



ADDENDUM NUMBER 03
Monday January 07, 2019

PROJECT: USC Sumter – Science Building Renovations
GMC PROJECT NO. AGRE180004
USC PROJECT NO. H39-9520

This addendum forms a part of the Construction Documents and modifies the original Bidding Documents dated 11.20.18 as noted below. Acknowledge receipt of this addendum in the space provided on the Bid Form. Failure to do so may subject Bidder to disqualification.

GENERAL:

- A3G1 The Revised Bid due date of 1/9/19 at 2:00pm has been delayed. The new bid due date is **1/15/19 at 3:00pm**. The location remains the same as originally posted on the SE-310, USC Facilities 1300 Pickens Street, Columbia SC 29208, Conference Room 100C
- A3G2 We are re-issuing Addendum 01 due to omitted information. The attached Addendum 01 has the complete information as specification section 226813 was omitted.

SPECIFICATIONS:

No Specification Changes

DRAWINGS:

No Drawing Changes

COMMENTS / QUESTIONS:

No comment or questions are included

END OF ADDENDUM NUMBER 03



ADDENDUM NUMBER 01
Wednesday December 19, 2018

PROJECT: USC Sumter – Science Building Renovations
GMC PROJECT NO. AGRE180004
USC PROJECT NO. H39-9520

This addendum forms a part of the Construction Documents and modifies the original Bidding Documents dated 11.20.18 as noted below. Acknowledge receipt of this addendum in the space provided on the Bid Form. Failure to do so may subject Bidder to disqualification.

GENERAL:

- A1G1 Pre-Bid Conference sign in sheet listing the attendees is attached to this addendum.
- A1G2 The bill of materials dated 12.19.18 contained in this addendum submitted by Rose Talbert Paints are approved equals. All other substitution request have been denied, use the specified product.
- A1G3 The Limited Asbestos & Lead Paint Survey dated 03.26.18 is attached to this addendum.

SPECIFICATIONS:

- A1S1 Section 22 68 13 – Replace section in its entirety with attached section 22 68 13
- A1S2 Section 23 73 13 – Replace section in its entirety with attached section 23 73 13
- A1S3 Section 23 81 26 – Replace section in its entirety with attached section 23 81 26

DRAWINGS:

- A1D1 Sheet E1.01 – Replace sheet in its entirety and replace with attached Sheet E1.01
- A1D2 Sheet E6.02 – Replace sheet in its entirety and replace with attached Sheet E6.02
- A1D3 Sheet P2.01 – Replace sheet in its entirety and replace with attached Sheet P2.01

COMMENTS / QUESTIONS:

The following are comments & questions received for addendum #01:

1. Does the owner provide the DI water system? Or do we need to price a DI water system and if so what brand /type?
The DI water system shall be Owner Furnished Contractor Installed (OFICI)
2. Does the electrician provide the power stations? Or do we need to price and if so, are they pedestal

type single or double face?

The selected lab casework vendor shall provide double side double gang power stations. The electrician shall provide the outlets and wiring. The power stations shall be polished aluminum finish.

3. Are safety shower to be purchased and installed by the plumber?
Yes
4. Are the deck mounted eye washes to be purchased and installed by the plumber?
Yes
5. Elevation 8/A6.02 - Are both cabinets under each hood supposed to acid storage or general purpose?
They shall be general purpose storage
6. Elevation 2/A6.00 - Is the hood cabinet to be acid storage or general purpose?
It shall be general purpose storage.
7. Are locks required for lab casework? Locations?
Hasp lock hardware shall be furnished at the island drawers for use by students. Locks shall be furnished by students and are not in contract. No locks on any other casework.
8. Are marine edges required at the sinks?
No marine edges.

END OF ADDENDUM NUMBER 01

**University of South Carolina
Non Mandatory Pre Bid Sign In Sheet
Sumter, South Carolina**

Project Name: USC Sumter-Science Building Renovation
Project Number: H39-9520
Pre Bid Date & Time: December 11, 2018 10:30AM Administration Building, Bultman Conference Room

SWMBE Contractor Indicate Below	Name	Company Name	Address	Phone #	Email
S W M B E	Jonathan Houston	JFContractors	119 S. Aarvin Sumter SC 29150	803.464 0503	jhouston@jfcontractors.com
S W M B E	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX etc
S W M B E	Ben Edmunds	Blankenship	950 Trinity Rd Raleigh, NC		bwedmunds@aol.com
S W M B E	Mike McCulloch	Gillum & Assoc	Po Box 1607 Aiken SC 29802	803 648 2835	Pete @ gillum and Associates .com
S W M B E	Joe Roddey	LCK	1301 GEORGE SUITE 600 CT. 29201	803-401 4261	JROODEY@LCKCS.com
S W M B E	WES SPIRES	EMC			WES.SPIRES@EMCNETWORK.COM
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****By signing this sheet you agree to receive information electronically.

**University of South Carolina
Non Mandatory Pre Bid Sign In Sheet
Lancaster, SC**

Project Name: USC Sumter - Science Building Renovation
Project Number: H39-9520
Pre Bid Date & Time: Tuesday, December 11, 2018 10:30AM; Bultman Conference Room - 2nd Floor; USC Sumter

SWMBE Contractor Indicate Below	Name	Company Name	Address	Phone #	Email
S <u>W</u> M B E	Blake Berkley	Solid Structures	2548 Morningside Dr. West Columbia SC 29169	803 926-0298	bberkley@solidstructures.info
S W <u>M</u> B E	Gregory Doughton	Farmer Construction Electrical Division	Columbia, SC School House Rd	803 477 6056	greg@scelectrical.com
S W M B E	Derek Skipper	Thompson Turner	100 N Main Street Sumter	843.995.2442	dskipper@thompsonturner.com
S W M B E	DWAYNE HARDEE	HARDEE CONSTRUCTION	1254 Wilson Hwy Sumter SC	803 419-9297	DWAYNE HARDEE HARDEE CONSTRUCTION.COM
S W M B E	Parks Bunch	Boyer Construction	4900 Fort Jackson Blvd Columbia, SC 29209	803-940-3410	bids@boyerconstruction.net
S W M B E	VAN HAUSER	LCK	1301 GERVAIS ST. COLUMBIA, SC	803/351-5725	VHAUSER@LCKCS.COM
S W M B E	Michael Sonntag	USC S	208 N. Main Rd Sumter SC	803 468 4178	sonntagm@uscsumter.edu
S W M B E					
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****By signing this sheet you agree to receive information electronically.

**University of South Carolina
Non Mandatory Pre Bid Sign In Sheet
Lancaster, SC**

Project Name: USC Sumter - Science Building Renovation
Project Number: H39-9520
Pre Bid Date & Time: Tuesday, December 11, 2018 10:30AM; Bultman Conference Room - 2nd Floor; USC Sumter

SWMBE Contractor Indicate Below	Name	Company Name	Address	Phone #	Email
S W M B E	H. Gillens	Quintech Solutions	102 Sangasee Pt Ct 4, Sville SC	843 695 0170	HGillens@QuintechSolutionsInc. com
S W M B E	Kacy Gunter	FBi Construction	2240 N Douglas St Florence, SC 29501	843-618-2441	Kacy.Gunter@fbconstruction.com
S W M B E	Gregg Hartley	S.N.B construction	2125A Jody Rd Florence, SC 29504	(843) 332-0687	tommy.snbc@gmail.com
S W M B E	Otis Barrow	Tyler Construction Group	433 Rabon Rd Columbia SC	803 865-1404	bids@tyler-construction.com
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**University of South Carolina
Non Mandatory Pre Bid Sign In Sheet
Sumter, South Carolina**

Project Name: USC Sumter-Science Building Renovation
Project Number: H39-9520
Pre Bid Date & Time: December 11, 2018 10:30AM Administration Building, Bultman Conference Room

SWMBE Contractor Indicate Below	Name	Company Name	Address	Phone #	Email
S W M B E	Tommy Stabler	Dennis Corp	1900 Hugo St Columbia	803 518-9862	tstabler@denniscorp.com
S W M B E	MIKE AMMONS	Premier Constructors	682 DuVance Rd West Columbia	803 960-9478	MAMMONS@PREMIERCONSTRUCTORS.NET
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****By signing this sheet you agree to receive information electronically.

Limited Asbestos & Lead Based Paint Survey

USC Sumter – Science Building

200 Miller Road
Sumter, South Carolina



March 26, 2018

Prepared For: University of South Carolina
Department of Facilities, Business & Finance
1300 Pickens Street, Columbia, SC
ARM Project No. 09-781-18

Report Compiled By

Robbie Robertson

Robbie Robertson

South Carolina Consultant / Building Inspector License #01179

Report Reviewed By

Sid Havird

Sid Havird

South Carolina Consultant / Building Inspector License #00258

ARM ENVIRONMENTAL
SERVICES, INC.

1210 1st STREET SOUTH EXTENSION / COLUMBIA, SC 29209 / phone 803-783-3314 fax 803-783-2587

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EXECUTIVE SUMMARY

This executive summary is intended as an overview for the convenience of the reader. The report should be reviewed in its entirety prior to making any decisions regarding this project.

ARM Environmental Services, Inc. (ARM) has conducted an asbestos and lead-based paint (LBP) survey of the USC Sumter Science Building at 200 Miller Road in Sumter, South Carolina. The purpose of this survey was to sample and identify suspect asbestos-containing materials (ACM) and provide information regarding the identity, location, condition and approximate quantities of ACM in the interior building components and to characterize the condition of any materials found to contain Lead Based Paint.

The survey was performed on March 15, 2018, by a South Carolina Department of Health and Environmental Control (SCDHEC) licensed asbestos inspector, in accordance with the sampling protocols established in EPA 40 CFR 763 (Asbestos Hazard Emergency Response Act, AHERA) and the SCDHEC Regulation 61-86.1 Standards of Performance for Asbestos Projects. Twenty-four (24) bulk samples were collected from eight (8) homogeneous areas of suspect ACM.

Based on the results of laboratory analysis, the following material was confirmed to contain asbestos at concentrations greater than one percent (>1%).

- **Beige Vinyl Sheet Flooring with Mastic ~ 9,200 SF**

In the event of future disturbance of this material, there is a potential for asbestos fibers to be released. State and Federal regulations require the removal of asbestos-containing materials prior to any disturbance caused by renovation or demolition.

Please note, there were no roofing materials included in this survey. In the event that any suspect ACM, which was not addressed in this survey is encountered, the material/component should be presumed to contain asbestos until analysis can be conducted.

ARM personnel conducted a limited lead-based paint (LBP) survey of accessible building components at the USC Sumter Science building on March 15, 2018. The LBP survey was conducted using a Niton XL-309 X-Ray Fluorescence (XRF) Analyzer (Serial #17307) to measure the lead content of surface coatings on representative homogenous building components. Based on the XRF results, the following materials tested positive or are assumed positive for lead-based paint:

- **Red Metal Window Panels (Exterior)- Side A,C,D**
- **White Specked Ceramic Wall Tile (Interior, Hall- H101, H102) – Side A**
- **White Ceramic Wall Tile (Interior, Hall- H101, H102, H104) – Side B,C,D**
- **Yellow Ceramic Wall Tile (Interior, Hall- H101, H102, H104) – Side B,C,D**
- **Black Ceramic Wall Tile (Interior, Hall- H101, H102, H104) – Side B,C,D**

1.0 INTRODUCTION

ARM conducted a limited asbestos and lead-based paint survey of building materials at the USC Sumter Science building located on 200 Miller Road in Sumter, South Carolina. The survey was conducted on March 15, 2018 by a South Carolina Department of Health and Environmental Control (SCDHEC) licensed building inspector.

We understand the asbestos survey was requested due to the planned renovation or demolition of the building. Environmental Protection Agency (EPA) regulation 40 CFR 61, Subpart M, National Emission Standards for Hazardous Air Pollutants (NESHAP), prohibits the release of asbestos fibers to the atmosphere during renovation/demolition activities. NESHAP requires that potentially regulated asbestos-containing building materials be identified, classified and quantified prior to planned disturbances or demolition activities. SCDHEC defines a renovation as, "altering a facility or one or more facility components in any way, including the stripping or removal of Regulated ACM from any facility component." A demolition is defined as, "Wrecking or taking out any load supporting structural member of a facility together with any related handling operations, the burning of any facility, or moving of a structure."

Suspect ACM was sampled in general accordance with the sampling protocols outlined in EPA Regulation 40 CFR 763 Subpart E763.86 (Asbestos Hazard Emergency Response Act, AHERA) and SCDHEC Regulation 61-86.1 Standards of Performance for Asbestos Projects. Interior and exterior building components were surveyed and homogeneous areas of suspect ACM were visually identified and documented. Although reasonable effort was made to survey accessible suspect materials, additional suspect but un-sampled materials could be located in walls, in voids or in other concealed areas. Samples were delivered to an accredited laboratory for analysis by Polarized Light Microscopy (PLM) and Transmission Electron Microscopy (TEM), as required.

2.0 BUILDING DESCRIPTION

The subject building is used as an educational building for college students. The building is a single-story brick structure, approximately 9,200 square feet in size, and is built on a concrete slab foundation.

One-Story Building

Interior Materials - consist of block walls and dropped ceiling tiles. The floors are either vinyl sheet flooring or carpet over a concrete slab foundation.

Exterior Materials – consist of a brick exterior with metal windows and doors. The roof has a flat built-up commercial roof.

3.0 ASBESTOS SURVEY

The asbestos survey was conducted by Robbie Robertson; SCDHEC licensed Asbestos Building Inspector (License No. BI-01179, exp. 11/16/18). Mr. Robertson's Inspectors License is included as Appendix E. The survey was conducted on March 15, 2018, in

general accordance with the sampling protocols established by EPA Regulation 40 CFR 763 Subpart E 763.86, AHERA and SCDHEC R61-86.1.

A summary of survey activities is provided below. Site photographs taken during the survey are included as Appendix G.

3.1 Regulatory Overview

An ACM is defined by SCDHEC as any material containing asbestos of any type in an amount greater than one percent (1%). The asbestos NESHAP (40 CFR Part 61, Subpart M) regulates asbestos fiber emissions and asbestos waste disposal practices. It also requires the identification and classification of existing building materials prior to demolition or renovation activity. Under NESHAP, asbestos-containing building materials are classified as either friable, Category I non-friable or Category II non-friable ACM. Friable materials are those that, when dry, may be crumbled, pulverized or reduced to powder by hand pressure. Category I non friable ACM includes packing materials, gaskets, resilient floor coverings and asphalt roofing products containing more than 1 percent (%) asbestos. Category II non-friable ACM are non-friable materials other than Category I materials that contain more than 1% asbestos.

Friable ACM, Category I and Category II non-friable ACM which is in poor condition and has become friable or which will be subjected to drilling, sanding, grinding, cutting or abrading and which could be crushed or pulverized during anticipated renovation/demolition activities are considered regulated ACM (RACM). RACM must be removed prior to renovation or demolition activities.

In the state of South Carolina, asbestos activities are regulated by the SCDHEC under the SCDHEC Regulation 61-86.1 Standards of Performance for Asbestos Projects. SCDHEC requires that any asbestos-related activity conducted in a public building be performed by personnel licensed by the SCDHEC. The owner or operator must provide SCDHEC with written notification of planned abatement and removal activities prior to the commencement of those activities. SCDHEC typically requires 4 day notification for non-friable projects and 10 day notification for RACM projects. Asbestos abatement must be performed by SCDHEC-licensed asbestos abatement contractors. A SCDHEC-licensed Project Designer shall prepare a written abatement design for each abatement renovation project involving the removal of greater than 3,000 square, 1,500 linear, or 656 cubic feet of RACM. Third-party air monitoring is typically required during the abatement of friable (regulated) ACM. The SCDHEC asbestos regulations can be found at http://www.scdhec.gov/environment/baq/Asbestos/asbestos_regulations.asp. The Occupational Safety and Health Administration (OSHA) Asbestos Standard for Construction Industry (29 CFR 1926.1101) regulates workplace exposure to asbestos. The OSHA standard requires that employee exposure to airborne asbestos fibers be maintained below 0.1 asbestos fibers per cubic centimeter of air (0.1 f/cc). The OSHA standard classifies construction and maintenance activities, which could disturb ACM, and specifies work practices and precautions which employers must follow when engaging in each class of regulated work. A full copy of the OSHA asbestos standard for general industry may be found at OSHA's website (www.osha.gov) and should be referenced for specific information.

3.2 Visual Assessment

Our survey activities began with a visual observation of the interior of the building to identify apparent homogeneous areas of suspect ACM. A homogeneous area consists of building materials, which appear similar throughout in terms of color, texture and date of application. Building materials which were not identified as concrete, glass, wood, masonry, metal or rubber were considered suspect ACM.

ARM lifted floor coverings in several areas, where possible, and did not observe additional flooring layers unless mentioned in this report; however, as ARM could not assess beneath all floor covering in all areas, there may be isolated areas of additional suspect material present beneath existing flooring.

3.3 Physical Assessment

A physical assessment of each homogeneous area of suspect ACM was conducted to assess the friability and condition of the materials. A friable material is defined by the EPA as a material, which can be crumbled, pulverized or reduced to powder by hand pressure when dry. Friability was assessed by physically touching suspect materials.

3.4 Sample Collection

Based on the results of the visual sampling, bulk samples of suspect ACM were collected in general accordance with AHERA sample collection protocols. Random samples of suspect materials were collected in each homogeneous area. Bulk samples were collected using wet methods as applicable to reduce the potential for fiber release. Samples were placed in sealable containers and labeled with unique sample numbers using an indelible marker.

The selection of sample locations and frequency of sampling was based on ARM's observations and the assumption that like materials in the same area are homogeneous in content.

Twenty-four (24) bulk samples were collected from eight (8) homogeneous areas of suspect ACM in the building. Sample locations are depicted on the Figure 1 Site Plan, which is included as Appendix A.

3.5 Sample Analysis

Bulk samples were submitted under chain of custody to EMSL Analytical Inc. (EMSL) of Pineville, North Carolina for analysis by Polarized Light Microscopy (PLM) with dispersion staining techniques per EPA EPA/600/R-93/116. The percentage of asbestos, where applicable, was determined by microscopical visual estimation. EMSL is accredited under the National Voluntary Laboratory Accreditation Program NVLAP (#200841-0). If applicable, layered analysis of samples was conducted by the lab to separate the tile and mastic, plaster base coat and finish, layers of vinyl sheet flooring, cove base & mastic, and the drywall and joint compound.

Per the SCDHEC Regulation 61-86.1 Standards of Performance for Asbestos Projects, negative results for non-friable organically bound (NOB) materials such as flooring and

roofing were verified with at least one Transmission Electron Microscopy (TEM) analysis. The additional analysis was performed by TEM in accordance with EPA/600/R-93/116 Section 2.5.5.1.

Asbestos Sample Summary Tables of the suspect ACM samples collected during this assessment are included as Appendix B. The complete laboratory analytical results are included as Appendix C.

3.6 Finding and Recommendations

Based on the results of laboratory analyses, the following material tested positive for asbestos at a concentration >1%:

Regulated Asbestos Containing Materials (RACM) – No Regulated Asbestos Containing Materials were identified during this survey.

Non-Friable Category I Asbestos Containing Materials – This material has been identified as non-friable Category I ACM.

- **Beige Vinyl Sheet Flooring with Mastic ~ 9,200 SF**

In its present condition, and in the absence of future disturbance, there is a low potential for significant concentrations of asbestos fibers to be released into the air from this non-friable Category I asbestos material. It is recommended that a licensed asbestos abatement contractor conduct or supervise the removal and proper disposal of this material prior to demolition of this building.

Non-Friable Category II Asbestos Containing Materials – (No Category II non-friable ACBM was identified during this asbestos survey.)

Please note, there were no roofing materials included in this survey. In the event that any suspect ACM, which was not addressed in this survey is encountered, the material/component should be presumed to contain asbestos until analysis can be conducted.

4.0 LEAD BASED PAINT SURVEY

4.1 Scope of the Limited Lead-Based Paint Survey

ARM personnel conducted a lead-based paint (LBP) survey of accessible building components on March 15, 2018. The LBP survey was conducted using a Niton XL-309 X-Ray Fluorescence (XRF) Analyzer (Serial #17307) to measure the lead content of surface coatings on representative homogenous building components. A homogenous building component is a building material that is uniform in paint color, texture, and appears identical in every respect.

The sample methodology for this survey was limited in scope and generally based on the 1997 revised United States Department of Housing and Urban Development (HUD) guidelines.

HUD and EPA guidelines define lead-based paint as any paint with equal to or greater than 1.0 milligram of lead per square centimeter of painted surface (mg/cm²) when measured by X-ray Fluorescence.

The South Carolina Department of Health and Environmental Control (SCDHEC) defines lead based paint as any paint that is equal to or greater than 0.7 mg/cm² when measured with an XRF. In this survey, the regulatory limit (0.7 mg/cm²) established by SCDHEC was used when measured by the XRF since the structure is slated for renovation or demolition. All waste debris coated with lead-based paint equal to or greater than 0.7mg/cm² must be disposed of in an approved Class Two (C&D) or Class Three (MSWLF) landfill or approved metal recycler. Any building components coated with paint containing lead should be handled in a manner that minimizes the exposure of building occupants or maintenance / renovation / demolition personnel to airborne lead contaminants. Interior room equivalents are identifiable parts of a building (such as a room or a hallway) and are generally listed by number, starting with the first room of the main entrance and proceeding clockwise around the building. The main entrance of the structure was considered to be the front entrance and all walls or building components are labeled A, B, C, or D with A facing the entrance of the building and proceeding clockwise. Floor plans indicating the locations of the building components tested for LBP in the subject building are included in Appendix A of this report.

