AND ALL APPLICABLE CODES.

THE GENERAL CONTRACTOR SHALL PROVIDE IN-WALL REINFORCEMENT AS NECESSARY FOR ALL COMMUNICATIONS CABINETS, SHELVES, BRACKETS, FURNITURE MOUNTS, ETC. AND SHALL MOUNT CABINETS, SHELVES, BRACKETS, AND FURNITURE MOUNTS IN ACCORDANCE WITH DRAWINGS, VENDOR SUBMITTALS, AND ALL APPLICABLE CODES.

COORDINATE FINAL LOCATIONS AND ELEVATIONS OF ALL TELECOMMUNICATIONS DEVICES AND OUTLETS WITH ARCHITECTURAL PLANS, CASEWORK AND ELEVATIONS, AND VENDOR REQUIREMENTS.

THE CONTRACTOR SHALL PROVIDE A COMPLETION SCHEDULE BROKEN DOWN BY PROJECT PHASES, FOR TURNOVER OF COMPLETED COMMUNICATIONS ROUGH-IN FOR VENDOR FINISH WORK. THE CONTRACTOR SHALL COORDINATE TURNOVER WITH VENDORS, AND SHALL TURNOVER AREAS FOR VENDOR FINISH WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY EXTRA VENDOR COST RESULTING FROM INCORRECT COMMUNICATIONS ROUGH-IN.

### POWER

| | |
|---|---|
| WP | DUPLEX RECEPTACLE, GROUND FAULT INTERRUPTING TYPE, 20A, 120V, WITH COOPER MODEL WIU-TD (OR EQUAL) "WHILE-IN-USE" WEATHERPROOF COVER, 18"AFG U.O.N. |
| J | JUNCTION BOX - ABOVE CEILINGS OR FLUSH IN WALLS. |
| | ELECTRICAL PANELBOARD |
| | ELECTRICAL CIRCUIT RUN IN CONDUIT AND CIRCUIT HOMERUN TO PANELBOARD (PANEL AND CIRCUIT DESIGNATION AS INDICATED). AS A MINIMUM CONDITION, EACH SINGLE PHASE CIRCUIT SHALL HAVE 1 #12 PHASE CONDUCTOR, 1 #12 NEUTRAL CONDUCTOR, AND 1 #12 GROUNDING CONDUCTOR IN 3/4" CONDUIT. PROVIDE ADDITIONAL PHASE CONDUCTORS AS REQUIRED FOR "MULTIPLE PHASED" ELECTRICAL LOADS. PROVIDE ADDITIONAL "SWITCH LEG" CONDUCTORS TO PROVIDE THE LIGHT FIXTURE CONTROL INDICATED. MULTIPLE SINGLE PHASE CONDUCTORS SHALL BE GROUPED TOGETHER IN A COMMON CONDUIT IN ACCORDANCE WITH THE NEC AND AT THE CONTRACTOR'S DISCRETION. NEUTRAL AND GROUNDING CONDUCTORS SHALL BE SHARED AS ALLOWED BY THE NEC. CONDUIT LARGER THAN 3/4" AND CONDUCTORS LARGER THAN #12 SHALL BE AS INDICATED. |

### FIRE ALARM

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|---|---|
| FACP | FIRE ALARM CONTROL PANEL, SURFACE MOUNTED, TOP 5'-0" AFF. |
| FAAP | FIRE ALARM ANNUNCIATOR PANEL, RECESSED, TOP 5'-0" AFF. |
| NACP | FIRE ALARM NOTIFICATION APPLIANCE CIRCUIT EXTENDER PANEL, SURFACE MOUNTED, TOP, 5'-0" AFF. |
| F | FIRE ALARM MANUAL PULL STATION, 44"AFF TO ACTUATING ARM, U.O.N. |
| SD | ADDRESSABLE FIRE ALARM SYSTEM PHOTO-ELECTRIC SMOKE DETECTOR, CEILING MOUNTED. |
| SD ER | ELEVATOR RECALL ADDRESSABLE FIRE ALARM SYSTEM PHOTO-ELECTRIC SMOKE DETECTOR, CEILING MOUNTED. |
| DD | DUCT MOUNTED ADDRESSABLE FIRE ALARM SYSTEM PHOTO-ELECTRIC SMOKE DETECTOR. |
| MM | FIRE ALARM SYSTEM MONITOR MODULE. |
| CM | FIRE ALARM SYSTEM CONTROL MODULE. |
| RT | FIRE ALARM SYSTEM ADDRESSABLE REMOTE TEST SWITCH. |
| 30 | FIRE ALARM VISUAL (STROBE) APPLIANCE, CEILING MOUNTED. SUBSCRIPT INDICATES MINIMUM CANDELA RATING. |
| 30 | FIRE ALARM SYSTEM VISUAL (STROBE) APPLIANCE, WALL MOUNTED AT 80" AFF TO BOTTOM OF LENS, OR 6" BELOW FINISHED CEILING, WHICHEVER IS LOWER, U.O.N. SUBSCRIPT INDICATES MINIMUM CANDELA RATING. |
| AV 30 | FIRE ALARM AUDIO/VISUAL (HORN/STROBE) APPLIANCE, CEILING MOUNTED. SUBSCRIPT INDICATES MINIMUM CANDELA RATING. |
| AV 30 | FIRE ALARM SYSTEM AUDIO/VISUAL (HORN/STROBE), WALL MOUNTED AT 80" AFF TO BOTTOM OF LENS, OR 6" BELOW FINISHED CEILING, WHICHEVER IS LOWER, U.O.N. SUBSCRIPT INDICATES MINIMUM CANDELA RATING. |
| TS | SPRINKLER SYSTEM SUPERVISORY VALVE TAMPER SWITCH CONNECTION. |
| FS | SPRINKLER SYSTEM SUPERVISORY FLOW SWITCH CONNECTION. |
| PS | SPRINKLER SYSTEM PRESSURE SWITCH CONNECTION. |
| B | SPRINKLER SYSTEM BELL ALARM APPLIANCE, WEATHERPROOF. MOUNT 80" AFG. |
| MFSD | MOTORIZED FIRE/SMOKE DAMPER CONNECTION, 120V. REFER TO DETAIL 2/E-501 FOR MORE INFORMATION ABOUT ASSOCIATED FIRE ALARM DEVICES. |

### LIGHTING

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|---|---|
| | LIGHTING FIXTURE. |
| | DOWNLIGHT FIXTURE. |
| | WALL MOUNTED LIGHTING FIXTURE. |
| | LIGHTING FIXTURE WITH EMERGENCY BATTERY. TYPICAL ALL FIXTURE TYPES. |
| | EMERGENCY LIGHTING REMOTE UNIT, CONNECT AHEAD OF LOCAL CONTROLS. |
| | EMERGENCY BATTERY LIGHTING UNIT, CONNECT AHEAD OF LOCAL CONTROLS |
| | EXIT LIGHTING FIXTURE WITH EMERGENCY HEADS AND DIRECTIONAL ARROWS AS INDICATED ON DRAWINGS. CONNECT TO LIGHTING CIRCUIT AHEAD OF LOCAL CONTROLS. SHADED AREA DENOTES LIGHTED FACE. |
| $S_a$ | SINGLE POLE SWITCH, 20A, 120/277V, 44"AFF U.O.N. SUBSCRIPT "a" INDICATES ASSOCIATED FIXTURES TO BE CONTROLLED. |
| $S_{L1a}$ | LOW VOLTAGE SWITCH FOR ON/OFF CONTROL OF A SINGLE ZONE, 44" AFF U.O.N. SUBSCRIPT "a", WHERE USED, INDICATES ASSOCIATED FIXTURES TO BE CONTROLLED. PROVIDE GREENMAX MODEL #DRKDN-C2X OR APPROVED EQUAL. |
| $S_{D1a}$ | LOW VOLTAGE SWITCH FOR ON/OFF AND RAISE/LOWER CONTROL OF A SINGLE ZONE, 44" AFF U.O.N. SUBSCRIPT "a", WHERE USED, INDICATES ASSOCIATED FIXTURES TO BE CONTROLLED. PROVIDE GREENMAX MODEL #DRKDN-C4X OR APPROVED EQUAL. |
| $S_{D2a,b}$ | LOW VOLTAGE SWITCH FOR ON/OFF AND RAISE/LOWER CONTROL OF A TWO ZONES, 44" AFF U.O.N. SUBSCRIPT "a,b", WHERE USED, INDICATES ASSOCIATED FIXTURES TO BE CONTROLLED. PROVIDE GREENMAX MODEL #DRKDN-C8X OR APPROVED EQUAL. |
| $S_{VSa}$ | LINE VOLTAGE DUAL TECHNOLOGY WALL SWITCH VACANCY SENSOR WITH ON/OFF CONTROL (MANUAL ON), 44" AFF U.O.N. SUBSCRIPT "a", WHERE USED, INDICATES ASSOCIATED FIXTURES TO BE CONTROLLED. PROVIDE GREENGATE MODEL #VNW-D OR APPROVED EQUAL. |
| VS a | ANALOG 360-DEGREE MULTI-TECHNOLOGY VACANCY SENSOR. SUBSCRIPT "a", WHERE USED, INDICATES ASSOCIATED FIXTURES TO BE CONTROLLED. PROVIDE LEVITON MODEL #OSC10-MOW OR APPROVED EQUAL. PROVIDE COMPATIBLE SMART PACK FOR EACH CONTROL ZONE. PROVIDE COMPATIBLE 2-PORT ANALOG INTERFACE. |
| OS a | ANALOG 360-DEGREE MULTI-TECHNOLOGY OCCUPANCY SENSOR. SUBSCRIPT "a", WHERE USED, INDICATES ASSOCIATED FIXTURES TO BE CONTROLLED. PROVIDE LEVITON MODEL #OSC10-MOW OR APPROVED EQUAL. PROVIDE COMPATIBLE SMART PACK FOR EACH CONTROL ZONE. PROVIDE COMPATIBLE 2-PORT ANALOG INTERFACE. (NOTE: SAME PRODUCT AS "VACANCY" SENSOR, NOTED DIFFERENTLY TO INDICATE CONTROL STRATEGY) |
| SP a | GREENMAX DRC SMART PACK MODEL #DRD07-EDO OR APPROVED EQUAL. SUBCRIPT "a", WHERE USED, INDICATES ASSOCIATED FIXTURES TO BE CONTROLLED. |
| 2P | LEVITON 2-PORT ANALOG INTERFACE MODEL #DRIDO-CB2 OR APPROVED EQUAL. |
| RC | GREENMAX DRC LINE VOLTAGE ROOM CONTROLLER MODEL # DRC07-EDO OR APPROVED EQUAL. |

