2400 5th Avenue S, Suite 200 | Birmingham, Alabama 35233
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TRANSMITTAL COVER SHEET

DATE: October 11, 2024

TO: ALL PLAN HOLDERS OF RECORD

FROM: JACQUI HART, AIA, IIDA, LEED AP, PROJECT MANAGER

PROJECT: TUSCALOOSA DEPARTMENT OF HUMAN RESOURCES
GMC PROJECT NO. ABHM220021

RE: ADDENDUM NO. 3 AND
ACKNOWLEDGEMENT OF RECEIPT OF ADDENDUM NO. 3

ACKNOWLEDGEMENT OF RECEIPT:

PLEASE PRINT RECIPIENT'S NAME, FIRM, AND DATE RECEIVED.

THEN E-MAIL BACK TO alyssa.martin@gmcnetwork.com FOR OUR RECORDS AND TO ACKNOWLEDGE YOUR RECEIPT OF THIS ADDENDUM.

_____
NAME *(PLEASE PRINT)*

_____
FIRM *(PLEASE PRINT)*

_____
DATE RECEIVED *(PLEASE PRINT)*

If there are any problems with this transmittal, please contact sender, at the number listed above.

ADDENDUM NUMBER 03

October 11, 2024

PROJECT: **TUSCALOOSA DEPARTMENT OF HUMAN RESOURCES**
GM&C PROJECT NO. ABHM220021

AD3-1 GENERAL:

A. The following revisions and/or additions to the Drawings and Project Manual are hereby made a part of same, and shall be incorporated in the Work of the Contract the same as if originally included in the Bid and Construction Documents.

B. Bidders shall acknowledge receipt of this Addendum in writing, as provided on the Proposal Form.

C. When a revision and/or addition is called for to the Drawings or Project Manual, they shall be fully coordinated with and carried through all applicable Drawings and portions of the Project Manual, including in part, all related Civil, Landscaping, Architectural, Structural, Plumbing, Mechanical, Electrical, and other Documents.

AD3-2 PROJECT MANUAL AND SPECIFICATIONS:

A. New Section 07 1400 – Fluid-Applied Air Barrier
B. New Section 07 7230 – Eave Vents
C. New Section 08 1113 – Steel Doors and Frames
D. New Section 08 3100 – Access Doors and Panels
E. New Section 08 5413 – Fiberglass Clad Wood Windows
F. New Section 08 7100 – Door Hardware
G. Revised Section 22 0410 – Plumbing Piping
H. New Section 23 0054 – Variable Frequency Drives
I. Revised Section 23 0725 – Custom Indoor Air-Handling Units
J. New Section 31 3116 – Termite Control
K. New Section 32 1816.13 – EPDM/TPV Playground Protective Surfacing
L. New Supplemental Playground Equipment GTEvents Specifications

AD3-3 DRAWINGS:

A. Revised L5.05
B. New L6.01
C. Revised M0.01
D. Revised M4.01
E. Revised P0.01
F. Revised P4.01

AD3-4 MISCELLANEOUS:

A.

AD3-5 ATTACHMENTS:

A. New Spec Section 07 1400
B. New Spec Section 07 7230
C. New Spec Section 08 1113
D. New Spec Section 08 3100
E. New Spec Section 08 5413
F. New Spec Section 08 7100
G. Revised Spec Section 22 0410
H. New Spec Section 23 0054
I. Revised Spec Section 23 0725
J. New Spec Section 31 3116
K. New Spec Section 32 1816.13
L. New Supplemental Section – GTEvents
M. Revised Sheet L5.05
N. New Sheet L6.01
O. Revised Sheet M0.01
P. Revised Sheet M4.01
Q. Revised Sheet P0.01
R. Revised Sheet P4.01

END OF ADDENDUM NUMBER 03

PREPARED BY

2400 5th Avenue S, Suite 200 | Birmingham, Alabama 35233
Tel 205.879.4462 | GMCNETWORK.COM
Goodwyn Mills Cawood, LLC.

SECTION 07 1400
FLUID-APPLIED AIR BARRIER

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Sealants for substrates of fluid-applied air barrier.

B. Cant strips and other Other Accessories.

1.02 RELATED REQUIREMENTS

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

B. Section 04 2000 - Unit Masonry: Masonry joints prepared to receive flashings.

C. Section 07 1300 - Sheet Waterproofing: Sheet membrane waterproofing for below grade slab and walls.

D. Section 07 9005 - Joint Sealers: Sealant for joints other than substrates for air barrier in this Section.

E. Section 09 2116 - Gypsum Board Assemblies: Exterior sheathing receiving fluid-applied air barrier.

1.03 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM C836/C836M - Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course; 2018.

C. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.

D. ASTM E 2178 Standard Test Method for Air Permeance of Building Materials.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for air barrier system(s) specified.

C. Shop Drawings: Indicate special joint or termination conditions and conditions of interface with other materials.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Manufacturer's Installation Instructions: Indicate special procedures and acceptable installation temperatures.

F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Membrane Manufacturer Qualifications: Company specializing in fluid-applied air barrier membranes with ten years experience.

B. Installer Qualifications: Company specializing in installation of fluid-applied air barrier with minimum five years documented experience.

C. Mock-Up: Include Fluid-Applied Air Barrier in Mock-Up as described in Section 01 4000 - Quality Requirements.

D. Comply with ALL special requirements and inspections of air barrier system manufacturer, as required to obtain the required 5-year labor and materials warranty.

E. Single-Source Responsibility: Obtain primary air barrier materials of each type required from a single manufacturer.

F. Sealant for Substrate Surfaces: Sealant shall be manufactured by same manufacturer as fluid-applied air barrier.

1.06 FIELD CONDITIONS

A. Maintain range of ambient and substrate temperatures recommended by air barrier manufacturer. Do not apply product to wet substrate or during snow, rain, fog, or mist.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Provide five (5) year manufacturer warranty for air barrier failing to resist penetration of water and _____, except where such failures are the result of structural failures of building. Hairline cracking of concrete due to temperature change or shrinkage is not considered a structural failure.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Fluid-Applied Waterproofing Vapor Permeable Air Infiltration Barrier System (for CMU, Sheathing, and as indicated):
   1. GE "Elemax 2600 AWB" 100% Silicone Air and Water-Resistive Barrier system; [Basis of Design]: www.siliconeforbuilding.com/AWB/.
   2. Dow Corning "DefendAir 200" Silicone Liquid Applied Air & Weather Barrier: www.dowcorning.com.
   3. Pecora "XL-Perm Ultra VP" Air, Vapor & Water Barrier System: www.pecora.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FLUID-APPLIED WATERPROOFING MATERIALS

A. Fluid-Applied Air Barrier - General: Cold-applied elastomeric fluid-applied membrane.
   1. General: Provide fluid-applied air barrier system that is watertight and complies with performance requirements specified, as demonstrated by testing performed by a nationally recognized independent testing laboratory of manufacturer's standard systems according to test methods indicated.
   2. Fluid-applied air barrier system shall be compatible with specified substrate.

B. Liquid Air Infiltration Barrier, Vapor Permeable, Cold-Applied Elastomeric Membrane:, complying with ASTM C 836, one component. (For CMU, Sheathing, and as indicated).
   1. Cured Thickness: Comply with manufacturer's recommendation to meet performance specified.
   2. Suitable for installation over concrete, and sheathing substrates.
   3. UV Resistant.
   4. Membrane Air Permeance ASTM E2178: Not to exceed 0.004 cfm/sq. ft. of surface area (at specified thickness) at test pressure of 0.3 in. water (75 Pa) on CMU block.
   5. Membrane Vapor Transmission per ASTM E96, Method B: Not less than 10 perms.
   6. Product shall withstand weather exposure up to 6 months.

C. Flexible Flashings: Type recommended by membrane manufacturer.

2.03 ACCESSORIES

A. General: Auxiliary materials recommended by air barrier manufacturer for intended use and compatible with air barrier membrane. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

B. Joint Reinforcing/Transition Strip: 2" wide glass fiber tape, self-adhesive polymeric air/vapor barrier membrane (30 mil minimum), or other material applicable for application, which is approved by air barrier manufacturer.

C. Surface Conditioner: Compatible with membrane compound; as recommended by membrane manufacturer.

D. Sealant for Substrate Surfaces: As recommended by membrane manufacturer.

E. Liquid Membrane for details and terminations: As recommended by membrane manufacturer.

F. Detail Membrane: Flexible, fully-adhered membrane for detail flashing areas: As recommended by membrane manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify substrate surfaces are free of frozen matter, dampness, loose particles, cracks, pits, projections, penetrations, or foreign matter, including efflorescence, detrimental to adhesion or application of air barrier system.

C. Verify that substrate surfaces are smooth, free of honeycomb or pitting, and not detrimental to full contact bond of air barrier materials.

D. Verify that items that penetrate surfaces to receive air barrier are securely installed.

3.02 PREPARATION

A. Protect adjacent surfaces not designated to receive air barrier.

B. Do not apply air barrier to surfaces unacceptable to manufacturer.

C. Caulk sheathing joints prior to application of water/air barrier coating. Caulk with manufacturer-recommended joint sealant reinforced with fiberglass mesh tape encapsulated in sealant. Encapsulate fastener heads with manufacturer-recommended sealant. Fiberglass reinforcement is not required for sheathing fastener heads.
   1. Verify that Fluid-Applied air barrier is compatible with sealant used.

D. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

E. All surfaces must be sound and free from spalled areas, loose aggregate, loose nails or screws, sharp protrusions or other matter that will hinder the adhesion or regularity of the membrane installation. The surface must also be free from frost, dirt, grease, oil or other contaminants. Clean loose dust and dirt from the surface by brushing or wiping with a clean, dry cloth.

F. Concrete and other monolithic cementitious surfaces: Pretreat surface irregularities and large voids with liquid membrane, or repair with lean mortar mix or nonshrinking grout.

G. CMU surfaces: Strike joints full and flush to face of concrete block. Ensure surface is smooth and free from projections. Fill voids and holes with lean mortar mix or nonshrinking grout.

H. Sheathing panels: Fasten corners and edges with appropriate screws. Drive fasteners flush with panel surface (not countersunk). Tape panel butt joints with 2 in. wide sheathing tape recommended by manufacturer.

I. Complete detailing prior to applying air barrier.

J. Fill and seal cracks and joints between exterior sheathing panels or adjacent substrates, or in masonry, with trowel application of air barrier product and reinforce with strip of 2" (minimum) wide glass fiber tape. Follow manufacturer's instructions if other joint treatment is recommended. Allow recommended cure time before proceeding.

K. Proceed with applying air barrier only after substrate cleaning, sealing, and other preparation and sealing of joints and penetrations have been completed.

3.03 INSTALLATION

A. Apply air barrier in accordance with manufacturer's instructions to specified minimum thickness.

B. Apply surface conditioner (if required) at a rate recommended by manufacturer. Protect conditioner from rain or frost until dry.

C. Apply by spray a complete and continuous unbroken film of liquid air and water barrier membrane.

D. Apply air barrier in accordance with manufacturer's instructions to uniform wet film thickness in order to dry to thickness recommended by manufacturer to achieve performance specified.
   1. Apply more than one coat, if recommended by manufacturer.

E. Roll the air barrier after spray application to fill all pin holes.

F. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.

G. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air barrier components.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Owner will provide testing services, and Contractor to provide temporary construction and materials for testing.

C. Provide daily on-site attendance of roofing and insulation manufacturer's representative during installation of this work.

3.05 CLEANING AND PROTECTION

A. Do not inhibit damp substrate from drying out. Do not expose the backside of the substrate to moisture or rain.

B. Protect air barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

C. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. Remove and replace air barrier exposed for more than 180 days.

D. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construcion.

E. Remove masking materials after installation.

END OF SECTION

SECTION 07 7230
EAVE VENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Eave vents.

1.02 RELATED SECTIONS

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

B. Section 06 1000 - Rough Carpentry.

C. Section 07 5400 - Thermoplastic Membrane Roofing.

D. Section 07 7100 - Roof Specialties.

1.03 SUBMITTALS

A. Submit under provisions of Section 01 3000.

B. Product Data: Manufacturer's catalog data, standard details, and installation instructions.

C. Samples: 2 inch long samples of each profile required.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store products indoors and protect from construction traffic and damage.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Manufacturer: Provide vents fabricated by Cor-A-Vent, Inc.; P.O. Box 428; Mishawaka, IN 46546: www.cor-a-vent.com.

B. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

A. Eave Vents: Cor-A-Vent PS-400 Strip Vent [Basis of Design].
   1. Net free area: 10 sq in per lin ft.
   2. Dimensions: 1 inch wide by 48 inches long by 3/4 inch high.
   3. Color: As selected by Architect.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that framing is in place with proper clearance to receive vents.

3.02 INSTALLATION

A. Install eave vents in accordance with manufacturer's instructions.

3.03 EAVE VENTS

A. Install continuous vents full length of soffits, unless otherwise indicated.

B. Ensure that adequate blocking or barriers are installed to prevent insulation from impeding air flow.

3.04 ADJUST AND CLEAN

A. Remove any scrap from the site, and leave in a neat and clean condition.

END OF SECTION

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SECTION 08 1113
STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS

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

B. Section 08 7100 - Door Hardware.

C. Section 09 9100 - Painting: Field painting.

1.02 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.

C. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.

D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2017.

E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.

F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2018.

G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2018.

H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.

I. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2015a.

J. ASTM C476 - Standard Specification for Grout for Masonry; 2018.

K. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2016.

L. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

M. DHI A115 Series - Specifications for Steel Doors and Frame Preparation for Hardware; Door and Hardware Institute; 2000 (ANSI/DHI A115 Series).

N. ITS (DIR) - Directory of Listed Products; current edition.

O. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.

P. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.

Q. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2007.

R. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2014.

S. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2019.

T. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2017.

U. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2013.

V. UL (DIR) - Online Certifications Directory; Current Edition.

W. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.

B. Provide doors and frames complying with Steel Door Institute “Recommended Specifications: Standard Steel Doors and Frames” (SDI-100) and as herein specified.

C. Provide steel doors and frames from a single manufacturer.

D. Fire-Rated Door Assemblies:
   1. Where fire-rated door assemblies are indicated or required, provide fire-rated door and frame assemblies that comply with NFPA 80 “Standard for Fire Doors and Windows,” and have been tested, listed and labeled in accordance with ASTM E 152 “Standard Methods of Fire Tests of Door Assemblies” by a nationally recognized independent testing and inspection agency acceptable to authorities having jurisdiction.
   2. Labels mounted on doors and door frames must indicate the time rating of the door/frame assembly.
   3. Provide units listed and labeled by UL.
   4. Attach fire rating label to each fire-rated unit.
   5. Fire rating label must be accessible, permanent (embossed on metal label), and be kept legible at all times.
   6. Labels on frames with transoms or sidelights must identify that the opening assembly includes same.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

C. Deliver hollow metal work cartoned or crated to provide protection during transit and job storage.

D. Inspect hollow metal work upon delivery for damage. Minor damages may be repaired provided finish items are equivalent in all respects to new work and acceptable to Architect; otherwise, remove and replace damaged items as directed.