4.2 Summary of Lead-Based Paint Results

Coated surfaces on the referenced building were analyzed with the XRF. The following building components listed in Table 1 tested positive or are assumed positive for lead-based paint:

Table 1: Lead-Based Paint Material Summary

Material Description	Material Location	Color	Material Condition	XRF Results mg/cm²
Red Metal Window Panels	Exterior – Side A	Red	Intact	1.60 – 2.40
Wall Tile (ceramic)	Interior, Hall H101, H102 – Side A	White Specked	Intact	6.40 – 7.30
Wall Tile (ceramic)	Interior, Hall H101, H102, H104 – Side B,C,D	White	Intact	4.60 – 14.40
Wall Tile (ceramic)	Interior, Hall H101, H102, H104 – Side B,C,D	Yellow	Intact	4.50 – 5.70
Wall Tile (ceramic)	Interior, Hall H101, H102, H104 – Side B,C,D	Black	Intact	6.40 – 7.80

4.3 Lead-Based Paint Survey Conclusions / Recommendations

Based on the XRF results, the following building components tested positive or are assumed positive for lead-based paint:

Exterior Materials

- **Red Metal Window Panels (Exterior, Side A,C,D)**

Interior Materials

- **White Specked Ceramic Wall Tile (Interior, Hall- H101, H102) – Side A**
- **White Ceramic Wall Tile (Interior, Hall- H101, H102, H104) – Side B,C,D**
- **Yellow Ceramic Wall Tile (Interior, Hall- H101, H102, H104) – Side B,C,D**
- **Black Ceramic Wall Tile (Interior, Hall- H101, H102, H104) – Side B,C,D**

Building materials with lead-based paint are subject to South Carolina Department of Health and Environmental Control regulations pertaining to waste disposal, and to OSHA regulations pertaining to worker safety. If these building components are disturbed during renovation or demolition, contractors and workers should be informed as to the presence of lead-based paint and appropriate work practices and personal protective equipment should be used to prevent exposure to lead dust/fumes or spreading lead contamination from the work site. The building components containing lead should be disposed of in accordance with federal and state regulations.

Any building components to be removed containing equal to or greater than $0.7\text{mg}/\text{cm}^2$ lead-based paint should be disposed of in a Class II or Class III solid waste landfill or recycled by an approved metal recycler. If any paint is to be removed from the building components (chemical stripping, scraping, sandblasting, etc.) the paint residue after removal should be tested for lead using the toxic characteristic leaching procedure (TCLP) to determine if the paint waste should be handled/disposed of as hazardous waste.

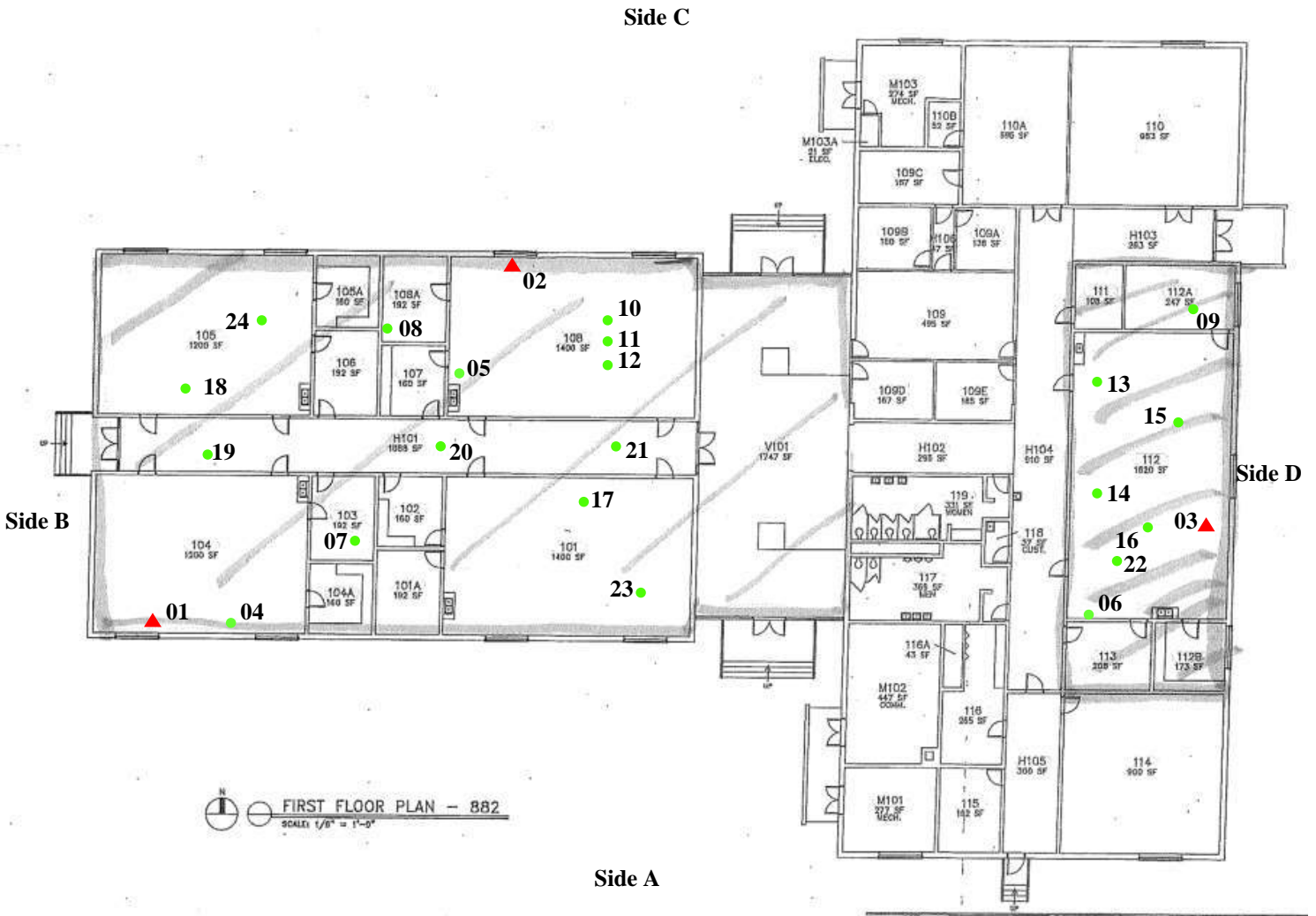
This survey was limited to the accessible building materials tested. All painted surfaces on each building material not tested during the survey, should be presumed to contain lead-based paint until XRF or laboratory analysis can be conducted.

Warranty

ARM warrants that the findings contained herein have been prepared in general accordance with accepted professional practices as applied by similar professionals in the community at the time of its preparation. Changes in the state of the art or in applicable regulations cannot be anticipated and have not been addressed in this report. The field and laboratory results reported herein are considered sufficient in detail and scope to determine the presence of accessible and/or exposed suspect lead-based coated materials at the time of the inspection. Test results are valid only for the materials tested. There is a distinct possibility that conditions may exist which could not be identified within the scope of study or which were not apparent during the site visit. This inspection covered only those materials, which were exposed and/or accessible to the inspector. No other warranties are implied or expressed.

Appendix A

Figures



Project
 Asbestos & Lead-Based Paint Survey
 USC – Sumter Science Building
 Sumter, South Carolina
 ARM Project #09-781-18

Figure 1

Floor Plan Showing Sample Locations
 ▲ = Positive Asbestos Sample
 ● = Negative Asbestos Sample

Scale
 Not to Scale

Date
 March, 2018

ARM ENVIRONMENTAL SERVICES, INC.

Appendix B

Asbestos Sample Summary Tables

Table 1 - Asbestos Sample Summary
USC Sumter Science Building 200 Miller Road / Sumter, South Carolina
ARM Project # 09-781-18

HA	Approx. Quantity (ft ²)	Sample Number	Description	Material Location	Lab Result	Category	Present Condition
HA-1	9,200 SF	1	Beige Vinyl Sheet Flooring with Mastic	Room 104	10% Chrysotile Asbestos (Tile)	Misc	Good / NF
		2	Beige Vinyl Sheet Flooring with Mastic	Room 108	Positive Stop	Misc	Good / NF
		3	Beige Vinyl Sheet Flooring with Mastic	Room 112	1.2% Chrysotile Asbestos (Mastic)	Misc	Good / NF
HA-2	600 LF	4	Black Vinyl Baseboard with Mastic	Room 104	<1% Chrysotile Asbestos (Mastic)	Misc	Good / NF
		5	Black Vinyl Baseboard with Mastic	Room 108	<1% Chrysotile Asbestos (Mastic)	Misc	Good / NF
		6	Black Vinyl Baseboard with Mastic	Room 112	<0.53% Chrysotile Asbestos (Mastic)	Misc	Good / NF
HA-3	1,500 SF	7	Carpet Mastic Only	Room 103	NAD - PLM	Misc	Good / NF
		8	Carpet Mastic Only	Room 108A	NAD - PLM	Misc	Good / NF
		9	Carpet Mastic Only	Room 112A	NAD - TEM	Misc	Good / NF
HA-4	500 SF	10	Solid Surface Lab Countertop	Room 108	NAD - PLM	Misc	Good / NF
		11	Solid Surface Lab Countertop	Room 108	NAD - PLM	Misc	Good / NF
		12	Solid Surface Lab Countertop	Room 108	NAD - PLM	Misc	Good / NF
HA-5	9,200	13	2'x4' Pinhole/Fissure Ceiling Tile	Room 112	NAD - PLM	Misc	Good / F
		14	2'x4' Pinhole/Fissure Ceiling Tile	Room 112	NAD - PLM	Misc	Good / F
		15	2'x4' Pinhole/Fissure Ceiling Tile	Room 112	NAD - PLM	Misc	Good / F
HA-6	11, 800 SF	16	Ceiling Material	Above dropped tile/ on bar joists (throughout)	NAD - PLM	Misc	Good / F
		17	Ceiling Material	Above dropped tile/ on bar joists (throughout)	NAD - PLM	Misc	Good / F
		18	Ceiling Material	Above dropped tile/ on bar joists (throughout)	NAD - PLM	Misc	Good / F
HA-7	4,000 SF	19	2'x2' Pinhole Ceiling Tile	Hallway	NAD - PLM	Misc	Good / F
		20	2'x2' Pinhole Ceiling Tile	Hallway	NAD - PLM	Misc	Good / F
		21	2'x2' Pinhole Ceiling Tile	Hallway	NAD - PLM	Misc	Good / F
HA-8	11,800 SF	22	Foil Backed Attic Insulation	Ceiling Plenum	NAD - PLM	Misc	Good / F
		23	Foil Backed Attic Insulation	Ceiling Plenum	NAD - PLM	Misc	Good / F
		24	Foil Backed Attic Insulation	Ceiling Plenum	NAD - PLM	Misc	Good / F

HA - Homogeneous Area **NAD** - No Asbestos Detected **PLM** - Polarized Light Microscopy **Chry** - Chrysotile asbestos **Misc** - Miscellaneous Material
TEM = Transmission Electron Microscopy **SM** - Surfacing Material **Cat I** - asbestos containing packings, gaskets, asphaltic roofing products, resilient flooring, pliable mastics
SF - Square Feet **LF** - Linear Feet **VFT** - Vinyl Floor Tile **F**-Friable **NF**- Non-Friable **G** - Good (very localized limited damage)
D - Damaged (Damage of less than 10% distributed & less than 25% localized) **SD** - Significantly damaged (damage equal to or greater than 10% distributed/25% localized)

Appendix C

Analytical Results



EMSL Analytical, Inc.

10801 Southern Loop Blvd Pineville, NC 28134

Tel/Fax: (704) 525-2205 / (704) 525-2382

<http://www.EMSL.com> / charlottelab@emsl.com

EMSL Order: 411802068

Customer ID: ARM62

Customer PO:

Project ID:

Attention: Sid Havird
ARM Environmental Services, Inc.
1210 1st Street South Extension
Columbia, SC 29209

Phone: (803) 783-3314

Fax: (803) 783-2587

Received Date: 03/16/2018 9:00 AM

Analysis Date: 03/16/2018

Collected Date: 03/15/2018

Project: USC Sumter-Science Bld.

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
01-Flooring <small>411802068-0001</small>	Beige Vinyl Sheet Flooring w/ Mastic	Beige Non-Fibrous Homogeneous	3% Cellulose	87% Non-fibrous (Other)	10% Chrysotile
01-Mastic <small>411802068-0001A</small>	Beige Vinyl Sheet Flooring w/ Mastic	Tan Non-Fibrous Homogeneous	1% Cellulose	99% Non-fibrous (Other)	None Detected
02-Flooring <small>411802068-0002</small>	Beige Vinyl Sheet Flooring w/ Mastic				Positive Stop (Not Analyzed)
02-Mastic <small>411802068-0002A</small>	Beige Vinyl Sheet Flooring w/ Mastic	Tan Non-Fibrous Homogeneous	2% Cellulose	98% Non-fibrous (Other)	None Detected
04-Baseboard <small>411802068-0003</small>	Black Vinyl Baseboard w/ Mastic	Black Non-Fibrous Homogeneous		8% Ca Carbonate 92% Non-fibrous (Other)	None Detected
04-Mastic <small>411802068-0003A</small>	Black Vinyl Baseboard w/ Mastic	Brown Non-Fibrous Homogeneous		5% Ca Carbonate 95% Non-fibrous (Other)	<1% Chrysotile
05-Baseboard <small>411802068-0004</small>	Black Vinyl Baseboard w/ Mastic	Black Non-Fibrous Homogeneous		10% Ca Carbonate 90% Non-fibrous (Other)	None Detected
05-Mastic <small>411802068-0004A</small>	Black Vinyl Baseboard w/ Mastic	Tan Non-Fibrous Homogeneous		3% Ca Carbonate 97% Non-fibrous (Other)	<1% Chrysotile
07 <small>411802068-0005</small>	Carpet Mastic Only	Tan Non-Fibrous Homogeneous		5% Ca Carbonate 95% Non-fibrous (Other)	None Detected
08 <small>411802068-0006</small>	Carpet Mastic Only	Tan Non-Fibrous Homogeneous		5% Ca Carbonate 95% Non-fibrous (Other)	None Detected
10 <small>411802068-0007</small>	Solid Surface Lab Countertop	Gray/Black Non-Fibrous Homogeneous		8% Ca Carbonate 92% Non-fibrous (Other)	None Detected
11 <small>411802068-0008</small>	Solid Surface Lab Countertop	Gray/Black Non-Fibrous Homogeneous		8% Ca Carbonate 92% Non-fibrous (Other)	None Detected
12 <small>411802068-0009</small>	Solid Surface Lab Countertop	Gray Non-Fibrous Homogeneous		5% Ca Carbonate 95% Non-fibrous (Other)	None Detected
13 <small>411802068-0010</small>	2x4 Pinhole/Fissure Ceiling Tile	Gray/White Fibrous Heterogeneous	60% Cellulose 10% Min. Wool	10% Perlite 20% Non-fibrous (Other)	None Detected
14 <small>411802068-0011</small>	2x4 Pinhole/Fissure Ceiling Tile	Gray/White Fibrous Heterogeneous	60% Cellulose 5% Min. Wool	10% Perlite 25% Non-fibrous (Other)	None Detected
15 <small>411802068-0012</small>	2x4 Pinhole/Fissure Ceiling Tile	Tan/White Fibrous Homogeneous	40% Cellulose 10% Min. Wool	10% Perlite 40% Non-fibrous (Other)	None Detected

Initial report from: 03/16/2018 16:57:07



EMSL Analytical, Inc.

10801 Southern Loop Blvd Pineville, NC 28134

Tel/Fax: (704) 525-2205 / (704) 525-2382

<http://www.EMSL.com> / charlottelab@emsl.com

EMSL Order: 411802068
Customer ID: ARM62
Customer PO:
Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
16 <i>411802068-0013</i>	Ceiling Material	Gray Fibrous Heterogeneous	10% Cellulose	90% Non-fibrous (Other)	None Detected
17 <i>411802068-0014</i>	Ceiling Material	Gray Fibrous Heterogeneous	10% Cellulose	90% Non-fibrous (Other)	None Detected
18 <i>411802068-0015</i>	Ceiling Material	Gray/Tan Fibrous Homogeneous	10% Cellulose	90% Non-fibrous (Other)	None Detected
19 <i>411802068-0016</i>	2x2 Pinhole Ceiling Tile	Gray/White Fibrous Heterogeneous	60% Cellulose 8% Min. Wool	15% Perlite 17% Non-fibrous (Other)	None Detected
20 <i>411802068-0017</i>	2x2 Pinhole Ceiling Tile	Gray/White Fibrous Heterogeneous	60% Cellulose 8% Min. Wool	10% Perlite 22% Non-fibrous (Other)	None Detected
21 <i>411802068-0018</i>	2x2 Pinhole Ceiling Tile	Gray/White Fibrous Homogeneous	50% Cellulose 10% Min. Wool	10% Perlite 30% Non-fibrous (Other)	None Detected
22-Wrap <i>411802068-0019</i>	Foil Backed Attic Insulation	Tan/Black/Silver Fibrous Heterogeneous	50% Cellulose 4% Glass	46% Non-fibrous (Other)	None Detected
22-Insulation <i>411802068-0019A</i>	Foil Backed Attic Insulation	Pink Non-Fibrous Homogeneous	99% Glass	1% Non-fibrous (Other)	None Detected
23-Wrap <i>411802068-0020</i>	Foil Backed Attic Insulation	Tan/Black/Silver Fibrous Heterogeneous	60% Cellulose 3% Glass	37% Non-fibrous (Other)	None Detected
23-Insulation <i>411802068-0020A</i>	Foil Backed Attic Insulation	Pink Fibrous Homogeneous	99% Glass	1% Non-fibrous (Other)	None Detected
24-Wrap <i>411802068-0021</i>	Foil Backed Attic Insulation	Tan/Black/Silver Fibrous Homogeneous	50% Cellulose	50% Non-fibrous (Other)	None Detected
24-Insulation <i>411802068-0021A</i>	Foil Backed Attic Insulation	Pink Fibrous Homogeneous	99% Glass	1% Non-fibrous (Other)	None Detected

Analyst(s) _____

Eric Loomis (17)

Katherine Sluder (10)

Lee Plumley, Laboratory Manager
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Samples received in good condition unless otherwise noted. Estimated accuracy, precision and uncertainty data available upon request. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Reporting limit is 1%

Samples analyzed by EMSL Analytical, Inc. Pineville, NC NVLAP Lab Code 200841-0, VA 3333 00312

Initial report from: 03/16/2018 16:57:07



EMSL Analytical, Inc.

10801 Southern Loop Blvd Pineville, NC 28134

Tel/Fax: (704) 525-2205 / (704) 525-2382

<http://www.EMSL.com> / charlottelab@emsl.com

EMSL Order: 411802068

Customer ID: ARM62

Customer PO:

Project ID:

Attention: Sid Havird
ARM Environmental Services, Inc.
1210 1st Street South Extension
Columbia, SC 29209

Phone: (803) 783-3314

Fax: (803) 783-2587

Received Date: 03/16/2018 9:00 AM

Analysis Date: 03/17/2018 - 03/19/2018

Collected Date: 03/15/2018

Project: USC Sumter-Science Bld.

Test Report: Asbestos Analysis of Non-Friable Organically Bound Materials by TEM via EPA/600/R-93/116 Section 2.5.5.1

Sample ID	Description	Appearance	% Matrix Material	% Non-Asbestos Fibers	Asbestos Types
03-Mastic 411802068-0022	Beige Vinyl Sheet Flooring w/ Mastic	Tan Non-Fibrous Heterogeneous	98.8	None	1.2% Chrysotile
06-Baseboard 411802068-0023	Black Vinyl Baseboard w/ Mastic	Black Non-Fibrous Heterogeneous	100	None	No Asbestos Detected
06-Mastic 411802068-0024	Black Vinyl Baseboard w/ Mastic	Brown Non-Fibrous Heterogeneous	100	None	<0.53% Chrysotile
09 411802068-0025	Carpet Mastic Only	Tan Non-Fibrous Heterogeneous	100	None	No Asbestos Detected

Analyst(s)

Aaron Hartley (3)
Derrick Young (1)

Lee Plumley, Laboratory Manager
or other approved signatory

This laboratory is not responsible for % asbestos in total sample when the residue only is submitted for analysis. The above report relates only to the items tested. This report may not be reproduced, except in full, without written approval by EMSL Analytical, Inc. Samples received in good condition unless otherwise noted. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample.

Samples analyzed by EMSL Analytical, Inc. Pineville, NC

Initial report from: 03/19/2018 13:04:49



EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

Asbestos Chain of Custody

EMSL Order Number (Lab Use Only):

411802068

EMSL ANALYTICAL, INC.
10801 SOUTHERN LOOP BLVD.
PINEVILLE, NC 28134
PHONE: (704) 525-2205
FAX: (704) 525-2382

Company Name : ARM Environmental		EMSL Customer ID:	
Street: 1210 First Street South Ext.		City: Columbia	State/Province: SC
Zip/Postal Code: 29209	Country: US	Telephone #: 803-783-3314	Fax #: 803-783-2587
Report To (Name): Sid Havird		Please Provide Results: <input type="checkbox"/> Fax <input checked="" type="checkbox"/> Email	
Email Address: shavird@armenv.com , rrobertson@armenv.com		Purchase Order:	
Project Name/Number: USC Sumter-Science Bld./ ?		EMSL Project ID (Internal Use Only):	
U.S. State Samples Taken: SC		CT Samples: <input type="checkbox"/> Commercial/Taxable <input type="checkbox"/> Residential/Tax Exempt	

EMSL-Bill to: Same Different - If Bill to is Different note instructions in Comments**
Third Party Billing requires written authorization from third party

Turnaround Time (TAT) Options* - Please Check

3 Hour 6 Hour 24 Hour 48 Hour 72 Hour 96 Hour 1 Week 2 Week

*For TEM Air 3 hr through 6 hr, please call ahead to schedule. *There is a premium charge for 3 Hour TEM AHERA or EPA Level II TAT. You will be asked to sign an authorization form for this service. Analysis completed in accordance with EMSL's Terms and Conditions located in the Analytical Price Guide.