### LIGHTING FIXTURE KEY

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|---|---|
| Aa NL | 1. LETTER "A" DENOTES FIXTURE TYPE. REFER TO LIGHTING FIXTURE SCHEDULE.<br>2. ASSOCIATED LETTER "a", WHERE USED, INDICATES LIGHTING FIXTURE CONTROL DEVICE DESIGNATION.<br>3. "NL" INDICATES A NIGHT LIGHT FIXTURE CIRCUITED AHEAD OF LOCAL CONTROLS. |

### GENERAL

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|---|---|
| 1 | KEYNOTE. |

### LINEWEIGHTS

| | |
|---|---|
| | NEW |
| | EXISTING |
| | REMOVE EXISTING |

### ELECTRICAL ABBREVIATIONS

| | |
|---|---|
| A | AMPERE |
| AFF | ABOVE FINISHED FLOOR |
| AFG | ABOVE FINISHED GRADE |
| AHU | AIR HANDLING UNIT |
| AIC | AMPERE INTERRUPTING CURRENT |
| ATS | AUTOMATIC TRANSFER SWITCH |
| AV | AUDIO/VISUAL |
| BFG | BELOW FINISHED GRADE |
| C | CONDUIT |
| CB | CIRCUIT BREAKER |
| CKT | CIRCUIT |
| EBU | EMERGENCY BATTERY UNIT |
| EC | EMPTY CONDUIT |
| EC | ELECTRICAL CONTRACTOR |
| ECB | ENCLOSED CIRCUIT BREAKER |
| EF | EXHAUST FAN |
| ETR | EXISTING TO REMAIN |
| EWC | ELECTRIC WATER COOLER |
| EWH | ELECTRIC WATER HEATER |
| EX | EXISTING |
| FLA | FULL LOAD AMPS |
| GC | GENERAL CONTRACTOR |
| GFCI | GROUND FAULT CIRCUIT INTERRUPTER |
| GND | GROUND |
| HID | HIGH INTENSITY DISCHARGE |
| HP | HORSE POWER/HEAT PUMP |
| HVAC | HEATING, VENTILATING, AND AIR CONDITIONING |
| IG | ISOLATED GROUND |
| JB | JUNCTION BOX |
| KVA | KILO-VOLT AMPERE |
| KW | KILO-WATT |
| LC | LIGHTING CONTACTOR |
| LTG | LIGHTING |
| MAU | MAKE UP AIR UNIT |
| MCA | MINIMUM CIRUIT AMPS |
| MC | MECHANICAL CONTRACTOR |
| MC | METAL CLAD |
| MCB | MAIN CIRCUIT BREAKER |
| MFR | MANUFACTURER |
| MLO | MAIN LUGS ONLY |
| NEC | NATIONAL ELECTRICAL CODE |
| NF | NON-FUSED |
| NL | NIGHT LIGHT |
| NTS | NOT TO SCALE |
| OC | ON CENTER |
| OFCI | OWNER FURNISHED CONTRACTOR INSTALLED |
| P | POLE |
| PC | PLUMBING CONTRACTOR |
| PCP | PUMP CONTROL PANEL |
| PF | POWER FACTOR |
| PNL | PANEL |
| PNLBD | PANELBOARD |
| Ø | PHASE |
| PRI | PRIMARY |
| RTU | ROOF TOP UNIT |
| SEC | SECONDARY |
| TBB | TELEPHONE BACKBOARD |
| TR | TAMPER RESISTANT |
| TYP | TYPICAL |
| UON | UNLESS OTHERWISE NOTED |
| V | VOLTS |
| VAC | VOLTS ALTERNATING CURRENT |
| VAV | VARIABLE AIR VOLUME |
| VDC | VOLTS DIRECT CURRENT |
| VFD | VARIABLE REQUENCY DRIVE |
| W | WATTS/WIRE |
| WP | WEATHERPROOF |
| XFMR | TRANSFORMER |

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REVISIONS

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|---|---|
| 1 | COMPLETE FIRE ALARM REPLACEMENT PER T.O., #1 4.7 |

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
ELECTRICAL DATA SHEET

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-001 |
| ISSUE DATE 07/17/2024 | | |

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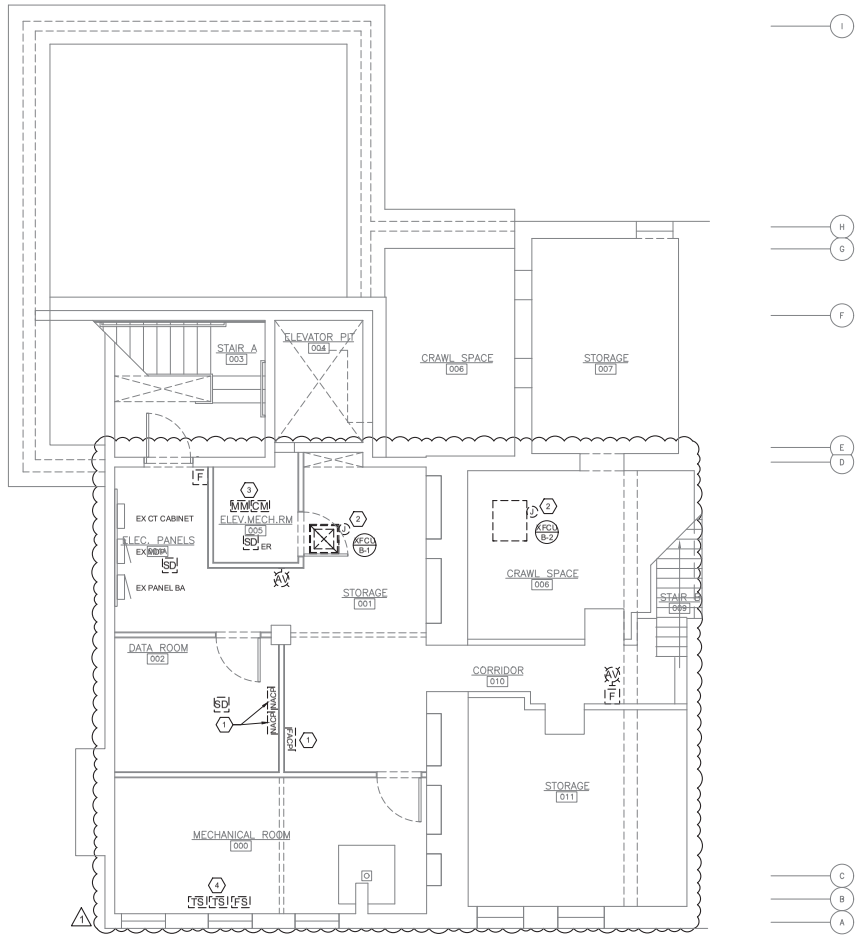
2 Allegheny Center, Nova Tower 2 - Suite 1001 - Pittsburgh, PA 15212
ASE JOB #2041090




1 BASEMENT ELECTRICAL DEMOLITION PLAN
E-100 1/4" = 1'-0"

ALTERNATE:

CONTRACTOR SHALL PRICE SEPARATELY ALL WORK, INCLUSIVE OF ALL LABOR, MATERIALS, TAX, OVERHEAD AND PROFIT, ASSOCIATED WITH THE DEMOLITION OF THE EXISTING LIGHTING AND LIGHTING CONTROLS. ALL WORK ASSOCIATED WITH THE REPLACEMENT OF EXISTING FIXTURES SHALL BE INCLUDED IN THE DEDUCT ALTERNATE INCLUDING BUT NOT LIMITED TO FIXTURES, SWITCHES, WIRING, CONTROLS, CONTROL PANELS, PROGRAMMING, GENERAL CEILING AND WALL PATCHING. DO NOT INCLUDE IN THE DEDUCT ANY WORK ASSOCIATED WITH SALVAGING AND REINSTALLING EXISTING DEVICES TO ALLOW FOR THE NEW MECHANICAL CHASE.