E. Store doors and frames at building site under cover. Place units on minimum 4-inch-high wood blocking. Avoid use of non-vented plastic or canvas shelters which could create humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide 1/4-inch spaces between stacked doors to promote air circulation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Steel Doors and Frames, (General):
   1. Ceco Door: www.cecodoor.com.
   2. Curries, Mason City, Iowa: www.curries.com.
   3. Mesker Industries, Inc.
   4. Republic Builders Products Corp./Subs. Republic Steel.

B. Substitutions: Section 01 6000 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

A. Requirements for Hollow Metal Doors and Frames:
   1. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
   2. Accessibility: Comply with ICC A117.1 and ADA Standards.

3. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturer's standard.
4. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
5. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
   a. Based on SDI Standards: Provide at least A40/ZF120 (galvannealed) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvannealed) for corrosive locations.

B. Materials:
1. Hot-Rolled Steel Sheets and Strip: Commercial quality carbon steel, pickled and oiled, complying with ASTM A 569 and ASTM A 568.
2. Cold-Rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A 366 and ASTM SA 568.
3. Galvanized Steel Sheets: Zinc-coated carbon steel sheets of commercial quality, complying with ASTM A 526, with ASTM A 525, G60 zinc coating, mill phosphatized.
4. Supports and Anchors: Fabricate of galvanized sheet steel of gage not less than that of door frame.
5. Inserts, Bolts and Fasteners: Manufacturer's standard units, except hot-dip galvanize items to be built into exterior walls, complying with ASTM A 153, Class C or D as applicable.

C. Fabrication:
1. Fabricate steel door and frame units to be rigid, neat in appearance and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at project site.
2. Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers and moldings from either cold-rolled or hot-rolled steel (at fabricator's option).
3. Fabricate exterior doors, panels and frames from galvanized sheet steel. Close top and bottom edges of exterior doors as integral part of door construction or by addition of minimum 16-gauge inverted steel channels.
   a. Use galvanizing repair paint for surfaces damaged by fabrication or welding.
4. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat Phillips heads for exposed screws and bolts.
5. Finish Hardware Preparation:
   a. Prepare doors and frames to receive mortise and concealed finish hardware in accordance with final Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A 115 series specifications for door and frame preparation for hardware.
   b. Reinforce doors and frames to receive surface applied hardware. Drilling and tapping for surface-applied finish hardware may be done at project site.
   c. Locate finish hardware as indicated on final shop drawings, or if not indicated, in accordance with “Recommended Locations for Builders' Hardware,” published by Door and Hardware Institute.
6. Shop Painting:
   a. Clean, treat and paint exposed surfaces of steel door and frame units, including galvanized surfaces.
   b. Clean steel surfaces of mill scale, rust, oil, grease, dirt and other foreign materials before application of paint.
   c. Use galvanizing repair paint for surfaces damaged by fabrication or welding, prior to prime coat.

d. Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive finish paint.
e. Do not paint fire labels on doors or frames.

D. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

A. Provide metal doors of types and styles indicated on drawings or schedules, or seamless hollow steel construction. Form exterior doors of hot dip galvanized steel.

B. Exterior Doors, Non-Fire-Rated:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
a. Level 3 - Extra Heavy-duty.
b. Physical Performance Level A 1 000 000 cycles; in accordance with ANSI/SDI A250.4.
c. Model 1 - Full Flush.
d. Door Face Metal Thickness: 20 gage, 0.032 inch (0.8 mm), minimum.
2. Core Material: Polystyrene, 1 lbs/cu ft minimum density.
3. Top Closures for Outswinging Doors: Flush with top of faces and edges.
4. Door Face Sheets: Flush.

C. Exterior Doors, Fire-Rated:
1. Grade: ANSI A250.8 - SDI-100; Level 3 - Extra Heavy-Duty, Physical Performance Level A, Model 1 - Full Flush.
2. Fire Rating: As indicated on Door and Frame Schedule, tested in accordance with UL 10C ("positive pressure").
a. Provide units listed and labeled by UL (Underwriters Laboratories) - UL (BMD).
b. Attach fire rating label to each fire rated unit.
3. Door Face Metal Thickness: 16 gage, 0.053 inch (1.3 mm), minimum.
4. Core: Mineral board.
5. Thickness: 1-3/4 inch (44.5 mm).
6. Top Closures : Flush with top of faces and edges.
7. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
8. Texture: Smooth faces.

D. Interior Doors, Non-Fire Rated:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
a. Level 2 - Heavy-duty.
b. Physical Performance Level B 500 000 cycles; in accordance with ANSI/SDI A250.4.
c. Model 1 - Full Flush.
d. Door Face Metal Thickness: 18 gage, 0.042 inch (1.0 mm), minimum.
2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
3. Door Thickness: 1-3/4 inches (44.5 mm), nominal.

E. Fire-Rated Doors:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
a. Level 2 - Heavy-duty.
b. Physical Performance Level B 500 000 cycles; in accordance with ANSI/SDI A250.4.
c. Model 1 - Full Flush.
d. Door Face Metal Thickness: 20 gage, 0.032 inch (0.8 mm), minimum.
2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
a. Provide units listed and labeled by UL (DIR) or ITS (DIR).

b. Attach fire rating label to each fire rated unit.
3. Core Material: Mineral board.
4. Door Thickness: 1-3/4 inches (44.5 mm), nominal.

2.04 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. General:
1. Comply with the requirements of grade specified for corresponding door.
a. Provide metal frames for doors, transoms, sidelights, borrowed lights, and other openings, of types and styles as shown on drawings and schedules. Conceal fastenings, unless otherwise indicated. Fabricated frames of minimum 16-gauge cold-rolled furniture steel for interior door frames; 14-gauge cold-rolled furniture steel for exterior door frames.
1) Frames for doors 7'-10" or more in height and/or over 3'-5" in width: 14 gauge cold-rolled furniture steel, and one additional hinge, whether or not indicated in hardware schedule.
2. Frames shall be formed by press brake with corners sharp and true. Corners shall be mitered and accurately fitted, and shall be fully electrically welded and then ground smooth. Removable spreaders shall be welded to the bottom of the frame. Frames shall be accurately mortised for hardware.
3. Contractor shall verify width of throat opening required, before fabrication.
4. A minimum of three wall anchors shall be provided at each jamb, except four at doors 7'-10" high or more, and six at doors 10-foot high or more. Anchors shall be attached to door frames, adjustable, suitable for wall conditions and job requirements, and shall be 16 gauge minimum. Floor anchors shall be provided and welded to foot of each jamb with two 5/16" holes for securing to the floor.
5. Reinforcements of adequate gauge shall be provided for strikes, closers and brackets and other surface applied hardware for field drilling and tapping.

C. Exterior Door Frames: Fully welded type.
1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
2. Weatherstripping: Separate, see Section 08 7100.

D. Interior Door Frames: Fully welded type.

E. Interior Door Frames, Fire-Rated: Fully welded type.
1. Fire Rating: Same as door, labeled.

F. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.

G. ////////Frames for Fiberglass Reinforced Polyester Doors (FRP). Fully welded type.
1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.

H. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.

I. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.

J. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches (102 mm) high to fill opening without cutting masonry units.

2.05 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.06 ACCESSORIES

A. Glazing: As specified in Section 08 8000 - Glazing.

B. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches (102 mm) as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.

C. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
   1. Provide additional door silencers at doors over 3'-0" wide or 7'-0" in height.
   2. Provide silencers equivalent to "GJ64" silencers as manufactured by Glenn-Johnson Corp., for metal frames, when not provided under the work of Section 08 7100 - "Finish Hardware."

D. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

2.07 FINISHES

A. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating. This coating shall be factory installed on all interior of all hollow metal frames. Field application is not acceptable.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

A. General: Install standard steel doors, frames and accessories in accordance with final shop drawings and manufacturer's data, and as herein specified.

B. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

C. Install fire rated units in accordance with NFPA 80.

D. Coordinate frame anchor placement with wall construction.

E. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

F. Placing Frames:
   1. Comply with provisions of SDI-1-06 “Recommended Erection Instructions for Steel Frames,” unless otherwise indicated.
   2. Remove before installation all spreader bars and braces used for shipping.
   3. Except for frames located at in-place concrete or masonry, place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces leaving surfaces smooth and undamaged.
   4. In masonry construction, locate a minimum of 3 wall anchors per jamb at hinge and strike levels. Add 1 wall anchor per jamb at hinge and strike levels for each whole 1'-10" height increment over 6'-0"; Similar at glazed and cased openings.
   5. At in-place concrete or masonry construction, set frames and secure to adjacent construction with machine screws and masonry anchorage devices.
   6. In metal stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. Attach wall anchors to studs with tapping screws. Add additional anchors as indicated in paragraphs above.
   7. Install fire-rated frames in accordance with NFPA Std. No. 80

G. Door Installation:

1. Fit hollow metal doors accurately in frames, within clearances specified in SDI-100.
2. Place fire-rated doors with clearances as specified in NFPA Std. No. 80.

H. Install silencers after all painting of doors and frames has been completed.

I. Install door hardware as specified in Section 08 7100.

J. Comply with glazing installation requirements of Section 08 8000.

K. Coordinate installation of electrical connections to electrical hardware items.

3.04 TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.

B. Maximum Diagonal Distortion: 1/16 inch (1.6 mm) measured with straight edge, corner to corner.

3.05 ADJUSTING

A. Adjust for smooth and balanced door movement.

B. Prime Coat Touch-up:
1. Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.
2. Use galvanizing repair paint for galvanized surfaces, prior to prime coat.

C. Final Adjustments: Check and readjust operating finish hardware items, leaving steel doors and frames undamaged and in complete and proper operating condition.

D. Repair all dents, bends, and prying prior to painting.

3.06 SCHEDULE

A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

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SECTION 08 3100
ACCESS DOORS AND PANELS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Access door and frame units, fire-rated and non-fire-rated, in wall and ceiling locations.

B. Attic Hatch.

1.02 RELATED REQUIREMENTS

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

B. Section 07 9005 - Joint Sealers.

C. Section 09 2116 - Gypsum Board Assemblies: Openings in gypsum ceilings or partitions.

D. Section 09 9100 - Painting: Field paint finish.

E. Divisions 22-26 Sections: Additional access doors provided and installed by Contractors for Plumbing, Mechanical, Electrical and related work.

1.03 SUMMARY

A. This Section includes access doors for installation in the following types of new construction:
   1. Gypsum drywall.
   2. Unit masonry.
   3. As otherwise indicated.

B. Provide fire-rated access doors where indicated or scheduled, and at access openings in all walls of stairs, elevator shafts and equipment rooms, other shafts and plumbing chase walls which are partially or fully open through floors, and at walls and ceilings indicated or required by Code to be fire-rated.

1.04 REFERENCE STANDARDS

A. UL (FRD) - Fire Resistance Directory; Current Edition.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
   1. Include complete schedule, including types, general locations, sizes, wall and ceiling construction details, finishes, latching or locking provisions, and other data pertinent to installation.

C. Shop Drawings: Indicate exact position of all access door units. Also indicate fabrication and installation of customized access doors and frames, including details of each frame type, elevations of door design types, anchorage and accessory items.

D. Manufacturer's Installation Instructions: Indicate installation requirements.

E. Project Record Documents: Record actual locations of each access unit.

1.06 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire rated access doors.
   1. Provide access doors of fire rating equivalent to the fire rated assembly in which they are to be installed.
   2. Provide products listed and labeled by UL as suitable for the purpose specified and indicated.

B. Fire-Resistance Ratings: Wherever a fire-resistance classification is indicated, provide access door assembly with panel door, frame, hinge, and latch from manufacturer listed in Underwriters Laboratories, Inc.'s “Building Materials Directory” for rating shown.
   1. Provide UL label on each fire-rated access door.

2. Fire rating label must be accessible, permanent (embossed on metal label), kept legible at all times, and shall contain the fire resistance rating in hours and/or minutes.

1.07 QUALITY ASSURANCE

A. Single-Source Responsibility: Obtain access doors for entire project from one source from a single manufacturer.

B. Size Variations: Obtain Architect's acceptance of manufacturer's standard size units, which may vary slightly from sizes indicated.

C. Coordination: Furnish inserts and anchoring devices that must be built into other work for installation of access doors. Coordinate delivery with other work to avoid delay.

1.08 PROJECT CONDITIONS

A. Coordinate the work with other work requiring access doors.

B. Verification: Obtain specific locations and sizes for required access doors from trades requiring access to concealed equipment, and indicate on submittal schedule.

C. Special-Size Access Doors: Use where required or requested; indicate on schedule.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Wall and Ceiling Access Doors:
1. Acudor Products Inc: www.acudor.com.
2. Bar-Co., Inc.
3. Cesco Products
4. J.L. Industries [Basis of Design]: www.activarcpg.com/jl-industries/.
5. Karp Associates, Inc: www.karpinc.com.
6. Larsens Manufacturing Co.
7. Milcor by Commercial Products Group of Hart & Cooley, Inc: www.milcorinc.com.
8. Nystrom: www.nystrom.com.
9. The Williams Brothers Corp.
10. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ATTIC HATCH

A. Nystrom Building Products: www.nystrom.com. Product: NT, Steel Access Door, 36 inch by 36 inch, with 1 inch flange at perimeter, constructed of 14 gauge steel at door, 16 gauge at frame. 1 year warranty. Powder coat. For ceiling mount. Latch: As selected by Architect.
1. Substitutions: See Section 01 6000 - Product Requirements.

B. Precision Ladders: www.precisionladders.com. Product: Super Simplex Disappearing Stairway aluminum folding stairway. Individual tread test weight -1,000 lbs. No shear of rivets when tested at 2,000 lbs. 11 gauge steel frame. 5-3/16" tread depth. Meet ANSI A14.9-2004.
1. Substitutions: See Section 01 6000 - Product Requirements.

2.03 ACCESS DOORS AND PANELS

A. All Units: Factory fabricated, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies units are to be installed in.

B. Units in Fire Rated Assemblies: Fire rating equivalent to the fire rated assembly in which they are to be installed.

2.04 MATERIALS AND FABRICATION: ACCESS DOOR UNITS - WALLS AND CEILINGS

A. Door and Frame Units: Formed steel.
1. General: Furnish each access door assembly manufactured as an integral unit, complete with all parts, and ready for installation.
2. Steel Access Doors and Frames: Fabricate units of continuous welded steel construction, unless otherwise indicated. Grind welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to

types of support shown.

3. Frames and flanges: 0.058 inch (1.5 mm) steel.
   a. Fabricate frame with exposed flange, nominal 1-inch wide around perimeter of frame for units installed in the following construction:
      1) Exposed masonry.
      2) Exposed concrete.
      3) Exposed siding.
   b. For gypsum drywall or gypsum veneer plaster, furnish perforated flange frames with drywall bead.
   c. For full-bed plaster and E.I.F.S. applications, furnish frames with galvanized expanded metal lath and exposed casing bead, welded to perimeter of frame.
4. Door panels: 0.070-inch single thickness steel sheet.
   a. Painted Flush Panel Doors (non-fire-rated and fire-rated): Fabricate from not less than 16-gage galvanized sheet steel, with concealed spring hinges or concealed continuous piano hinge set to open 175 degrees. Finish with manufacturer's factory-applied prime paint.
      1) Restore any damage to galvanized finish with cold-process galvanizing repair paint, prior to applying factory prime coating, or other finishes.
   b. Stainless Steel Flush Panel Doors: Fabricate from not less than 18-gage stainless steel sheet, with concealed spring hinges or concealed piano hinge set to open 175 degrees. Buff exposed surfaces to #4 satin finish, except where other finishes are indicated.
5. Size: As indicated or as necessary to access and service equipment.
6. Hardware:
   a. Hardware for Fire-Rated Units: As required for listing.
   b. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.
   c. Hinge: 175 degree steel piano hinge with removable pin.
   d. Latch/Lock: Screw driver slot for quarter turn cam latch.
7. Galvanized, hot dipped finish, except where indicated otherwise.
8. Finish: No. 4 finish for stainless units.