<p>PCM - Air <input type="checkbox"/> Check if samples are from NY</p> <p><input type="checkbox"/> NIOSH 7400</p> <p><input type="checkbox"/> w/ OSHA 8hr. TWA</p> <p>PLM - Bulk (reporting limit)</p> <p><input checked="" type="checkbox"/> PLM EPA 600/R-93/116 (<1%)</p> <p><input type="checkbox"/> PLM EPA NOB (<1%)</p> <p>Point Count</p> <p><input type="checkbox"/> 400 (<0.25%) <input type="checkbox"/> 1000 (<0.1%)</p> <p>Point Count w/Gravimetric</p> <p><input type="checkbox"/> 400 (<0.25%) <input type="checkbox"/> 1000 (<0.1%)</p> <p><input type="checkbox"/> NYS 198.1 (friable in NY)</p> <p><input type="checkbox"/> NYS 198.6 NOB (non-friable-NY)</p> <p><input type="checkbox"/> NYS 198.8 SOF-V</p> <p><input type="checkbox"/> NIOSH 9002 (<1%)</p>	<p>TEM - Air <input type="checkbox"/> 4-4.5hr TAT (AHERA only)</p> <p><input type="checkbox"/> AHERA 40 CFR, Part 763</p> <p><input type="checkbox"/> NIOSH 7402</p> <p><input type="checkbox"/> EPA Level II</p> <p><input type="checkbox"/> ISO 10312</p> <p>TEM - Bulk</p> <p><input checked="" type="checkbox"/> TEM EPA NOB</p> <p><input type="checkbox"/> NYS NOB 198.4 (non-friable-NY)</p> <p><input type="checkbox"/> Chatfield SOP</p> <p><input type="checkbox"/> TEM Mass Analysis-EPA 600 sec. 2.5</p> <p>TEM - Water: EPA 100.2</p> <p>Fibers >10µm <input type="checkbox"/> Waste <input type="checkbox"/> Drinking</p> <p>All Fiber Sizes <input type="checkbox"/> Waste <input type="checkbox"/> Drinking</p>	<p>TEM- Dust</p> <p><input type="checkbox"/> Microvac - ASTM D 5755</p> <p><input type="checkbox"/> Wipe - ASTM D6480</p> <p><input type="checkbox"/> Carpet Sonication (EPA 600/J-93/167)</p> <p>Soil/Rock/Vermiculite</p> <p><input type="checkbox"/> PLM EPA 600/R-93/116 with milling prep (<1%)</p> <p><input type="checkbox"/> PLM EPA 600/R-93/116 with milling prep (<0.25%)</p> <p><input type="checkbox"/> TEM EPA 600/R-93/116 with milling prep (<0.1%)</p> <p><input type="checkbox"/> TEM Qualitative via Filtration Prep</p> <p><input type="checkbox"/> TEM Qualitative via Drop Mount Prep</p> <p><input type="checkbox"/> Cincinnati Method EPA 600/R-04/004 - PLM/TEM (BC only)</p> <p>Other:</p> <p><input checked="" type="checkbox"/> Please run TEM on the following if needed: 03,06,09</p>
---	---	---

Check For Positive Stop - Clearly Identify Homogenous Group Filter Pore Size (Air Samples): 0.8µm 0.45µm

Samplers Name: Robbie Robertson Samplers Signature: *Robbie Robertson*

Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
01-03	Beige Vinyl Sheet Flooring w/mastic (PLM, TEM)	1	3-15-18
04-06	Black vinyl baseboard w/ mastic (PLM, TEM)	2	3-15-18
07-09	Carpet Mastic only (PLM, TEM)	3	3-15-18
10-12	Solid surface lab countertop (PLM)	4	3-15-18
13-15	2x4 Pinhole/fissure ceiling tile (PLM)	5	3-15-18

Client Sample # (s): 01 - 24 Total # of Samples: 24

Relinquished (Client): Robbie Robertson Date: 3-15-18 Time: 1730

Received (Lab): *Kyle Nelson* Date: *3/16/18* Time: *9:00 AM Fk*

Comments/Special Instructions: Run PLM analyses first & if less than 1% run TEM confirmation on all NOB materials. Bill to: ARM Environmental, 1210 First Street South Ext., Columbia, SC Attention: Gail Cruz Phone: 803-783-3314 Email: gacruz@armenv.com

7954 4626 5597

Appendix D

Inspectors Licenses and Certifications

SCDHEC ISSUED

Asbestos ID Card

Robbie Robertson



SUPERAHERA SA-01861
CONSULTBI BI-01179

Expiration Date:
11/15/18
11/16/18



1416 Chapin Road, Chapin, South Carolina 29036 803-345-3833

Robbie Robertson

SSN xxx-xx-3715

This is to certify that the above named student has completed the requisite training for asbestos accreditation under TSCA Title II and has met the requirements of and passed the examination for an EPA approved:

AHERA Asbestos Inspector Refresher

Course Location: Irmo SC

Certificate Number: 20171116Ab301-06

Start Date November 16, 2017

End Date November 16, 2017

Exam Date: November 16, 2017

Expiration Date November 16, 2018

Principal Instructor / Training Administrator - Lee Capell

11/16/2017

Date

SCDHEC ISSUED
Asbestos ID Card

Cyril O Havird Jr



SUPERAHERA SA-02162
CONSULTBI BI-00258

Expiration Date:
11/15/18
11/16/18



1416 Chapin Road, Chapin, South Carolina 29036 803-345-3833

Sid Havird

SSN xxx-xx-4506

This is to certify that the above named student has completed the requisite training for asbestos accreditation under TSCA Title II and has met the requirements of and passed the examination for an EPA approved:

AHERA Asbestos Inspector Refresher

Course Location: Irmo SC

Certificate Number: 20171116Ab301-03

Start Date November 16, 2017

End Date November 16, 2017

Exam Date: November 16, 2017

Expiration Date November 16, 2018

Principal Instructor / Training Administrator - Lee Capell

11/16/2017

Date

Appendix E

XRF Field Data & Characteristics Sheets

Index	Time	Component	Substrate	Side	Condition	Color	Site	Floor	Room	Results	PbC
1	2018-03-15 12:14										7.83 ± 0.00
2	2018-03-15 12:20			CALIBRATE						Positive	1.00 ± 0.30
3	2018-03-15 12:20			CALIBRATE						Positive	1.10 ± 0.40
4	2018-03-15 12:20			CALIBRATE						Positive	1.10 ± 0.40
5	2018-03-15 12:20			CALIBRATE						Positive	1.00 ± 0.20
6	2018-03-15 12:23	windows	METAL	CALIBRATE	INTACT	RED	usc sumter- science bld	FIRST	OUTSIDE	Negative	0.09 ± 0.23
7	2018-03-15 12:23	windows	METAL	CALIBRATE	INTACT	RED	usc sumter- science bld	FIRST	OUTSIDE	Positive	1.60 ± 0.60
8	2018-03-15 12:24	windows	METAL	CALIBRATE	INTACT	RED	usc sumter- science bld	FIRST	OUTSIDE	Positive	2.40 ± 1.00
9	2018-03-15 12:25	door frame	METAL	A	INTACT	RED	usc sumter- science bld	FIRST	OUTSIDE	Negative	0.03 ± 0.06
10	2018-03-15 12:25	door frame	METAL	A	INTACT	RED	usc sumter- science bld	FIRST	OUTSIDE	Negative	0.03 ± 0.05
11	2018-03-15 12:26	door	METAL	A	INTACT	RED	usc sumter- science bld	FIRST	OUTSIDE	Negative	0.00 ± 0.02
12	2018-03-15 12:26	door	METAL	A	INTACT	RED	usc sumter- science bld	FIRST	OUTSIDE	Negative	0.00 ± 0.02
13	2018-03-15 12:28	railing	METAL	C	INTACT	grey	usc sumter- science bld	FIRST	OUTSIDE	Negative	0.01 ± 0.06
14	2018-03-15 12:28	railing	METAL	C	INTACT	grey	usc sumter- science bld	FIRST	OUTSIDE	Negative	0.00 ± 0.02
15	2018-03-15 12:30	wall tile	ceramic	A	INTACT	white specked	usc sumter- science bld	FIRST	HALL	Positive	6.40 ± 5.40
16	2018-03-15 12:31	wall tile	ceramic	A	INTACT	white specked	usc sumter- science bld	FIRST	HALL	Positive	7.30 ± 6.20
17	2018-03-15 12:31	wall tile	ceramic	B	INTACT	WHITE	usc sumter- science bld	FIRST	HALL	Positive	14.40 ± 11.70
18	2018-03-15 12:31	wall tile	ceramic	B	INTACT	WHITE	usc sumter- science bld	FIRST	HALL	Positive	4.60 ± 3.50
19	2018-03-15 12:32	wall tile	ceramic	B	INTACT	YELLOW	usc sumter- science bld	FIRST	HALL	Positive	4.50 ± 3.50
20	2018-03-15 12:32	wall tile	ceramic	B	INTACT	YELLOW	usc sumter- science bld	FIRST	HALL	Positive	5.70 ± 4.60
21	2018-03-15 12:33	wall tile	ceramic	B	INTACT	BLACK	usc sumter- science bld	FIRST	HALL	Positive	7.80 ± 6.20
22	2018-03-15 12:33	wall tile	ceramic	B	INTACT	BLACK	usc sumter- science bld	FIRST	HALL	Positive	6.40 ± 4.70
23	2018-03-15 12:41	DOOR FRAME	METAL	A	INTACT	BLACK	usc sumter- science bld	FIRST	FOYER	Negative	0.03 ± 0.02
24	2018-03-15 12:41	DOOR FRAME	METAL	A	INTACT	BLACK	usc sumter- science bld	FIRST	FOYER	Negative	0.03 ± 0.06
25	2018-03-15 12:43	WALL	CONCRETE	D	INTACT	BEIGE	usc sumter- science bld	FIRST	RM 104	Negative	0.02 ± 0.02
26	2018-03-15 12:44	WALL	CONCRETE	D	INTACT	BEIGE	usc sumter- science bld	FIRST	RM 104	Negative	0.03 ± 0.04
27	2018-03-15 12:45	DOOR	WOOD	D	INTACT	black	usc sumter- science bld	FIRST	RM 104	Negative	0.03 ± 0.05
28	2018-03-15 12:45	DOOR	WOOD	D	INTACT	black	usc sumter- science bld	FIRST	RM 104	Negative	0.02 ± 0.05
29	2018-03-15 12:45	DOOR frame	WOOD	D	INTACT	black	usc sumter- science bld	FIRST	RM 104	Negative	0.02 ± 0.05
30	2018-03-15 12:45	DOOR frame	WOOD	D	INTACT	black	usc sumter- science bld	FIRST	RM 104	Negative	0.03 ± 0.08
31	2018-03-15 12:47	lab countertop	CONCRETE	A	INTACT	black	usc sumter- science bld	FIRST	RM 104	Negative	0.00 ± 0.02
32	2018-03-15 12:47	lab countertop	CONCRETE	A	INTACT	black	usc sumter- science bld	FIRST	RM 104	Negative	0.00 ± 0.02

Index	Time	Component	Substrate	Side	Condition	Color	Site	Floor	Room	Results	PbC
33	2018-03-15 12:52	8x12 wall tile	ceramic	C	INTACT	BEIGE	usc sumter- science bld	FIRST	RM 108	Null	0.60 ± 0.10
34	2018-03-15 12:52	8x12 wall tile	ceramic	C	INTACT	BEIGE	usc sumter- science bld	FIRST	RM 108	Negative	0.50 ± 0.10
35	2018-03-15 12:53	8x12 wall tile	ceramic	C	INTACT	BEIGE	usc sumter- science bld	FIRST	RM 108	Negative	0.50 ± 0.10
36	2018-03-15 12:54	bar joists	METAL	UPPER	INTACT	black	usc sumter- science bld	FIRST	RM 108	Negative	0.00 ± 0.02
37	2018-03-15 12:55	bar joists	METAL	UPPER	INTACT	black	usc sumter- science bld	FIRST	RM 108	Negative	0.00 ± 0.03
38	2018-03-15 12:57	door	WOOD	C	INTACT	black	usc sumter- science bld	FIRST	RM 101	Negative	0.02 ± 0.05
39	2018-03-15 12:57	door	WOOD	C	INTACT	black	usc sumter- science bld	FIRST	RM 101	Negative	0.02 ± 0.05
40	2018-03-15 12:58	door header	WOOD	C	INTACT	black	usc sumter- science bld	FIRST	RM 101	Negative	0.05 ± 0.08
41	2018-03-15 12:58	door header	WOOD	C	INTACT	black	usc sumter- science bld	FIRST	RM 101	Null	0.09 ± 0.22
42	2018-03-15 12:58	door header	WOOD	C	INTACT	black	usc sumter- science bld	FIRST	RM 101	Negative	0.05 ± 0.09
43	2018-03-15 13:00	door frame	METAL	D	INTACT	black	usc sumter- science bld	FIRST	foyer	Negative	0.01 ± 0.05
44	2018-03-15 13:01	DOOR	WOOD	D	INTACT	black	usc sumter- science bld	FIRST	foyer	Negative	0.00 ± 0.03
45	2018-03-15 13:03	DOOR	WOOD	B	INTACT	black	usc sumter- science bld	FIRST	rm 112	Negative	0.04 ± 0.07
46	2018-03-15 13:03	DOOR	WOOD	B	INTACT	black	usc sumter- science bld	FIRST	rm 112	Negative	0.03 ± 0.06
47	2018-03-15 13:03	DOOR	WOOD	B	INTACT	black	usc sumter- science bld	FIRST	rm 112	Null	0.04 ± 0.15
48	2018-03-15 13:03	DOOR	WOOD	B	INTACT	black	usc sumter- science bld	FIRST	rm 112	Negative	0.03 ± 0.06
49	2018-03-15 13:04	DOOR frame	METAL	B	INTACT	black	usc sumter- science bld	FIRST	rm 112	Negative	0.05 ± 0.09
50	2018-03-15 13:04	DOOR frame	METAL	B	INTACT	black	usc sumter- science bld	FIRST	rm 112	Negative	0.02 ± 0.04
51	2018-03-15 13:05	WALL	CONCRETE	D	INTACT	BEIGE	usc sumter- science bld	FIRST	rm 112	Negative	0.00 ± 0.02
52	2018-03-15 13:05	WALL	CONCRETE	D	INTACT	BEIGE	usc sumter- science bld	FIRST	rm 112	Negative	0.00 ± 0.02
53	2018-03-15 13:08	window panels	METAL	D	INTACT	black	usc sumter- science bld	FIRST	rm 112	Negative	0.02 ± 0.07
54	2018-03-15 13:08	window panels	METAL	D	INTACT	black	usc sumter- science bld	FIRST	rm 112	Negative	0.04 ± 0.16
55	2018-03-15 13:11			CALIBRATE						Positive	1.10 ± 0.30
56	2018-03-15 13:11			CALIBRATE						Positive	1.10 ± 0.30
57	2018-03-15 13:11			CALIBRATE						Positive	1.10 ± 0.40

Performance Characteristic Sheet

EFFECTIVE DATE: September 24, 2004

EDITION NO.: 1

MANUFACTURER AND MODEL:

Make: Niton LLC

Tested Model: XLp 300

Source: ^{109}Cd

Note: This PCS is also applicable to the equivalent model variations indicated below, for the Lead-in-Paint K+L variable reading time mode, in the XLi and XLp series:

XLi 300A, XLi 301A, XLi 302A and XLi 303A.

XLp 300A, XLp 301A, XLp 302A and XLp 303A.

XLi 700A, XLi 701A, XLi 702A and XLi 703A.

XLp 700A, XLp 701A, XLp 702A, and XLp 703A.

Note: The XLi and XLp versions refer to the shape of the handle part of the instrument. The differences in the model numbers reflect other modes available, in addition to Lead-in-Paint modes. The manufacturer states that specifications for these instruments are identical for the source, detector, and detector electronics relative to the Lead-in-Paint mode.

FIELD OPERATION GUIDANCE

OPERATING PARAMETERS:

Lead-in-Paint K+L variable reading time mode.

XRF CALIBRATION CHECK LIMITS:

0.8 to 1.2 mg/cm² (inclusive)

The calibration of the XRF instrument should be checked using the paint film nearest 1.0 mg/cm² in the NIST Standard Reference Material (SRM) used (e.g., for NIST SRM 2579, use the 1.02 mg/cm² film).

If readings are outside the acceptable calibration check range, follow the manufacturer's instructions to bring the instruments into control before XRF testing proceeds.

SUBSTRATE CORRECTION:

For XRF results using Lead-in-Paint K+L variable reading time mode, substrate correction is not needed for:

Brick, Concrete, Drywall, Metal, Plaster, and Wood

INCONCLUSIVE RANGE OR THRESHOLD:

K+L MODE READING DESCRIPTION	SUBSTRATE	THRESHOLD (mg/cm ²)
Results not corrected for substrate bias on any substrate	Brick	1.0
	Concrete	1.0
	Drywall	1.0
	Metal	1.0
	Plaster	1.0
	Wood	1.0

BACKGROUND INFORMATION

EVALUATION DATA SOURCE AND DATE:

This sheet is supplemental information to be used in conjunction with Chapter 7 of the HUD *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing* ("HUD Guidelines"). Performance parameters shown on this sheet are calculated from the EPA/HUD evaluation using archived building components. Testing was conducted in August 2004 on 133 testing combinations. The instruments that were used to perform the testing had new sources; one instrument's was installed in November 2003 with 40 mCi initial strength, and the other's was installed June 2004 with 40 mCi initial strength.

OPERATING PARAMETERS:

Performance parameters shown in this sheet are applicable only when properly operating the instrument using the manufacturer's instructions and procedures described in Chapter 7 of the HUD Guidelines.

SUBSTRATE CORRECTION VALUE COMPUTATION:

Substrate correction is not needed for brick, concrete, drywall, metal, plaster or wood when using Lead-in-Paint K+L variable reading time mode, the normal operating mode for these instruments. If substrate correction is desired, refer to Chapter 7 of the HUD Guidelines for guidance on correcting XRF results for substrate bias.

EVALUATING THE QUALITY OF XRF TESTING:

Randomly select ten testing combinations for retesting from each house or from two randomly selected units in multifamily housing. Use the K+L variable time mode readings.

Conduct XRF retesting at the ten testing combinations selected for retesting.

Determine if the XRF testing in the units or house passed or failed the test by applying the steps below.

Compute the Retest Tolerance Limit by the following steps:

Determine XRF results for the original and retest XRF readings. Do not correct the original or retest results for substrate bias. In single-family housing a result is defined as the average of three readings. In multifamily housing, a result is a single reading. Therefore, there will be ten original and ten retest XRF results for each house or for the two selected units.

Calculate the average of the original XRF result and retest XRF result for each testing combination.

Square the average for each testing combination.

Add the ten squared averages together. Call this quantity C.

Multiply the number C by 0.0072. Call this quantity D.

Add the number 0.032 to D. Call this quantity E.

Take the square root of E. Call this quantity F.

Multiply F by 1.645. The result is the Retest Tolerance Limit.

Compute the average of all ten original XRF results.

Compute the average of all ten re-test XRF results.

Find the absolute difference of the two averages.

If the difference is less than the Retest Tolerance Limit, the inspection has passed the retest. If the difference of the overall averages equals or exceeds the Retest Tolerance Limit, this procedure should be repeated with ten new testing combinations. If the difference of the overall averages is equal to or greater than the Retest Tolerance Limit a second time, then the inspection should be considered deficient.

Use of this procedure is estimated to produce a spurious result approximately 1% of the time. That is, results of this procedure will call for further examination when no examination is warranted in approximately 1 out of 100 dwelling units tested.

TESTING TIMES:

For the Lead-in-Paint K+L variable reading time mode, the instrument continues to read until it is moved away from the testing surface, terminated by the user, or the instrument software indicates the reading is complete. The following table provides testing time information for this testing mode. The times have been adjusted for source decay, normalized to the initial source strengths as noted above. Source strength and type of substrate will affect actual testing times. At the time of testing, the instruments had source strengths of 26.6 and 36.6 mCi.

Testing Times Using K+L Reading Mode (Seconds)						
Substrate	All Data			Median for laboratory-measured lead levels (mg/cm ²)		
	25 th Percentile	Median	75 th Percentile	Pb < 0.25	0.25 ≤ Pb < 1.0	1.0 ≤ Pb
Wood Drywall	4	11	19	11	15	11
Metal	4	12	18	9	12	14
Brick Concrete Plaster	8	16	22	15	18	16

CLASSIFICATION RESULTS:

XRF results are classified as positive if they are greater than or equal to the threshold, and negative if they are less than the threshold.

DOCUMENTATION:

A document titled *Methodology for XRF Performance Characteristic Sheets* provides an explanation of the statistical methodology used to construct the data in the sheets, and provides empirical results from using the recommended inconclusive ranges or thresholds for specific XRF instruments. For a copy of this document call the National Lead Information Center Clearinghouse at 1-800-424-LEAD.

This XRF Performance Characteristic Sheet was developed by the Midwest Research Institute (MRI) and QuanTech, Inc., under a contract between MRI and the XRF manufacturer. HUD has determined that the information provided here is acceptable when used as guidance in conjunction with Chapter 7, Lead-Based Paint Inspection, of HUD's *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*.

Appendix F

DHEC Asbestos Renovation/
Demolition Requirements

Q. Am I required to submit notification of all renovation projects?

A. Each owner/operator must notify DHEC's Asbestos Section in writing before beginning any renovation activity of a regulated facility/structure only if the scope of work contains asbestos. (see chart below)

Project Type	Minimum Required Notification Period
DEMOLITION	10 Working Days
NESHAP Removal (> or = 160 SF, 260 LF, or 35 CF)	10 Working Days
SMALL Removal (> 25 SF but < 160 SF, 260 LF, or 35 CF)	4 Working Days
MINOR Removal (< or = 25 SF)	2 Working Days
Non-Friable NESHAP-Sized Removal (non-friable > or = 160 SF, 260 LF, or 35 CF)	4 Working Days

Q. How do I notify DHEC's Asbestos Section?

A. Get notification forms by calling or writing to:

S.C. DHEC Asbestos Section
 2600 Bull Street
 Columbia, SC 29201
 (803) 898-4289

DHEC's Asbestos Section will mail you the necessary forms and can answer any questions you may have.

The forms and additional information are also available to view and download from the DHEC Asbestos Section's Web site at:

www.scdhec.gov/asbestos

This brochure is a brief overview of South Carolina's asbestos regulations pertaining to demolition and renovation activities. Before owners or operators become involved in demolition and renovation activities, they are encouraged to contact the DHEC-Asbestos Section to make sure they understand the applicable regulations, accreditation and permitting requirements.