ELECTRICAL DEMOLITION GENERAL NOTES:

1. ELECTRICAL DISTRIBUTION EQUIPMENT IS EXISTING TO REMAIN, UNLESS OTHERWISE NOTED.
2. FIXTURES AND DEVICES NOTED WITH "EX" ARE EXISTING TO REMAIN. MAINTAIN EXISTING CIRCUITRY UNLESS OTHERWISE NOTED ON NEW WORK PLANS.
3. ALL HOLES IN WALLS, COLUMN ENCLOSURES, CEILINGS AND FLOORS FROM CONDUIT PENETRATIONS, JUNCTION BOXES OR WIRING DEVICES SHALL BE PATCHED AND PAINTED PER THE ARCHITECT.
4. ALL DEVICES ON WALLS THAT ARE SCHEDULED FOR DEMOLITION, WHETHER REPRESENTED ON THIS PLAN OR NOT, SHALL BE DISCONNECTED AND REMOVED. INTERCEPT AND EXTEND CIRCUITS AS REQUIRED TO MAINTAIN CONTINUITY OF POWER TO EXISTING DEVICES.
5. NOT ALL DEVICES ON WALLS THAT ARE SCHEDULED AS EXISTING TO REMAIN ARE REPRESENTED ON THIS PLAN. ELECTRICAL CONTRACTOR SHALL FIELD VERIFY AND CONSULT WITH ARCHITECT AND BUILDING OWNER ABOUT WHETHER DEVICE SHOULD BE REMOVED OR NOT.
6. ALL EXISTING LIGHTING FIXTURES, EMERGENCY BATTERY HEADS, EMERGENCY LIGHTING INVERTERS, EXIT SIGNS AND ASSOCIATED CONTROL DEVICES SHALL BE DEMOLISHED, UNLESS OTHERWISE NOTED. THE MAJORITY OF LIGHTING EQUIPMENT IS NOT REPRESENTED ON THIS PLAN. ELECTRICAL CONTRACTOR SHALL FIELD SURVEY TO UNDERSTAND THE DEMOLITION SCOPE. REFER TO ALTERNATE NOTE ON THIS SHEET FOR MORE INFORMATION.
7. DISCONNECT AND REMOVE THE EXISTING FIRE ALARM SYSTEM, INCLUDING HEAD-END EQUIPMENT, POWER SUPPLIES, INITIATING AND NOTIFICATION DEVICES, AND ASSOCIATED BRANCH CIRCUITRY. MAINTAIN EXISTING CONDUIT AND BACKBOXES FOR REUSE WHERE INFRASTRUCTURE CAN BE REUSED FOR NEW DEVICES. REFER TO NEW WORK PLANS FOR MORE INFORMATION.

ELECTRICAL DEMOLITION KEY NOTES: (#)

1. DEMOLISH EXISTING FIRE ALARM HEAD-END EQUIPMENT INCLUDING BUT NOT LIMITED TO FACP, NACP, DACT, FAAP, ETC. DEMOLISH ALL EXISTING FIRE ALARM CIRCUITS. REFER TO NEW FIRE ALARM WORK PLANS FOR MORE INFORMATION.
2. DISCONNECT AND REMOVE ELECTRICAL CONNECTION TO EXISTING FURNACE. MAINTAIN EXISTING CIRCUIT FOR CONNECTION TO NEW FURNACE. REFER TO NEW BASEMENT POWER WORK PLAN FOR MORE INFORMATION.
3. DISCONNECT AND REMOVE EXISTING ADDRESSABLE FIRE ALARM CONTROL AND MONITOR MODULE(S) FOR THE ELEVATOR. ALL ELEVATOR FIRE ALARM DEVICES WHETHER SHOWN ON THIS PLAN OR NOT SHALL BE REPLACED ONE FOR ONE. A SINGLE CONTROL AND MONITOR MODULE IS SHOWN ON PLAN, THE EC SHALL OWN THE DEMOLITION SCOPE REGARDLESS OF THE QUANTITY OF DEVICES IN THE FIELD.
4. DISCONNECT AND REMOVE EXISTING ADDRESSABLE FIRE TAMPER, FLOW, AND PRESSURE SWITCHES(S) FOR THE FIRE PROTECTION SYSTEM. ALL FIRE PROTECTION FIRE ALARM DEVICES WHETHER SHOWN ON THIS PLAN OR NOT SHALL BE REPLACED ONE FOR ONE. A SINGLE FLOW AND TWO TAMPER SWITCHES ARE SHOWN ON PLAN. THE EC SHALL OWN THE DEMOLITION SCOPE REGARDLESS OF THE QUANTITY OF DEVICES IN THE FIELD.

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ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE.

REVISIONS

1 COMPLETE FIRE ALARM REPLACEMENT PER T.O. #147

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
BASEMENT ELECTRICAL DEMOLITION PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-100 |
| ISSUE DATE 07/17/2024 | | |

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MEP Engineering
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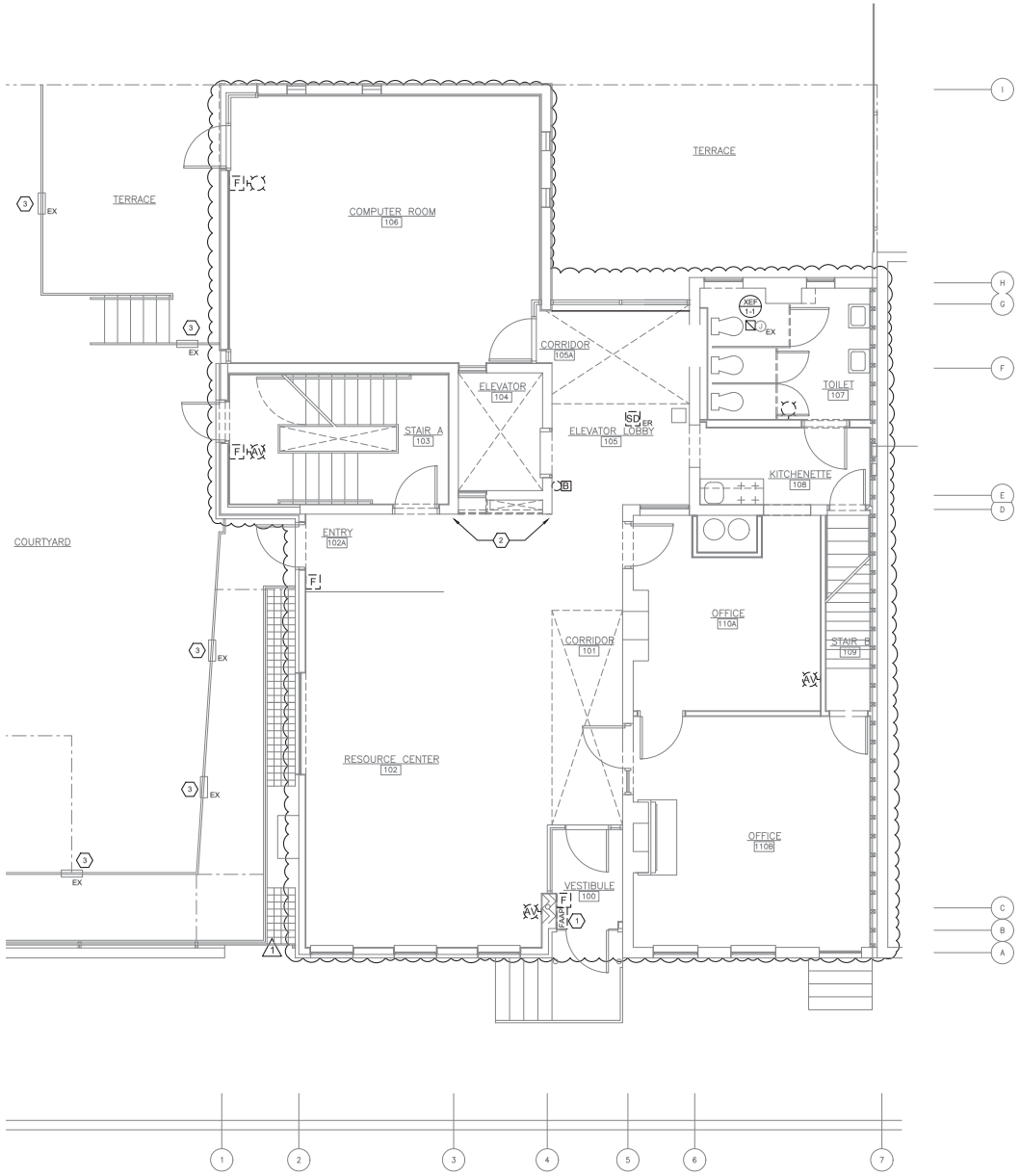


1 E-101 FIRST FLOOR ELECTRICAL DEMOLITION PLAN
1/4" = 1'-0"

**ALTERNATE:**

CONTRACTOR SHALL PRICE SEPARATELY ALL WORK, INCLUSIVE OF ALL LABOR, MATERIALS, TAX, OVERHEAD AND PROFIT, ASSOCIATED WITH THE DEMOLITION OF THE EXISTING LIGHTING AND LIGHTING CONTROLS. ALL WORK ASSOCIATED WITH THE REPLACEMENT OF EXISTING FIXTURES SHALL BE INCLUDED IN THE DEDUCT ALTERNATE INCLUDING BUT NOT LIMITED TO FIXTURES, SWITCHES, WIRING, CONTROLS, CONTROL PANELS, PROGRAMMING, GENERAL CEILING AND WALL PATCHING. DO NOT INCLUDE IN THE DEDUCT ANY WORK ASSOCIATED WITH SALVAGING AND REINSTALLING EXISTING DEVICES TO ALLOW FOR THE NEW MECHANICAL CHASE.