B. Non-Fire Rated Door and Frame Units in Walls:
   1. Provide manufacturer's standard flush panel/door and frame.

C. Fire Rated Door and Frame Units in Walls:
   1. For fire rated units, provide manufacturer's standard insulated flush panel/doors, with continuous piano hinge and self-closing mechanism.

D. Locking Devices: Furnish flush, screwdriver-operated cam locks of number required to hold door in flush, smooth plane when closed.

E. Finishes:
   1. Attic hatch: Phosphate dipped with factory applied primer coat.
   2. Exterior: 3-coat 70% resin “Kynar 500” finish (i.e.: 7-mil prime coat, 9-mil color coat, and 9-mil clear top coat) with minimum 2.4 mil total dry film thickness, in color to match adjacent finish where occurs, unless otherwise selected by Architect from manufacturer's standard non-metallic colors - 15 colors minimum to select from, including white.
   3. Interior, Exposed to Normal View: To match finish on interior. Door "Finish Hardware" (refer to Section 08 7100), or if not indicated, to match existing hardware in room where occurs.
   4. Interior, in Service Areas, Above Ceilings, etc: Factory primed baked enamel.
   5. Toilet Rooms, Janitors Rooms, Kitchens, Kitchen Areas, Rooms Where Food is Stored, Prepared, Cooked and/or Served, and Break Rooms: Stainless steel, No. 4, satin finish.

2.05 FABRICATION

A. Weld, fill, and grind joints to ensure flush and square unit.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that rough openings are correctly sized and located.

3.02 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install frames plumb and level in openings in relation to adjacent finish surfaces. Secure rigidly in place.

C. Position units to provide convenient access to concealed equipment when necessary.

D. Coordinate installation with work of other trades.

E. Prepare perimeter of rough openings in concrete, CMU, and clay masonry with mortar/grout full-depth of wall and to size required; use pressure-treated wood as necessary for other concealed blocking, grounds, and supports at any stud wall construction.

3.03 ADJUST AND CLEAN

A. Adjust hardware and panels after installation for proper operation.

B. Remove and replace panels or frames that are warped, bowed, or otherwise damaged.

END OF SECTION

SECTION 08 5413
FIBERGLASS CLAD WOOD WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fixed fiberglass clad wood windows.

B. Factory glazed.

C. Perimeter sealant.

1.02 RELATED REQUIREMENTS

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

B. Section 07 9005 - Joint Sealers: Perimeter sealant and back-up materials.

1.03 REFERENCE STANDARDS

A. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).

B. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.

C. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).

D. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2000 (Reapproved 2008)

E. ASTM F588 - Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact; 2007.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week week before starting work of this section.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide component dimensions, anchorage and fasteners, glass, internal drainage details.

C. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work, installation requirements.

D. Samples: Submit two corner sash sections, 8x8 inch (____x____ mm) in size, illustrating window frame section.

E. Submit two samples of operating hardware.

F. Manufacturer's Certificate: Certify that products of this section meet or exceed specified requirements.

G. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years of experience.

1.07 MOCK-UP

A. Include Fiberglass Windows in Mock-Up as described in Section 01 4000 - Quality Requirements, and on drawings.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Protect finished surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.

B. Jig, brace, and box the window frame assemblies for transport to minimize flexing of members or joints.

1.09 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C).

B. Maintain this minimum temperature during and after installation of sealants.

1.10 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a ten year period after Date of Substantial Completion.

C. Provide twenty year manufacturer warranty for insulated glass units from seal failure, interpane dusting or misting, and replacement of same.

D. Provide manufacturer's 10 year warranty for window assembly and components, including degradation of color finish.

E. Provide manufacturer's 20 year warranty against stress cracks in glass.

F. Provide manufacturer's 10 year warranty covering hardware and other non-glass components from manufacturing defects.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fiberglass-Clad Wood Windows:
   1. Integrity Windows; Product "Wood-Ultrex"; [Basis of Design]: www.integritywindows.com.
   2. Milgard Windows & Doors; Product "WoodClad": www.milgard.com.
   3. Weather Shield Windows & Doors; Product "EnduraShield": www.weathershield.com.

2.02 WINDOW UNITS

A. Fiberglass-Clad Wood Windows:
   1. Fiberglass: Pultruded, reinforced fiberglass.
   2. Wood veneer: Clear pine veneer. 0.020 inches thick nominal, with manufacturer's recommended backing. Water repellent preservative treated. [VERIFY VENEER WITH INTERIOR DESIGNER.]
   3. Performance Requirements: ANSI/AAMA/101/I.S.2.
   4. Configuration: Direct set, unless indicated otherwise.

B. Performance Requirements:
   1. Forced Entry Resistance: Conform to ASTM F588 requirements for performance level 10 for window type A.
   2. System Design: Design and size components to withstand dead and live loads caused by pressure and suction of wind acting normal to plane of window.
      a. Calculate design pressures in accordance with applicable code
      b. Measure performance of units by testing in accordance with ASTM E330/E330M, using test pressure equal to 1.5 times the design wind pressure and 10 second duration of maximum load.
   3. Deflection: Limit member deflection to 1/200 of the longer dimension with full recovery of glazing materials.
   4. Assembly: To accommodate, without damage to components or deterioration of seals, movement between window and perimeter framing, deflection of lintel.

5. Air Infiltration: Limit air infiltration through assembly to 0.3 cu ft/min/sq ft (____ L/s/sq m) or less, of frame single-hung, measured at a reference differential pressure across assembly of 1.57 psf (75 Pa) as measured in accordance with ASTM E283. [VERIFY MANUFACTURER'S AIR-INFILTRATION PERFORMANCE FOR SELECTED CONFIGURATION.]
6. Vapor Seal: No vapor seal failure at interior static pressure of 1 inch (25 mm), 72 degrees F (22 degrees C), and 40 percent relative humidity.
7. Water Leakage: None, when measured in accordance with ASTM E331 at 6.0 psf. [VERIFY MANUFACTURER'S PUBLISHED PERFORMANCE FOR SELECTED CONFIGURATION.]
8. System Internal Drainage: Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to the exterior by a weep drainage network.
9. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound. Position thermal insulation on exterior surface of air barrier and vapor retarder.
10. Thermal Movement: Design sections to permit movement caused by thermal expansion and contraction of fiberglass to suit glass, infill, and perimeter opening construction.

2.03 COMPONENTS

A. Frames: Pultruded reinforced fiberglass 0.070 (nominal) inch wall thickness.
   1. Type: Nailing flange (for new windows). [VERIFY - OR WITHOUT NAILING FLANGE]
   2. Frame Corners: Joined per manufacturer's standard.
   3. Frame depth:
      a. All Fiberglass: 3-3/32". [VERIFY WHICH - A OR B, OR BOTH]
      b. Fiberglass-Clad Wood: 4-9/16".
   4. Jamb Depth: 2".

B. Sills: Pultruded fiberglass: 10-degree (nominal) sloped for positive wash.

C. Sash: Pultruded fiberglass, 15/16-inch thickness.
   1. Provide custodial locks (for use by authorized personnel) for operable windows.

D. Fasteners: Stainless steel.

2.04 GLASS AND GLAZING MATERIALS

A. Select quality complying with ASTM C 1036. Insulating glass SIGMA/IGCC when tested in accordance with ASTM E 2190. STC/OITC ratings are tested to the stated performance level in accordance with ASTM E 90-09.

B. Glass and Glazing Materials:
   1. Glass in Exterior Lights: High Performance LowE.
      a. Comply with Alabama Energy Code
   2. U-value = 0.65. SHGC = 0.25

2.05 SEALANT MATERIALS

A. Perimeter Sealant and Backing Materials: Type as specified in Section 07 9005.

B. Glazing Sealant: Silicone bedding at exterior.
   1. Interior with glazing boot.

C. Sealant Used Within System (Not Used for Glazing): Type recommended by manufacturer.

2.06 FABRICATION

A. Fabricate framing, mullions and sash members with fusion welded corners and joints, in a rigid jig. Supplement frame sections with internal reinforcement where required for structural rigidity.

B. Form sills in one piece. Slope sills for wash.

C. Form snap-in glass stops, closure molds, weather stops, and flashings for tight fit into window frame section.

D. Form weather stop flange to perimeter of unit.

E. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

F. Arrange fasteners to be concealed from view.

G. Permit internal drainage weep holes and channels to migrate moisture to exterior. Provide internal drainage of glazing spaces to exterior through weep holes.

H. Double weatherstrip operable units.

I. Factory glaze window units.

2.07 FINISHES

A. Factory baked-on acrylic organic coating system. Meet AAMA 624-10 requirements.

B. Color:
   1. Exterior: As selected by Architect from minimum of 6 of manufacturer's colors.
   2. Interior of Fiberglass Clad Wood Windows: Treated bare wood. [VERIFY DESIRED FINISH - COORDINATE WITH INTERIOR DESIGNER]
      a. Unfinished stain grade with no exposed fasteners, holes, or fingerjoints. [VERIFY THIS OR WHITE PREFINISH]

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.

3.02 INSTALLATION

A. Install window units in accordance with manufacturers instructions.

B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.

C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.

D. Install sill.

E. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

F. Coordinate attachment and seal of perimeter air and vapor barrier materials.

G. Install perimeter sealant and backing materials in accordance with Section 07 9005.

3.03 TOLERANCES

A. Maximum Variation from Level or Plumb: 0.06 inches every 3 ft (1.5 mm/m) non-cumulative or 0.5 inches per 100 ft (12 mm/30 m), whichever is less.

3.04 FIELD QUALITY CONTROL

A. Test installed windows by an approved testing agency approved and paid for by the Owner for compliance with specified performance requirements for water penetration, in accordance with AAMA 502-08 Field Testing using uniform pressure and same pressure difference as specified for laboratory tests.
   1. [VERIFY MFRS AIR & WATER PERFORMANCE FOR APPROPRIATE WINDOW TYPE.]
   2. Architect and Owner shall select three (3) windows of the first 25 installed windows for Field verification of performance.
   3. If any window fails, test two (2) additional windows of Architect's choosing at Contractor's expense.

B. Repair or replace windows that have failed field testing and retest until performance is satisfactory. Any repairs made to installed windows to demonstrate compliance with performance shall also be made to all other windows.

3.05 ADJUSTING

A. Adjust hardware for smooth operation and secure weathertight closure.

3.06 CLEANING

A. Remove protective material from pre-finished surfaces.

B. Wash surfaces by method recommended and acceptable to sealant and window manufacturer; rinse and wipe surfaces clean.

C. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

3.07 PROTECTION

A. Protect windows from damage until Substantial Completion.

B. Replace damaged windows that cannot be repaired to Architect's satisfaction.

3.08 CLOSE OUT DOCUMENTS

A. Provide manufacturer's maintenance manual as an electronic file.

B. Conduct scheduled walk-thru with Owner's representative to discuss routine service and maintenance.

END OF SECTION

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SECTION 08 7100
DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

A. This Section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.

B. This Section includes the following:
1. Architectural Hinges
2. Continuous Hinges
3. Key Control System, Cylinders and Cores.
4. Locksets, Latchsets and Deadbolts
5. Panic Devices and Fire Rated Exit Devices
6. Closers and Door Control Devices
7. Automatic Door Operators
8. Overhead Door Stops and Holders
9. Floor and Wall Stops
10. Door Bolts and Coordinators
11. Door Pulls, Push/Pull Plates and Push/Pull Sets
12. Protective Plates
13. Door Seals, Gasketing and Weatherstripping
14. Thresholds
15. Miscellaneous Door Control Devices
16. Electromechanical Hardware
17. Miscellaneous Access Control Components and Security Equipment

C. Related Sections: The following Sections contain requirements that relate to the following sections.
1. Section 01 2000: Price and Payment Procedures
2. Section 08 1113: Hollow Metal Doors and Frames
3. Section 08 1400: Wood Doors
4. Section 08 3323: Coiling Doors
5. Section 08 4113: Aluminum-Framed Entrances and Storefronts
6. Division 26: Electrical
7. Division 28: Electronic Safety and Security

D. Products furnished but not installed under this Section to include:
1. Cylinders for locks on entrance doors.
2. Final replacement cores and keys to be installed by Owner.

1.3 REFERENCES:

A. Standards of the following as referenced:
   1. American National Standards Institute (ANSI)
   2. Door and Hardware Institute (DHI)
   3. Factory Mutual (FM)
   4. National Fire Protection Association (NFPA)
   5. Underwriters' Laboratories, Inc. (UL)
   6. UL 10C - Fire Tests Door Assemblies
   7. Warnock Hersey

B. Regulatory standards of the following as referenced:
   1. Department of Justice, Office of the Attorney General, *Americans with Disabilities Act*, Public Law 101-336 (ADA).
   2. CABO/ANSI A117.1: *Providing Accessibility and Usability for Physically Handicapped People*, 2010 edition.

1.4 SUBMITTALS:

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification sections.

B. Product data including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements. For items other than those scheduled in the “Headings” of Section 3, provide catalog information for the specified items and for those submitted.

C. Final hardware schedule coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
   1. Final Hardware Schedule Content: Based on hardware indicated, organize schedule into vertical format “hardware sets" indicating complete designations of every item required for each door or opening. Use specification heading numbers with any variations suffixed a, b, etc. Include the following information:
      a. Type, style, function, size, and finish of each hardware item.
      b. Name and manufacturer of each item.
      c. Fastenings and other pertinent information.
      d. Location of each hardware set cross-referenced to indications on Drawings both on floor plans and in door and frame schedule.
      e. Explanation of all abbreviations, symbols, and codes contained in schedule.
      f. Mounting locations for hardware.
      g. Door and frame sizes and materials.
      h. Keying information.
      i. Cross-reference numbers used within schedule deviating from those specified.
      j. Column 1: State specified item and manufacturer.
      k. Column 2: State prior approved substituted item and its manufacturer.
   2. Furnish complete wiring diagrams, riser diagrams, elevation drawings and operational descriptions of electrical components and systems, listed by opening

in the hardware submittals. Elevation drawings shall identify locations of the system components with respect to their placement in the door opening. Operational descriptions shall fully detail how each electrical component will function within the opening, including all conditions of ingress and egress. Provide a copy with each hardware schedule submitted for approval. Supply a copy with delivery of hardware to the jobsite and another copy to the Owner at the time of project completion.

3. Submittal Sequence: Submit final schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work that is critical in the Project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by door hardware, and other information essential to the coordinated review of schedule.
4. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.

D. Provide samples if requested of each type of exposed hardware unit in finish indicated and tagged with full description for coordination with schedule. Submit samples prior to submission of final hardware schedule.
1. Samples will be returned to the supplier. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated in the Work, within limitations of keying coordination requirements.

E. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

F. Contract closeout submittals:
1. Operation and maintenance data: Complete information for installed door hardware.
2. Warranty: Completed and executed warranty forms.