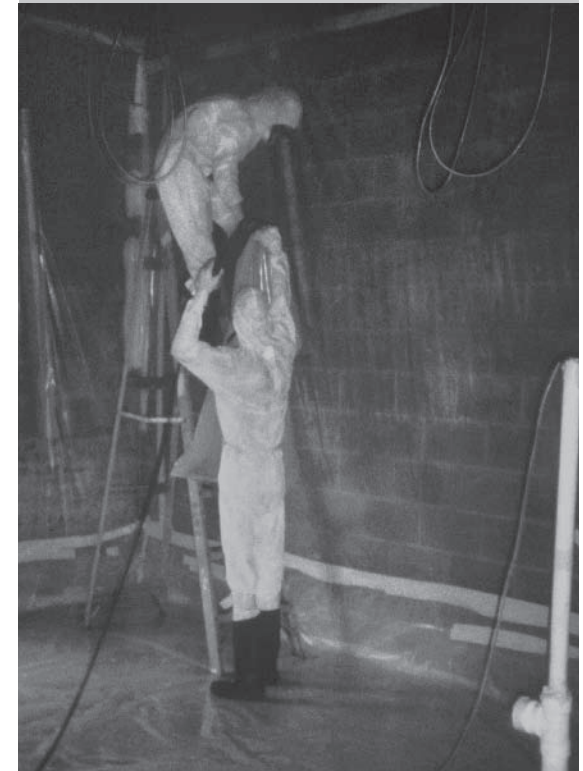
www.scdhec.gov

We promote and protect the health of the public and the environment.

ML-025415 7/09

Renovation, Demolition & Asbestos

What Building Owners & Contractors Should Know



S.C. Department of Health and Environmental Control

Asbestos Section
803-898-4289

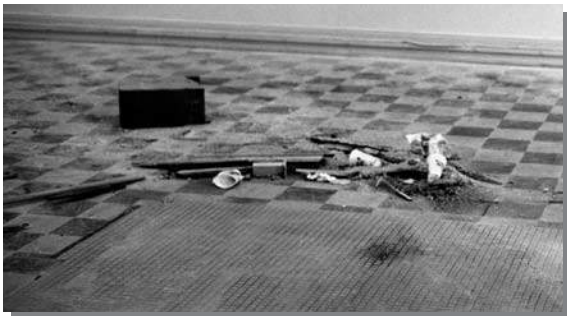
What is Asbestos?

Asbestos is the common name for a group of naturally occurring minerals made up of long, thin fibers. Asbestos is very strong and resistant to stress or forces that might tear it apart. It's also heat resistant. Asbestos fibers can be toxic to humans if inhaled. Despite this, it can still be found in a number of building products, including:

- Heating system insulation
- Spray-applied insulation
- Vinyl floor tiles
- Vinyl sheet flooring
- Ceiling tiles
- Roofing paper and shingles
- Cement siding shingles
- Plaster and joint compound

***It is still possible to purchase new products that contain asbestos. ***

When materials that contain asbestos are disturbed during renovations or demolitions, people nearby may get the dangerous fibers in their lungs. So before beginning a building project that could disturb asbestos-containing materials, property owners need to know how to spot asbestos and ensure the safety of those working nearby.



Frequently Asked Questions

Q. What is demolition?

A. Demolition is the wrecking or removal of a regulated facility/structure's load-bearing structure(s). It also refers to related handling operations, the burning of a regulated facility, or moving of a regulated structure.

Q. What is renovation?

A. It's altering all or part of a regulated facility/structure in any way (except demolition). Stripping or removing regulated asbestos-containing materials (RACM) from a regulated facility/structure is considered renovation.



Q. What is a regulated facility?

- A.
- Any institutional, commercial, public, industrial, or residential structure, installation, or building (including condominiums or individual dwelling units operated as a residential cooperative, but excluding residential buildings having four or fewer dwelling units);
 - any bridge;
 - any ship;
 - any active or inactive waste disposal site; and

- any structure, installation or building that was previously subject to this requirement, regardless of its current use or function.

Note: Under this definition, any building, structure, or installation that contains a loft used as a dwelling is not considered a residential structure, installation, or building.

Q. Do asbestos regulations require me to have my property inspected for asbestos?

A. S.C. DHEC Regulation 61-86.1 states that prior to any demolition or renovation at a regulated facility, a thorough inspection must be done to detect any asbestos-containing materials. The inspection must be carried out by a person licensed by DHEC's Asbestos Section as an asbestos building inspector.

If asbestos is found in an area that will be disturbed during renovation or repair work, it must be removed properly and disposed of at an approved landfill. DHEC's Asbestos Section keeps a list of South Carolina landfills that accept asbestos. These actions also must occur prior to any building demolition project. In most cases, asbestos removal and disposal activities must be performed by a licensed asbestos abatement contractor.

Q. Am I required to submit notification of all *demolition* projects?

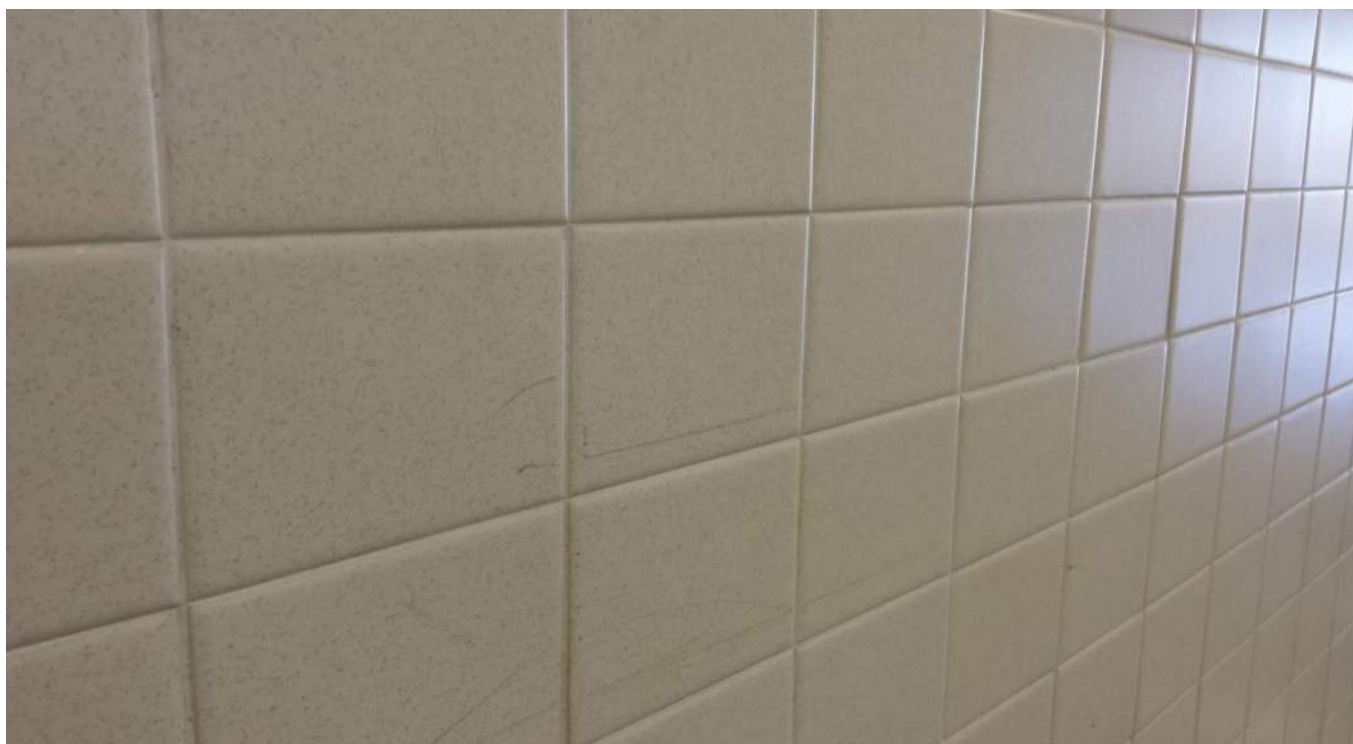
A. Each owner/operator must notify DHEC's Asbestos Section in writing before beginning any demolition of a regulated facility/structure regardless of the amount of asbestos present (and even when no asbestos is present).

Appendix G

Photographs



Photograph 1 – View of the USC Science building at 200 Miller Road in Sumter, SC where a Limited Asbestos and Lead Based Paint Survey was performed by ARM Environmental.



Photograph 2 – This photo shows the white speckled ceramic wall tile that is positive for lead based paint.



Photograph 3 – A view of the white, yellow, and black ceramic wall tiles that are positive for lead based paint.



Photograph 4 – This photo shows the red, metal window panels that contain lead based paint.



Photograph 5 – This photo shows the beige vinyl floor tile that contains asbestos.



Photograph 6 – This photo shows the asbestos containing mastic beneath the beige vinyl floor tile (which also contains asbestos).

ROSE TALBERT

P A I N T S

P.O. BOX 2658 CAYCE-WEST COLUMBIA, S. C. 29171
803-513-0490 OFFICE/803-791-0648 FAX
E-MAIL: pope@rosetalbertpaint.com

USC Sumter – Science Building Renovation

SUBSTITUTION REQUEST

ARCHITECT:

Goodwyn Mills & Caywood, Inc.
101 East Washington Street, Suite 200
Greenville, SC 29601

ROSE TALBERT PAINT COMPANY
The Color of Quality since 1919

ROSE TALBERT P A I N T S

P.O. BOX 2658 CAYCE-WEST COLUMBIA, S. C. 29171

803-513-0490 OFFICE/803-791-0648 FAX

E-MAIL: pope@rosetalbertpaint.com

December 3, 2018


Goodwyn Mills & Caywood, Inc.
101 East Washington Street, Suite 200
Greenville, SC 29601

RE: USC Sumter – Science Building Renovation

Rose Talbert would like to be approved for the above referenced project. We offer equivalent products to the specified items in Section 099113 page 4 and Section 099123 pages 5 and 6 of the specifications.

<u>Product Number</u>	<u>Description</u>
9072	High Solids Phenolic Gray Primer
860	Imflo Rust Inhibitive Industrial Enamel
8900	Aqua Chem DTM Primer/Finish White
9002	QD Gray Metal Primer
300	Premium Alkyd Semi-Gloss Enamel
250	Bondaplex Interior/Exterior Primer
5100	Clean Zero VOC 100% Acrylic Enamel Gloss / Semi-Gloss
5000	Clean Premium Vinyl Latex Flat Zero VOC
5400	Clean Premium Acrylic Low Lustre Enamel Zero VOC

Enclosed is a Substitution request form, Section 099113 page 4 and Section 099123 pages 5 and 6 of the specifications, product data sheets and a recent job list.

Submitted By: 
Pope B. Walker

ROSE TALBERT PAINT COMPANY
The Color of Quality since 1919

CSI Form 1.5C

**SUBSTITUTION
REQUEST**
(During the Bid Period)

Project: USC Sumter - Science Building Renovation Substitution Request Number: _____

To: Goodwyn Mills & Caywood, Inc.
101 East Washington Street, Suite 200
Greenville, SC 29601 From: Rose Talbert Paint Company

Re: Paint Substitution Date: 12/03/18

Specification Title: Exterior/ Interior Painting Description: _____

Section: 099113 Page: 4 Article/Paragraph: _____
099123 5-6

A/E Project Number: H39-9520

Contract For: _____

Proposed Substitution: Rose Talbert Paint Company

Manufacturer: Rose Talbert Address: 901 Frink Street Phone: 803-796-0324

Trade Name: Cayce, SC 29033 Model No.: _____

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: Pope B. Walker - VP/Sales

Signed by: *Pope B. Walker*

Firm: Rose Talbert Paint Company

Address: 901 Frink Street
Cayce, SC 29033

Telephone: 803-513-0490

A/E's REVIEW AND ACTION

- Substitution approved - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
- Substitution approved as noted - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
- Substitution rejected - Use specified materials.
- Substitution Request received too late - Use specified materials.

Signed by: _____ Date: _____

Supporting Data Attached: Drawings Product Data Samples Tests Reports _____

- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 EXTERIOR PAINTING SCHEDULE

- A. Steel Substrates: Hollow metal doors, frames, and miscellaneous steel.

- 1. Alkyd System MPI EXT 5.1D:

- a. RT: 9072 High Solids Phenolic Gray Primer**
 - d. RT: 860 Imflo Rust Inhibitive Industrial Enamel**
 - a. Prime Coat: Primer, alkyd, anticorrosive for metal, MPI #79.
 - b. Prime Coat: Shop primer specified in Section where substrate is specified.
 - c. Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - d. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5), MPI #94.

- B. Galvanized-Metal Substrates: Miscellaneous steel.

- 1. Alkyd System MPI EXT 5.3B:

- a. RT: 8900 Aqua Chem DTM Primer/Finish White**
 - c. RT: 860 Imflo Rust Inhibitive Industrial Enamel**
 - a. Prime Coat: Primer, galvanized metal, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated.
 - b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - c. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5), MPI #94.

END OF SECTION 099113

- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 INTERIOR PAINTING SCHEDULE

A. Steel Frames:

1. Alkyd System MPI INT 5.1E:

**a. RT: 9002 QD Gray
Metal Primer
c. RT: 300 Premium
Alkyd Semi-Gloss
Enamel**

- a. Prime Coat: Primer, alkyd, quick dry, for metal, MPI #76.
- b. Intermediate Coat: Alkyd, interior, matching topcoat.
- c. Topcoat: Alkyd, interior, semi-gloss (MPI Gloss Level 5), MPI #47.

B. Wood Doors: Factory primed.

1. Institutional Low-Odor/VOC Latex System MPI INT 6.2L:

**a. RT: 250 Bondaplex
Interior/Exterior Primer
c. RT: 5100 Clean Zero
VOC 100% Acrylic
Enamel Gloss / Semi-Gloss**

- a. Prime Coat: Primer, latex, for interior wood, MPI #39.
- b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
- c. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5), MPI #147.

C. Gypsum Board Substrates (Ceilings):

1. Institutional Low-Odor/VOC Latex System MPI INT 9.2M:

**a. RT: 250 Bondaplex
Interior/Exterior Primer
b. RT: 5000 Clean
Premium Vinyl Latex
Flat Zero VOC**

- a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.
- b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
- c. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 1), MPI #143.

D. Gypsum Board (Walls in general areas):

1. Institutional Low-Odor/VOC Latex System MPI INT 9.2M:

**a. RT: 250 Bondaplex
Interior/Exterior Primer
c. RT: 5400 Clean
Premium Acrylic Low
Lustre Enamel Zero VOC**

- a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 3), MPI #145.
- E. Gypsum Board Substrates (Walls indicated in Finish Schedule for semi-gloss finish):
- 1. Institutional Low-Odor/VOC Latex System MPI INT 9.2M:

**a. RT: 250 Bondaplex
Interior/Exterior Primer
c. RT: 5100 Clean Zero
VOC 100% Acrylic
Enamel Gloss / Semi-
Gloss**

- a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.
- b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
- c. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (MPI Gloss Level 5), MPI #147.

END OF SECTION 099123

ROSE TALBERT

P A I N T S

9072 HIGH SOLIDS PHENOLIC GRAY PRIMER

9072 High Solids Gray Primer is a high performance phenolic alkyd, rust inhibitive primer. Designed for use under most conventional topcoats including 2 component epoxies, and most oleoresinous systems.

1. RECOMMENDED USES: Use as shop or field primer for iron, steel, tanks, machinery, and galvanized metal.

2. LIMITATIONS: Do not paint over chalk, dust, dirt, grease, mildew, rusty or glossy surfaces. For interior/exterior use. Apply only when the atmospheric temperature and surface temperature will remain above 50°F, and not in foggy or rainy weather.

3. RECOMMENDED FINISHES: Two finish coats of 860 Imflo Enamel, 1200 Polyflex Epoxy, 7000 Instant Enamel, 8600 Water Borne Enamel, and other conventional enamel topcoats.

4. COLOR: Gray

5. TECHNICAL DATA:

DRYING TIME: @ 77°F and 50% RH
15 min.. - TO TOUCH
1 hr. - TO HANDLE
1-2 hrs. - TO RECOAT

FINISH: Flat

COVERAGE: 842 SQ. FT. @ 1 MIL DFT

VISCOSITY: 60-85 KU

VEHICLE TYPE: Phenolic Alkyd Resin

SOLIDS BY VOLUME: 52.5 ± 2.0%

WEIGHT PER GALLON: 13.28 LB. ± 2.0%

FLASH POINT: 45°F

VOC: 406 g/l

6. SURFACE PREPARATION: Surface must be dry and free of chalk, dirt, grease, oil and mildew. Hand tool cleaning (SSPC-SP2) or power tool cleaning (SSPC-SP3) is preferred.

7. MIXING: One component. Stir thoroughly in a lifting motion before using.

8. THINNING: Xylene if necessary.

9. SHELF LIFE: 12 Months

10. CLEAN-UP: Xylene.

11. CAUTION: PROTECT FROM FREEZING: VAPOR MAYBE HARMFUL. BREATHING OF VAPOR MAY CAUSE RESPIRATORY IRRITATION. USE ONLY WITH ADEQUATE VENTILATION. CAUSES EYE IRRITATION. DO NOT TAKE INTERNALLY. IN CASE OF SPILLAGE, ABSORB AND DISPOSE OF ACCORDING TO LOCAL REGULATIONS. KEEP OUT OF REACH OF CHILDREN.

FIRST AID: IN CASE OF SKIN CONTACT, FLUSH WITH PLENTY OF WATER; FOR EYES, FLUSH WITH RUNNING WATER FOR 15 MINUTES AND GET MEDICAL ATTENTION. IF EFFECTED BY INHALATION, MOVE TO FRESH AIR. **IF SWALLOWED, CALL PHYSICIAN IMMEDIATELY. DO NOT INDUCE VOMITING.**

NOTE: ALL TECHNICAL ADVICE, RECOMMENDATIONS AND SERVICES RENDERED BY THE SELLER IS GRATIS. SELLER ASSUMES NO LIABILITY WHATSOEVER FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION CONTAINED HEREIN. ANY INFORMATION CONTAINED HEREIN IS BELIEVED BY THE SELLER TO BE RELIABLE AND INTENDED FOR THE USES BY PERSONS HAVING SKILL AND KNOW-HOW, AT THEIR DISCRETION AND RISK. FINAL DETERMINATION OF THE SUITABILITY FOR THE USE CONTEMPLATED AND THE MANNER OF USE IS THE SOLE RESPONSIBILITY OF THE USER.

ROSE TALBERT PAINT COMPANY
P.O. BOX 2658
CAYCE-WEST COLUMBIA, S.C. 29171
803 796-0324

ROSE TALBERT

P A I N T S

860 IMFLO RUST INHIBITIVE INDUSTRIAL ENAMEL

IMFLO Alkyd Gloss Industrial Enamel is a high quality coating designed to meet the demanding needs of both the consumer and professionals. It has been designed for all tough interior and exterior applications.

1. RECOMMENDED USES: To be used as a finish paint for wood, trim, doors, shutters, metal fixtures, primed steel, aluminum, galvanized iron, and masonry surfaces.

2. LIMITATIONS: Do not paint over chalk, dust, dirt, grease, mildew, rusty, glossy or unsealed surfaces. Apply only when the atmospheric temperature and surface temperature will remain above 50°F.

3. RECOMMENDED PRIMERS:

- A. Drywall: 690 Premium Vinyl Emulsion Primer, Clean 5690 Premium Vinyl Emulsion Primer, 3590 High Build Primer/Surfacer.
- B. Plaster: 180 Premium Enamel Undercoat(Alkyd), 690 Premium Vinyl Emulsion Primer, Clean 5690 Premium Vinyl Emulsion Primer, 3590 High Build Primer/Surfacer.
- C. Wood: 250 Bondaplex Acrylic Primer, 180 Premium Enamel Undercoat(Alkyd), 690 Premium Vinyl Emulsion Primer, Clean 5690 Premium Vinyl Emulsion Primer.
- D. Masonry: 690 Premium Vinyl Emulsion Primer.
- E. Concrete Block: 3550 HD Block Filler, 650 Block Filler, Clean 5550 Heavy Duty Vinyl Block Filler Zero VOC.
- F. Steel: # 76, 78, 9072 & 9074-66 Metal Primers.
- G. Aluminum: #76 Metal Primer & 8900 DTM Primer
- H. Galvanized: 250 Bondaplex Acrylic Primer, 690 Premium Vinyl Emulsion Primer.

4. COLOR: 1400 custom colors & Safety Colors.

5. TECHNICAL DATA:

DRYING TIME:	@ 77°F @ 50% RH 2 - 4 hr. - TO TOUCH 24 hr. - TO RECOAT
FINISH:	High Gloss
COVERAGE:	425 SQ. FT. @ 2 MIL DFT
VISCOSITY:	77 KU
VEHICLE TYPE:	Alkyd
SOLIDS BY VOLUME:	43.93 ± 2.0%
WEIGHT PER GALLON:	9.35 LB. ± 2.0%
FLASH POINT:	104°F
VOC:	439 g/l

6. SURFACE PREPARATION: Surface must be dry and free of chalk, dirt, grease, oil and mildew. Lightly sand all glossy surfaces to provide an anchor profile for the new paint to adhere to.

7. MIXING: One component. Stir thoroughly in a lifting motion before using.

8. THINNING: Mineral spirits if necessary.

9. SHELF LIFE: 12 Months

10. CLEAN-UP: Mineral spirits.

11. CAUTION: PROTECT FROM FREEZING: VAPOR MAYBE HARMFUL. BREATHING OF VAPOR MAY CAUSE RESPIRATORY IRRITATION. USE ONLY WITH ADEQUATE VENTILATION. CAUSES EYE IRRITATION. DO NOT TAKE INTERNALLY. IN CASE OF SPILLAGE, ABSORB AND DISPOSE OF ACCORDING TO LOCAL REGULATIONS. KEEP OUT OF REACH OF CHILDREN.