## ELECTRICAL DEMOLITION GENERAL NOTES:

1. ELECTRICAL DISTRIBUTION EQUIPMENT IS EXISTING TO REMAIN, UNLESS OTHERWISE NOTED.
2. FIXTURES AND DEVICES NOTED WITH "EX" ARE EXISTING TO REMAIN. MAINTAIN EXISTING CIRCUITRY UNLESS OTHERWISE NOTED ON NEW WORK PLANS.
3. ALL HOLES IN WALLS, COLUMN ENCLOSURES, CEILINGS AND FLOORS FROM CONDUIT PENETRATIONS, JUNCTION BOXES OR WIRING DEVICES SHALL BE PATCHED AND PAINTED PER THE ARCHITECT.
4. ALL DEVICES ON WALLS THAT ARE SCHEDULED FOR DEMOLITION, WHETHER REPRESENTED ON THIS PLAN OR NOT, SHALL BE DISCONNECTED AND REMOVED. INTERCEPT AND EXTEND CIRCUITS AS REQUIRED TO MAINTAIN CONTINUITY OF POWER TO EXISTING DEVICES.
5. NOT ALL DEVICES ON WALLS THAT ARE SCHEDULED AS EXISTING TO REMAIN ARE REPRESENTED ON THIS PLAN. ELECTRICAL CONTRACTOR SHALL FIELD VERIFY AND CONSULT WITH ARCHITECT AND BUILDING OWNER ABOUT WHETHER DEVICE SHOULD BE REMOVED OR NOT.
6. ALL EXISTING LIGHTING FIXTURES, EMERGENCY BATTERY HEADS, EMERGENCY LIGHTING INVERTERS, EXIT SIGNS AND ASSOCIATED CONTROL DEVICES SHALL BE DEMOLISHED, UNLESS OTHERWISE NOTED. THE MAJORITY OF LIGHTING EQUIPMENT IS NOT REPRESENTED ON THIS PLAN. ELECTRICAL CONTRACTOR SHALL FIELD SURVEY TO UNDERSTAND THE DEMOLITION SCOPE. REFER TO ALTERNATE NOTE ON THIS SHEET FOR MORE INFORMATION. (1)
7. DISCONNECT AND REMOVE THE EXISTING FIRE ALARM SYSTEM, INCLUDING HEAD-END EQUIPMENT, POWER SUPPLIES, INITIATING AND NOTIFICATION DEVICES, AND ASSOCIATED BRANCH CIRCUITRY. MAINTAIN EXISTING CONDUIT AND BACKBOXES FOR REUSE WHERE INFRASTRUCTURE CAN BE REUSED FOR NEW DEVICES. REFER TO NEW WORK PLANS FOR MORE INFORMATION.

## ELECTRICAL DEMOLITION KEY NOTES: (#)

1. DEMOLISH EXISTING FIRE ALARM ANNUNCIATOR PANEL WHERE PRESENT.
2. DISCONNECT AND REMOVE ALL DEVICES THAT CONFLICT WITH THE NEW MECHANICAL CHASE. CONFIRM LOCATION OF NEW CHASE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS. COORDINATE WITH ARCHITECT WHICH DEVICES SHALL BE SALVAGED FOR REINSTALLATION AND WHICH DEVICES SHALL BE DEMOLISHED. REFER TO NEW WORK PLANS FOR MORE INFORMATION.
3. EXTERIOR STEP LIGHT IS EXISTING TO REMAIN. MAINTAIN EXISTING LIGHTING CIRCUIT(S) AND CONTROL DEVICE(S).

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ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE.

REVISIONS

| |
|---|
| 1 COMPLETE FIRE ALARM REPLACEMENT PER T.O. #147 |

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
FIRST FLOOR ELECTRICAL DEMOLITION PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-101 |
| ISSUE DATE 07/17/2024 | | |

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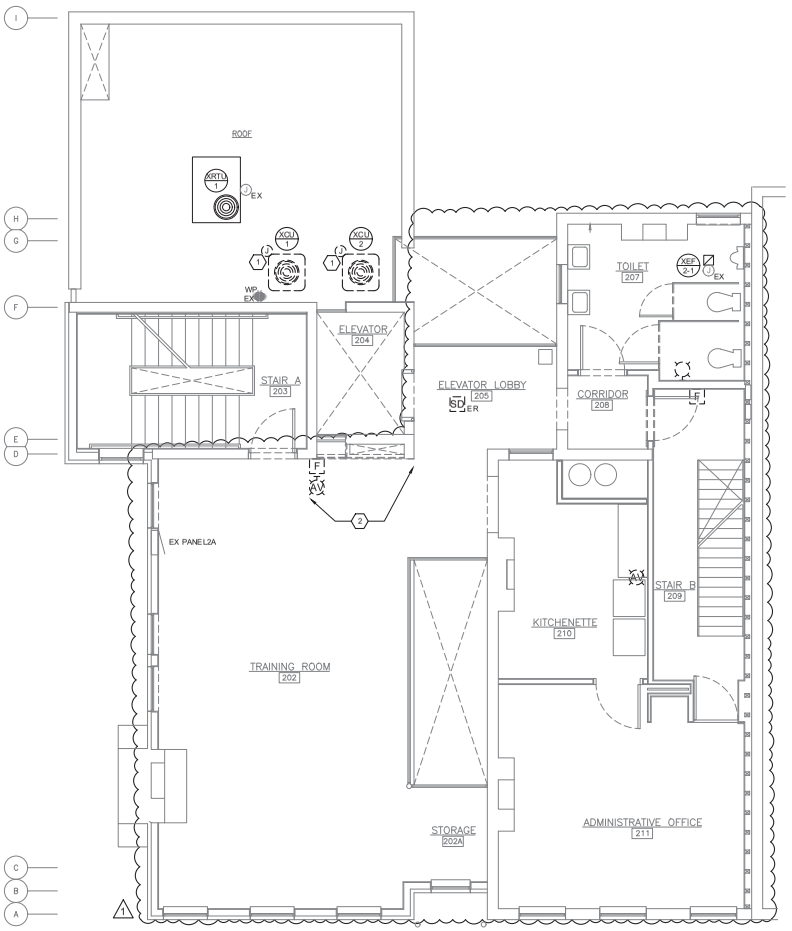
MEP Engineering
2 Allegheny Center, Nova Tower 2 - Suite 1901 - Pittsburgh, PA 15212
ASE JOB #2041090




1 SECOND FLOOR ELECTRICAL DEMOLITION PLAN
E-102 1/4" = 1'-0"

ALTERNATE:

CONTRACTOR SHALL PRICE SEPARATELY ALL WORK, INCLUSIVE OF ALL LABOR, MATERIALS, TAX, OVERHEAD AND PROFIT, ASSOCIATED WITH THE DEMOLITION OF THE EXISTING LIGHTING AND LIGHTING CONTROLS. ALL WORK ASSOCIATED WITH THE REPLACEMENT OF EXISTING FIXTURES SHALL BE INCLUDED IN THE DEDUCT ALTERNATE INCLUDING BUT NOT LIMITED TO FIXTURES, SWITCHES, WIRING, CONTROLS, CONTROL PANELS, PROGRAMMING, GENERAL CEILING AND WALL PATCHING. DO NOT INCLUDE IN THE DEDUCT ANY WORK ASSOCIATED WITH SALVAGING AND REINSTALLING EXISTING DEVICES TO ALLOW FOR THE NEW MECHANICAL CHASE.

ELECTRICAL DEMOLITION GENERAL NOTES:

1. ELECTRICAL DISTRIBUTION EQUIPMENT IS EXISTING TO REMAIN, UNLESS OTHERWISE NOTED.
2. FIXTURES AND DEVICES NOTED WITH "EX" ARE EXISTING TO REMAIN. MAINTAIN EXISTING CIRCUITRY UNLESS OTHERWISE NOTED ON NEW WORK PLANS.
3. ALL HOLES IN WALLS, COLUMN ENCLOSURES, CEILINGS AND FLOORS FROM CONDUIT PENETRATIONS, JUNCTION BOXES OR WIRING DEVICES SHALL BE PATCHED AND PAINTED PER THE ARCHITECT.
4. ALL DEVICES ON WALLS THAT ARE SCHEDULED FOR DEMOLITION, WHETHER REPRESENTED ON THIS PLAN OR NOT, SHALL BE DISCONNECTED AND REMOVED. INTERCEPT AND EXTEND CIRCUITS AS REQUIRED TO MAINTAIN CONTINUITY OF POWER TO EXISTING DEVICES.
5. NOT ALL DEVICES ON WALLS THAT ARE SCHEDULED AS EXISTING TO REMAIN ARE REPRESENTED ON THIS PLAN. ELECTRICAL CONTRACTOR SHALL FIELD VERIFY AND CONSULT WITH ARCHITECT AND BUILDING OWNER ABOUT WHETHER DEVICE SHOULD BE REMOVED OR NOT.
6. ALL EXISTING LIGHTING FIXTURES, EMERGENCY BATTERY HEADS, EMERGENCY LIGHTING INVERTERS, EXIT SIGNS AND ASSOCIATED CONTROL DEVICES SHALL BE DEMOLISHED, UNLESS OTHERWISE NOTED. THE MAJORITY OF LIGHTING EQUIPMENT IS NOT REPRESENTED ON THIS PLAN. ELECTRICAL CONTRACTOR SHALL FIELD SURVEY TO UNDERSTAND THE DEMOLITION SCOPE. REFER TO ALTERNATE NOTE ON THIS SHEET FOR MORE INFORMATION.
7. DISCONNECT AND REMOVE THE EXISTING FIRE ALARM SYSTEM, INCLUDING HEAD-END EQUIPMENT, POWER SUPPLIES, INITIATING AND NOTIFICATION DEVICES, AND ASSOCIATED BRANCH CIRCUITRY. MAINTAIN EXISTING CONDUIT AND BACKBOXES FOR REUSE WHERE INFRASTRUCTURE CAN BE REUSED FOR NEW DEVICES. REFER TO NEW WORK PLANS FOR MORE INFORMATION.

ELECTRICAL DEMOLITION KEY NOTES:

1. DEMOLISH ELECTRICAL CONNECTION TO EXISTING CONDENSING UNIT BACK TO SOURCE. DEMOLISH ANY AND ALL ASSOCIATED CONDUIT, WIRING, AND DISCONNECTS, ETC.
2. DISCONNECT AND REMOVE ALL DEVICES THAT CONFLICT WITH THE NEW MECHANICAL CHASE. CONFIRM LOCATION OF NEW CHASE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS. COORDINATE WITH ARCHITECT WHICH DEVICES SHALL BE SALVAGED FOR REINSTALLATION AND WHICH DEVICES SHALL BE DEMOLISHED. REFER TO NEW WORK PLANS FOR MORE INFORMATION.