1.5 QUALITY ASSURANCE:

A. Single Source Responsibility: Obtain each type of hardware (latch and locksets, hinges, closers, etc.) from a single manufacturer.
1. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that employs an experienced Architectural Hardware Consultant (AHC) who is available for consultation to Owner, Architect, and Contractor, at reasonable times during the course of the Work.

B. Coordination Meetings:
1. Contractor to set up and attend the following:
a. Lock distributor to meet with the Owner to finalize lock functions and keying requirements and to obtain final instructions in writing.
b. Lock distributor and lock, closer and exit device manufacturer to meet

with the installer prior to beginning of installation of door hardware. Instruct installer on proper installation of specified products.

2. General Contractor to set up and attend the following:
3. Meet with the Owner, General Contractor, Supplier, electrical and security contractors to coordinate all electrical hardware items. Supplier to provide riser diagrams, elevation drawings, wiring diagrams and operational descriptions as required by the General and sub-contractors.

C. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 requirements of authorities having jurisdiction.
1. Provide only items of door hardware that are listed and tested by UL or Warnock Hersey for given type/size opening and degree of label. Provide proper latching hardware, door closers, approved-bearing hinges and seals whether listed in the Hardware Schedule or not. All hardware to comply with State and local codes and UL 10C.
2. Where emergency exit devices are required on fire-rated doors, (with supplementary marking on doors' UL labels indicating "Fire Door to be equipped with Fire Exit Hardware") provide UL label on exit devices indicating "Fire Exit Hardware".

D. All hardware is to comply with Federal and State Handicap laws.

E. Substitutions: Request for substitutions of items of hardware other than those listed as "acceptable and approved" shall be made to the architect in writing no later than fourteen (14) days prior to bid opening. Approval of substitutions will only be given in writing or by Addenda. Requests for substitutions shall be accompanied by samples and/or detailed information for each manufacturer of each product showing design, functions, material thickness and any other pertinent information needed to compare your product with that specified. Lack of this information will result in a refusal.

F. Pre-Installation Coordination:
1. Installation of hardware shall be installed or directly supervised and inspected by a skilled installer certified by the manufacturer of locksets, door closers, and exit devices used on the project, or with not less than 3 years' experience in successful completion of projects similar in size and scope.
2. Schedule a hardware pre-installation meeting on site to review and discuss the installation of continuous hinges, locksets, door closers, exit devices, overhead stops, and electromechanical door hardware.
3. Meeting attendees shall be notified 7 days in advance and shall include: Architect, Contractor, Door Hardware Installers (including low voltage hardware), Manufacturers representatives for above hardware items, and any other effected subcontractors or suppliers.
4. All attendees shall be prepared to distribute installation manuals, hardware schedules, templates, and physical hardware samples.

1.6 PRODUCT HANDLING:

A. Tag each item or package separately with identification related to final hardware schedule, and include basic installation instructions with each item or package.

B. Packaging of door hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packed in same container.

C. Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

D. Deliver individually packaged door hardware items promptly to place of installation (shop or Project site).

E. Provide secure lock-up for door hardware delivered to the Project, but not yet installed. Control handling and installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.

1.7 WARRANTY:

A. Special warranties:
1. Mortise Locks and Cylinders: Three Year Period
2. Door Closers: Thirty Year Period
3. Exit Devices: Three Year Period
4. Electrified Exit Devices: One Year Period

1.8 MAINTENANCE:

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions that are packed in hardware items for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Parts kits: Furnish manufacturers' standard parts kits for locksets, exit devices, and door closers.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS: (*Denotes manufacturer referenced in the Hardware Headings)

A. Hinges:
1. Acceptable manufacturers:
a. Ives*
b. Bommer
c. McKinney
2. Characteristics:
a. Templates: Provide only template-produced units.
b. Screws: Provide Phillips flat-head screws complying with the following requirements:
1) For metal doors and frames install machine screws into drilled and tapped holes.
2) For wood doors and frames install threaded-to-the-head wood screws.

3) For fire-rated wood doors install #12 x 1-1/4 inch, threaded-to-the-head steel wood screws.
4) Finish screw heads to match surface of hinges or pivots.

c. Hinge pins: Except as otherwise indicated, provide hinge pins as follows:
1) Out-Swing Exterior Doors: Non-removable pins.
2) Out-Swing Corridor Doors with Locks: Non-removable pins.
3) Interior Doors: Non-rising pins.
4) Tips: Flat button and matching plug. Finished to match leafs.

d. Size: Size hinges in accordance with specified manufacturer's published recommendations.

e. Quantity: Furnish one pair of hinges for all doors up to 5'-0" high. Furnish one hinge for each additional 2-1/2 feet or fraction thereof, unless otherwise specified in Hardware Headings.

B. Geared Continuous Hinges:
1. Acceptable manufacturers:
a. Ives*
b. Select Products
c. Markar
2. Characteristics:
a. Continuous gear hinges to be manufactured of extruded 6063-T6 aluminum alloy with anodized finish, or factory painted finish as scheduled.
b. All hinges are to be manufactured to template. Uncut hinges to be non-handed and to be a pinless assembly of three interlocking extrusions applied to the full height of the door and frame without mortising.
c. Vertical door loads to be carried on chemically lubricated polyacetal thrust bearings. The door and frame leaves to be continually geared together for the entire hinge length and secured with a full cover channel. Hinge to operate to a full 180°.
d. Hinges to be milled, anodized and assembled in matching pairs. Fasteners supplied to be steel self-drilling, self-tapping 12-24 x ¾" screws.
e. Provide UL listed continuous hinges at fire doors. Continuous hinges at fire doors (suffix -FR) to meet the required ratings without the use of auxiliary fused pins or studs.

C. Cylinders and Keying:
1. Acceptable manufacturers:
a. Schlage Primus Everest 29T/Schlage Everest 29T
2. Characteristics:
a. New keying system: Except as otherwise indicated, provide new master key system for Project.
b. Provide new Schlage Primus Everest 29T Full Size Interchangeable Cores (FSIC) and cylinders at card access security doors and exterior doors.
c. Supplier shall establish a new grand master key system for project featuring patented, restricted keys and auxiliary locking pin. Patented key and cylinder design to be valid until 2029. All cores are to be of 7-pin design, and shall be instantly interchangeable without adaptation or modification, into the housing of all locks. Provide temporary brass

construction cores for ALL locksets during the construction phase of the project.

d. Schlage Everest 29T Full Size Interchangeable Cores (FSIC) and cylinders for balance of the doors. Supplier shall establish a new grand master key system for project featuring patented, restricted keys and auxiliary locking pin. Patented key and cylinder design to be valid until 2029. All cores are to be of 7-pin design, and shall be instantly interchangeable without adaptation or modification, into the housing of all locks. Provide temporary brass construction cores for ALL locksets during the construction phase of the project.

e. All locks and cylinders are to be constructed so that a Full Size Interchangeable Cores (FSIC) and cylinders is used. The control key is to have the same number of cuts as the master keys and is not to vary in size in any way, other than the depth of the cuts, from the size of the grandmaster, master, sub-master and operating keys.

f. Metals: Construct lock cylinder parts from brass or bronze, stainless steel, or nickel silver.

g. Comply with Owner's instructions for master keying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.

1) Permanently inscribe each key with number of lock that identifies cylinder manufacturer's key symbol, and notation, “DO NOT DUPLICATE”.

h. Key Material: Provide keys of nickel silver only.

i. Key Quantity: Furnish (3) change keys for each lock, (5) master keys for each master system, (5) grandmaster keys for each grandmaster system, (10) construction master keys, (2) construction Control Keys.

1) Furnish one extra blank for each lock.
2) Furnish construction master keys to General Contractor.
3) Deliver keys to Owner.

j. Key Control Software: Schlage Sitemaster 200 for Windows or equivalent, supplied with factory bitting, and keyset symbols.

D. Mortise Locksets and Latchsets: as scheduled.

1. Acceptable manufacturers:
   a. Schlage L9000 Series*
   b. Sargent 8200 Series
   c. Corbin Russwin ML2000 Series
2. Required Features:
   a. Chassis: Cold-rolled steel, handing field-changeable without disassembly.
   b. Latchbolts: 3/4-inch throw stainless steel anti-friction type.
   c. Lever Trim: Through-bolted, accessible design, cast or solid rod lever as scheduled. Spindles: Independent break-away.
   d. Thumbturns: Accessible design not requiring pinching or twisting motions to operate.
   e. Deadbolts: Stainless steel 1-inch throw.
   f. Electric operation: Manufacturer-installed continuous duty solenoid.
   g. Strikes: 16 gage curved stainless steel, bronze or brass with 1" deep box

construction, lips of sufficient length to clear trim and protect clothing.

h. Scheduled Lock Series and Design: Schlage L Series **07A**:
   1) Lever Design **07**
   2) Rosette Design **A.**

i. Certifications:
   1) ANSI A156.13, 1994, Grade 1 Operational, Grade 1 Security.
   2) ANSI/ASTM F476-84 Grade 30 UL Listed.

E. Exit Devices:
1. Acceptable manufacturers:
   a. Von Duprin 98 Series*
   b. Sargent 8000 Series
   c. Precision Apex 2100
2. Characteristics:
   a. Exit devices to be UL Listed for life safety. Exit devices for fire rated openings to have “UL" labels for “Fire Exit Hardware."
   b. Exit devices mounted on labeled wood doors to be mounted on the door per the door manufacturer’s requirements.
   c. All trim to be thru-bolted to the lock stile case.
   d. Lever trim to be solid case material with a break-away feature to limit damage to the unit from vandalism. Lever design to match locksets.
   e. All exit devices to be made of brass, bronze, stainless steel, or aluminum material, powder coated, anodized, or plated to the standard architectural finishes to match the balance of the door hardware.
   f. Provide glass bead conversion kits to shim exit devices on doors with raised glass beads.
   g. All exit devices to be one manufacturer. No deviation will be considered.
   h. All series exit devices to incorporate a fluid damper, which decelerates the touchpad on its return stroke and eliminates noise associated with exit device operation. All exit devices to be non-handed. Touchpad to extend a minimum of 1/2 of the door width and to extend to the height of the cross rail housing for a “no pinch” operation. Plastic touchpads are not acceptable. All latchbolts to be the deadlocking type. Latchbolts to have a self-lubricating coating to reduce wear. Plated or plastic coated latchbolts are not acceptable. Plastic linkage and “dogging” components are not acceptable.
   i. Surface vertical rod devices to be UL labeled for fire door applications without the use of bottom rod assemblies. Where bottom rods are required for security applications, the devices to be UL labeled for fire doors applications with rod and latch guards by the device manufacturer.
   j. Exit devices to include impact resistant, flush mounted end cap design to avoid damage due to carts and other heavy objects passing through an opening. End cap to be of heavy-duty metal alloy construction and provide horizontal adjustment to provide alignment with device cover plate. When exit device end cap is installed, no raised edges will protrude.

F. Closers and Door Control Devices:
1. Acceptable manufacturers:
   a. LCN Closers 4010/4110/4020 Series*
   b. Norton 9500 Series

c. Corbin Russwin DC8000

2. Characteristics:
   a. Door closers to have fully hydraulic, full rack and pinion action with a high strength cast iron cylinder.
   b. All closers to utilize a stable fluid withstanding temperature range of 120°F to -30°F without seasonal adjustment of closer speed to properly close the door. Closers for fire-rated doors to be provided with temperature stabilizing fluid that complies with standards UBC 7-2 (1997) and UL 10C.
   c. Spring power to be continuously adjustable over the full range of closer sizes, and allow for reduced opening force for the physically handicapped. Spring power adjustment (LCN Fast ™ Power Adjust) allows for quick and accurate power adjustment and visually shows closer power size settings by way of dial adjustment gauge located on closer spring tube. Hydraulic regulation to be by tamper-proof, non-critical valves. Closers to have separate adjustment for latch speed, general speed and back check.
   d. All closers to have solid forged steel main arms (and forearms for parallel arm closers) and where specified to have a cast-in solid stop on the closer shoe ("CUSH"). All parallel arm mounted closers to have "EDA" type arms or, where door travel on out-swing doors must be limited, use "CUSH" or "SCUSH" type closers. Auxiliary stops are not required when "CUSH" type closers are used. Provide drop plates where top rail of door is not sufficient for closer mounting. Provide "cush shoe supports" and "blade stop spacers" where dictated by frame details.
   e. All surface closers to be certified to exceed ten million (10,000,000) full load cycles by a recognized independent testing laboratory. All closers (overhead, surface and concealed) to be of one manufacturer and carry manufacturer's ten year warranty (electric closers to have two year warranty).
   f. Access-Free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped provide adjustable units complying with ADA and ANSI A-117.1 provisions for door opening force.
   g. Closers to be installed to allow door swing as shown on plans. Doors swinging into exit corridors to provide for corridor clear width as required by code. Where possible, mount closers inside rooms.
   h. Powder coating finish to be certified to exceed 100 hours salt spray testing by ETL, an independent testing laboratory used by BHMA for ANSI certification.

G. Overhead Door Holders:
   1. Acceptable manufacturers:
      a. Glynn Johnson*
      b. Rixson Firemark
   2. Characteristics:
      a. Provide heavy duty concealed door holders of stainless steel.
      b. Provide heavy duty surface mounted door holders of stainless steel.
      c. Concealed holders to be installed with the jamb bracket mortised flush with the bottom of the jamb. The arm and channel to be mortised into the door.

d. Surface holders to be installed with the jamb bracket mounted on the stop.

H. Floor Stops and Wall Bumpers:
1. Acceptable manufacturers:
a. Ives*
b. Trimco
c. Rockwood Manufacturing
2. Characteristics: Refer to Hardware Headings.

I. Door Bolts/Coordinators:
1. Acceptable manufacturers:
a. Ives*
b. Trimco
c. Rockwood Manufacturing
2. Characteristics:
a. Flush bolts to be forged brass 6-3/4" x 1", with 1/2" diameter bolts. Plunger to be supplied with milled surface one side that fits into a matching guide.
b. Automatic flush bolts to be UL listed as top and bottom bolts on a pair of classified fire doors. Bolt construction to be of rugged steel and brass components.
c. Self-latching flush bolts to be UL listed as top and bottom bolts on a pair of classified fire doors. Bolt construction to be of rugged steel and brass components.
d. Automatic flush bolts and self-latching flush bolts to be UL listed for fire door application without bottom bolts (LBB).
e. Furnish dust proof bottom strikes.
f. Coordinator to be soffit mounted non-handed fully automatic UL listed coordinating device for sequential closing of paired doors with or without astragals.
g. Provide filler piece to close the header. Provide brackets as required for mounting of soffit applied hardware.

J. Push Plates:
1. Acceptable manufacturers:
a. Ives*
b. Trimco
c. Rockwood Manufacturing
2. Characteristics:
a. Exposed Fasteners: Provide manufacturers standard exposed fasteners.
b. Material to be forged stainless steel, per the Hardware Headings.
c. Provide plates sized as shown in Hardware Headings.

K. Door Pulls & Pull Plates:
1. Acceptable manufacturers:
a. Ives*
b. Trimco
c. Rockwood Manufacturing
2. Characteristics:
a. Provide concealed thru-bolted trim on back to back mounted pulls, but

not for single units.
b. Material to be forged stainless steel.
c. Provide units sized as shown in Hardware Headings.