FIRST AID: IN CASE OF SKIN CONTACT, FLUSH WITH PLENTY OF WATER; FOR EYES, FLUSH WITH RUNNING WATER FOR 15 MINUTES AND GET MEDICAL ATTENTION. IF EFFECTED BY INHALATION, MOVE TO FRESH AIR. **IF SWALLOWED, CALL PHYSICIAN IMMEDIATELY. DO NOT INDUCE.**

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**ROSE TALBERT PAINT COMPANY
P.O. BOX 2658
CAYCE-WEST COLUMBIA, S.C. 29171
(803)796-0324**

ROSE TALBERT

P A I N T S

8900 AQUA CHEM DTM PRIMER / FINISH

A fast drying metal primer and or finish coat designed to be lead & chromate free. Formulated for use in normal and light industrial environments. It dries to a hard finish that will take hard gloss enamel top coats without the danger of alligatoring or cracking.

1. RECOMMENDED USES: To be used as a shop primer or field primer for structural or miscellaneous steel, galvanized metal, tanks, and machinery. As a top coat, eggshell finish has good rust and moisture resistance.

2. LIMITATIONS: Do not paint over chalk, dust, dirt, grease, mildew, or rusty surfaces. Apply only when the atmospheric temperature and surface temperature will remain above 50°F, and not in foggy or rainy weather. Avoid using in direct sunlight above 95°F.

3. RECOMMENDED FINISHES: 860 Imflo Industrial Enamel, 8600 Waterborne Enamel, 1300 Acrylic Epoxy, and other conventional topcoats.

4. COLOR: White - May be tinted.

5. TECHNICAL DATA:

DRYING TIME:	@ 77°F
	15 min. - TO TOUCH
	2 -4 hrs. - TO RECOAT
FINISH:	Low Luster
COVERAGE:	677 SQ. FT. @ 1 MIL DFT
VISCOSITY:	80-85 KU
VEHICLE TYPE:	Acrylic Resin
SOLIDS BY VOLUME:	42.26 ± 2.0%
WEIGHT PER GALLON:	10.94 LB. ± 2.0%
FLASH POINT:	N/A°F
VOC:	65 g/l

6. SURFACE PREPARATION: Surface must be dry and free of chalk, dirt, grease, oil and mildew. Remove loose rust or mill scale. Hand tool cleaning (SSPC-SP2) or power tool cleaning (SSPC-SP3) is preferred.

7. MIXING: One component. Stir thoroughly in a lifting motion before using.

8. THINNING: Water if necessary

9. SHELF LIFE: 12 Months

10. CLEAN-UP: Warm soapy water.

11. CAUTION: PROTECT FROM FREEZING; VAPOR MAYBE HARMFUL. BREATHING OF VAPOR MAY CAUSE RESPIRATORY IRRITATION. USE ONLY WITH ADEQUATE VENTILATION. CAUSES EYE IRRITATION. DO NOT TAKE INTERNALLY. IN CASE OF SPILLAGE, ABSORB AND DISPOSE OF ACCORDING TO LOCAL REGULATIONS. KEEP OUT OF REACH OF CHILDREN.

FIRST AID: IN CASE OF SKIN CONTACT, FLUSH WITH PLENTY OF WATER; FOR EYES, FLUSH WITH RUNNING WATER FOR 15 MINUTES AND GET MEDICAL ATTENTION. IF EFFECTED BY INHALATION, MOVE TO FRESH AIR. **IF SWALLOWED, CALL PHYSICIAN IMMEDIATELY. DO NOT INDUCE VOMITING.**

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ROSE TALBERT

P A I N T S

9002 QD GRAY METAL PRIMER

9002 QD Gray Primer is a fast drying shopcoat metal primer designed to be lead & chromate free. It is formulated for use in normal or light industrial environments. It dries to a hard finish that will take gloss enamel top coats without alligating or cracking.

- 1. RECOMMENDED USES:** Shop or field priming of structural and miscellaneous steel, tanks, and machinery.
- 2. LIMITATIONS:** Do not paint over chalk, dust, dirt, grease, mildew, rusty or glossy surfaces. For interior/exterior use. Apply only when the atmospheric temperature and surface temperature will remain above 50°F, and not in foggy or rainy weather. Not to be recoated with aromatic or other strong solvent paints..
- 3. RECOMMENDED FINISHES:** 860 Imflo Enamel, 8600 Water Borne Enamel, 7000 Instant enamel, and other conventional enamel topcoats.
- 4. COLOR:** Gray.
- 5. TECHNICAL DATA:**

DRYING TIME:	@ 77°F and 50% RH
	15 mins - TO TOUCH
	1 hr - TO HANDLE
	8-12 hrs. - TO RECOAT
FINISH:	Eggshell
COVERAGE:	798 SQ. FT. @ 1 MIL DFT
VISCOSITY:	75-85 KU
VEHICLE TYPE:	Alkyd resin
SOLIDS BY VOLUME:	49.0 ± 2.0%
WEIGHT PER GALLON:	11.69 LB. ± 2.0%
FLASH POINT:	45°F
VOC:	382 g/l
- 6. SURFACE PREPARATION:** Surface must be dry and free of chalk, dirt, grease, oil and mildew. Hand tool cleaning (SSPC-SP2) or power tool cleaning (SSPC-SP3) is preferred.
- 7. MIXING:** One component. Stir thoroughly in a lifting motion before using.
- 8. THINNING:** Mineral spirits or VM&P Naptha if necessary
- 9. SHELF LIFE:** 12 Months
- 10. CLEAN-UP:** Mineral spirits.

11. CAUTION: PROTECT FROM FREEZING: VAPOR MAYBE HARMFUL. BREATHING OF VAPOR MAY CAUSE RESPIRATORY IRRITATION. USE ONLY WITH ADEQUATE VENTILATION. CAUSES EYE IRRITATION. DO NOT TAKE INTERNALLY. IN CASE OF SPILLAGE, ABSORB AND DISPOSE OF ACCORDING TO LOCAL REGULATIONS. KEEP OUT OF REACH OF CHILDREN.

FIRST AID: IN CASE OF SKIN CONTACT, FLUSH WITH PLENTY OF WATER; FOR EYES, FLUSH WITH RUNNING WATER FOR 15 MINUTES AND GET MEDICAL ATTENTION. IF EFFECTED BY INHALATION, MOVE TO FRESH AIR. **IF SWALLOWED, CALL PHYSICIAN IMMEDIATELY. DO NOT INDUCE VOMITING.**

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ROSE TALBERT

P A I N T S

300 PREMIUM ALKYD SEMI-GLOSS ENAMEL

Premium Alkyd Semi-Gloss Enamel is a high quality coating designed to meet the demanding needs of both the consumer and professionals.

1. RECOMMENDED USES: To be used as a finish paint for wood, trim, doors, shutters, primed steel, aluminum, galvanized iron, and masonry surfaces.

2. LIMITATIONS: Do not paint over chalk, dust, dirt, grease, mildew, rusty, glossy or unsealed surfaces. Apply only when the atmospheric temperature and surface temperature will remain above 50°F. For interior use only.

3. RECOMMENDED PRIMERS:

- A. Drywall: 690 Premium Vinyl Emulsion Primer.
- B. Plaster: 180 Premium Enamel Undercoat (Alkyd); 690 Premium Vinyl Emulsion Primer.
- C. Wood: 250 Bondaplex Acrylic Primer; 180 Premium Enamel Undercoat (Alkyd); 690 Premium Vinyl Emulsion Primer.
- D. Masonry: Premium Vinyl Emulsion Primer.
- E. Concrete Block: 3550 HD Block Filler/ 650 Block Filler
- F. Steel: #76, 78,9072 & 9075 Metal Primers.
- G. Aluminum: #76 Metal Primer & 8900 DTM Primer.
- H. Galvanized: 250 Bondaplex Acrylic Primer, 690 Premium Vinyl Emulsion Primer.

4. COLOR: 1400 custom colors.

5. TECHNICAL DATA:

DRYING TIME: @ 77°F @ 50% RH
2 - 4 hr. - TO TOUCH
24 hr. - TO RECOAT

FINISH: Semi-Gloss

COVERAGE: 425 SQ. FT. @ 2 MIL DFT

VISCOSITY: 83 - 88 KU

VEHICLE TYPE: Alkyd

SOLIDS BY VOLUME: 53.00 ± 2.0%

WEIGHT PER GALLON: 11.02 LB. ± 2.0%

FLASH POINT: 108°F

VOC: 376 g/l

6. SURFACE PREPARATION: Surface must be dry and free of chalk, dirt, grease, oil and mildew. Lightly sand all glossy surfaces to provide an anchor profile for the new paint to adhere to.

7. MIXING: One component. Stir thoroughly in a lifting motion before using.

8. THINNING: Mineral spirits if necessary.

9. SHELF LIFE: 12 Months

10. CLEAN-UP: Mineral spirits.

11. CAUTION: PROTECT FROM FREEZING; VAPOR MAYBE HARMFUL. BREATHING OF VAPOR MAY CAUSE RESPIRATORY IRRITATION. USE ONLY WITH ADEQUATE VENTILATION. CAUSES EYE IRRITATION. DO NOT TAKE INTERNALLY. IN CASE OF SPILLAGE, ABSORB AND DISPOSE OF ACCORDING TO LOCAL REGULATIONS. KEEP OUT OF REACH OF CHILDREN.

FIRST AID: IN CASE OF SKIN CONTACT, FLUSH WITH PLENTY OF WATER; FOR EYES, FLUSH WITH RUNNING WATER FOR 15 MINUTES AND GET MEDICAL ATTENTION. IF EFFECTED BY INHALATION, MOVE TO FRESH AIR. **IF SWALLOWED, CALL PHYSICIAN IMMEDIATELY. DO NOT INDUCE.**

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ROSE TALBERT

P A I N T S

250 BONDAPLEX INTERIOR/EXTERIOR PRIMER

250 Bondaplex Acrylic Primer is designed to provide excellent stain blocking properties, resistance to nail head rusting, and promotes adhesion to new and repaint surfaces. 250 Bondaplex Primer has excellent adhesion to aged gloss alkyd surfaces, and is both an interior & exterior primer.

1. RECOMMENDED USES: To be used as an interior/exterior primer for wood, trim, doors, shutters, fascia, primed steel, aluminum, galvanized iron, vinyl siding, and masonry surfaces. Recommended for priming aged gloss alkyd surfaces.

2. LIMITATIONS: Do not paint over chalk, dust, dirt, grease, mildew, or rusty surfaces. Apply only when the atmospheric temperature and surface temperature will remain above 50°F, and not in foggy or rainy weather. Avoid using in direct sunlight above 95°F.

3. RECOMMENDED FINISHES:

Exterior	Interior
200 Bondaplex Low Lustre	300 Prem. Alkyd SG
1400 Bondaplex Gloss	400 Prem. Acrylic SG
1600 Bondaplex Flat	860 Imflo Enamel
100 Premium Oil House & Trim	8600 WB Acrylic Enamel
2600 Weatherbond	600 & 3500 Flat Latex
	5000 Prem. Latex Flat
	5400 Prem. Acr. Low Lus.
	8400 WB Low Lus. Enam.
	300 Prem. Alkyd SG

4. COLOR: White.

5. TECHNICAL DATA:

DRYING TIME:	@ 77°F
	30 min. - TO THE TOUCH
	2 - 4 hr. - TO RECOAT
FINISH:	Low Lustre
COVERAGE:	365 SQ. FT. @ 1.75 MIL DFT
VISCOSITY:	95 - 100 KU
VEHICLE TYPE:	Acrylic
SOLIDS BY VOLUME:	39.8 + 2.0%
WEIGHT PER GALLON:	10.84 LB. + 2.0%
FLASH POINT:	N/A OF.
VOC:	97 g/l

6. SURFACE PREPARATION: Surface must be dry and free of chalk, dirt, grease, oil and mildew.

7. MIXING: One component. Stir thoroughly in a lifting motion before using.

8. THINNING: Water if necessary

9. SHELF LIFE: 12 Months

10. CLEAN-UP: Warm soapy water.

11. CAUTION: PROTECT FROM FREEZING: VAPOR MAYBE HARMFUL. BREATHING OF VAPOR MAY CAUSE RESPIRATORY IRRITATION. USE ONLY WITH ADEQUATE VENTILATION. CAUSES EYE IRRITATION. DO NOT TAKE INTERNALLY. IN CASE OF SPILLAGE, ABSORB AND DISPOSE OF ACCORDING TO LOCAL REGULATIONS. KEEP OUT OF REACH OF CHILDREN.

FIRST AID: IN CASE OF SKIN CONTACT, FLUSH WITH PLENTY OF WATER; FOR EYES, FLUSH WITH RUNNING WATER FOR 15 MINUTES AND GET MEDICAL ATTENTION. IF EFFECTED BY INHALATION, MOVE TO FRESH AIR. **IF SWALLOWED, CALL PHYSICIAN IMMEDIATELY. DO NOT INDUCE VOMITING.**

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ROSE TALBERT

P A I N T S

5100 CLEAN ZERO VOC 100% ACRYLIC ENAMEL GLOSS / SEMI-GLOSS

An extremely durable, 100% Acrylic DTM modified acrylic enamel, which provides superior adhesion to alkyd gloss and semi-gloss surfaces. For use on most interior surfaces where maximum durability is desired. Also, can be used for select exterior applications.

1. RECOMMENDED USES: Excellent for use over primed, unprimed, or previously painted metal including galvanized; primed or previously painted wood, wallboard, plaster, concrete, brick, and concrete block. Use on walls, doors, wood trim, and machinery. Not to be used as a whole house paint on exterior wood.

2. LIMITATIONS: Do not paint over chalk, dust, dirt, grease, mildew, or rusty surfaces. Apply only when the atmospheric temperature and surface temperature will remain above 50°F, and not in foggy or rainy weather. Avoid using in direct sunlight above 95°F.

3. RECOMMENDED PRIMERS:

- A. Wood: 250 Bondaplex Acrylic Primer or 180 Enamel Undercoat (Alkyd).
- B. Drywall: 690 Vinyl Emulsion Primer.
- C. Masonry: 690 Vinyl Emulsion Primer.
- D. Concrete Block: 3550 HD Block Filler/650 Block Filler.
- E. Steel: #76, 78, 9072 & 9075 Metal Primers.
- F. Aluminum: #76 Metal Primer & 8900 DTM Primer.
- G. Galvanized: 250 Bondaplex or 690 Vinyl Emulsion Primer or 8600 WB Enamel Direct-to -Metal.

4. COLOR: 1400 custom colors.

5. TECHNICAL DATA:

DRYING TIME: @ 77°F, 50% RH.
1 hour - TO THE TOUCH
4 - 6 hr. - TO RECOAT

FINISH: Gloss / Semi-Gloss

COVERAGE: 326 SQ. FT. @ 2 MIL DFT/no loss

VISCOSITY: 85 - 95 KU

VEHICLE TYPE: Modified/Acrylic

SOLIDS BY VOLUME: 33.23 ± 2.0%

WEIGHT PER GALLON: 10.39 LB. ± 2.0%

FLASH POINT: N/A °F

VOC: 0 g/l; trace

6. SURFACE PREPARATION: Surface must be dry and free of chalk, dirt, grease, peeling or flaking paint, oil, mildew and rust.

7. MIXING: One component. Stir thoroughly in a lifting motion before using.

8. THINNING: Water if necessary

9. SHELF LIFE: 12 Months

10. CLEAN-UP: Warm soapy water.

11. CAUTION: PROTECT FROM FREEZING: VAPOR MAYBE HARMFUL. BREATHING OF VAPOR MAY CAUSE RESPIRATORY IRRITATION. USE ONLY WITH ADEQUATE VENTILATION. CAUSES EYE IRRITATION. DO NOT TAKE INTERNALLY. IN CASE OF SPILLAGE, ABSORB AND DISPOSE OF ACCORDING TO LOCAL REGULATIONS. KEEP OUT OF REACH OF CHILDREN.

FIRST AID: IN CASE OF SKIN CONTACT, FLUSH WITH PLENTY OF WATER; FOR EYES, FLUSH WITH RUNNING WATER FOR 15 MINUTES AND GET MEDICAL ATTENTION. IF EFFECTED BY INHALATION, MOVE TO FRESH AIR. **IF SWALLOWED, CALL PHYSICIAN IMMEDIATELY. DO NOT INDUCE VOMITING.**

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ROSE TALBERT

P A I N T S

CLEAN 5000 PREMIUM VINYL LATEX FLAT ZERO VOC

Clean 5000 is a premium quality flat finish made with a durable vinyl acrylic emulsion that forms a smooth, uniform, & dirt resistant finish. It has excellent hiding, uniform touch-up, and washing characteristics. Clean 5000 Products are zero VOC and low odor formulations.

1. RECOMMENDED USES: To be used as a finish coat on drywall, plaster, concrete block, masonry, wood, and steel.

2. LIMITATIONS: Do not paint over chalk, dust, dirt, grease, mildew, rusty or glossy surfaces. For interior use only. Apply only when the atmospheric temperature and surface temperature will remain above 50°F, and not in foggy or rainy weather. Do not wash with hard or abrasive cleaners. Use a mild detergent, warm soapy water and soft cloth to remove dirt.

3. RECOMMENDED PRIMERS:

- A. Drywall: 690 Premium Vinyl Emulsion Primer; Clean 5690 Premium Vinyl Emulsion Primer; 250 Bondaplex Interior/Exterior Primer.
- B. Plaster: 180 Premium Enamel Undercoat (Alkyd); 690 Premium Vinyl Emulsion Primer; Clean 5690 Vinyl Emulsion Primer.
- C. Wood: 250 Bondaplex Acrylic Primer; 180 Premium Enamel Undercoat (Alkyd); 690 Premium Vinyl Emulsion Primer; Clean 5690 Premium Vinyl Emulsion Primer.
- D. Masonry: 690 Premium Vinyl Emulsion Primer; Clean 5690 Premium Vinyl Emulsion Primer; 250 Bondaplex Interior/Exterior Primer.
- E. Concrete Block: 3550 HD Block Filler/ 650 Block Filler; 5550 Heavy Duty Vinyl Block Filler Zero VOC.
- F. Steel: #76 Zinc Chromate Metal Primer; 78 White Metal Primer; 9072 High Solids Phenolic Gray Primer; 9074-66 High Solids Phenolic Red Oxide Primers; 8900 Aqua Chem DTM Primer/Finish.
- G. Aluminum: #76 Zinc Chromate Metal Primer; 8900 Aqua Chem DTM Primer/Finish.
- H. Galvanized: No primer necessary.

4. COLOR: 1400 custom colors.

5. TECHNICAL DATA:

DRYING TIME: @ 77°F
30 min. - TO TOUCH
2 - 4 hr. - TO RECOAT

FINISH: Flat

COVERAGE: 584 SQ. FT. @ 1.0 MIL. DFT

VISCOSITY: 95 - 100 KU
VEHICLE TYPE: Vinyl Acrylic
SOLIDS BY VOLUME: 36.4 ± 2.0%
WEIGHT PER GALLON: 11.54 LB. ± 2.0%
FLASH POINT: N/A °F.
VOC: 0 g/l

6. SURFACE PREPARATION: Surface must be dry and free of chalk, dirt, grease, oil and mildew.

7. MIXING: One component. Stir thoroughly in a lifting motion before using.

8. THINNING: Water if necessary

9. SHELF LIFE: 12 Months

10. CLEAN-UP: Warm soapy water.

11. CAUTION: PROTECT FROM FREEZING: VAPOR MAYBE HARMFUL. BREATHING OF VAPOR MAY CAUSE RESPIRATORY IRRITATION. USE ONLY WITH ADEQUATE VENTILATION. CAUSES EYE IRRITATION. DO NOT TAKE INTERNALLY. IN CASE OF SPILLAGE, ABSORB AND DISPOSE OF ACCORDING TO LOCAL REGULATIONS. KEEP OUT OF REACH OF CHILDREN.

FIRST AID: IN CASE OF SKIN CONTACT, FLUSH WITH PLENTY OF WATER; FOR EYES, FLUSH WITH RUNNING WATER FOR 15 MINUTES AND GET MEDICAL ATTENTION. IF EFFECTED BY INHALATION, MOVE TO FRESH AIR. IF SWALLOWED, CALL PHYSICIAN IMMEDIATELY. DO NOT INDUCE VOMITING.

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ROSE TALBERT

P A I N T S

CLEAN 5400 PREMIUM ACRYLIC LOW LUSTRE ENAMEL ZERO VOC

Premium Acrylic Low Lustre Enamel is a premium quality low luster enamel formulated to have all the characteristics of gloss enamel. This tough, high hiding non-yellowing paint is for use in high traffic areas where a flat finish is not recommended. Clean 5000 products are zero VOC and low odor formulation.

1. RECOMMENDED USES: Use as an interior finish on plaster, drywall, masonry, concrete block, primed steel, and wood in homes, hospitals, schools and factories.

2. LIMITATIONS: Do not paint over chalk, dust, dirt, grease, mildew, rusty or glossy surfaces. For interior use only. Apply only when the atmospheric temperature and surface temperature will remain above 50°F, and not in foggy or rainy weather. Do not wash with hard or abrasive cleaners. Use a mild detergent, warm soapy water and soft cloth to remove dirt.

3. RECOMMENDED PRIMERS:

- A. Drywall: 690 Premium Vinyl Emulsion Primer; 5690 Premium Vinyl Emulsion Primer Zero VOC; 250 Bondaplex Interior/exterior.
- B. Plaster: 180 Premium Enamel UNDERcoat (Alkyd); 690 Premium Vinyl Emulsion Primer.
- C. Wood: 250 Bondaplex Acrylic Primer; 180 Premium Enamel Undercoat (alkyd); 690 Premium Vinyl Emulsion Primer; 5690 Premium Vinyl Emulsion Primer Zero VOC.
- D. Masonry: 690 Premium Vinyl Emulsion Primer; 5690 Premium Vinyl Emulsion Primer Zero VOC; 250 Bondaplex Interior/Exterior Primer.
- E. Concrete Block: 3550 HD Block Filler/ 650 Block Filler; 5550 Heavy Duty Vinyl Block Filler Zero VOC.
- F. Steel: #76 Zinc Chromate Metal Primer; 78 White Metal Primer; 9072 High solids Phenolic Gray Primer; 9075 High solids Phenolic Red Oxide Primer; 8900 Aqua Chen DTM Primer/Finish.
- G. Aluminum: #76 Metal Primer & 8900 DTM Primer.
- H. Galvanized: No primer necessary.