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MEP Engineering
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ASE JOB #2041090

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ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE.

REVISIONS

| | |
|---|---|
| 1 | COMPLETE FIRE ALARM REPLACEMENT PER T.O. #147 |

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER

PROPERTY REHABILITATION FOR:

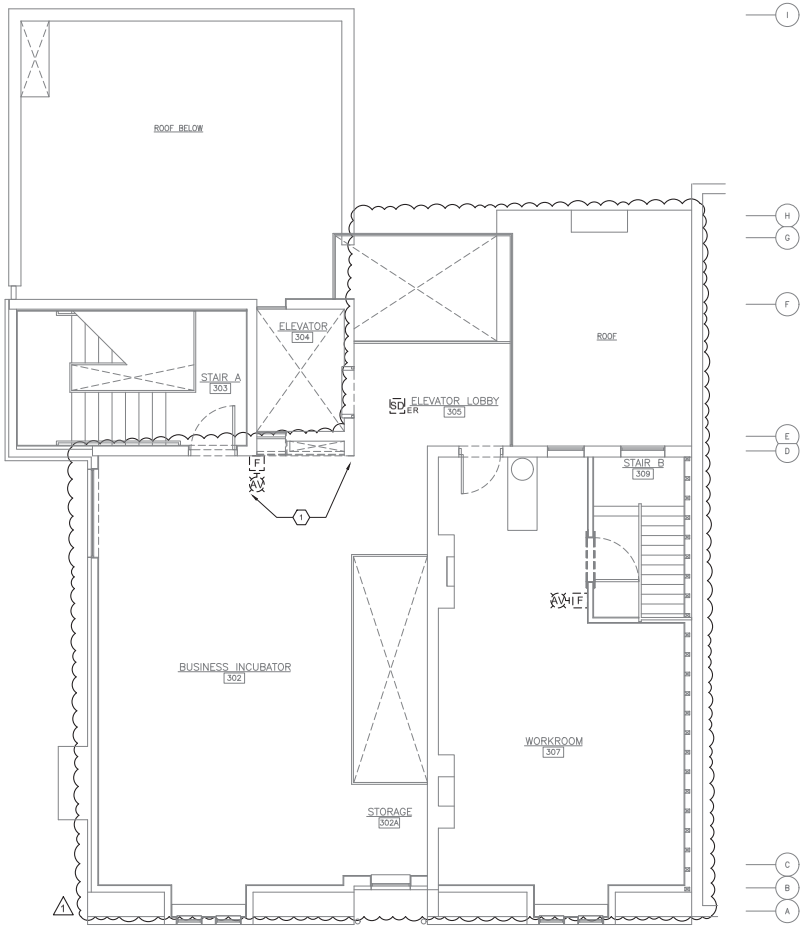
# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
SECOND FLOOR ELECTRICAL DEMOLITION PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-102 |
| ISSUE DATE 07/17/2024 | | |




1 THIRD FLOOR ELECTRICAL DEMOLITION PLAN
E-103 1/4" = 1'-0"

ELECTRICAL DEMOLITION GENERAL NOTES:

1. ELECTRICAL DISTRIBUTION EQUIPMENT IS EXISTING TO REMAIN, UNLESS OTHERWISE NOTED.
2. FIXTURES AND DEVICES NOTED WITH "EX" ARE EXISTING TO REMAIN. MAINTAIN EXISTING CIRCUITRY UNLESS OTHERWISE NOTED ON NEW WORK PLANS.
3. ALL HOLES IN WALLS, COLUMN ENCLOSURES, CEILINGS AND FLOORS FROM CONDUIT PENETRATIONS, JUNCTION BOXES OR WIRING DEVICES SHALL BE PATCHED AND PAINTED PER THE ARCHITECT.
4. ALL DEVICES ON WALLS THAT ARE SCHEDULED FOR DEMOLITION, WHETHER REPRESENTED ON THIS PLAN OR NOT, SHALL BE DISCONNECTED AND REMOVED. INTERCEPT AND EXTEND CIRCUITS AS REQUIRED TO MAINTAIN CONTINUITY OF POWER TO EXISTING DEVICES.
5. NOT ALL DEVICES ON WALLS THAT ARE SCHEDULED AS EXISTING TO REMAIN ARE REPRESENTED ON THIS PLAN. ELECTRICAL CONTRACTOR SHALL FIELD VERIFY AND CONSULT WITH ARCHITECT AND BUILDING OWNER ABOUT WHETHER DEVICE SHOULD BE REMOVED OR NOT.
6. ALL EXISTING LIGHTING FIXTURES, EMERGENCY BATTERY HEADS, EMERGENCY LIGHTING INVERTERS, EXIT SIGNS AND ASSOCIATED CONTROL DEVICES SHALL BE DEMOLISHED, UNLESS OTHERWISE NOTED. THE MAJORITY OF LIGHTING EQUIPMENT IS NOT REPRESENTED ON THIS PLAN. ELECTRICAL CONTRACTOR SHALL FIELD SURVEY TO UNDERSTAND THE DEMOLITION SCOPE. REFER TO ALTERNATE NOTE ON THIS SHEET FOR MORE INFORMATION.
7. DISCONNECT AND REMOVE THE EXISTING FIRE ALARM SYSTEM, INCLUDING HEAD-END EQUIPMENT, POWER SUPPLIES, INITIATING AND NOTIFICATION DEVICES, AND ASSOCIATED BRANCH CIRCUITRY. MAINTAIN EXISTING CONDUIT AND BACKBOXES FOR REUSE WHERE INFRASTRUCTURE CAN BE REUSED FOR NEW DEVICES. REFER TO NEW WORK PLANS FOR MORE INFORMATION.

ELECTRICAL DEMOLITION KEY NOTES: (#)

1. DISCONNECT AND REMOVE ALL DEVICES THAT CONFLICT WITH THE NEW MECHANICAL CHASE. CONFIRM LOCATION OF NEW CHASE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS. COORDINATE WITH ARCHITECT WHICH DEVICES SHALL BE SALVAGED FOR REINSTALLATION AND WHICH DEVICES SHALL BE DEMOLISHED. REFER TO NEW WORK PLANS FOR MORE INFORMATION.

ALTERNATE:

CONTRACTOR SHALL PRICE SEPARATELY ALL WORK, INCLUSIVE OF ALL LABOR, MATERIALS, TAX, OVERHEAD AND PROFIT, ASSOCIATED WITH THE DEMOLITION OF THE EXISTING LIGHTING AND LIGHTING CONTROLS. ALL WORK ASSOCIATED WITH THE REPLACEMENT OF EXISTING FIXTURES SHALL BE INCLUDED IN THE DEDUCT ALTERNATE INCLUDING BUT NOT LIMITED TO FIXTURES, SWITCHES, WIRING, CONTROLS, CONTROL PANELS, PROGRAMMING, GENERAL CEILING AND WALL PATCHING. DO NOT INCLUDE IN THE DEDUCT ANY WORK ASSOCIATED WITH SALVAGING AND REINSTALLING EXISTING DEVICES TO ALLOW FOR THE NEW MECHANICAL CHASE.

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MEP Engineering
2 Allegheny Center, Nova Tower 2 - Suite 1001 - Pittsburgh, PA 15212
ASE JOB #2041090

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ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE.

REVISIONS

| | |
|---|---|
| 1 | COMPLETE FIRE ALARM REPLACEMENT PER T.O. #147 |

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER

PROPERTY REHABILITATION FOR:

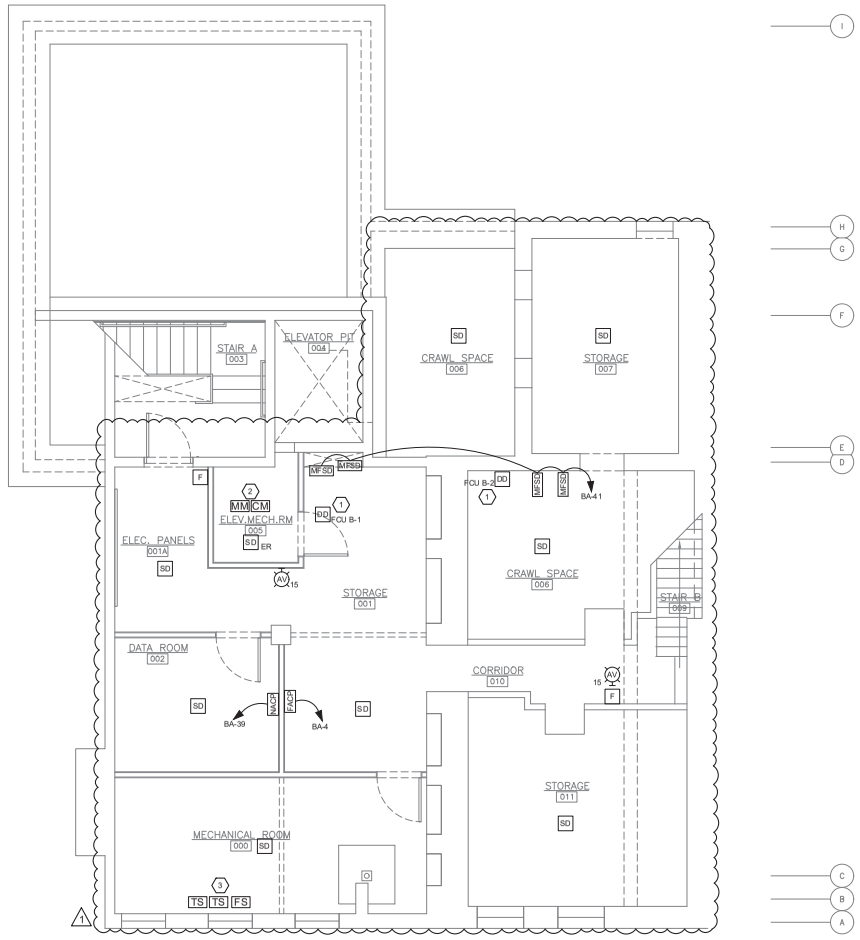
# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
THIRD FLOOR ELECTRICAL DEMOLITION PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | △ | E-103 |
| ISSUE DATE 07/17/2024 | | |