L. Push Pull Sets:
1. Acceptable manufacturers:
a. Ives*
b. Trimco
c. Rockwood Manufacturing
2. Characteristics:
a. Provide mounting systems as shown in hardware sets.
b. Material to be tubular stainless steel.
c. Provide Push/Pull sets sized as shown in Hardware Headings.

M. Protective Plates:
1. Acceptable manufacturers:
a. Ives*
b. Trimco
c. Rockwood Manufacturing
2. Characteristics:
a. Provide manufacturers standard exposed fasteners for door trim units consisting of either machine screws or self-tapping screws.
b. Materials:
c. Metal Plates: Stainless Steel, .050 inch (U.S. 18 gage).
d. Fabricate protection plates not more than 2 inches less than door width on push side and not more than 1 inch less than door width on pull side.
e. Sizes:
1) Refer to hardware headings for specific sizes.
2) Kick plates to be 8 inches in height.
3) Mop plates to be 6 inches in height.
4) Kick plates and Mop plates to be 1” less that bottom rail height where applicable.
5) Armor plates to be 34 inches in height. Armor plates on fire doors to comply with NFPA 80.

N. Thresholds:
1. Acceptable manufacturers:
a. Zero Weatherstripping Co., Inc.*
b. Pemko
c. Reese Industries
2. Types: Indicated in Hardware Headings.

O. Door Seals/Gasketing:
1. Acceptable manufacturers:
a. Zero Weatherstripping Co., Inc.*
b. Pemko
c. Reese Industries
2. Types: Indicated in Hardware Headings.

P. Silencers:
1. Acceptable manufacturers:

a. Ives*
b. Hager
c. Rockwood Manufacturing

2. Provide three for each single door; two for each pair of doors.

Q. Key Cabinet and System:
1. Acceptable manufacturers:
a. Telkee, Inc. (As Required)
2. Provide a key control system including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150 percent of the number of locks required for the project.
3. Provide complete cross index system set up by key control distributor, and place keys on markers and hooks in the cabinet as determined by the final key schedule.
4. Provide hinged-panel type cabinet for wall mounting.
5. Provide multiple-drawer type cabinet.

R. Knox Box:
1. Acceptable manufacturers:
a. Knox Box 3200 Series. (As Required)
2. Provide one surface mount Knox Box 3200 Series.
3. Provide unit compatible with the local Fire Department Knox key system.
4. General contractor shall install in location provided by architect.

2.2 MATERIALS AND FABRICATION:

A. Manufacturer's Name Plate: Do not use manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise acceptable to Architect.
1. Manufacturer's identification will be permitted on rim of lock cylinders only.

B. Base Metals: Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units by applicable ANSI/BHMA A156 series standards for each type of hardware item and with ANSI/BHMA A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods for those indicated, except as otherwise specified.

C. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
1. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.
2. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including “prepared for paint" surfaces to receive painted finish.
3. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent no standard units of type specified are available with

concealed fasteners.

4. Use thru-bolts for installation of all exit devices, closers, and surface-mounted overhead stops. Coordinate with wood doors and metal doors and frames. Where thru-bolts are used, provide sleeves for each thru-bolt as a means of reinforcing the work, or provide sex nuts and bolts.

2.3 HARDWARE FINISHES:

A. Match items to the manufacturer's standard color and texture finish for the latch and lock sets (or push-pull units if no latch or lock sets).

B. Provide finishes that match those established by ANSI or, if none established, match the Architect's sample.

C. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

D. Provide protective lacquer coating on all exposed hardware finishes of brass, bronze, and aluminum, except as otherwise indicated. The suffix "-NL" is used with standard finish designations to indicate "no lacquer."

E. The designations used to indicate hardware finishes are those listed in ANSI/BHMA A156.18, "Materials and Finishes," including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.

F. All hardware to be 626 (US26D), 652 (US26D) Satin Chrome Finish, with the following exceptions:
   1. Continuous Hinges: 628 (US28) Clear Anodized Aluminum
   2. Exterior Butt Hinges: 630 (US32D) Satin Stainless Steel
   3. Door Closers: 689 Powder Coat Aluminum
   4. Push Plates: 630 (US32D) Satin Stainless Steel
   5. Pull Plates: 630 (US32D) Satin Stainless Steel
   6. Protective Plates: 630 (US32D) Satin Stainless Steel
   7. Overhead Holders: 630 Satin Stainless Steel

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Mount hardware units at heights indicated in following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by Architect.
   1. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.
   2. "Recommended Locations for Builders Hardware for Custom Steel Doors and Frames" by the Door and Hardware Institute.
   3. NWWDA Industry Standard I.S.1.7, "Hardware Locations for Wood Flush Doors."

B. Install each hardware item in compliance with the manufacturer's instructions and

recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 9 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.

C. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

E. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements specified in Division 7 Section “Joint Sealers”.

F. Weatherstripping and Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

3.2 ADJUSTING, CLEANING, AND DEMONSTRATING:

A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
   1. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to function properly with final operation of heating and ventilating equipment.

B. Clean adjacent surfaces soiled by hardware installation.

C. Door Hardware Supplier's Field Service:
   1. Inspect door hardware items for correct installation and adjustment after complete installation of door hardware.
   2. Instruct Owner's personnel in the proper adjustment and maintenance of door hardware and hardware finishes.
   3. File written report of this inspection to Architect.

3.3 HARDWARE SCHEDULE:

HARDWARE SET: 01

DOOR NUMBER:
E1003

EACH TO HAVE:

3	HINGE	5BB1HW 4.5 X 4.5 NRP 630	IVE
1	STOREROOM LOCK	L9080T	SCH
1	PRIMUS CORE	20-740	SCH
1	LOCK GUARD	LG1	IVE
1	OH STOP	100S	GLY
1	RAIN DRIP	142AA (AS REQ'D)	ZER
1	GASKETING	8144SBK PSA	ZER
1	DOOR SWEEP	8198AA	ZER
1	THRESHOLD	65A-223	ZER

HARDWARE SET: 02

DOOR NUMBER:
1003B

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5 NRP	IVE
1	PANIC HARDWARE	98-L-SNB	VON
1	RIM CYLINDER	20-057 ICX	SCH
1	FSIC CORE	23-030	SCH
1	SURFACE CLOSER	4111 EDA MC TBWMS	LCN
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE

HARDWARE SET: 03

DOOR NUMBER:
1104

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	HALF DUMMY TRIM	L0170	SCH
1	PANIC HARDWARE	98-L-NL	VON
1	RIM CYLINDER	20-057 ICX	SCH
1	FSIC CORE	23-030	SCH
1	SURFACE CLOSER	4111 EDA MC TBWMS	LCN
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE

HARDWARE SET: 04

DOOR NUMBER:
1080 1083

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	CLASSROOM LOCK	L9070T	SCH
1	FSIC CORE	23-030	SCH
1	WALL STOP	WS401/402CVX	IVE
3	SILENCER	SR64	IVE

HARDWARE SET: 05

DOOR NUMBER:
1110

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	CLASSROOM LOCK	L9070T	SCH
1	FSIC CORE	23-030	SCH
1	OH STOP	90S	GLY
3	SILENCER	SR64	IVE

HARDWARE SET: 06

DOOR NUMBER:
1100

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	CLASSROOM LOCK	L9070T	SCH
1	FSIC CORE	23-030	SCH
1	SURFACE CLOSER	4011 MC TBWMS	LCN
1	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE
3	SILENCER	SR64	IVE

HARDWARE SET: 07

DOOR NUMBER:

1005	1006	1008	1009	1010	1011
1012	1013	1014	1015	1016	1017
1018	1019	1020	1021	1022	1023
1024	1025	1026	1027	1028	1029
1030	1031	1032	1033	1034	1035
1036	1037	1038	1039	1040	1041
1044	1045	1046	1047	1048	1049
1050	1051	1052	1053	1053	1054
1055	1056	1057	1058	1059	1060
1061	1062	1064	1065	1066	1067
1069	1070	1071	1072	1073	1074
1075	1081	1082	1085	1103A	1103B
1109	1111	1112	1113	1114	1115
1116	1119	1120	1121	1122	1123
1124	1125	1126	1127	1128	1129
1130	1131	1132	1133	1134	1135
1136	1137	1138	1139	1140	1141
1142	1144	1145	1146	1147	1148
1149	1151	1152	1153	1155	1157
1159	1183	1185	1187	1188	1189
1189	1190	1191	1192	1194	1195
1196	1197				

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	OFFICE LOCK	L9050T L583-363	SCH
1	FSIC CORE	23-030	SCH
1	WALL STOP	WS401/402CVX	IVE
3	SILENCER	SR64	IVE

HARDWARE SET: 08

DOOR NUMBER:

1201

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	OFFICE LOCK	L9050T L583-363	SCH
1	FSIC CORE	23-030	SCH
1	OH STOP	90S	GLY
3	SILENCER	SR64	IVE

HARDWARE SET: 09

DOOR NUMBER:
1102A 1102B 1206 1207

EACH TO HAVE:

3	HINGE	5BB1HW 4.5 X 4.5	IVE
1	PUSH PLATE	8200 4" X 16"	IVE
1	PULL PLATE	8303 10" 4" X 16"	IVE
1	SURFACE CLOSER	4011 MC TBWMS	LCN
1	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
1	MOP PLATE	8400 6" X 1" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE
3	SILENCER	SR64	IVE

HARDWARE SET: 10

DOOR NUMBER:
1302

EACH TO HAVE:

3	HINGE	5BB1HW 4.5 X 4.5	IVE
1	PUSH PLATE	8200 4" X 16"	IVE
1	PULL PLATE	8303 10" 4" X 16"	IVE
1	SURFACE CLOSER	4111 EDA MC TBWMS	LCN
1	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE
3	SILENCER	SR64	IVE

HARDWARE SET: 11

DOOR NUMBER:
1301

EACH TO HAVE:

3	HINGE	5BB1HW 4.5 X 4.5	IVE
1	PUSH PLATE	8200 4" X 16"	IVE
1	PULL PLATE	8303 10" 4" X 16"	IVE
1	SURFACE CLOSER	4111 SCUSH MC TBWMS	LCN
1	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
3	SILENCER	SR64	IVE

HARDWARE SET: 12

DOOR NUMBER:
1108

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	PRIVACY LOCK	L9440 L583-363 L283-721	SCH
1	OH STOP	90S	GLY
1	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
1	MOP PLATE	8400 6" X 1" LDW B-CS	IVE
3	SILENCER	SR64	IVE

HARDWARE SET: 13

DOOR NUMBER:
1084 1101

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	PRIVACY LOCK	L9440 L583-363 L283-721	SCH
1	SURFACE CLOSER	4011 MC TBWMS	LCN
1	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
1	MOP PLATE	8400 6" X 1" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE
3	SILENCER	SR64	IVE

HARDWARE SET: 14

DOOR NUMBER:
1004 1089

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	STOREROOM LOCK	L9080T	SCH
1	FSIC CORE	23-030	SCH
1	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE
3	SILENCER	SR64	IVE

HARDWARE SET: 15

DOOR NUMBER:
1076 1078 1206A

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	STOREROOM LOCK	L9080T	SCH
1	FSIC CORE	23-030	SCH
1	OH STOP	90S	GLY
1	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
3	SILENCER	SR64	IVE

HARDWARE SET: 16

DOOR NUMBER:
1105

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	STOREROOM LOCK	L9080T	SCH
1	FSIC CORE	23-030	SCH
1	SURFACE CLOSER	4111 SCUSH MC TBWMS	LCN
1	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
3	SILENCER	SR64	IVE

HARDWARE SET: 17

DOOR NUMBER:
1086

EACH TO HAVE:

6	HINGE	5BB1 4.5 X 4.5	IVE
1	MANUAL FLUSH BOLT	FB458	IVE
1	DUST PROOF STRIKE	DP1	IVE
1	STOREROOM LOCK	L9080T	SCH
1	FSIC CORE	23-030	SCH
1	OH STOP	90S	GLY
1	SURFACE CLOSER	4111 SCUSH MC TBWMS	LCN
2	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
2	SILENCER	SR64	IVE

HARDWARE SET: 18

DOOR NUMBER:
E1002 E1004 E1005 E1007 E1008

EACH TO HAVE:

3	HINGE	5BB1HW 4.5 X 4.5 NRP 630	IVE
1	POWER TRANSFER	EPT10	VON
1	ELEC PANIC HARDWARE	LXRX-LC-QEL-98-NL-SNB	VON
1	PRIMUS RIM CYLINDER	20-757 ICX	SCH
1	PRIMUS CORE	20-740	SCH
1	SURFACE CLOSER	4111 SCUSH MC TBWMS	LCN
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	RAIN DRIP	142AA (AS REQ'D)	ZER
1	GASKETING	8144SBK PSA	ZER
1	DOOR SWEEP	8198AA	ZER
1	THRESHOLD	65A-223	ZER
1	CREDENTIAL READER	BY SECURITY/ACCESS CTRL SYSTEMS	
1	DOOR CONTACT	679-05HM	SCE
1	POWER SUPPLY	PS902 900-4RL	VON

COORDINATE HARDWARE WITH ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.
BALANCE OF EAC COMPONENTS BY ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.

OPERATION: CARD READER TO UNLOCK HARDWARE AND ALLOW PASSAGE MOMENTARILY. FREE EGRESS AT ALL TIMES.

HARDWARE SET: 19

DOOR NUMBER:
E1006

EACH TO HAVE:

3	HINGE	5BB1HW 4.5 X 4.5 NRP 630	IVE
1	POWER TRANSFER	EPT10	VON
1	EU MORTISE LOCK	L9492TEU RX LX DPS	SCH
1	PRIMUS CORE	20-740	SCH
1	SURFACE CLOSER	4111 SCUSH MC TBWMS	LCN
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	RAIN DRIP	142AA (AS REQ'D)	ZER
1	GASKETING	8144SBK PSA	ZER
1	DOOR SWEEP	8198AA	ZER
1	THRESHOLD	65A-223	ZER
1	CREDENTIAL READER	BY SECURITY/ACCESS CTRL SYSTEMS	
1	POWER SUPPLY	PS902 900-4RL	VON

COORDINATE HARDWARE WITH ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.
BALANCE OF EAC COMPONENTS BY ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.

OPERATION: CARD READER TO UNLOCK HARDWARE AND ALLOW PASSAGE MOMENTARILY. FREE EGRESS AT ALL TIMES.

HARDWARE SET: 20

DOOR NUMBER:
1001A 1001B 1002B 1003A

EACH TO HAVE:

3	HINGE	5BB1HW 4.5 X 4.5 NRP	IVE
1	POWER TRANSFER	EPT10	VON
1	ELEC PANIC HARDWARE	LXRX-LC-QEL-98-NL-SNB	VON
1	RIM CYLINDER	20-057 ICX	SCH
1	FSIC CORE	23-030	SCH
1	SURFACE CLOSER	4111 EDA MC TBWMS	LCN
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE
1	CREDENTIAL READER	BY SECURITY/ACCESS CTRL SYSTEMS	
1	DOOR CONTACT	679-05HM	SCE
1	POWER SUPPLY	PS902 900-4RL	VON

COORDINATE HARDWARE WITH ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.
BALANCE OF EAC COMPONENTS BY ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.