4. COLOR: White & Custom colors.

5. TECHNICAL DATA:

DRYING TIME: @ 77°F @ 50% RH
30 min. - TO TOUCH
2 - 4 hr. - TO RECOAT

FINISH: Eggshell
COVERAGE: 400 SQ. FT. @ 1.32 MIL DFT
VISCOSITY: 95 KU
VEHICLE TYPE: Vinyl Acrylic

SOLIDS BY VOLUME: 32.27 ± 2.0%
WEIGHT PER GALLON: 10.42 L.B. ± 2.0%
FLASH POINT: N/A°F
VOC: 0 g/l

6. SURFACE PREPARATION: Surface must be dry and free of chalk, dirt, grease, oil and mildew.

7. MIXING: One component. Stir thoroughly in a lifting motion before using.

8. THINNING: Water if necessary

9. SHELF LIFE: 12 Months

10. CLEAN-UP: Warm soapy water.

11. CAUTION: PROTECT FROM FREEZING: VAPOR MAYBE HARMFUL. BREATHING OF VAPOR MAY CAUSE RESPIRATORY IRRITATION. USE ONLY WITH ADEQUATE VENTILATION. CAUSES EYE IRRITATION. DO NOT TAKE INTERNALLY. IN CASE OF SPILLAGE, ABSORB AND DISPOSE OF ACCORDING TO LOCAL REGULATIONS. KEEP OUT OF REACH OF CHILDREN.

FIRST AID: IN CASE OF SKIN CONTACT, FLUSH WITH PLENTY OF WATER; FOR EYES, FLUSH WITH RUNNING WATER FOR 15 MINUTES AND GET MEDICAL ATTENTION. IF EFFECTED BY INHALATION, MOVE TO FRESH AIR. IF SWALLOWED, CALL PHYSICIAN IMMEDIATELY. DO NOT INDUCE VOMITING.

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P A I N T S

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Recent Job List:

University of South Carolina

1. **University of South Carolina, Dodie Anderson Academic Enrichment Center** – Architect: Watson Tate Savory; GC: Construction Dynamics
2. **University of South Carolina New Men's Basketball Office and Team Spaces** – Architect: Garvin Design Group; GC: Gilliam & Associates, Inc.

Richland County

1. **Richland County Government Decker Center Remodel** – Architect: The Boudreaux Group; GC: H.G. Reynolds Company, Inc.
2. **Richland County Public Library Northeast Branch** – Architect: The Boudreaux Group; GC: Construction Dynamics, Inc.
3. **Richland County Public Library Wheatley Branch** – Architect: Liolllio Architecture; GC: Sumwalt Construction
4. **Richland County Public Library Cooper Branch** – Architect: The Boudreaux Group; GC: Pyramid Contracting

Lexington County Schools

1. **Riverbank Elementary** – Architect: Jumper Carter Sease; GC: Thompson Turner Construction
2. **Cayce Elementary School** – Architect: Jumper Carter Sease; GC: Thompson Turner Construction
3. **Oak Grove Elementary School** – GC: Edcon, Inc.
4. **New Lexington Elementary School #2** – Architect: Jumper Carter Sease; GC: Thompson Turner Construction
5. **Career and Technology Education Center** – Architect: Jumper Carter Sease; GC: M.B. Kahn
6. **Congaree Elementary School** – GC: H.G. Reynolds
7. **Airport High School** - Architect: Lambert Architecture and Construction Services
8. **Pine Ridge Middle School** – Architect: Boomerang Design GC: M.B. Kahn
9. **New Fleet Services Building and New Public Safety Regional Training Facility** – Architect: Boomerang Design; GC: Attaway Construction & Associates
10. **Auxiliary Administration Building** – Architect: Boomerang Design; GC: Pyramid Contracting
- 11.

Anderson County Schools

1. **Anderson Institute of Technology** – Architect: McMillan Pazdan Smith Architecture; GC: H.G. Reynolds

Horry County Schools

1. **Midland Elementary School** – Architect: Pike McFarland and Hall Architects; GC: FBI Construction

Calhoun County Schools

1. **Additions to St. Matthew & Dandy Run K-8 Schools –**
Architect: Moseley Architects; GC: Edcon, Inc.

Fairfield County

1. **Fairfield County Recreation Capital Projects**

- **Ridgeway EMS Station**
- **Jenkinsville Fire EMS Station**
- **Community Building District 4**
- **Community Building District 2**
- **Ridgeway Fire Station**

Architect: John Bowman Architects, PA; GC: Loveless
Commercial Contracting, LLC

Fort Mill Schools

1. **Pleasant Knoll Middle School –** Architect: LS3P; GC: Leitner
Construction

SECTION 226813 - 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. Manual gas shutoff valves.
 5. Motorized gas valves.
 6. Earthquake valves.
 7. Pressure regulators.
 8. Service meters.
 9. Dielectric fittings.

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 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. Pressure regulators. Indicate pressure ratings and capacities.
 5. 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.

1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For motorized gas valves, pressure regulators and service meters to include in emergency, operation, and maintenance manuals.

1.7 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.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- B. Store and handle pipes and tubes having factory-applied protective coatings to avoid damaging coating, and protect from direct sunlight.
- C. Protect stored PE pipes from direct sunlight.

1.9 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 Owner no fewer than ten 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.

1.10 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.
- B. 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 PERFORMANCE REQUIREMENTS

- A. Minimum Operating-Pressure Ratings:
 - 1. Piping and Valves: 100 psig minimum unless otherwise indicated.
 - 2. Service Regulators: 65 psig minimum unless otherwise indicated.
 - 3. Minimum Operating Pressure of Service Meter: 10 psig.
- B. Natural-Gas System Pressure within Buildings: As indicated on the drawings. Not more than 5 psig.
- C. Delegated Design: Design restraints and anchors for natural-gas piping and equipment, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

2.2 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.
 - 4. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
 - a. Material Group: 1.1.
 - b. End Connections: Threaded or butt welding to match pipe.
 - c. Lapped Face: Not permitted underground.
 - d. Gasket Materials: ASME B16.20, metallic, flat, asbestos free, aluminum o-rings, and spiral-wound metal gaskets.
 - e. Bolts and Nuts: ASME B18.2.1, carbon steel aboveground and stainless steel underground.
 - 5. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.
 - a. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.

2.3 PIPING SPECIALTIES

- A. Appliance Flexible Connectors:
 - 1. Indoor, Fixed-Appliance Flexible Connectors: Comply with ANSI Z21.24.
 - 2. Indoor, Movable-Appliance Flexible Connectors: Comply with ANSI Z21.69.
 - 3. Outdoor, Appliance Flexible Connectors: Comply with ANSI Z21.75.
 - 4. Corrugated stainless-steel tubing with polymer coating.

5. Operating-Pressure Rating: 0.5 psig.
6. End Fittings: Zinc-coated steel.
7. Threaded Ends: Comply with ASME B1.20.1.
8. Maximum Length: 60 inches

B. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 and smaller; flanged ends for NPS 2-1/2 and larger.
3. Strainer Screen: 40-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig.

- C. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.

2.4 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.

2.5 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. 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. A.Y. McDonald Mfg. Co.
 - b. Apollo Flow Controls; Conbraco Industries, Inc.
 - c. BrassCraft Manufacturing Co.; a Masco company
 - d. Lyall, R. W. & Company, Inc
 - e. Perfection Corporation
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 "Underground Manual Gas Shutoff Valve Schedule" and "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.

D. Bronze Plug Valves: MSS SP-78.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. A.Y. McDonald Mfg. Co.
 - b. Lee Brass Company
2. Body: Bronze, complying with ASTM B 584.
3. Plug: Bronze.
4. Ends: Threaded, socket, or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "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.

E. Valve Boxes:

1. Cast-iron, two-section box.
2. Top section with cover with "GAS" lettering.
3. Bottom section with base to fit over valve and a barrel a minimum of 5 inches in diameter.
4. Adjustable cast-iron extensions of length required for depth of bury.
5. Include tee-handle, steel operating wrench with socket end fitting valve nut or flat head, and with stem of length required to operate valve.

2.6 EARTHQUAKE VALVES

A. Earthquake Valves, Maximum Operating Pressure of 5 psig: Comply with ASCE 25.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Vanguard Valves, Inc
2. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction.
3. Maximum Operating Pressure: 5 psig.
4. Cast-aluminum body with nickel-plated chrome steel internal parts.
5. Nitrile-rubber valve washer.
6. Sight windows for visual indication of valve position.
7. Threaded end connections complying with ASME B1.20.1.
8. Wall mounting bracket with bubble level indicator.

2.7 PRESSURE REGULATORS

A. General Requirements:

1. Single stage and suitable for natural gas.
2. Steel jacket and corrosion-resistant components.
3. Elevation compensator.
4. End Connections: Threaded for regulators NPS 2 and smaller; flanged for regulators NPS 2-1/2 and larger.

- B. Line Pressure Regulators: Comply with ANSI Z21.80.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Actaris
 - b. American Meter Company
 - c. Eclipse Innovative Thermal Technologies
 - d. Fisher Control Valves & Instruments; a brand of Emerson Process Management
 - e. Invensys
 - f. Itron Gas
 - g. Maxitrol Company
 - h. Richards Industries
 2. Body and Diaphragm Case: Cast iron or die-cast aluminum.
 3. Springs: Zinc-plated steel; interchangeable.
 4. Diaphragm Plate: Zinc-plated steel.
 5. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
 6. Orifice: Aluminum; interchangeable.
 7. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
 8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
 9. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
 10. Overpressure Protection Device: Factory mounted on pressure regulator.
 11. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.
 - a. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.
 12. Maximum Inlet Pressure: 5 psig.
- C. Appliance Pressure Regulators: Comply with ANSI Z21.18.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton
 - b. Harper Wyman Co
 - c. Maxitrol Company
 - d. SCP, Inc
 2. Body and Diaphragm Case: Die-cast aluminum.
 3. Springs: Zinc-plated steel; interchangeable.
 4. Diaphragm Plate: Zinc-plated steel.
 5. Seat Disc: Nitrile rubber.
 6. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
 7. Factory-Applied Finish: Minimum three-layer polyester and polyurethane paint finish.
 8. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.
 9. Maximum Inlet Pressure: 1 psig.

2.8 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. A.Y. McDonald Mfg. Co.

- b. HART Industrial Unions, LLC
 - c. Jomar Valve
 - d. Matco-Norca
 - e. WATTS
 - f. Wilkins
 - g. Zurn Industries, LLC
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.

2.9 LABELING AND IDENTIFYING

- A. Detectable Warning Tape: Acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored yellow.

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 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 1 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. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap. Coordinate location with Architect.
- O. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, or below grade or floors unless indicated to be exposed to view.
- P. 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 Floors: Install natural-gas piping with welded joints and protective coating in cast-in-place concrete floors. Cover piping to be cast in concrete slabs with minimum of 1-1/2 inches of concrete. Piping may not be in physical contact with other metallic structures such as reinforcing rods or electrically neutral conductors. Do not embed piping in concrete slabs containing quick-set additives or cinder aggregate.
 - 3. In Walls or Partitions: Protect piping installed inside partitions or hollow walls from physical damage using steel striker barriers at rigid supports.
 - a. Exception: Piping passing through partitions or walls does not require striker barriers.
 - 4. 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.
- Q. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
- R. Connect branch piping from top or side of horizontal piping.
- S. 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.
- T. Do not use natural-gas piping as grounding electrode.
- U. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.
- V. Install pressure gage downstream from each line regulator.
- W. Install sleeves for piping penetrations of walls, ceilings, and floors.
- X. Install sleeve seals for piping penetrations of concrete walls and slabs.
- Y. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.4 VALVE INSTALLATION

- A. Install manual gas shutoff valve for each gas appliance ahead of connector.
- B. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.
- C. Install earthquake valves aboveground outside buildings according to listing.

3.5 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.

3.6 HANGER AND SUPPORT INSTALLATION

- A. Install seismic restraints on piping.
- B. Comply with requirements for pipe hangers and supports specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
- C. 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.

3.7 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.

3.8 LABELING AND IDENTIFYING

- A. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment" for piping and valve identification.
- B. Install detectable warning tape directly above gas piping, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.9 PAINTING

- A. Paint exposed, interior metal piping, valves, service regulators, service meters and meter bars, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.
 1. Alkyd System: MPI INT 5.1E.
 - a. Prime Coat: Alkyd anticorrosive metal primer.
 - b. Intermediate Coat: Interior alkyd matching topcoat.
 - c. Topcoat: Interior alkyd (flat).
 - d. Color: Gray.

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

3.10 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.
- E. Provide minimum 48 hours notice prior to testing to allow the Architect, Engineer, Commissioning Agent, Owner or his representative the opportunity to attend.

3.11 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain earthquake valves.

3.12 INDOOR PIPING SCHEDULE

- A. Aboveground, piping shall be one of the following:
 - 1. NPS 3/4 through 2: Steel pipe with malleable-iron fittings and threaded joints.
- B. Containment Conduit: Steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.
- C. Containment Conduit Vent Piping: Steel pipe with malleable-iron fittings and threaded or wrought-steel fittings with welded joints.

3.13 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

- A. Valves at service meter shall be one of the following:
 - 1. Two-piece, full-port, bronze ball valves with bronze trim.
 - 2. Bronze plug valve.
- B. Distribution piping valves shall be the following:
 - 1. Two-piece, full-port, bronze ball valves with bronze trim.
- C. Valves in branch piping for single appliance shall be the following:
 - 1. Two-piece, full-port, bronze ball valves with bronze trim.

END OF SECTION 226813

SECTION 237313 – AIR-HANDLING UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes packaged, large-capacity, rooftop air conditioning units (AHUs) with the following components and accessories:
 - 1. Casings.
 - 2. Fans.
 - 3. Motors.
 - 4. Coils.
 - 5. Refrigerant circuit components.
 - 6. Air filtration.
 - 7. Dampers.
 - 8. Electrical power connections.
 - 9. Controls.
 - 10. Accessories

1.3 DEFINITIONS

- A. DDC: Direct-digital controls.
- B. ECM: Electronically commutated motor.
- C. Outdoor-Air Refrigerant Coil: Refrigerant coil in the outdoor-air stream to reject heat during cooling operations and to absorb heat during heating operations. "Outdoor air" is defined as the air outside the building or taken from outdoors and not previously circulated through the system.
- D. AHU: Rooftop unit. As used in this Section, this abbreviation means packaged, large-capacity, rooftop air-conditioning units. This abbreviation is used regardless of whether the unit is mounted on the roof or on a concrete base on ground.
- E. Supply-Air Fan: The fan providing supply air to conditioned space. "Supply air" is defined as the air entering a space from air-conditioning, heating, or ventilating apparatus.
- F. Supply-Air Refrigerant Coil: Refrigerant coil in the supply-air stream to absorb heat (provide cooling) during cooling operations and to reject heat (provide heating) during heating operations. "Supply air" is defined as the air entering a space from air-conditioning, heating, or ventilating apparatus.

1.4 ACTION SUBMITTALS

- A. Product Data: For each air-handling unit, including components provided or furnished as part of the air-handling unit as a single submittal package, even where components are specified in related sections. Refer to related sections for component product data submittal requirements.
1. Unit dimensions and required clearances.
 2. Unit components.
 3. Casing material, metal thickness, finishes, insulation, and accessories.
 4. Casing construction details.
 5. Weight loads and distributions by component section.
 6. Sound Data:
 - a. Unweighted octave band air-handling unit sound power for inlets and outlets rated in accordance with AHRI Standard 260. Provide eight data points, the first for the octave centered at 63 Hz, and the eighth centered at 8,000 Hz.
 - b. Unweighted casing radiated sound power over the same 8 octave bands in accordance with ISO 9614 Parts 1&2 and ANSI S12.12.
 - c. Manufacturer shall not use sound estimates based on bare fan data (AMCA ratings), nor use calculations like the substitution method based on AHRI 260 tests of other air-handling unit products.
 7. Required clearances, field connection locations, wiring diagrams, shipping drawings, and curb drawings.
 8. Electrical requirements for power supply wiring including wiring diagrams for interlock and control wiring, clearly indicating factory-installed and field-installed wiring.
 9. Static pressure profiles by component section.
 10. Panel deflection at +/- 10-inch wg, stated in terms of 'L/X' where 'L' is the casing panel length and 'X' is a constant provided by the AHU manufacturer.
 11. Casing leakage rate at +/- 10-inch wg, specified in terms of percentage of design airflow.
- B. Air-handling unit plan, elevation and section views shall be provided in a scale no less than 1/4" = 1'-0".

1.5 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Data: Certificates, for AHUs, 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.
 4. Restraint of internal components, including fans, coils, and refrigeration components.
- B. Field quality-control reports.
- C. Source quality-control reports.
- D. Sample Warrant: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For AHUs to include in emergency, operation, and maintenance manuals.

1.7 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. Filters: For each air-handling unit, provide:
 - a. One set of filters at the start of testing, adjusting and balancing (TAB).
 - b. One set of filters for final turnover to owner.
 - 2. Gaskets: One set(s) for each access door.
 - 3. Fan Belts: One set(s) for each air-handling unit fan.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Comply with ASHRAE 62.1, Section 7 - "Construction and Startup." Protect equipment from moisture by appropriate in-transit and on-site procedures.
- B. Follow manufacturer's recommendations for handling, unloading and storage.
- C. Protect, pack, and secure loose-shipped items within the air-handling units. Include detailed packing list of loose-shipped items, including illustrations and instructions for application.
- D. Protect, pack and secure controls devices, motor control devices and other electronic equipment. Do not store electronic equipment in wet or damp areas even when they are sealed and secured.
- E. Enclose and protect control panels, electronic devices, and variable frequency drives. Do not store equipment in wet or damp areas even when they are sealed and secured.
- F. Seal openings to protect against damage during shipping, handling and storage.
- G. Wrap indoor units with a tight sealing 8 mil shrink wrap membrane for protection against rain, snow, wind, dirt, sun fading, road salt/chemicals, rust and corrosion during shipping. Wrapping membrane shall cover entire air-handling unit during shipping and storage. Cover equipment, regardless of size or shape.
- H. Tarp outdoor units with a tight sealing membrane for protection against rain, snow, wind, dirt, sun fading, road salt/chemicals, rust and corrosion during shipping. Tarp shall cover entire air-handling unit during shipping and storage. Cover equipment, regardless of size or shape.
- I. Clearly mark AHU sections with unit tag number, segment sequence number, and direction of airflow. Securely affix safety-warning labels.
- J. The unit manufacturer shall ship the unit with blank-off plates suitably sealed to allow for field air leakage testing to occur.

1.9 SOURCE QUALITY ASSURANCE

- A. AHRI 430 Certification: Air-handling units and their components shall be factory tested according to AHRI 430 and shall be listed and labeled by AHRI.
- B. AMCA 301 or AHRI 260: Air-handling unit fan sound ratings shall comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data," or AHRI 260, "Sound Rating of Ducted Air Moving and Conditioning Equipment."
- C. Fan Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Fans shall bear AMCA-certified sound ratings seal.
- D. Fan Performance Rating: Factory test fan performance for airflow, pressure, power, air density, rotation speed, and efficiency. Rate performance according to AMCA 210, "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating."
- E. Refrigerant Coils: Factory tested to minimum 450-psig internal pressure and to minimum 300-psig internal pressure while underwater, according to AHRI 410 and ASHRAE 33.

1.10 COORDINATION

- A. If equipment is supplied by a manufacturer other than the basis of design, coordinate with the General Contractor and affected subcontractors to ensure the specified performance is met. Coordination shall include (but is not limited to) the following:
 - 1. Structural supports for units.
 - 2. Size and location of concrete bases/housekeeping pads.
 - 3. Ductwork sizes and connection locations.
 - 4. Interference with existing or planned ductwork, piping and wiring.
 - 5. Electrical power requirements and wire/conduit and over current protection sizes.
 - 6. Trap height requirements.

1.11 WARRANTY

- A. Manufacturer agrees to repair or replace components of air handling unit that fail in materials or workmanship within specified warranty period. This warrants that all products are free from defects in material and workmanship.
 - 1. One year from date of Substantial Completion.
- B. Warranty work shall be performed by manufacturer's factory-trained and factory-employed technician.
- C. Warranty covers all parts except consumable items (belts, filters, fuses). Include factory-provided controls in the parts warranties.
- D. Parts associated with routine maintenance, such as belts and air filters shall be excluded.
- E. The manufacturer's factory-trained and factory-employed technician shall provide labor warranty for the unit's first operating year.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. The contractor shall furnish and install packaged mixed air units as shown and scheduled on the contract documents. The units shall be installed in accordance with this specification and perform at the specified conditions as scheduled.
- B. AHRI Compliance:
 - 1. Comply with AHRI 340/360 for testing and rating energy efficiencies for AHUs.
 - 2. Comply with AHRI 270 for testing and rating sound performance for AHUs.
 - 3. Comply with AHRI 1060 for testing and rating performance for air-to-air exchanger.
 - 4. Comply with AHRI 210/240 for testing and rating energy efficiencies for AHUs.
- C. AMCA Compliance:
 - 1. Comply with AMCA 11 and bear the AMCA-Certified Ratings Seal for air and sound performance according to AMCA 211 and AMCA 311.
 - 2. Damper leakage tested in accordance with AMCA 500-D.
 - 3. Operating Limits: Classify according to AMCA 99.
- D. ASHRAE Compliance:
 - 1. Comply with ASHRAE 15 for refrigeration system safety.
 - 2. Comply with ASHRAE 33 for methods of testing cooling and heating coils.
 - 3. Comply with applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and StaAHUp."
- E. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."
- F. NFPA Compliance: Comply with NFPA 90A or NFPA 90B.
- G. UL Compliance: Comply with UL 1995.
- H. 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 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide air handler as manufactured by Innovent Air Handling Equipment or comparable product by one of the following:
 - 1. Carrier Corporation; a unit of United Technologies Corp.
 - 2. Daikin Applied
 - 3. Munters
 - 4. Trane
 - 5. YORK; a Johnson Controls
 - 6. Venmar

2.3 PERFORMANCE REQUIREMENTS

- A. Wind-Restraint Performance:
 - 1. Refer to ASCE/SEI 7 and structural drawings for criteria.
 - 2. Minimum 10 lb/sq. ft. multiplied by the maximum area of the mechanical component projected on a vertical plane that is normal to the wind direction, and 45 degrees either side of normal.
- B. Seismic Performance: AHUs, accessories, and components shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- C. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified."