1 BASEMENT FIRE ALARM PLAN
E-400 1/4" = 1'-0"

1

FIRE ALARM GENERAL NOTES:

1. REFER TO FIRE ALARM RISER DIAGRAM 1/E-601 FOR GENERAL FIRE ALARM SYSTEM NOTES.
2. FIRE STOP ALL FIRE RATED FLOORS, CEILINGS, AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
3. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL DRAWINGS.
4. WHERE EXPOSED, BRANCH CIRCUITS SHALL BE RUN IN EMT CONDUIT ROUTED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE. WHERE CONCEALED WITHIN WALLS OR ABOVE CEILING, MC CABLE IS PERMISSIBLE. EXPOSED CONDUIT SHALL BE PAINTED PER THE ARCHITECTURAL DRAWINGS.
5. THE COLOR OF FIRE ALARM NOTIFICATION DEVICES SHALL BE VERIFIED WITH ARCHITECT PRIOR TO PROCUREMENT.
6. THE EXACT LOCATION OF ALL DEVICES AND ASSOCIATED EQUIPMENT SHALL BE LOCATED PER NFPA, ADA, AND ALL OTHER CODES HAVING JURISDICTION.
7. REUSE EXISTING CONDUIT AND BACKBOXES MAINTAINED DURING DEMOLITION WHERE POSSIBLE FOR NEW DEVICES

FIRE ALARM KEY NOTES: (#)

1. DUCT DETECTOR(S) SHALL BE FURNISHED BY ELECTRICAL CONTRACTOR, INSTALLED BY DIVISION 23, AND WIRED BY EC. LOCATE REMOTE TEST STATION IN BACK OF HOUSE SPACE OR FLUSH IN ACT CEILING, WHERE APPROVED BY OWNER.
2. PROVIDE THE QUANTITY OF ADDRESSABLE FIRE ALARM SYSTEM CONTROL AND MONITOR MODULES REQUIRED TO FULLY TIE THE ELEVATOR CONTROLS INTO THE FIRE ALARM SYSTEM PER CODE AND PER THE ELEVATOR MANUFACTURER'S SPECIFICATIONS.
3. COORDINATE THE EXACT QUANTITY OF TAMPER, FLOW, AND PRESSURE SWITCH CONNECTIONS, AS APPLICABLE, WITH DIVISION 21 PRIOR TO PROCUREMENT.

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REVISIONS

1 COMPLETE FIRE ALARM REPLACEMENT PER T.O. #147

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
BASEMENT FIRE ALARM PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-400 |
| ISSUE DATE 07/17/2024 | | |

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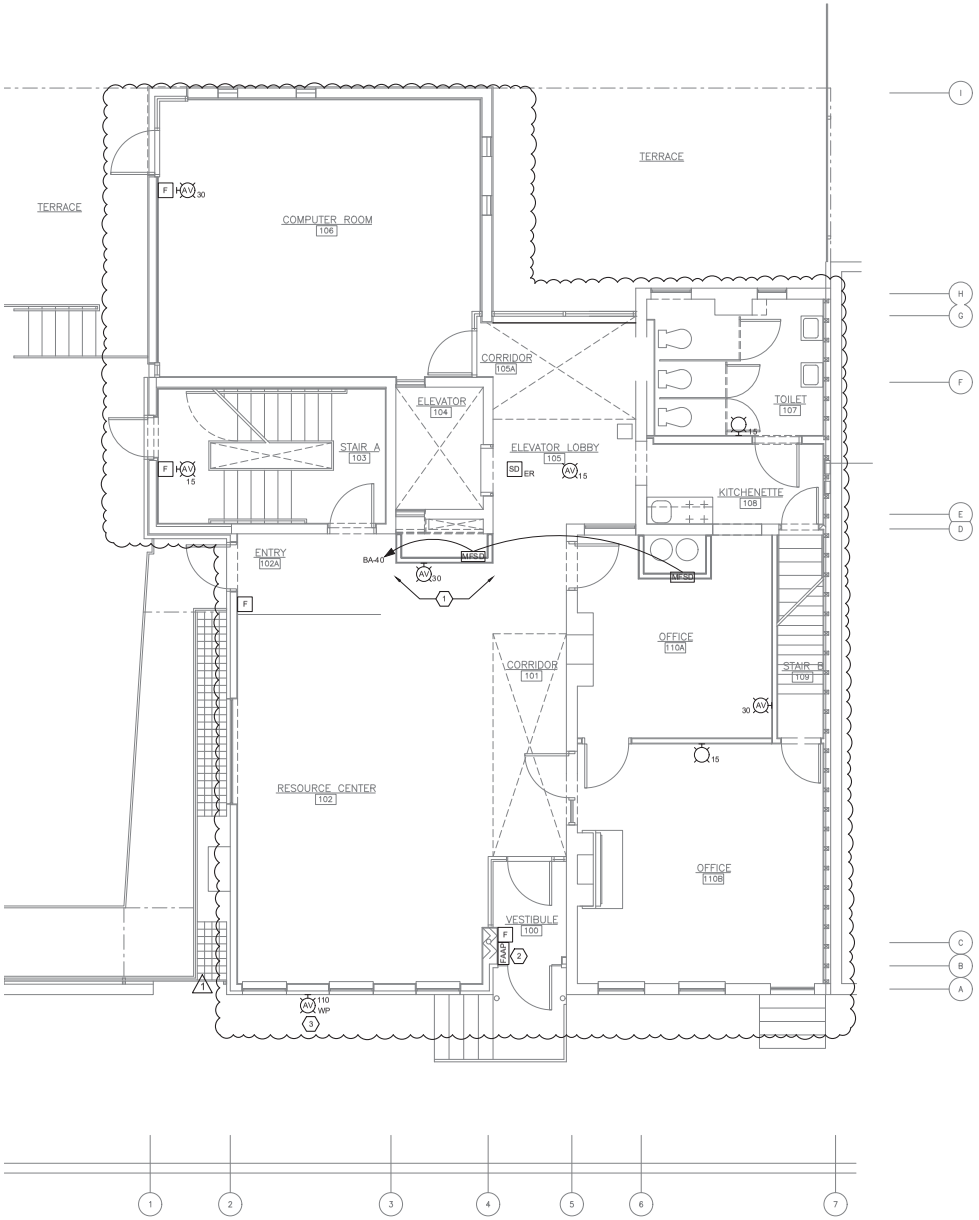
MEP Engineering
2 Allegheny Center, Nova Tower 2 - Suite 1001 - Pittsburgh, PA 15212
ASE JOB #2041090




1 E-401 FIRST FLOOR FIRE ALARM PLAN
1/4" = 1'-0"

1

FIRE ALARM GENERAL NOTES:

1. REFER TO FIRE ALARM RISER DIAGRAM 1/E-601 FOR GENERAL FIRE ALARM SYSTEM NOTES.
2. FIRE STOP ALL FIRE RATED FLOORS, CEILINGS, AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
3. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL DRAWINGS.
4. WHERE EXPOSED, BRANCH CIRCUITS SHALL BE RUN IN EMT CONDUIT ROUTED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE. WHERE CONCEALED WITHIN WALLS OR ABOVE CEILING, MC CABLE IS PERMISSIBLE. EXPOSED CONDUIT SHALL BE PAINTED PER THE ARCHITECTURAL DRAWINGS.
5. THE COLOR OF FIRE ALARM NOTIFICATION DEVICES SHALL BE VERIFIED WITH ARCHITECT PRIOR TO PROCUREMENT.
6. THE EXACT LOCATION OF ALL DEVICES AND ASSOCIATED EQUIPMENT SHALL BE LOCATED PER NFPA, ADA, AND ALL OTHER CODES HAVING JURISDICTION.
7. REUSE EXISTING CONDUIT AND BACKBOXES MAINTAINED DURING DEMOLITION WHERE POSSIBLE FOR NEW DEVICES

FIRE ALARM KEY NOTES: (#)

1. REINSTALL DEVICES ON THIS WALL THAT WERE SALVAGED THROUGH DEMOLITION AND CONFLICTED WITH THE NEW MECHANICAL CHASE. CONFIRM LOCATION OF NEW CHASE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS. COORDINATE WITH ARCHITECT WHICH DEVICES SHALL BE REINSTALLED AND WHICH DEVICES SHALL BE DEMOLISHED.
2. FIRE ALARM ANNUNCIATOR PANEL (FAAP) SHALL BE LOCATED AT THE PRIMARY FIRE DEPARTMENT ENTRANCE. LOCATION SHALL BE APPROVED BY AHJ PRIOR TO ROUGH-IN.
3. PROVIDE WEATHERPROOF FIRE ALARM NOTIFICATION DEVICE OVER THE FIRE DEPARTMENT CONNECTION. WHERE REQUIRED BY THE LOCAL JURISDICTION, ALSO PROVIDE A SPRINKLER BELL. COORDINATE EXACT LOCATION WITH DIVISION 21.

FOR CONSTRUCTION

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ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE.