OPERATION: CARD READER TO UNLOCK HARDWARE AND ALLOW PASSAGE MOMENTARILY. FREE EGRESS AT ALL TIMES.

HARDWARE SET: 21

DOOR NUMBER:
1002A

EACH TO HAVE:

3	HINGE	5BB1HW 4.5 X 4.5 NRP	IVE
1	POWER TRANSFER	EPT10	VON
1	ELEC PANIC HARDWARE	LXRX-LC-QEL-98-NL-SNB	VON
1	RIM CYLINDER	20-057 ICX	SCH
1	FSIC CORE	23-030	SCH
1	SURFACE CLOSER	4111 SCUSH MC TBWMS	LCN
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	CREDENTIAL READER	BY SECURITY/ACCESS CTRL SYSTEMS	
1	DOOR CONTACT	679-05HM	SCE
1	POWER SUPPLY	PS902 900-4RL	VON

COORDINATE HARDWARE WITH ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.
BALANCE OF EAC COMPONENTS BY ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.

OPERATION: CARD READER TO UNLOCK HARDWARE AND ALLOW PASSAGE MOMENTARILY. FREE EGRESS AT ALL TIMES.

HARDWARE SET: 22

DOOR NUMBER:
1079

EACH TO HAVE:

3	HINGE	5BB1HW 4.5 X 4.5 NRP	IVE
1	POWER TRANSFER	EPT10	VON
1	HALF DUMMY TRIM	L0170	SCH
1	ELEC PANIC HARDWARE	LXRX-LC-QEL-98-NL-OP-110MD-SNB	VON
1	RIM CYLINDER	20-057 ICX	SCH
1	FSIC CORE	23-030	SCH
1	SURFACE CLOSER	4111 SCUSH MC TBWMS	LCN
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	CREDENTIAL READER	BY SECURITY/ACCESS CTRL SYSTEMS	
1	DOOR CONTACT	679-05HM	SCE
1	POWER SUPPLY	PS902 900-4RL	VON

COORDINATE HARDWARE WITH ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.
BALANCE OF EAC COMPONENTS BY ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.

OPERATION: CARD READER TO UNLOCK HARDWARE AND ALLOW PASSAGE MOMENTARILY. FREE EGRESS AT ALL TIMES.

HARDWARE SET: 23

DOOR NUMBER:
1107

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	POWER TRANSFER	EPT10	VON
1	EU MORTISE LOCK	L9092TEU RX DPS	SCH
1	FSIC CORE	23-030	SCH
1	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE
3	SILENCER	SR64	IVE
1	CREDENTIAL READER	BY SECURITY/ACCESS CTRL SYSTEMS	
1	POWER SUPPLY	PS902	VON

COORDINATE HARDWARE WITH ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.
BALANCE OF EAC COMPONENTS BY ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.

OPERATION: CARD READER TO UNLOCK HARDWARE AND ALLOW PASSAGE MOMENTARILY. FREE EGRESS AT ALL TIMES.

HARDWARE SET: 24

DOOR NUMBER:
1118

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	POWER TRANSFER	EPT10	VON
1	EU MORTISE LOCK	L9092TEU RX DPS	SCH
1	FSIC CORE	23-030	SCH
1	OH STOP	90S	GLY
1	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
3	SILENCER	SR64	IVE
1	CREDENTIAL READER	BY SECURITY/ACCESS CTRL SYSTEMS	
1	POWER SUPPLY	PS902	VON

COORDINATE HARDWARE WITH ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.
BALANCE OF EAC COMPONENTS BY ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.

OPERATION: CARD READER TO UNLOCK HARDWARE AND ALLOW PASSAGE MOMENTARILY. FREE EGRESS AT ALL TIMES.

HARDWARE SET: 25

DOOR NUMBER:

1088	1117	1154	1156	1158	1161
1162	1163	1164	1165	1166	1167
1168	1169	1170	1171	1172	1173
1174	1175	1176	1177	1178	1179
1180	1182	1184	1186	1202	1203B

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	POWER TRANSFER	EPT10	VON
1	EU MORTISE LOCK	L9092TEU RX DPS	SCH
1	FSIC CORE	23-030	SCH
1	SURFACE CLOSER	4011 MC TBWMS	LCN
1	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE
3	SILENCER	SR64	IVE
1	CREDENTIAL READER	BY SECURITY/ACCESS CTRL SYSTEMS	
1	POWER SUPPLY	PS902	VON

COORDINATE HARDWARE WITH ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.
BALANCE OF EAC COMPONENTS BY ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.

OPERATION: CARD READER TO UNLOCK HARDWARE AND ALLOW PASSAGE MOMENTARILY. FREE EGRESS AT ALL TIMES.

HARDWARE SET: 26

DOOR NUMBER:

1042	1106	1150	1203A

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	POWER TRANSFER	EPT10	VON
1	EU MORTISE LOCK	L9092TEU RX DPS	SCH
1	FSIC CORE	23-030	SCH
1	OH STOP	90S	GLY
1	SURFACE CLOSER	4011 MC TBWMS	LCN
1	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
3	SILENCER	SR64	IVE
1	CREDENTIAL READER	BY SECURITY/ACCESS CTRL SYSTEMS	
1	POWER SUPPLY	PS902	VON

COORDINATE HARDWARE WITH ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.
BALANCE OF EAC COMPONENTS BY ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.

OPERATION: CARD READER TO UNLOCK HARDWARE AND ALLOW PASSAGE MOMENTARILY. FREE EGRESS AT ALL TIMES.

HARDWARE SET: 27

DOOR NUMBER:
1077 1204

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	POWER TRANSFER	EPT10	VON
1	EU MORTISE LOCK	L9092TEU RX DPS	SCH
1	FSIC CORE	23-030	SCH
1	SURFACE CLOSER	4111 SCUSH MC TBWMS	LCN
1	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
3	SILENCER	SR64	IVE
1	CREDENTIAL READER	BY SECURITY/ACCESS CTRL SYSTEMS	
1	POWER SUPPLY	PS902	VON

COORDINATE HARDWARE WITH ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.
BALANCE OF EAC COMPONENTS BY ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.

OPERATION: CARD READER TO UNLOCK HARDWARE AND ALLOW PASSAGE MOMENTARILY. FREE EGRESS AT ALL TIMES.

HARDWARE SET: 28

DOOR NUMBER:
1090

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	POWER TRANSFER	EPT10	VON
1	EU MORTISE LOCK	L9092TEU RX DPS	SCH
1	FSIC CORE	23-030	SCH
1	SURFACE CLOSER	4011 MC TBWMS	LCN
1	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE
1	GASKETING	188SBK PSA	ZER
1	CREDENTIAL READER	BY SECURITY/ACCESS CTRL SYSTEMS	
1	POWER SUPPLY	PS902	VON

COORDINATE HARDWARE WITH ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.
BALANCE OF EAC COMPONENTS BY ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.

OPERATION: CARD READER TO UNLOCK HARDWARE AND ALLOW PASSAGE MOMENTARILY. FREE EGRESS AT ALL TIMES.

HARDWARE SET: 29

DOOR NUMBER:

1007A	1007B	1063A	1063B	1081A	1081B
1143A	1143B	1160A	1160B	1181A	1181B
1200	1205				

CASED OPENING TO RECEIVE NO HARDWARE.

HARDWARE SET: AL-01

DOOR NUMBER:
E1000

EACH TO HAVE:

2	CONT. HINGE	112XY	IVE
1	REMOVABLE MULLION	KR4954 STAB	VON
1	PANIC HARDWARE	CD-98-EO	VON
1	PANIC HARDWARE	CD-98-NL-OP-110MD	VON
2	DOOR PULL	9264F 36” O	IVE
3	MORTISE CYLINDER	20-061 ICX (DOGGING/MULLION)	SCH
3	FSIC CORE	23-030 (DOGGING/MULLION)	SCH
1	PRIMUS RIM CYLINDER	20-757 ICX	SCH
1	PRIMUS CORE	20-740	SCH
2	OH STOP	100S	GLY
2	SURFACE CLOSER	4021 MC TBSRT	LCN
2	MOUNTING PLATE	4020-18 SRT	LCN
1	MULLION SEAL	139N PSA	ZER
1	THRESHOLD	65A-223	ZER

COORDINATE HARDWARE WITH ALUMINUM DOOR/FRAME MANUFACTURER/SUPPLIER.
BALANCE OF HARDWARE BY ALUMINUM DOOR/FRAME MANUFACTURER/SUPPLIER.

HARDWARE SET: AL-02

DOOR NUMBER:
1000

EACH TO HAVE:

2	CONT. HINGE	112XY	IVE
1	REMOVABLE MULLION	KR4954 STAB	VON
1	PANIC HARDWARE	CD-98-EO	VON
1	PANIC HARDWARE	CD-98-NL-OP-110MD	VON
2	DOOR PULL	9264F 36” O	IVE
3	MORTISE CYLINDER	20-061 ICX (DOGGING/MULLION)	SCH
3	FSIC CORE	23-030 (DOGGING/MULLION)	SCH
1	PRIMUS RIM CYLINDER	20-757 ICX	SCH
1	PRIMUS CORE	20-740	SCH
2	OH STOP	100S	GLY
2	SURFACE CLOSER	4021 MC TBSRT	LCN
2	MOUNTING PLATE	4020-18 SRT	LCN
1	MULLION SEAL	139N PSA	ZER

COORDINATE HARDWARE WITH ALUMINUM DOOR/FRAME MANUFACTURER/SUPPLIER.
BALANCE OF HARDWARE BY ALUMINUM DOOR/FRAME MANUFACTURER/SUPPLIER.

END OF SECTION

SECTION 22 0410

PLUMBING PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Pipe, pipe fittings, valves for the following piping systems:
   1. Sanitary, waste and vent piping.
   2. Domestic, hot and cold water piping.

1.2 RELATED SECTIONS

A. Section 220401 – General Plumbing Requirements.

B. Section 220403 – Basic Plumbing Materials and Methods.

C. Section 220405 – Identification for Plumbing Piping and Equipment.

D. Section 220407 – Plumbing Systems Insulation.

1.3 SUBMITTALS FOR REVIEW

A. Division 01 – Submittals and Section 220401: Procedures for submittals.

B. Provide product data on the following:
   1. Pipe materials, pipe fittings and accessories.
   2. Manufacturers catalogue data and cut sheets on all fixtures and equipment.
   3. Valve data and ratings.

C. Manufacturer's drawings of listed closing methods to be used to close penetrations through rated assemblies.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with the City of Tuscaloosa, Alabama, codes and standards.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

PART 2 - PRODUCTS

2.1 SANITARY WASTE PIPING, BELOW GRADE OR BELOW SLAB ON GRADE

A. PVC Pipe:
   1. Pipe: Schedule 40, ASTM D2665 and ASTM D1785.
   2. Fittings: PVC with DWV pattern, ASTM D2665.
   3. Joints: ASTM D2855, solvent weld with ASTM F-656 purple primer and ASTM D2564 solvent cement.

2.2 SANITARY WASTE AND VENT PIPING, ABOVE SLAB ON GRADE

A. PVC Pipe:
   1. Pipe: ASTM D1785, Schedule 40 and ASTM D2265.
   2. Fittings: ASTM D2465, PVC.
   3. Joints: ASTM D2855, solvent weld with ASTM F-656 purple primer and ASTM D2564 solvent cement.

*B. **Cast Iron Pipe:***
   *1. **Pipe: CISPI 301, hubless, service weight, bituminous coating.***
   *2. **Fittings: Cast iron, bituminous coated.***

3. ***Joints: CISPI 310, neoprene gaskets and stainless steel clamp and shield assemblies. All standard duty hubless couplings shall meet CISPI 310 and be listed by NSF International.***
a. Approved manufacturers: Husky HD 2000, Mission Heavyweight or Clamp All-80.
b. Approved manufacturers: Anaco Husky HD 4000, Ideal-Tridon Super Heavy Duty "HD" no-hub couplings, fernco HD Heavy Duty no-hub couplings.

2.3 WATER PIPING, BELOW SLAB ON GRADE OR BELOW GRADE

A. Copper Tubing:
1. Pipe: ASTM B88, Type K soft copper.
2. Fittings: ASME B16.22 wrought copper and bronze.
3. Joints: "Sil-Fos".
4. Piping to be installed to minimize the number of joints below grade of or below slab on grade.
5. Encase all below ground copper piping in plastic sleeve or 1/2" unsplit foam insulation.

2.4 WATER PIPING, ABOVE GRADE

A. Copper Tubing:
1. Pipe: ASTM B88, Type L, hard drawn.
2. Fittings: ASME B16.22, wrought copper and bronze.
3. Joints: ASTM B32, 95-5 solder, Grade 95TA, lead free with lead free flux.

B. Insulation:
1. Insulate all water piping (cold, hot and hot return) above slab on grade with 1" fiberglass insulation. Insulation thickness may be reduced to 1/2 inch walls. Foam type insulation may be used in concrete block walls.
2. Insulation shall be installed continuous through walls.
3. See Section 220407 of the specifications for insulation description.

C. Identification:
1. Identify all piping in accordance with Section 220405 of the specification.

2.5 FLEXIBLE PIPE CONNECTIONS

A. Stainless steel corrugated tubing with stainless steel wire braid.

B. Working pressure 200 psi minimum.

C. End connections 2" and smaller-male pipe threads, larger than 2" flanged.

D. Manufacturers: Minnesota Flexible Corporation, Metaflex, Flexicraft and Hyspan.

2.6 FLANGES, UNIONS, AND COUPLINGS

A. Pipe Size 2 Inches and Under:
1. Ferrous pipe: Class 150 malleable iron threaded unions.
2. Copper tube and pipe: Class 150 bronze unions with soldered joints.

B. Pipe Size Over 2 Inches:
1. Ferrous pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
2. Copper tube and pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.

C. Dielectric Connections: Dielectric waterway; zinc electroplated steel nipple with thermoplastic liner and threaded ends.

2.7 PIPE HANGERS AND SUPPORTS

A. Hangers:

1. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Carbon steel, adjustable swivel, split ring.
2. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
3. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods or Unistrut multiuse channel.
4. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
5. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
6. Vertical Support: Steel riser clamp.
7. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
8. Copper Pipe Support when applied directly to the copper piping: Copper steel ring, adjustable.
9. Install hanger over insulation on insulated pipe with sheet metal saddle rolled on the ends centered in hanger. See Section 220407.

B. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.

C. Inserts: Malleable iron case of steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

D. Roof Supports:
1. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Erico PP50H6.
2. Hangers for Pipe Sizes 2 Inches and Over: Erico PP50H6.
3. Vertical Support: Steel riser clamp.

E. For fasteners in existing concrete structures, use drilled in expansion anchors with load rating 150% greater than the pipe hanger rating. Note: Powder drive anchors are not acceptable.

F. Beam Clamps: Grinnell Figure #229.

2.8 BALL VALVES (LEAD FREE)

A. Up to and including 4 inches:
1. Manufacturers:
   a. Jomar JF-100SG / JF-100TG full port.
   b. Nibco, Apollo, Milwaukee, Kitz 868M/869M (3/8”-2”).
2. MSS-SP-110 Class 125, lead free bronze body, 316 stainless steel full port ball and stem, PTFE seats and seals, blow-out proof stem and threaded ends.