2.4 GENERAL

- A. Unit(s) shall be designed for dehumidification, cooling and/or heating of Mixed Air.
- B. For dehumidification and cooling modes the evaporator temperature shall be monitored, reported at unit controller.
- C. Compressor controls shall modulate capacity to maintain evaporator leaving set point. Hot Gas Bypass shall not be used to control compressor capacity. Compressor hot gas reheat (HGRH) shall be factory installed a minimum of 6" downstream from the leaving face of the evaporator coil.
- D. Compressor on-off only or primary heating on-off only controls shall not be acceptable control strategies.
- E. Units shall have labels, decals, and/or tags to aid in the service of the unit and indicate caution areas.
- F. Unit discharge airflow configuration shall be down flow.

2.5 CASINGS

- A. General Fabrication Requirements for Casings: Formed and reinforced double-wall insulated panels, fabricated to allow removal for access to internal parts and components, with joints between sections sealed.
- B. Double-Wall Construction: Fill space between walls with 2-inch foam insulation and seal moisture tight for minimum R-13 performance.
- C. Exterior Casing Material: Galvanized steel with factory-painted finish, with pitched roof panels and lifting lugs.
 - 1. Provide openings thru the base for power, control and gas connections.
- D. Inner Casing Fabrication Requirements:
 - 1. Inside Casing: G-90-coated galvanized steel, 0.034 inch thick.
- E. Base Material: Double-wall construction with 2-inch foam insulation, fully enclosed with G-90-coated galvanized steel cover. Insulation shall not be exposed on underside of unit base.

- F. Roof Material: Double-wall construction with 2-inch foam insulation, fully enclosed with G-90-coated galvanized steel cover. One piece construction, or where seams exist, it shall be double-hemmed and gasket-sealed.
- G. Hinged Panels: Water- and air-tight hinged access panels shall provide access to all areas requiring routine service including air filters, heating section, electrical and control cabinet sections, power relief fan section, supply air fan section, evaporator and reheat coil sections.
 - 1. Insulated doors shall be constructed to allow the hinges to be reversed in the field.
 - 2. Hold-open devices shall be factory installed on all hinged access doors. Chains shall not be used as hold-open devices.
 - 3. Latches with locking hasp or tool operated closure devices shall be factory installed on all hinged access panels.
- H. Corrosion-Resistant Coating: Apply a corrosion-resistant coating capable of withstanding a 500-hour salt-spray test according to ASTM B 45.
- I. Condensate Drain Pans: Fabricated using stainless-steel sheet 0.025 inch thick, a minimum of 2 inches deep, and complying with ASHRAE 62.1 for design and construction of drain pans.
 - 1. Double-Wall Construction: Fill space between walls with minimum 1 inch thick foam insulation and seal moisture tight.
 - 2. Drain Connections: Threaded nipple.
- J. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

2.6 FANS

- A. Supply-Air Fans: Backward inclined, premium efficiency.
 - 1. Electronic commutated motor (ECM) with integrated power electronics for variable motor speed.
- B. Condenser-Coil Fan: Propeller, premium efficiency, direct drive mounted on shaft of permanently lubricated motors. Low-noise corrosion resistant glass reinforced polypropylene props, powder coated wire discharge guards and electro-plated motor mounting brackets.
- C. Provide shafts constructed of solid hot rolled steel, ground and polished, with key-way, and protectively coated with lubricating oil.
- D. Fans shall be statically and dynamically balanced.

2.7 POWERED RELIEF

- A. Provide a factory installed power exhaust assembly that shall be designed to ventilate return air to atmosphere.
- B. Plenum mounted direct drive airfoil design. Wheel material shall be heavy gauge aluminum, welded construction and rated for up to Class III speed/pressure performance.
 - 1. Belt-drive and/or forward curve plenums fans shall not be used.
- C. Exhaust to discharge through powered isolation dampers located on each side of unit cabinet.

2.8 MOTORS

- A. Comply with Section 230513 "Common Motor Requirements for HVAC Equipment" and the requirements of this Article.
- B. Efficiency: Premium efficient.

2.9 COILS

- A. Supply-Air and Hot-Gas Reheat Refrigerant Coil:
 - 1. Aluminum-plate fin and seamless internally grooved copper tube in steel casing with equalizing-type vertical distributor.
 - 2. Coil Split: Interlaced. Maximum of 12 FPI.
 - 3. Leak Test: Factory leak tested in accordance ANSI/ASHRAE 15-1992 at a minimum pressure of 500 PSIG.
 - 4. Evaporator coil face and the hot gas reheat coil face shall be separated by a minimum of six inches.
- B. Condenser Refrigerant Coil:
 - 1. Aluminum-plate fin and seamless internally grooved copper tube in steel casing with equalizing-type vertical distributor.
 - 2. Coil Split: Interlaced. Maximum of 12 FPI.
 - 3. Leak Test: Factory leak tested in accordance ANSI/ASHRAE 15-1992 at a minimum pressure of 500 PSIG.

2.10 REFRIGERANT CIRCUIT COMPONENTS

- A. Compressor: Hermetic, dual-digital scroll type, mounted on vibration isolators; with internal overcurrent and high-temperature protection, internal pressure relief, and crankcase heater.
 - 1. Two hermetically sealed independent refrigerant circuits factory-supplied completely piped with liquid line filter-drier, liquid line charging port, suction and liquid line pressure ports, sight glass, and thermal expansion valve.
 - 2. Provide each circuit with automatic reset high and low pressure and high temperature switches for safety control.
 - 3. Modulate compressor capacity during dehumidification or cooling modes to maintain evaporator dehumidification or cooling setpoint and prevent evaporator frosting or freezing.
 - 4. Hot gas by pass shall not be an acceptable compressor capacity control strategy.
- B. Refrigeration Specialties:
 - 1. Refrigerant: R-410A.
 - 2. Expansion valve with replaceable thermostatic element.
 - 3. Refrigerant filter/dryer.
 - 4. Manual-reset high-pressure safety switch.
 - 5. Automatic-reset low-pressure safety switch.
 - 6. Minimum off-time relay.
 - 7. Automatic-reset compressor motor thermal overload.
 - 8. Brass service valves installed in compressor suction and liquid lines.
 - 9. Low-ambient kit high-pressure sensor.
 - 10. Hot-gas reheat solenoid valve modulating with a replaceable magnetic coil.
 - 11. Four-way reversing valve with a replaceable magnetic coil, thermostatic expansion valves with bypass check valves, and a suction line accumulator.

2.11 AIR FILTRATION

- A. Unit shall be equipped with a 6" filter rack upstream of the evaporator:
 - 1. 2" deep, MERV 8
 - 2. 12" deep, MERV 13
- B. Minimum arresance and MERV according to ASHRAE 52.2.

2.12 ELECTRIC RESISTANCE HEAT

- A. Heaters shall meet the requirements of the National Electrical Code and shall be listed by Underwriters Laboratories for zero clearance to combustibile surfaces and for use with heat pumps and air conditioning equipment.
- B. Heating elements shall be open coil, 80 percent nickel, 20 percent chromium, Grade A resistance wire. Type C alloys containing iron or other alloys are not acceptable.
- C. Coils shall be machine crimped into stainless steel terminals extending at least 1 inch into the air stream and all terminal hardware shall be stainless steel.
- D. Coils shall be supported by ceramic bushings staked into supporting brackets.
- E. Heater frames and terminal boxes shall be corrosion resistant steel. Unless otherwise indicated, the terminal box shall be NEMA 1 construction and shall be provided with a hinged, latching cover.
- F. Heaters shall be furnished with a disc type, automatic reset thermal cutout for primary over temperature protection.
- G. All heaters shall also be furnished with disc type, load-carrying manual reset thermal cutouts, factory wired in series with heater stages for secondary protection. Heat limiters or other fusible over temperature devices are not acceptable.
- H. Control will be SCR type.

2.13 DAMPERS

- A. Refer to Section 233300 "Air Duct Accessories" for damper product data and additional requirements. Dampers shall be provided by the air-handing unit manufacturer. Actuators shall be provided by the BAS provider.
- B. Return-, and Relief-Air Control Dampers:
 - 1. Type: Opposed-blade.
 - 2. Material: Galvanized steel. Provide extruded-aluminum in units with aluminum inside casing wall.
 - 3. Leakage: Class IA.
 - 4. Damper Operators: Comply with requirements in Section 230900 "Building Automation and Temperature Control System."
- C. Backdraft Dampers:
 - 1. Type: Parallel-blade.
 - 2. Material: Galvanized steel. Provide extruded-aluminum in units with aluminum inside casing wall.

3. Damper Operators: Gravity.
- D. Smoke Dampers:
1. Type: Opposed-blade.
 2. Material: Galvanized steel. Provide extruded-aluminum in units with aluminum inside casing wall.
 3. Leakage: Class I.
 4. Damper Motor: Two-position action, as required.
- E. Isolation Dampers:
1. Type: Opposed-blade.
 2. Material: Galvanized steel. Provide extruded-aluminum in units with aluminum inside casing wall.
 3. Leakage: Class I.
 4. Damper Operators: Comply with requirements in Section 230900 "Building Automation and Temperature Control System."
- F. Outdoor Airflow Measuring and Control Dampers:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. TAMCO/EBTRON AIR-IQ
 - b. Greenheck AMD-TD
 2. Type: Factory assembled, damper mounted electronic thermal dispersion airflow and temperature measurement device.
 3. Mounting: The suitable for horizontal or vertical airflow applications, as required.
 4. Performance:
 - a. Leakage: Class 1A.
 - b. Operating Temperature Limits: -20°F to 160°F.
 - c. Temperature Accuracy: $\pm 0.14^\circ\text{F}$ over the entire operating temperature range.
 - d. Airflow Accuracy: $\pm 2\%$ of reading.
 - e. Airflow Rates: 0 to 5,000 FPM.
 5. Damper and Sleeve:
 - a. Frame: Galvanized steel 5" x 1" structural hat channel, minimum 16 gauge.
 - b. Blades: Heavy gauge extruded aluminum, airfoil shape.
 - c. Blade Orientation: Horizontal.
 - d. Blade Operation: Opposed blade or parallel.
 - e. Seals:
 - 1) Blade Edge: Silicon or extruded EPDM, mechanically fastened to each blade.
 - 2) Frame: Extruded silicon.
 - f. Linkage: Concealed in frame out of the airstream, plated steel material.
 - g. Axles: Minimum $\frac{1}{2}$ inch dia. stainless steel or aluminum. Removable control shaft shall extend 6" beyond the damper frame.
 - h. Bearings: 304 stainless steel or celcon acetal copolymer.
 - i. Sleeve: 18-inch, minimum 20 gauge sleeve with air straightener.
 6. Airflow/Temperature Measurement Devices
 - a. Probes: Each sensor probe shall consist of one to eight independent sensor nodes in a gold anodized, aluminum 6063 alloy tube with 304 stainless steel mounting brackets.
 - b. Sensor Node: Each sensor node shall consist of two hermetically sealed bead-in-glass thermistors. Chip thermistors of any type or packaging are not acceptable.
 - c. Sensor Density Requirements: Number of individual sensor nodes provided for each damper location shall be detailed in published documentation by the manufacturer.
 - d. Wiring: All internal wiring between thermistors and probe connecting cables shall be Kynar jacketed.

- 1) Manufacturer shall provide UL listed, FEP jacketed, plenum rated cable(s) between sensor probes and the remote transmitter.
7. Transmitter:
- a. Supplied by the same manufacturer as the measuring station.
 - b. Input power shall be 24VAC/24VDC. Include over-voltage and over-current protection, and ensure continuous operation following power failures and/or brown-outs.
 - c. Analog output shall be field configurable as linear 0-5 VDC, 0-10 VDC or 4-20mA signals.
 - d. Two isolated and fused analog output signals and one RS-485 network connection
 - 1) One analog output signal shall provide the average airflow rate.
 - 2) One analog output signal shall be field configurable to output the average temperature, the velocity weighted temperature or a binary airflow alarm.
 - 3) The RS-485 network connection shall be field configurable as BACnet MS/TP.
 - e. The RS-485 connection shall transmit the average airflow rate, average temperature, individual airflow rates of each sensor node, and individual temperatures of each sensor node and system status.
 - f. High visibility backlit LCD for display of either the averaged or individual sensor airflow and temperature measurements, in user selectable units of measure.

2.14 ELECTRICAL POWER CONNECTIONS

- A. AHU shall have a single connection of power to unit with unit-mounted disconnect switch accessible from outside unit and control-circuit transformer with built-in overcurrent protection.
 1. SCCR rating shall be a minimum of 65kA.
- B. Field wiring access shall be provided thru unit base into isolated enclosure with removable cover.
- C. All low voltage field wiring connections shall be made at factory installed low voltage terminal strip.

2.15 CONTROLS

- A. Control equipment and sequence of operation are specified in Section 230900 "Building Automation and Temperature Control System" and indicated on the drawings.
- B. AHU DDC controller shall be by the unit manufacturer and unit configuration shall be coordinated with contract documents.
- C. Unit System Control Points:
 1. Outdoor Air Temperature Sensor
 2. Outdoor Air Humidity Sensor
 3. Outdoor Air Flow Measuring Station
 4. Outdoor Air Modulating Damper and Actuator
 5. Return Air/Mixed Air Modulating Damper and Actuator
 6. Filter Differential Pressure Switch - Status
 7. 0-10 vDc Input for Dual Compressor Capacity Modulation
 8. Evaporator Leaving Air Temperature Sensor
 9. 0-10 vDc Input for Hot Gas Reheat Modulation
 10. Supply Fan Status
 11. Supply Fan Piezometer Air Flow Measuring Station

12. Supply Fan VFD Control
13. 0-10vDc Input for Natural Gas Heater Modulation
14. Relief Air Damper and Actuator
15. Relief Fan VFD Control
16. Return Air Enthalpy Sensor – Humidity and Temperature
17. Space Static Pressure Sensor – Building Pressure Control
18. Discharge Temperature Sensor
19. Duct Static Pressure Sensor – Supply Fan VFD Control

D. System Control shall include:

1. Anti-cycle timing.
2. Minimum compressor run/off-times.

E. Interface Requirements for Building Automation and Temperature Control System:

1. Interface relay for scheduled operation.
2. Interface relay to provide indication of fault at the central workstation and diagnostic code storage.
3. Provide compatible interface for central HVAC control workstation for the following:
 - a. Adjusting set points.
 - b. Monitoring supply fan start, stop, and operation.
 - c. Inquiring data to include outdoor-air damper position, supply- and room-air temperature and humidity.
 - d. Monitoring occupied and unoccupied operations.
 - e. Monitoring constant and variable motor loads.
 - f. Monitoring variable-frequency drive operation.
 - g. Monitoring cooling load.
 - h. Monitoring economizer cycles.
 - i. Monitoring air-distribution static pressure and ventilation air volume.

2.16 ACCESSORIES

- A. Duplex, 115-V, ground-fault-interrupter outlet with 15-A overcurrent protection. Include transformer if required. Outlet shall be energized even if the unit main disconnect is open.
- B. Low-ambient kit using for operation down to 25 deg F.
- C. Filter differential pressure switch with sensor tubing on either side of filter. Set for final filter pressure loss.
- D. Remote potentiometer to adjust minimum economizer damper position.
- E. Return-air bypass damper.
- F. Factory- or field-installed demand-controlled ventilation.
- G. Safeties:
 1. Smoke detector.
 2. Condensate overflow switch.
 3. Phase-loss reversal protection.
 - a. Phase Unbalance Protection: Factory set 2%
 - b. Over/Under/Brown Out Voltage Protection: +/-10% of nameplate voltage
 - c. Phase Loss/Reversal.
 4. High and low pressure control.

- 5. Electric coil airflow-proving switch.
- H. Coil guards of painted, galvanized-steel wire.
- I. Hail guards of galvanized steel, painted to match casing.
- J. Door switches to disable heating or reset set point when open.
- K. Outdoor air intake weather hood with moisture eliminator.
- L. Service Lights and Switch: Factory installed in each accessible section with weatherproof cover. Factory wire lights to a single-point field connection.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of AHUs.
- B. Examine roughing-in for AHUs to verify actual locations of piping and duct connections before equipment installation.
- C. Examine roofs for suitable conditions where AHUs will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Equipment Mounting:
 - 1. Install AHUs on cast-in-place concrete equipment bases.
 - 2. Comply with requirements for vibration isolation and seismic control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."

3.3 CONNECTIONS

- A. Install condensate drain, minimum connection size, with trap and indirect connection to nearest roof drain or area drain.
- B. Comply with duct installation requirements specified in other HVAC Sections. Drawings indicate general arrangement of ducts. The following are specific connection requirements:
 - 1. Connect supply ducts to AHUs with flexible duct connectors specified in Section 233300 "Air Duct Accessories."
- C. Connect electrical wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- D. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

- E. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.
 - 1. Nameplate shall be laminated acrylic or melamine plastic signs as layers of black with engraved white letters at least 1/2 inch high.
 - 2. Locate nameplate where easily visible.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Perform tests and inspections with the assistance of a factory-authorized service representative.
- C. Tests and Inspections:
 - 1. After installing AHUs and after electrical circuitry has been energized, test units for compliance with requirements.
 - 2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
 - 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. AHU will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

3.5 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Inspect for visible damage to unit casing.
 - 3. Inspect for visible damage to furnace combustion chamber.
 - 4. Inspect for visible damage to compressor, coils, and fans.
 - 5. Inspect internal insulation.
 - 6. Verify that labels are clearly visible.
 - 7. Verify that clearances have been provided for servicing.
 - 8. Verify that controls are connected and operable.
 - 9. Verify that filters are installed.
 - 10. Clean condenser coil and inspect for construction debris.
 - 11. Clean furnace flue and inspect for construction debris.
 - 12. Connect and purge gas line.
 - 13. Remove packing from vibration isolators.
 - 14. Verify lubrication on fan and motor bearings.
 - 15. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
 - 16. Adjust fan belts to proper alignment and tension.
 - 17. Start unit according to manufacturer's written instructions.
 - a. Start refrigeration system.
 - b. Do not operate below recommended low-ambient temperature.
 - c. Complete startup sheets and attach copy with Contractor's startup report.
 - 18. Inspect and record performance of interlocks and protective devices; verify sequences.
 - 19. Operate unit for an initial period as recommended or required by manufacturer.
 - 20. Perform the following operations for both minimum and maximum firing. Adjust burner for peak efficiency:

- a. Measure gas pressure on manifold.
 - b. Inspect operation of power vents.
 - c. Measure combustion-air temperature at inlet to combustion chamber.
 - d. Measure flue-gas temperature at furnace discharge.
 - e. Perform flue-gas analysis. Measure and record flue-gas carbon dioxide and oxygen concentration.
 - f. Measure supply-air temperature and volume when burner is at maximum firing rate and when burner is off. Calculate useful heat to supply air.
21. Calibrate thermostats.
 22. Adjust and inspect high-temperature limits.
 23. Inspect outdoor-air dampers for proper stroke and interlock with return-air dampers.
 24. Start refrigeration system and measure and record the following when ambient is a minimum of 15 deg F above return-air temperature:
 - a. Coil leaving-air, dry- and wet-bulb temperatures.
 - b. Coil entering-air, dry- and wet-bulb temperatures.
 - c. Outdoor-air, dry-bulb temperature.
 - d. Outdoor-air-coil, discharge-air, dry-bulb temperature.
 25. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
 26. Measure and record the following minimum and maximum airflows. Plot fan volumes on fan curve.
 - a. Supply-air volume.
 - b. Return-air volume.
 - c. Relief-air volume.
 - d. Outdoor-air intake volume.
 27. Simulate maximum cooling demand and inspect the following:
 - a. Compressor refrigerant suction and hot-gas pressures.
 - b. Short circuiting of air through condenser coil or from condenser fans to outdoor-air intake.
 28. Verify operation of remote panel including pilot-light operation and failure modes. Inspect the following:
 - a. High-temperature limit on gas-fired heat exchanger.
 - b. Low-temperature safety operation.
 - c. Filter high-pressure differential alarm.
 - d. Economizer to minimum outdoor-air changeover.
 - e. Relief-air fan operation.
 - f. Smoke alarms.
 29. After startup and performance testing and prior to Substantial Completion, replace existing filters with new filters.

3.6 CLEANING AND ADJUSTING

- A. After completing system installation and testing, adjusting, and balancing AHU and air-distribution systems, clean filter housings and install new filters.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain AHUs.

END OF SECTION 237416.13

SECTION 238126 – SPLIT SYSTEM AIR-CONDITIONERS

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 split-system air-conditioning and heat-pump units consisting of separate evaporator-fan and compressor-condenser components.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Wiring Diagrams: For power, signal, and control wiring.
- C. Samples for Initial Selection: For units with factory-applied color finishes.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.
- B. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ASHRAE Compliance:
 - 1. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - "Procedures," and

Section 7 - "Construction and System Start-up."

- C. ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1.

1.7 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork are specified in Division 03.
- B. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

1.8 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period:
 - a. For Compressor: Five year(s) from date of Substantial Completion.
 - b. For Parts: Five year(s) from date of Substantial Completion.
 - c. For Labor: One year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Mitsubishi PKFY/PUMY multi-zone heat pump system or comparable product by one of the following:
 - 1. Carrier Corporation; Home Comfort and HVAC Building & Industrial Systems.
 - 2. Mitsubishi Electric & Electronics USA, Inc.; HVAC Advanced Products Division.
 - 3. Trane; a business of American Standard companies.
 - 4. YORK; a Johnson Controls company.
 - 5. Daikin Applied

2.2 INDOOR UNITS (5 TONS OR LESS)

- A. Wall-Mounted, Evaporator-Fan Components:
 - 1. Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect, and discharge drain pans with drain connection.
 - 2. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.
 - 3. Fan: Direct drive, centrifugal.
 - 4. Fan Motors:
 - a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
 - b. Multitapped, multispeed with internal thermal protection and permanent lubrication.