REVISIONS

| | |
|---|---|
| 1 | COMPLETE FIRE ALARM REPLACEMENT PER T.O. #147 |

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
FIRST FLOOR FIRE ALARM PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-401 |
| ISSUE DATE 07/17/2024 | | |

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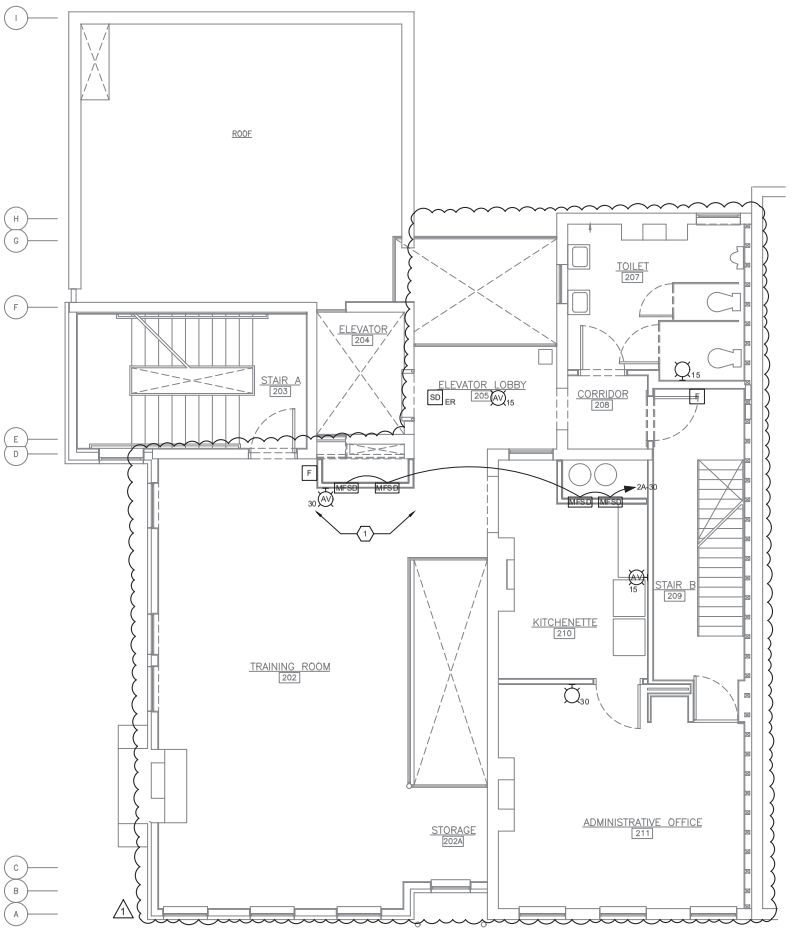
MEP Engineering
2 Allegheny Center, Nova Tower 2 - Suite 1001 - Pittsburgh, PA 15212
ASE JOB #2041090




1 SECOND FLOOR FIRE ALARM PLAN
E-402 1/4" = 1'-0"

1

FIRE ALARM GENERAL NOTES:

1. REFER TO FIRE ALARM RISER DIAGRAM 1/E-601 FOR GENERAL FIRE ALARM SYSTEM NOTES.
2. FIRE STOP ALL FIRE RATED FLOORS, CEILINGS, AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
3. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL DRAWINGS.
4. WHERE EXPOSED, BRANCH CIRCUITS SHALL BE RUN IN EMT CONDUIT ROUTED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE. WHERE CONCEALED WITHIN WALLS OR ABOVE CEILING, MC CABLE IS PERMISSIBLE. EXPOSED CONDUIT SHALL BE PAINTED PER THE ARCHITECTURAL DRAWINGS.
5. THE COLOR OF FIRE ALARM NOTIFICATION DEVICES SHALL BE VERIFIED WITH ARCHITECT PRIOR TO PROCUREMENT.
6. THE EXACT LOCATION OF ALL DEVICES AND ASSOCIATED EQUIPMENT SHALL BE LOCATED PER NFPA, ADA, AND ALL OTHER CODES HAVING JURISDICTION.
7. REUSE EXISTING CONDUIT AND BACKBOXES MAINTAINED DURING DEMOLITION WHERE POSSIBLE FOR NEW DEVICES

FIRE ALARM KEY NOTES: (W)

1. REINSTALL DEVICES ON THIS WALL THAT WERE SALVAGED THROUGH DEMOLITION AND CONFLICTED WITH THE NEW MECHANICAL CHASE. CONFIRM LOCATION OF NEW CHASE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS. COORDINATE WITH ARCHITECT WHICH DEVICES SHALL BE REINSTALLED AND WHICH DEVICES SHALL BE DEMOLISHED.

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REVISIONS

1 COMPLETE FIRE ALARM REPLACEMENT PER T.O. #147

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE E-036572 ENGINEER

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
SECOND FLOOR FIRE ALARM PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-402 |
| ISSUE DATE 07/17/2024 | | |

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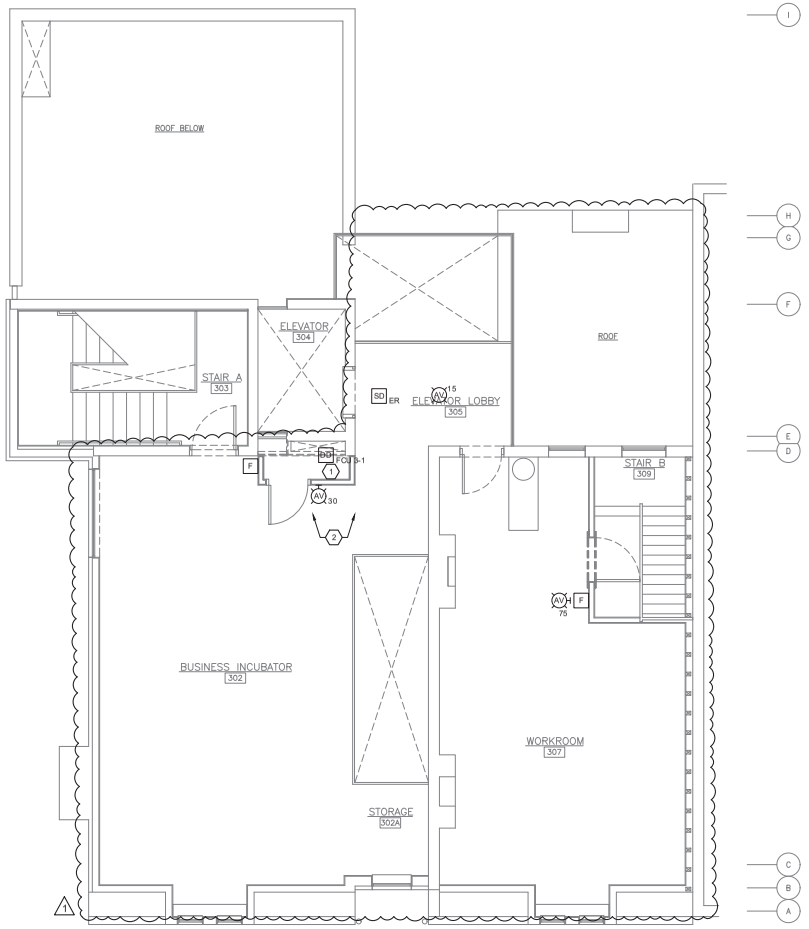


1 FIRE ALARM GENERAL NOTES:

1. REFER TO FIRE ALARM RISER DIAGRAM 1/E-601 FOR GENERAL FIRE ALARM SYSTEM NOTES.
2. FIRE STOP ALL FIRE RATED FLOORS, CEILINGS, AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
3. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL DRAWINGS.
4. WHERE EXPOSED, BRANCH CIRCUITS SHALL BE RUN IN EMT CONDUIT ROUTED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE. WHERE CONCEALED WITHIN WALLS OR ABOVE CEILING, MC CABLE IS PERMISSIBLE. EXPOSED CONDUIT SHALL BE PAINTED PER THE ARCHITECTURAL DRAWINGS.
5. THE COLOR OF FIRE ALARM NOTIFICATION DEVICES SHALL BE VERIFIED WITH ARCHITECT PRIOR TO PROCUREMENT.
6. THE EXACT LOCATION OF ALL DEVICES AND ASSOCIATED EQUIPMENT SHALL BE LOCATED PER NFPA, ADA, AND ALL OTHER CODES HAVING JURISDICTION.
7. REUSE EXISTING CONDUIT AND BACKBOXES MAINTAINED DURING DEMOLITION WHERE POSSIBLE FOR NEW DEVICES

FIRE ALARM KEY NOTES: W

1. ELECTRICAL CONTRACTOR SHALL FURNISH DUCT DETECTOR, DIVISION 23 SHALL INSTALL AND ELECTRICAL CONTRACTOR SHALL PROVIDE FIRE ALARM SYSTEM CONNECTION.
2. REINSTALL DEVICES ON THIS WALL THAT WERE SALVAGED THROUGH DEMOLITION AND CONFLICTED WITH THE NEW MECHANICAL CHASE. CONFIRM LOCATION OF NEW CHASE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS. COORDINATE WITH ARCHITECT WHICH DEVICES SHALL BE REINSTALLED AND WHICH DEVICES SHALL BE DEMOLISHED.