2.9 BUTTERFLY VALVES (LEAD FREE)

A. For pipe sizes 4 inches and larger
1. Manufacturers
   a. Kitz 6133EL
   b. Nibco, Jomar, Watts, Apollo, Milwaukee
2. Ductile iron body, lug style, stainless steel disc and stem, 10 position handle, EPDM o-rings
3. 250 PSI
4. Conforms to NSF 61, MSS-SP-67

2.10 BALANCING VALVES (CIRCUIT SETTER)

A. Manufacturer:
1. Caleffi 142251A Series, 3/4-inch variable orifice balancing valve.

B. Install on hot water return line at point of connection to hot water return riser on main and where indicated on drawings. Provide ball valve on leaving side of flow indicator.

2.11 SWING CHECK VALVES (LEAD FREE)

A. Up to and Including 3 Inches:
   1. Manufactures:
      a. Nibco Model S-413-Y-LF or T-413-B-LF.
      b. Crane, Stockham, Milwaukee, Kitz.
   2. MSS SP-80 and MSS SP-139, Class 125, bronze body and cap, bronze trim and seat, threaded ends.

2.12 WATER PRESSURE REDUCING VALVES

A. Provide water pressure reducing valve at the service entry on all buildings where main pressure is in excess of 80 psi. Set out pressure at 70 psi.

B. Up to and Including 2 Inches:
   1. Manufactures:
      a. Watts Model U5B.
      b. Wilkins, Cash, Acme.
   2. MSS SP-80, bronze body, stainless steel and thermoplastic internal parts, fabric reinforced diaphragm, internal by-pass, inlet strainer, threaded ends with single union and ball valve upstream of strainer.

C. Over 2 Inches:
   1. Manufactures:
      a. Watts ACV 115.
      b. Williams, Cash, Acme.
   2. MSS SP-85, cast iron body, bronze fitted, elastomeric diaphragm and seat disc, flanged.

D. Provide pressure gage (0-150 PSI) with needle valve stop on leaving side of pressure reducing valve

2.13 THERMOMETERS

A. Lights actuated digital thermometer reading in degrees Fahrenheit. Provide with well for minimum 1” insulation.

B. Weiss Vari-angle Digital Thermometer.

2.14 PRESSURE GAUGE (DOMESTIC WATER)

A. Manufacturers:
   1. Trerice.
   2. Weiss.
   3. Weksler.
   4. Winters.

B. 4-1/2-inch diameter, minimum dial face, stamped stainless steel, replaceable glass lens, with snap-on rings. Phosphor bronze tube, bronze brushed rotary movement, silver brazed or soldered to brass socket and brass tip, 1/4-inch bottom connection. Accuracy, on (1.0) percent of included scale range. White dial face with black numerals, graduated in pounds; equipped with bronze pulsation dampener or snubber and needle valve.

2.15 SLEEVES

A. Refer to Division 22, Section “Basic Plumbing Materials and Methods” for requirements.

2.16 FIRE STOP SYSTEM

A. All wall and floor penetrations are to be closed. Refer to the Arch. Life Safety Plans and close all openings with a U.L. Listed assembly compatible with the rating of the wall or floor being penetrated.

B. Non-rated walls:
   1. Sheet rock joint compound may be used to seal opening. Insulation to be continuous through wall.

C. For piping passing through sheet rock walls or partitions:
   1. Insulated pipe passing through 2 walls or partitions – Hilti FS605 with sleeve U.L. Listing #WL1056.
   2. Insulated pipe passing through 2 hour walls or partitions – Hilti FS611A with no sleeve, U.L. Listing #WL5029. Insulation to be continuous through sleeve.

D. For piping passing through concrete floors, concrete walls or concrete block walls:
   1. Uninsulated Schedule 40 steel on copper pipe: Hilti #F5605 with sleeve, U.L. #CAT155.
   2. Insulated Schedule 40 steel on insulated copper pipe: Hilti #FS6114A, U.L. #CAT5045.

E. For non-metallic piping passing through concrete floors, walls or concrete block.
   1. 2” and smaller piping: Hilti #FS611A, U.L. #CAT2062 or U.L. #CAT2065.
   2. Larger than 2”: Hilti #FS611A with collar, U.L. #CAT095.

2.17 FLASHING

A. Refer to Division 22, Section “Basic Plumbing Materials and Methods” for requirements.

2.18 WATER HAMMER ARRESTERS

A. Install water piping to ASME B31.9. Closed copper tube chamber with permanently sealed 410 kPa (60 psig) air charge above a Double O-ring piston. Two high heat Buna-N O-rings pressure packed and lubricated with FDA approved silicone compound. All units shall be designed in accordance with ASSE 1010 for sealed wall installations without an access panel. Size and install in accordance with Manufacturers requirements. Unit shall be as manufactured by Precision Plumbing Products, Inc., Watts, or Sioux Chief. Provide water hammer arrestors at:
   1. All solenoid valves.
   2. All groups of two or more flush valves.
   3. All quick opening or closing valves.
   4. All washing equipment.

PART 3 - EXECUTION

3.1 PREPARATION

A. Cut pipe square and ream pipe and tube ends. Remove burrs.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Provide quarter turn, full port ball valve between all pressure gauges and piping system.

3.2 PIPING INSTALLATION GENERAL

A. Install in accordance with manufacturer’s instructions.

B. Provide dielectric fittings wherever jointing dissimilar metals.

C. Make piping connections to equipment with flanges or unions.

D. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

E. Run piping concealed, except where specifically shown to be exposed.

F. Install piping to maintain headroom, conserve space, and not interfere with use of space.

G. Group piping whenever practical at common elevations.

H. Install piping to allow for expansion and contraction without stressing pipe, joints or connected equipment.

I. Provide clearance in hanger and from structure and other equipment for installation of insulation and access to valves and fittings.

J. Provide access where valve is not accessible. Provide minimum 18”x18” access doors at valves in hard ceiling.

K. Establish elevations of buried pressure piping outside the building to ensure not less than 18 inches of cover.

L. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

M. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Section 099100.

N. Install chrome plated floor, wall and ceiling plates on all exposed piping passing through finished surfaces in finished spaces.

O. Install bell and spigot pipe with bell end upstream.

P. Install valves with stems upright or horizontal, not inverted.

Q. Inserts:
1. Provide inserts for placement in concrete formwork.
2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
5. Where inserts are omitted, or in existing concrete structures use drilled in expansion anchors with load rating at least 150% of pipe hanger rating (powder driven anchors not acceptable).

R. Pipe Hangers and Supports:
1. Support horizontal piping as scheduled.
2. Install hangers to provide minimum ½-inch space between finished covering and adjacent work.
3. Place hangers within 12 inches of each horizontal elbow.
4. Use hangers with 1-1/2-inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
5. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
6. Where several pipes can be installed in parallel and at same elevation, trapeze hangers may be used.
7. Provide copper hangers and supports when applied directly to copper piping.
8. Prime coat exposed steel hangers and supports located outdoors, in crawl spaces, pipe shafts. Above suspended ceiling spaces is not considered exposed.
9. Provide hangers adjacent to motor driven equipment.
10. Support cast iron drainage and vent piping at every joint and minimum 5'-0" on center.
11. Support of all pipe, tubing and fixtures and equipment shall be accomplished by means of engineered products specified to each application. Makeshift, field devised methods of

plumbing pipe supports, such as scrap wood, wire or duct tape are not allowed. These shall be HoldRite, B-Line, Sioux Chief or approved equal.

S. Provide pipe line markers and valve tags in accordance with other sections of the specifications.

T. Sleeves:
   1. Refer to Division 22, Section “Basic Plumbing Materials and Methods” for requirements.

U. Flashing:
   1. Refer to Division 22, Section “Basic Plumbing Materials and Methods” for requirements.

3.3 EXCAVATION AND BACKFILLING

A. Refer to Division 22, Section “Basic Plumbing Materials and Methods” for requirements.

3.4 APPLICATION

A. Install unions at equipment or apparatus connections.

B. Install brass male adapters each side of valves in copper piped system.

C. Install valves for shut-off and to isolate equipment, part of systems, or vertical risers.

D. Provide check valves on discharge of water pumps.

E. Provide flow indicators in water recirculating systems where indicated.

3.5 ERECTION TOLERANCES

A. Slope all sanitary waste piping and storm piping at a minimum 1/8" per foot. Slope all sanitary sewer piping 2" and smaller below slab on grade at a minimum 1/4" per foot.

B. Arrange all water piping to drain to low points and provide ball valve with plug at low point.

3.6 SANITARY, WASTE AND VENT SYSTEM

A. Install vent stacks through roof. Terminate 12 inches above finish roof and minimum 10'-0" from HVAC roof top unit outside air intakes. Flashings for penetrations are under another section.

B. Connect to site sanitary sewer approximately 5'-0" from building. Verify exact size, location and invert with Civil Drawings prior to beginning work.

3.7 WATER PIPING SYSTEM

A. Connect to site water service approximately 5’-0" from building installed under another section. Verify with Civil drawings exact size and location of site water service.

3.8 FIELD QUALITY CONTROL

A. Perform all tests as required by local codes. Contractor shall furnish testing equipment and keep a record of all testing listing tests made, results and those witnessing test. Include testing record in close out documents.

B. If local codes are more stringent than the following, local codes shall govern.

C. Sanitary, Waste, Vent and Rain Water Systems:
   1. Test piping by stopping lower outlets and filling to 10 feet hydrostatic head for a minimum period of 15 minutes with all joints exposed throughout test. Stop all leaks and retest system until tight.
   2. Test all piping by stopping all outlets and applying 5 pounds per square inch of air pressure to the system for a period of 15 minutes. Stop all leaks and retest system until tight.
   3. Provide ball test on all piping 3" and larger.

D. Domestic Water Piping:
   1. Hydrostatic test at 150 psig without pressure drop for 4 hours. Stop all leaks and retest system until free from leaks.
   2. Leave City pressure on system for duration of project.

3.9 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Prior to starting work, verify hot and cold water systems are complete, flushed and clean.

B. Ensure PH of water to be treated is between 7.4 and 7.6.

C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 ppm residual.

D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.

E. Maintain disinfectant in system for 24 hours.

F. If final disinfectant residual tests less than 25 ppm, repeat treatment.

G. Flush disinfectant from system until residual equal to that of incoming water.

H. Submit sample of water from all new or modified systems to local Health Department and receive certification that water is acceptable for human consumption. Include certification of water in close out documents.

3.10 SCHEDULES

A. Pipe Hanger Spacing:
   1. Metal Piping:
      a. Pipe size: 1/2 to 1-1/4 inches:
         1) Maximum hanger spacing: 6.5 ft.
         2) Hanger rod diameter: 3/8 inch.
      b. Pipe size: 1-1/2 to 2 inches:
         1) Maximum hanger spacing: 10 ft.
         2) Hanger rod diameter: 3/8 inch.
      c. Pipe size: 2-1/2 to 3 inches:
         1) Maximum hanger spacing: 10 ft.
         2) Hanger rod diameter: 1/2 inch.
      d. Pipe size: 4 to 6 inches:
         1) Maximum hanger spacing: 10 ft.
         2) Hanger rod diameter: 5/8 inch.
      e. Pipe size: 8 to 12 inches:
         1) Maximum hanger spacing: 14 ft.
         2) Hanger rod diameter: 7/8 inch.
      f. Pipe size: 14 inches and over:
         1) Maximum hanger spacing: 20 ft.
         2) Hanger rod diameter: 1 inch.
   2. Plastic Non-Metallic Piping:
      a. All Sizes:
         1) Maximum hanger spacing: 4 ft.
         2) Hanger rod diameter: 3/8 inch.

END OF SECTION 22 0410

SECTION 23 0054

VARIABLE FREQUENCY DRIVES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes solid-state, PWM, VFD's for speed control of three-phase, squirrel-cage induction motors.

1.2 DEFINITIONS

A. BAS: Building automation system.

B. IGBT: Integrated gate bipolar transistor.

C. LAN: Local area network.

D. PID: Control action, proportional plus integral plus derivative.

E. PWM: Pulse-width modulated.

F. VFD: Variable frequency drive.

G. NRTL: Nationally Recognized Testing Laboratory.

1.3 SUBMITTALS

A. Product Data: For each type of VFD. Include dimensions, mounting arrangements, location for conduit entries, shipping and operating weights, and manufacturer's technical data on features, performance, electrical ratings, characteristics, and finishes.
   1. Include manufacturer’s allowable drive to motor wire length.
   2. Include product data on output filters, if filters are required.
   3. Include statement that drive capacities and electrical characteristics have been coordinated to match requirements of equipment being furnished on this project.

B. Shop Drawings: For each VFD.
   1. Include dimensioned drawings, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings. Include the following:
      a. Each installed unit's type and details.
      b. Nameplate legends.
      c. Short-circuit current rating of integrated unit.
      d. Listed and labeled for series rating of overcurrent protective devices in combination controllers by an NRTL acceptable to authorities having jurisdiction.
   2. Wiring Diagrams: Power, signal, and control wiring for VFD's. Provide schematic wiring diagram for each type of VFD.

C. Compliance with IEEE 519: VFD manufacturer shall provide calculations, specific to this specific installation, showing the total harmonic voltage distortion is less than 5%. Input line filters shall be provided and sized as required by the VFD manufacturer to ensure compliance with IEEE 519.

D. Coordination Drawings: Drawings to scale, showing dimensioned layout, required working clearances, and required area above and around VFD's and output filters where pipe and ducts are prohibited. Show VFD layout and relationships between electrical components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate field measurements.

E. Operation and Maintenance Data: For VFD's, all installed devices, and components to include in emergency, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer. Maintain, within 100 miles of Project site, a service center capable of providing training, parts, and emergency maintenance and repairs.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NFPA 70.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store VFD's indoors in clean, dry space with uniform temperature to prevent condensation. Protect VFD's from exposure to dirt, fumes, water, corrosive substances, and physical damage.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation, capable of driving full load without derating, under the following conditions, unless otherwise indicated:
1. Ambient Temperature: 0 to 40 deg C (5 deg to 104 deg F).
2. Humidity: Less than 95 percent (noncondensing).
3. Altitude: Not exceeding 3300 feet.
4. Drives located outdoors or in non-air conditioned mechanical rooms, central plants, etc., shall have a continuous output current rating of 110% of motor nameplate FLA.

1.7 COORDINATION

A. Coordinate layout and installation of VFD's with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate features, accessories, and functions of each VFD and each installed unit with ratings and characteristics of supply circuit, motor, required control sequence, and duty cycle of motor and load.

C. Coordinate sizing of VFD's to match horsepower, output amps, and electrical characteristic requirements with submittal data for the equipment being provided on this project.

1.8 WARRANTY

A. Special Warranty: Manufacturers standard form in which manufacturer agrees to provide onsite parts and labor warranty for a period of two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. ABB Power Distribution, Inc.; ABB Control, Inc. Subsidiary Series ACH 550.
2. Danfoss Inc.; Danfoss Electronic Drives Div. VTL6000 Series.
3. Emerson Industrial Automation.
4. Rockwell Automation; Allen-Bradley Co.; Industrial Control Group.
5. Siemens Energy and Automation; Industrial Products Division.
6. Square D.
7. Yaskawa Electric America.

2.2 VARIABLE FREQUENCY DRIVES

A. Description: NEMA ICS 2, IGBT, PWM, VFD; listed and labeled as a complete unit and arranged to provide variable speed of an NEMA MG 1, Design B, 3-phase induction motor by adjusting output voltage and frequency.
   1. Provide unit suitable for operation of premium-efficiency motor as defined by NEMA MG 1.
   2. Plenum rated.