- c. Enclosure Type: Totally enclosed, fan cooled.
 - d. NEMA Premium (TM) efficient motors as defined in NEMA MG 1.
 - e. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in electrical Sections.
 - f. Mount unit-mounted disconnect switches on exterior or interior of unit.
5. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
6. Condensate Drain Pans:
- a. Fabricated with one percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.
 - 1) Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1.
 - 2) Depth: A minimum of 1 inch deep.
 - b. Insulated, stainless-steel sheet.
 - c. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on one end of pan.
 - 1) Minimum Connection Size: NPS 1.
 - d. Drain pan level sensor.
7. Air Filtration Section:
- a. General Requirements for Air Filtration Section:
 - 1) Comply with NFPA 90A.
 - 2) Minimum MERV according to ASHRAE 52.2.
 - 3) Filter-Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lifted out from access plenum.
 - b. Disposable Panel Filters:
 - 1) Factory-fabricated, viscous-coated, flat-panel type.
 - 2) Thickness: 1 inch.
 - 3) MERV according to ASHRAE 52.2: 5.
 - 4) Media: Interlaced glass fibers sprayed with nonflammable adhesive.
 - 5) Frame: Galvanized steel, with metal grid on outlet side, steel rod grid on inlet side, and hinged; with pull and retaining handles.

2.3 OUTDOOR UNITS (5 TONS OR LESS)

A. Air-Cooled, Compressor-Condenser Components:

- 1. Capable of providing variable refrigerant flow control for multiple indoor units.
- 2. Casing: Steel, finished with baked enamel in color selected by Architect, 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.
- 3. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload

devices, start capacitor, relay, and contactor.

- a. Compressor Type: Scroll.
 - b. Refrigerant: R-410A.
 - c. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with ARI 206/110.
4. Fan: Aluminum-propeller type, directly connected to motor.
 5. Motor: Permanently lubricated, with integral thermal-overload protection.
 6. Low Ambient Kit: Permits operation down to 45 deg F.
 7. Mounting Base: Polyethylene.

2.4 ACCESSORIES

- A. Thermostat: Low voltage with subbase to control compressor and evaporator fan with the following features:
 1. 24-hour time control of system stop and start.
 2. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.
 3. Fan-speed selection including auto setting.
- B. Automatic-reset timer to prevent rapid cycling of compressor.
- C. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install units level and plumb.
- B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
- C. Equipment Mounting:
 1. Install ground-mounted, compressor-condenser components on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Division 03.
 2. Install ground-mounted, compressor-condenser components on polyethylene mounting base.
 3. Comply with requirements for vibration isolation and seismic control devices specified in Section 230548 "Mechanical Vibration, Sound and Seismic Controls."
- D. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

- B. Where piping is installed adjacent to unit, allow space for service and maintenance of unit.

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Remove and replace malfunctioning units and retest as specified above.
- D. Prepare test and inspection reports.

3.4 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.

3.5 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain units.

END OF SECTION 238126

PANELBOARD: PP-4
 LOCATION: STORAGE 4
 MOUNTING: Surface
 ENCL NEMA: Type 1
 MIN AIC: 65,000

MAINS: MCB
 VOLTS: 480/277 Wye
 PHASE: 3
 WIRES: 4

AMPS: 600

PANEL NOTES:
 PROVIDE GROUND BUS
 PROVIDE FULL SIZE NEUTRAL BUS UNLESS NOTED OTHERWISE
 PANEL SHALL BE SERVICE ENTRANCE RATED WITH 100% RATED MCB

WIRE SIZE	LOAD DESCRIPTION	P	TRIP AMPS	TYPE	CKT	A	B	C	CKT	TYPE	TRIP AMPS	P	LOAD DESCRIPTION	WIRE SIZE
EXISTING	H822 SEC 1 (EXISTING - 22)	3	400 A		1	26.94	48.67		2		225 A	3	AHU-1	(4) #10, #4G, 2-1/2" C
					3			26.94	48.67					
					5				48.67					
					7	0.00	14.23		8					
					9			0.00	13.57					
					11				10.44					
					13	0.00	0.00							
					15			0.00	0.00					
					17			0.00	0.00					
					19	0.00	0.00							
					21			0.00	0.00					
					23				0.00					
					25	0.00	0.00							
					27			0.00	0.00					
					29				0.00					
					31	0.00	0.00							
					33			0.00	0.00					
					35				0.00					
					37	0.00	0.00							
					39			0.00	0.00					
					41				0.00					
					43	0.00	0.00							
					45			0.00	0.00					
					47				0.00					
TOTAL LOAD:						89.84 kVA	89.18 kVA	86.05 kVA						

BREAKER TYPE KEYS:
 LO - INDICATES C.B. EQUIPPED WITH "LOCK-ON" DEVICE
 GF - INDICATES C.B. IS GROUND FAULT TYPE (5mA FOR PERSONNEL)
 ST - INDICATES C.B. EQUIPPED WITH SHUNT TRIP DEVICE
 HT - INDICATES C.B. EQUIPPED WITH 30mA GROUND FAULT FOR EQUIPMENT

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals
Power	0.00	0.00%	0.00	
REC	24.06	70.78%	17.03	Total Conn. Load: 265.07 kVA
Equipment	95.01	100.00%	95.01	Total Est. Demand: 258.04 kVA
HVAC	146.00	100.00%	146.00	Total Conn. Current: 318.83 A
				Total Est. Demand Current: 310.37 A

PANELBOARD: CLP1
 LOCATION: STORAGE 4
 MOUNTING: Surface
 ENCL NEMA: Type 1
 MIN AIC: 10,000

MAINS: MCB
 VOLTS: 208/120 Wye
 PHASE: 3
 WIRES: 4

AMPS: 150

PANEL NOTES:
 PROVIDE GROUND BUS
 PROVIDE FULL SIZE NEUTRAL BUS UNLESS NOTED OTHERWISE

WIRE SIZE	LOAD DESCRIPTION	P	TRIP AMPS	TYPE	CKT	A	B	C	CKT	TYPE	TRIP AMPS	P	LOAD DESCRIPTION	WIRE SIZE
#12, 3/4"	REC CHEMISTRY LAB 112	1	20 A		1	1.50	1.50		2		20 A	1	REC CHEMISTRY LAB 112	#12, 3/4" C
#12, 3/4"	REC CHEMISTRY LAB 112	1	20 A		3			1.50	1.50		20 A	1	REC CHEMISTRY LAB 112	#12, 3/4" C
#12, 3/4"	REC CHEMISTRY LAB 112	1	20 A		5			1.50	1.50		20 A	1	REC CHEMISTRY LAB 112	#12, 3/4" C
#12, 3/4"	REC CHEMISTRY LAB 112	1	20 A		7	1.50	1.50		8		20 A	1	REC CHEMISTRY LAB 112	#12, 3/4" C
#12, 3/4"	REC CHEMISTRY LAB 112	1	20 A		9			1.50	1.50		20 A	1	REC CHEMISTRY LAB 112	#12, 3/4" C
#12, 3/4"	REC CHEMISTRY LAB 112	1	20 A		11			1.50	1.50		20 A	1	REC CHEMISTRY LAB 112	#12, 3/4" C
	SPARE	1	20 A		13	0.00	1.50		14		20 A	1	REC CHEMISTRY LAB 112	#12, 3/4" C
	SPARE	1	20 A		15			0.00	1.50		20 A	1	REC CHEMISTRY LAB 112	#12, 3/4" C
#12, 3/4"	REC CHEMISTRY LAB 112	1	20 A		17			0.90	0.72		20 A	1	REC CHEMISTRY LAB 112	#12, 3/4" C
#12, 3/4"	REC CHEMISTRY LAB 112	1	20 A		19	1.20	0.36		20		20 A	1	REC CHEMISTRY LAB 112	#12, 3/4" C
#12, 3/4"	REC CHEMISTRY LAB 112	1	20 A		21			1.20	0.90		20 A	1	REC CHEMISTRY LAB 112	#12, 3/4" C
#12, 3/4"	REC CHEMISTRY LAB 112	1	20 A		23			0.18	1.20		20 A	1	REC CHEMISTRY PREP &...	#12, 3/4" C
#12, 3/4"	REC CHEMISTRY PREP &...	1	20 A	GF	25	1.50	1.80		26	GF	20 A	1	REC CHEMISTRY PREP &...	#12, 3/4" C
#12, 3/4"	REC CHEMISTRY PREP &...	1	20 A	GF	27			0.60	1.50		20 A	1	REC CHEMISTRY PREP &...	#12, 3/4" C
#12, 3/4"	EAV - 1, CAV - 1, 2, 3, 4 RM...	1	20 A		29			0.00	1.44		20 A	1	IWH-1 CHEMISTRY PREP ...	#12, 3/4" C
(2) #10, #10G, 3/4"	HP-1	2	25 A		31	1.87	0.00		32		20 A	1	SPARE	--
					33			1.87	0.00		20 A	1	SPARE	--
	SPARE	1	20 A		35			0.00	0.00		20 A	1	SPARE	--
	SPARE	1	20 A		37	0.00	0.00		38		20 A	1	SPARE	--
	SPARE	1	20 A		39			0.00	0.00		20 A	1	SPARE	--
	SPARE	1	20 A		41			0.00	0.00		20 A	1	SPARE	--
TOTAL LOAD:						14.23 kVA	13.57 kVA	10.44 kVA						

BREAKER TYPE KEYS:
 LO - INDICATES C.B. EQUIPPED WITH "LOCK-ON" DEVICE
 GF - INDICATES C.B. IS GROUND FAULT TYPE (5mA FOR PERSONNEL)
 ST - INDICATES C.B. EQUIPPED WITH SHUNT TRIP DEVICE
 HT - INDICATES C.B. EQUIPPED WITH 30mA GROUND FAULT FOR EQUIPMENT

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals
REC	24.06	70.78%	17.03	Total Conn. Load: 38.24 kVA
Equipment	14.18	100.00%	14.18	Total Est. Demand: 31.21 kVA
HVAC	0.00	0.00%	0.00	Total Conn. Current: 106.14 A
				Total Est. Demand Current: 86.63 A

GENERAL NOTES

- PANELBOARD SCHEDULES SHOW NEW LOADS ONLY.
- CONTRACTOR SHALL FIELD VERIFY BREAKERS TO BE DEMOLISHED AS PART OF EQUIPMENT DEMOLITION.
- AT COMPLETION OF PROJECT, CONTRACTOR SHALL UPDATE PANELBOARD DIRECTORIES TO REFLECT AS-BUILT CONDITION.

PANELBOARD: H822 SEC 1 (EX)
 LOCATION: STORAGE 4
 MOUNTING: Surface
 ENCL NEMA: Type 1
 MIN AIC: EXISTING

MAINS: MCB
 VOLTS: 480/277 Wye
 PHASE: 3
 WIRES: 4

AMPS: 400

PANEL NOTES:
 PROVIDE GROUND BUS
 PROVIDE FULL SIZE NEUTRAL BUS UNLESS NOTED OTHERWISE

WIRE SIZE	LOAD DESCRIPTION	P	TRIP AMPS	TYPE	CKT	A	B	C	CKT	TYPE	TRIP AMPS	P	LOAD DESCRIPTION	WIRE SIZE
--	EXISTING LOAD	3	20 A		1	0.00	2.67		2		20 A	3	VAV - 13 LECTURE 18	#12, 3/4" C
					3			0.00	2.67					
					5				2.67					
					7	0.00	3.00		8					
					9			0.00	3.00					
					11				3.00					
					13	0.00	0.00							
					15			0.00	0.00					
					17				0.00					
					19	2.83	0.00							
					21			2.83	0.00					
					23				2.83					
					25	3.00	0.00							
					27			3.00	0.00					
					29				3.00					
					31	3.00	0.00							
					33			3.00	0.00					
					35				3.00					
					37	3.33	2.50							
					39			3.33	2.50					
					41				3.33					
					43	6.61	0.00							
					45			6.61	0.00					
					47				6.61					
TOTAL LOAD:						26.94 kVA	26.94 kVA	26.94 kVA						

BREAKER TYPE KEYS:
 LO - INDICATES C.B. EQUIPPED WITH "LOCK-ON" DEVICE
 GF - INDICATES C.B. IS GROUND FAULT TYPE (5mA FOR PERSONNEL)
 ST - INDICATES C.B. EQUIPPED WITH SHUNT TRIP DEVICE
 HT - INDICATES C.B. EQUIPPED WITH 30mA GROUND FAULT FOR EQUIPMENT

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals
Power	0.00	0.00%	0.00	
Equipment	80.83	100.00%	80.83	Total Conn. Load: 80.83 kVA
				Total Est. Demand: 80.83 kVA
				Total Conn. Current: 97.22 A
				Total Est. Demand Current: 97.22 A

PANELBOARD: H822 SEC 2 (EX)
 LOCATION: STORAGE 4
 MOUNTING: Surface
 ENCL NEMA: Type 1
 MIN AIC: EXISTING

MAINS: MCB
 VOLTS: 480/277 Wye
 PHASE: 3
 WIRES: 4

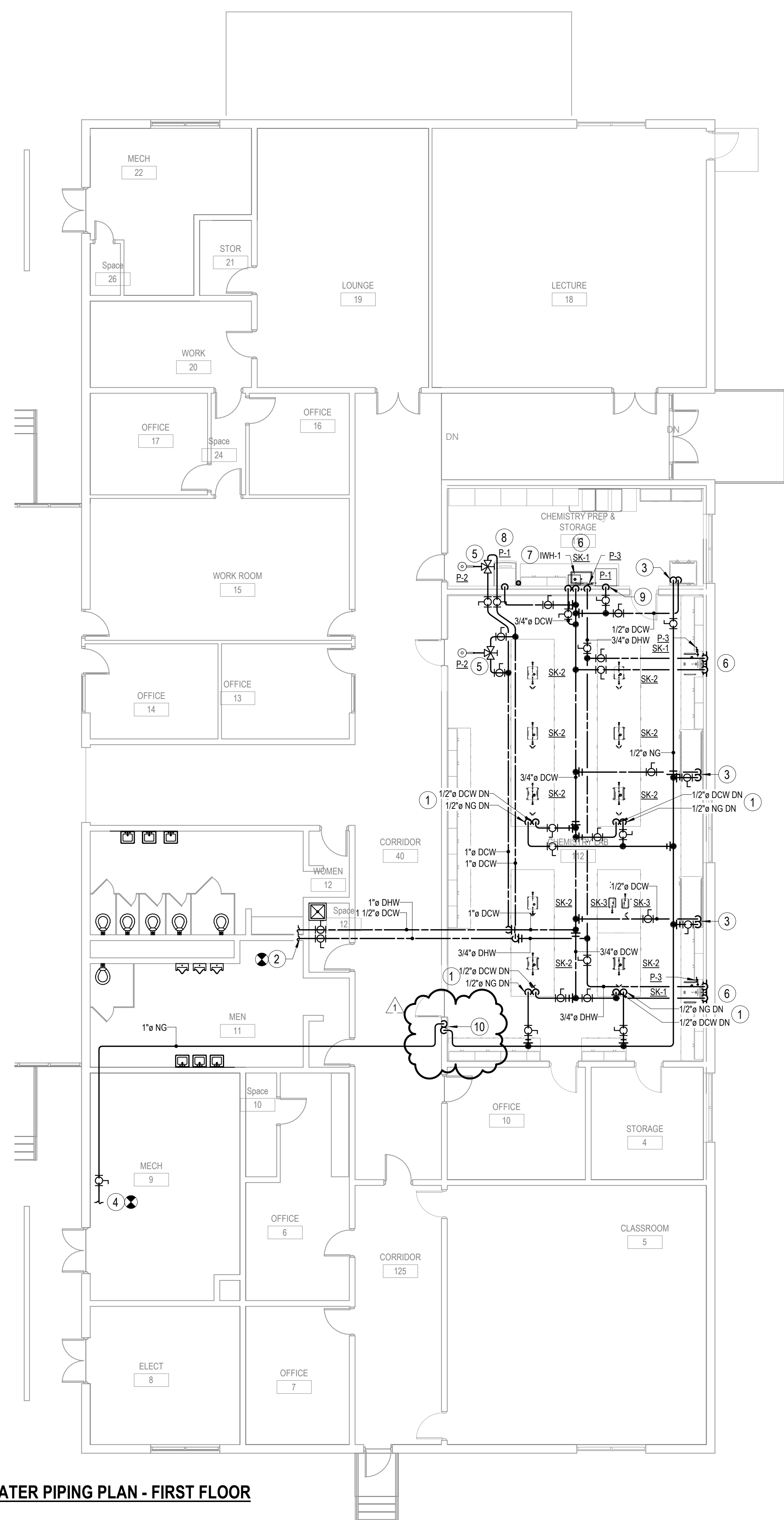
AMPS: 400

PANEL NOTES:
 PROVIDE GROUND BUS
 PROVIDE FULL SIZE NEUTRAL BUS UNLESS NOTED OTHERWISE

WIRE SIZE	LOAD DESCRIPTION	P	TRIP AMPS	TYPE	CKT	A	B	C	CKT	TYPE	TRIP AMPS	P	LOAD DESCRIPTION	WIRE SIZE
					1	0.00			2					
					3			0.00	4					
					5				6					
					7	0.00	0.00		8					
					9			3.00	10					
					11				12					
					13	3.00	0.00		14					
					15			2.33	16					
					17				18					
					19	2.33	0.00		20					
					21			1.28	22					
					23				24					
					25	1.28	0.00		26					
					27			0.00	28					
					29				30					
					31	0.00	0.00		32					
					33			0.00	34					
					35				36					
					37	0.00			38					
					39			0.00	40					
					41				42	</				

1 2 3 4 5 6 7 8 9 10

H
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A

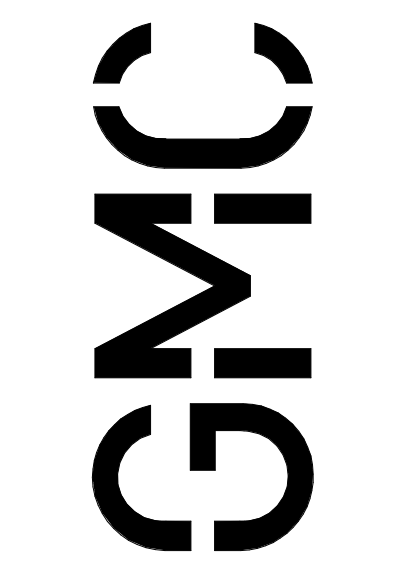
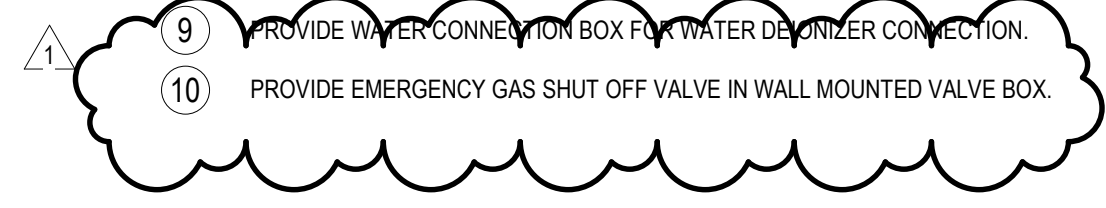


GENERAL NOTES

1. REFER TO P0.01 FOR GENERAL NOTES.

DRAWING NOTES

- 1 ROUTE 1/2" DOMESTIC COLD WATER AND 1/2" NATURAL GAS PIPING DOWN THROUGH PIPING CHASE INTO CASEWORK. CONNECT 1/2" DOMESTIC COLD WATER TO LAB SINKS AND WATER TURRET VALVES. AND CONNECT 1/2" NATURAL GAS TO GAS TURRET VALVES. SHUT OFF VALVES SHALL BE PROVIDED ON NATURAL GAS AND DOMESTIC COLD WATER PIPING WITHIN CASEWORK AND SHALL BE ACCESSIBLE THROUGH CABINETS.
- 2 CONNECT NEW 1 1/2" DOMESTIC COLD WATER AND 1" DOMESTIC HOT WATER PIPING TO EXISTING PIPING AT RESTROOM.
- 3 1/2" DOMESTIC COLD WATER AND 1/2" NATURAL GAS PIPING DOWN TO FUME HOOD CONNECTIONS. COORDINATE CONNECTIONS WITH MANUFACTURER'S INSTRUCTIONS.
- 4 CONNECT 1" NATURAL GAS PIPING TO EXISTING NATURAL GAS PIPING IN MECHANICAL ROOM.
- 5 PROVIDE THERMOSTATIC MIXING VALVE IN ACCESSIBLE AREA ABOVE CEILING. TEMPER WATER TO 90°F. ROUTE 1" TEMPERED WATER TO EMERGENCY SHOWER.
- 6 3/4" DOMESTIC COLD AND HOT WATER DOWN TO LAB SINK AND EMERGENCY EYE WASH. PROVIDE THERMOSTATIC MIXING VALVE FOR EYE WASH, ACCESSIBLE BELOW LAB SINK. TEMPER WATER TO 90°F.
- 7 CONNECT 3/4" DOMESTIC COLD WATER TO INSTANTANEOUS WATER HEATER. ROUTE HOT WATER PIPING FROM INSTANTANEOUS WATER HEATER TO DISHWASHER WATER INLET CONNECTION.
- 8 PROVIDE WATER CONNECTION BOX FOR ICE MAKER WATER CONNECTION.
- 9 PROVIDE WATER CONNECTION BOX FOR WATER DEIONIZER CONNECTION.
- 10 PROVIDE EMERGENCY GAS SHUT OFF VALVE IN WALL MOUNTED VALVE BOX.



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ISSUE	DATE
ISSUE FOR BID	11/13/18
ADDENDUM 1	12/19/18
DRAWN BY: NEJ	
CHECKED BY: CRB	

USC Sumter - Science Building
Renovation
200 Miller Road Sumter, SC
RMF # 316434.E0
OSE # H39-9520
ISSUE FOR BID



1
P2.01
DOMESTIC WATER PIPING PLAN - FIRST FLOOR
SCALE: 1/8" = 1'-0"

DOMESTIC WATER PIPING PLAN - FIRST FLOOR
P2.01

1 2 3 4 5 6 7 8 9 10