1 THIRD FLOOR FIRE ALARM PLAN
E-403 1/4" = 1'-0"

Allen + Shariff
MEP Engineering
2 Allegheny Center, Nova Tower 2 - Suite 1901 - Pittsburgh, PA 15212
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REVISIONS

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|---|---|
| 1 | COMPLETE FIRE ALARM REPLACEMENT PER T.O. #147 |

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE

PROPERTY REHABILITATION FOR:

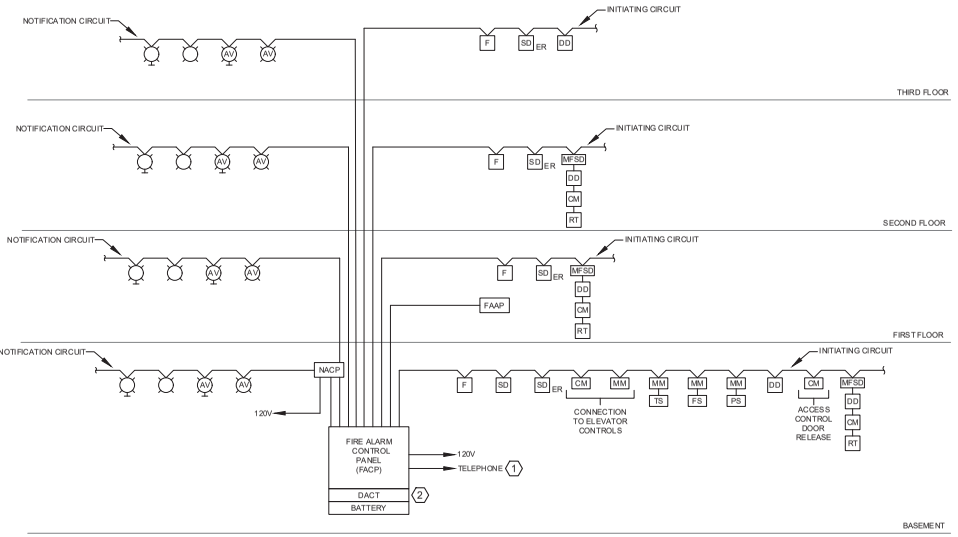
# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
THIRD FLOOR FIRE ALARM PLAN

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-403 |
| ISSUE DATE 07/17/2024 | | |




## 1 FIRE ALARM RISER DIAGRAM

E-601 NOT TO SCALE

### GENERAL FIRE ALARM SYSTEM NOTES:

1. REFER TO FLOOR PLAN FOR QUANTITY AND LOCATION OF SYSTEM COMPONENTS. EXACT ARRANGEMENT AND QUANTITY OF DEVICES SHALL BE INDICATED ON THE SHOP DRAWINGS. PROVIDE COMPLETE RISER DIAGRAM AS PART OF SHOP DRAWINGS.
2. VERIFY WIRING SIZES WITH THE FIRE ALARM SYSTEM MANUFACTURER AND INSTALL AS DIRECTED. DO NOT LOAD ANY CIRCUIT BEYOND 80% OF RATED CAPACITY. ADD CIRCUITS AS REQUIRED AND SUBMIT CALCULATIONS TO SUBSTANTIATE.
3. FIRE ALARM WIRING SHALL BE ROUTED VIA A SEPARATE CONDUIT SYSTEM (3/4" MINIMUM). FIRE RATED MC CABLE IS ACCEPTABLE WHERE CONCEALED. MC CABLE SHALL BE COLORED RED. PROVIDE CONDUIT SLEEVES WITH ESCUTCHEON PLATES WHERE PASSING THROUGH WALLS, FLOOR, OR CEILINGS. WIRING SHALL BE INSTALLED IN THE APPROPRIATE RACEWAY TO MEET THE SURVIVABILITY REQUIREMENTS OF THE CITY OF PITTSBURGH.
4. FIRE ALARM CIRCUITS SHALL BE CLEARLY IDENTIFIED AT TERMINAL AND JUNCTION LOCATIONS IN COMPLIANCE WITH 2017 NEC SECTION 760.30.
5. PROVIDE ADDITIONAL POWER SUPPLIES, BATTERIES, EXTENDER PANELS, ETC. AS REQUIRED FOR A COMPLETE AND OPERATIONAL SYSTEM. PROVIDE BATTERY CALCULATIONS, WIRING DIAGRAMS, EQUIPMENT CUTS, ETC. AS PART OF THE SHOP DRAWING SUBMITTAL.
6. CANDELA RATING SHALL BE PER 2016 NFPA-72 CHAPTER 18 REQUIREMENTS. ALL VISUAL AND AUDIO DEVICES SHALL BE SYNCHRONIZED.
7. AUDIBLE ALARM SYSTEM SOUND PRESSURE LEVELS SHALL COMPLY WITH 2018 IBC SECTION 907.5.2.1.
8. COORDINATE WITH DIVISION 23 TO PROVIDE DUCT DETECTORS WHERE REQUIRED FOR HVAC EQUIPMENT. COORDINATE LOCATION OF REMOTE TEST SWITCHES WITH OWNER PRIOR TO INSTALLATION. THESE SHALL BE LOCATED IN UTILITY OR BACK OF HOUSE SPACES.
9. COORDINATE THE EXACT QUANTITY OF TAMPER, FLOW, AND PRESSURE SWITCH CONNECTIONS, AS APPLICABLE, WITH DIVISION 21 PRIOR TO PROCUREMENT.
10. PROVIDE 120V CONNECTION, DUCT DETECTOR(S), ADDRESSABLE CONTROL MODULE, AND REMOTE TEST SWITCH FOR EACH FIRE SMOKE AND SMOKE DAMPER. COORDINATE QUANTITY AND LOCATION WITH DIVISION 23. COORDINATE LOCATION OF REMOTE TEST SWITCHES WITH OWNER PRIOR TO INSTALLATION. THESE SHALL BE LOCATED IN UTILITY OR BACK OF HOUSE SPACES.
11. PROVIDE ADDRESSABLE CONTROL MODULES TO INTERFACE WITH ALL ACCESS CONTROLLED DOORS AS REQUIRED BY CODE.
12. THE COMPLETED FIRE ALARM SYSTEM SHALL BE FULLY TESTED IN ACCORDANCE WITH NFPA-72 AND LOCAL FIRE DEPARTMENT REQUIREMENTS BY THE INSTALLER, IN THE PRESENCE OF THE OWNER'S REPRESENTATIVE AND THE LOCAL FIRE MARSHALL. UPON COMPLETION OF A SUCCESSFUL TEST, THE INSTALLER SHALL SO CERTIFY, IN WRITING, TO THE OWNER AND GENERAL CONTRACTOR.
13. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS, PRODUCTS, EXECUTION, AND INSTALLATION OF THE FIRE ALARM SYSTEM.

### KEY NOTES: (#)

1. IN ORDER TO PROVIDE DIAL OUT CAPABILITIES TO THE FIRE DEPARTMENT, TWO TRANSMISSION CHANNELS SHALL BE PROVIDED TO THE DACT WITHIN THE FIRE ALARM SYSTEM PER 2016 NFPA-72 SECTION 26.6.4.1.4. THE SYSTEM SHALL EMPLOY ONE PHONE LINE AND AN ADDITIONAL, APPROVED TRANSMISSION MEANS AS OUTLINED UNDER THAT CODE SECTION AND DEEMED AVAILABLE AT THE SITE. WHERE ONE OF THE ALTERNATE TRANSMISSION CHANNELS IS NOT AVAILABLE AT THE SITE AND WHERE THE AHJ APPROVES, A SECOND TELEPHONE LINE MAY BE USED IN LIEU OF THE ALTERNATE TECHNOLOGY. COORDINATE WITH OWNER TO DETERMINE IF THE DACT DIALS DIRECTLY TO FIRE DEPARTMENT OR TO THIRD PARTY 24/7 MONITORING SERVICE CONTRACTED BY OWNER.
2. NEW CELLULAR COMMUNICATOR MUST BE TELGUARD TG-7 LTE PER HACP SPECIFICATIONS. COORDINATE EXACT REQUIREMENTS WITH HACP PROJECT MANAGER PRIOR TO PURCHASE.

**FIRE ALARM PERMIT NOTE (CITY OF PITTSBURGH):**

THE E.C. BID SHALL INCLUDE THE COST FOR AN INDEPENDENT THIRD PARTY PROFESSIONAL ENGINEER TO SIGN, DATE, AND SEAL ALL FIRE ALARM DOCUMENTS REQUIRED FOR BUILDING PERMIT. THE FIRE ALARM DOCUMENTS INCLUDED WITH THE E-SERIES DRAWINGS ARE PROVIDED FOR FIRE ALARM DESIGN INTENT WITHIN THE CITY OF PITTSBURGH. THE CITY OF PITTSBURGH WILL REQUIRE SIGNED/SEALED MANUFACTURER SHOP DRAWINGS (BY THE INDEPENDENT THIRD PARTY) FOR PERMIT APPROVAL BEYOND THE DOCUMENTS CONTAINED IN THE E-SERIES DRAWINGS.

THE FIRE ALARM SHOP DRAWINGS SHALL INCLUDE AT A MINIMUM FIRE ALARM FLOOR PLANS AND A RISER DIAGRAM. EACH PLAN OR RISER SHALL INDICATE THE NUMBER AND TYPES OF FIRE ALARM DEVICES INSTALLED ON EACH CIRCUIT, DEVICE ADDRESSES, CONDUCTOR TYPES AND SIZES, FIRE ALARM ZONES, PRIMARY AND SECONDARY POWER SUPPLIES (AS NECESSARY), AND ALL NEW FIRE ALARM DEVICES AS ADDED TO EXISTING CIRCUITS. DOCUMENTS SHALL ALSO CONTAIN BATTERY AND VOLTAGE DROP CALCULATIONS.

Allen + Shariff
MEP Engineering
2 Allegheny Center, Nova Tower 2 - Suite 1001 - Pittsburgh, PA 15212
ASE JOB #2041090

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REVISIONS

| | |
|---|---|
| 1 | COMPLETE FIRE ALARM REPLACEMENT PER T.O. #147 |

COMMONWEALTH OF PENNSYLVANIA — REGISTERED PROFESSIONAL — DAVID C. PRICE — PRELIM

PROPERTY REHABILITATION FOR:

# HACP TASK ORDER #35 DEVELOPMENT & OPPORTUNITIES CENTER REHAB

1205 LIVERPOOL STREET
BUILDING #35
PITTSBURGH, PA 15233

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
FIRE ALARM RISER DIAGRAM

| COMM. NO. | REVISION NO. | DWG NO. |
|---|---|---|
| 2035 | 1 | E-601 |
| ISSUE DATE 07/17/2024 | | |