B. Design and Rating: Match load type such as fans, blowers, and pumps; and type of connection used between motor and load such as direct or through a power-transmission connection.

C. Output Rating: 3-phase; 6 to 60 Hz, with voltage proportional to frequency throughout voltage range.

D. Unit Operating Requirements:
   1. Input ac voltage tolerance of plus or minus 10 percent.
   2. Input frequency tolerance of 60 Hz, plus or minus 6 percent.
   3. Minimum Efficiency: 98 percent at 60 Hz, full load.
   4. Minimum Displacement Primary-Side Power Factor: 98 percent.
   5. Overload Capability: 1.1 times the base load current for 60 seconds; 2.0 times the base load current for 3 seconds.
   6. Starting Torque: 100 percent of rated torque or as indicated.
   7. Speed Regulation: Plus or minus 1 percent.
   8. Input Line Impedance: 5 percent.

E. Isolated control interface to allow controller to follow control signal over an 11:1 speed range.
   1. Electrical Signal: 4 to 20 mA at 24 V.

F. Internal Adjustability Capabilities:
   1. Minimum Speed: 30 percent of maximum rpm.
   2. Maximum Speed: 80 to 100 percent of maximum rpm.
   3. Acceleration: 1 to a minimum of 1800 seconds.
   4. Deceleration: 1 to a minimum of 1800 seconds.
   5. Current Limit: 110 percent of maximum rating.

G. Self-Protection and Reliability Features:
   1. Input transient protection by means of surge suppressors.
   2. Under- and overvoltage trips; inverter overtemperature, overload, and overcurrent trips.
   3. Motor Overload Relay: Adjustable and capable of NEMA ICS 2, Class 20 or 30 performance.
   4. Notch filter to prevent operation of the controller-motor-load combination at a natural frequency of the combination.
   5. Instantaneous line-to-line and line-to-ground overcurrent trips.
   6. Loss-of-phase protection.
   7. Reverse-phase protection.
   8. Short-circuit protection.
   9. Motor overtemperature fault.
   10. Fast acting drive input fuses.

H. Short Circuit Current Rating: 100 KAIC

I. Automatic Reset/Restart: Attempts three restarts after controller fault or on return of power after an interruption and before shutting down for manual reset or fault correction. Bidirectional autospeed search shall be capable of starting into rotating loads spinning in either direction and returning motor to set speed in proper direction, without damage to controller, motor, or load.

J. Torque Boost: Automatically varies starting and continuous torque to at least 1.5 times the minimum torque to ensure high-starting torque and increased torque at slow speeds.

K. Motor Temperature Compensation at Slow Speeds: Adjustable current fall-back based on output frequency for temperature protection of self-cooled, fan-ventilated motors at slow speeds.

L. Input Line Conditioning: VFD shall have an integral 5% impedance line reactor to reduce the harmonics to the power line. The impedance may be from dual (positive and negative DC bus) reactors, or 5% AC line reactors.

M. VFD Output Filtering: Provide output filters when wire length from drive to motor exceeds manufacturer's allowable length. Filters shall be equal to KLC dv/dt Guard, U.L. Listed, in NEMA 1 enclosure.

N. Status Lights: Door-mounted LED indicators shall indicate the following conditions:
1. Power on – normal operation.
2. Fault.
3. Alarm control

O. Panel-Mounted Operator Station: Start-stop and auto-manual selector switches with manual speed control potentiometer and real time clock.
1. Indicating Devices: Digital LED readout and selector switch, to indicate the following controller parameters:
a. Output frequency (Hz).
b. Motor speed (rpm).
c. Motor status (running, stop, fault).
d. Motor current (amperes).
e. Motor torque (percent).
f. Fault or alarming status (code).
g. PID feedback signal (percent).
h. DC-link voltage (VDC).
i. Set-point frequency (Hz).
j. Motor output voltage (V).

P. Control Signal Interface:
1. Electric Input Signal Interface: A minimum of 2 analog inputs (0 to 10 V or 0/4-20 mA) and 6 programmable digital inputs.
2. Remote Signal Inputs: Capability to accept any of the following speed-setting input signals from the BMS or other control systems:
a. 0 to 10-V dc.
b. 0-20 or 4-20 mA.
c. Potentiometer using up/down digital inputs.
d. Fixed frequencies using digital inputs (Fireman's override).
e. RS485.
f. Keypad display for local hand operation.
3. Output Signal Interface:
a. A minimum of 2 analog output signal (0/4-20 mA), which can be programmed to any of the following:
1) Output frequency (Hz).
2) Output current (load).
3) DC-link voltage (VDC).
4) Motor torque (percent).
5) Motor speed (rpm).

6) Set-point frequency (Hz).

4. Remote Indication Interface: A minimum of 3 dry circuit relay outputs (120-V ac, 1 A) for remote indication of the following:
   a. Motor running.
   b. Fault and warning indication (overtemperature or overcurrent).
   c. Loss of load condition (broken belt / broken coupling).

Q. Communications: Provide an RS485 interface allowing VFD to be used with an external system within a multidrop LAN configuration. Interface shall allow all parameter settings of VFD to be programmed via BAS control. Provide capability for VFD to retain these settings within the nonvolatile memory.
   1. Coordinate requirements with controls diagrams and controls contractor to provide either Johnson Controls N2, Siemens FLN, LonWorks or BACnet MS/TP interface.

R. Integral Disconnecting Means: NEMA AB 1, instantaneous-trip circuit breaker or a NEMA KS 1, fusible switch door interlocked with lockable handle.

S. Bypass Controller (3-Contactor): NEMA ICS 2, full-voltage, nonreversing enclosed controller with across-the-line starting capability in manual-bypass mode. Provide motor overload protection under both modes of operation with control logic that allows common start-stop capability including stop on external safety fault, in either mode.
   1. Provide a manual 3-contactor bypass consisting of a door interlocked main fused disconnect padlockable in the off position, a built-in motor starter and a four position DRIVE/OFF/BYPASS/TEST switch controlling three contactors. In the DRIVE position, the motor is operated at an adjustable speed from the VFD. In the OFF position, the motor and the VFD are disconnected. In the BYPASS position, the motor is operated at full speed from the AC power line and power is disconnected from the VFD so that service can be performed. In the TEST position, the motor is operated at full speed from the AC line power while power is applied to the input of the VFD. This allows the VFD to be given an operational test while continuing to run the motor at full speed in bypass. In case of an external safety fault, a customer supplied normally closed dry contact shall be able to stop the motor whether in DRIVE or BYPASS mode.
   2. Service personnel shall be able to defeat the main power disconnect and open the bypass enclosure without disconnecting power. This shall be accomplished through the use of a specifically designed tool and mechanism while meeting all local and national code requirements for safety.

T. Bypass Controller (2-Contactor with Service Switch):
   1. Factory wired and tested bypass system consisting of a door interlocked, padlockable circuit breaker, output contactor, bypass contactor, and fast acting VFD input fuses. UL Listed motor overload protection shall be provided in both drive and bypass modes.
   2. The bypass enclosure door and VFD enclosure must be mechanically interlocked such that the disconnecting device must be in the “Off” position before either enclosure may be accessed.
   3. The VFD and bypass package shall have a UL listed short circuit current rating (SCCR) of 100,000 amps and this rating shall be indicated on the UL data label.
   4. Drive Isolation Fuses: Fast acting fuses, exclusive to the VFD, shall be provided to allow the VFD to disconnect from the line prior to clearing upstream branch circuit protection.
   5. Motor protection from single phase power conditions in the bypass mode.
   6. The bypass system shall be designed for standalone operation and shall be completely functional in both Hand and Automatic modes even if the VFD has been removed from the system for repair / replacement. Serial communications shall remain functional even with the VFD removed.

7. Serial Communications – the bypass shall be capable of being monitored and / or controlled via serial communications. On-board communications protocols shall include ModBus; Johnson Controls N2; Siemens Building Technologies FLN (P1); and BACnet.
8. The bypass control shall monitor the status of the VFD and bypass contactors and indicate when there is a welded contactor contact or open contactor coil. This failed contactor condition shall be indicated on the bypass LCD display, programmed to fire a Form-C relay output, and / or over the serial communications protocol.
9. The following operators shall be provided:
   a. Bypass Hand-Off-Auto
10. The bypass shall provide a separate terminal strip for connection of freeze, fire, smoke contacts, and external start command. All external safety interlocks shall remain fully functional whether the system is in VFD or Bypass mode. The remote start/stop contact shall operate in VFD and bypass modes. The terminal strip shall allow for independent connection of up to four (4) unique safety inputs.

2.3 ENCLOSURES

A. NEMA Type 1 for general purpose interior dry locations.

B. NEMA Type 3R for exterior or damp locations.

C. NEMA Type 12 for industrial use, dust tight and drip tight – interior locations.

2.4 ACCESSORIES

A. Devices shall be factory installed in controller enclosure, unless otherwise indicated.

B. Current-Sensing, Phase-Failure Relays for Bypass Controller: Solid-state sensing circuit with isolated output contacts for hard-wired connection; arranged to operate on phase failure, phase reversal, current unbalance of from 30 to 40 percent, or loss of supply voltage; with adjustable response delay.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Select features of each VFD to coordinate with ratings and characteristics of supply circuit and motor; required control sequence; and duty cycle of motor, controller, and load.

B. Select horsepower rating of controllers to suit motor(s) controlled. For VFD’s serving multiple motors, size VFD according to the sum of the RLA’s of all motors.

3.2 INSTALLATION

A. Anchor each VFD assembly to steel-channel sills arranged and sized according to manufacturer's written instructions. Attach by bolting.

B. Controller Fuses: Install fuses in each fusible switch.

3.3 CONTROL WIRING INSTALLATION

A. Connect hand-off-automatic switch and other automatic-control devices where applicable.
   1. Connect selector switches to bypass only manual- and automatic-control devices that have no safety functions when switch is in hand position.
   2. Connect selector switches with control circuit in both hand and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

3.4 CONNECTIONS

A. Conduit installation requirements are specified in Division 26 Sections.

B. Ground equipment according to Division 26.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to perform the following check-out and start-up services:
   1. Inspect controllers, wiring, components, connections, and equipment installation. For proper operation and installation of VFD, its options and interface wiring to the BAS.
   2. Set field-adjustable switches and circuit breaker trip ranges.
   3. Program step-overs for critical fan speeds (on cooling towers, verify critical speeds with tower manufacturer).
   4. Report results in writing.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain variable frequency drives. Refer to Division 01.

END OF SECTION 23 0054

SECTION 23 0725

CUSTOM INDOOR AIR-HANDLING UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes variable volume, site-built custom air-handling units with coils for indoor installations.

1.2 SUBMITTAL5S

A. Product Data: For each type of site built custom indoor air-handling unit indicated. Include the following:
   1. Unit dimensions, weights, structural weights, and required clearances.
   2. Fans:
      a. Certified fan-performance curves with system operating conditions indicated.
      b. Certified fan-sound power ratings.
      c. Certified fan-performance ratings with system operating conditions indicated.
      d. Motor ratings, electrical characteristics, and motor and fan accessories.
      e. Specialties and accessories.
      f. Material gages and finishes.
   3. Dampers, including housings and linkages.
   4. Filters with performance characteristics.

B. Shop Drawings:
   1. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
   2. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.
   3. Wiring Diagrams: Power, signal, and control wiring.

C. Field quality-control reports from manufacturer.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain modular indoor air-handling units through one source from a single manufacturer.

B. Options: Drawings indicate size, profiles, and dimensional requirements of modular indoor air-handling units and are based on the specific system indicated. Refer to Division 01, Section “Product Requirements.”

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. NFPA Compliance: Comply with NFPA 90A for design, fabrication, and installation of air-handling units and components.

E. ARI Certification: Modular indoor air-handling units and their components shall be factory tested according to ARI 430, "Central-Station Air-Handling Units," and shall be listed and labeled by ARI.

F. Comply with NFPA 70.

1.4 COORDINATION

A. Coordinate sizes and locations of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

1.5 WARRANTY

A. Provide complete unit parts warranty for one (1) year from startup.

B. Provide extended parts warranty for fan assembly for five (5) years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Climate Craft.
   2. Multistack.
   3. Temtrol.

2.2 GENERAL

A. Units shall be specifically engineered for final assembly at the job site. Units requiring any field disassembly to access the mechanical room are not acceptable. The equipment's cooling, heating, ventilating, and performance shall meet or exceed that shown on the schedule. Tags and decals to aid in service or to indicate caution areas shall be provided. Electrical wiring diagrams shall be attached to the control panel access doors. Operation and Maintenance manuals shall be furnished with each unit.

2.3 CABINET CONSTRUCTION

A. Site Assembled units: Units shall be provided by a manufacturer in the business of producing factory and site assembled custom air handling equipment and shall be specifically engineered for final assembly at the jobsite. Site assembly shall be accomplished using the same procedures and techniques as would be used by the manufacturer in the factory and shall yield the same performance characteristics. Site assembly techniques that negate thermal break or other performance characteristics shall not be accepted.
   1. The installing contractor shall provide technicians for training at the AHU manufacturer’s facility prior to equipment shipment and/or site assembly shall be supervised by a direct employee of the AHU manufacturer or by a manufacturer-certified technician. All unit warranty coverage shall be the same as for a factory assembled unit.
   2. Complete units shall be shipped, broken down into individual panel and component form and all pieces shall be engineered for site assembly with no disassembly required. Dimensions and weights of critical sized components shall be provided at time of project submission, for review by the engineer and contractor.
   3. All AHU components, assembly instructions, gasket and assembly hardware shall be provided by the AHU manufacturer. Assembly instructions shall include easy-to-follow photo details. These details shall include:
      a. Detailed unit specific assembly instructions with typical photo’s of assembly for both unit and component installation
      b. List of tools required for field installation
   4. Panel gasket supplied with the unit shall be a high quality weather resistant closed-cell EPDM sponge rubber. Units relying on field applied caulk for sealing are not acceptable. Units shall be securely assembled using machine bolts. Units relying on sheet metal binding screws for field assembly are not acceptable.
   5. Units shall be accompanied by detailed bills of material for each pallet and crate, pallet check lists, panel maps, parts, construction information and document check lists. All major components shall be identified to match the bills of material and packing lists

B. Casing deflection shall not exceed L/200 at +12.0 w.g. in all positive pressure sections and -12.0 w.g. in all negative pressure sections where L is defined as the panel span. Panels shall be designed to

deflect no more than 1/200 (.0005" per inch) of span under operating design conditions when measured at the panel span. Casing shall be rated for 1% leakage at 1.5 times the operating pressure with a maximum overall pressure of 12" wc.

C. The unit shall be constructed either of a 10 gauge galvanized C-channel perimeter rail with rail heights selectable from 5" to 12" in 1" increments or tubular steel in rail heights of 5" and 8".

D. Gasket supplied with the unit shall be a high-quality, weather-resistant closed-cell EPDM sponge rubber. Each section shall include a label to aid in proper field assembly. Floors shall be designed to deflect no more than 1/200 of span under operating conditions.

E. Standard Floors
1. Floors shall be fabricated of 16-gauge ~~G-90 galvanized steel}~~ {aluminum treadplate .125 base, 3/16" or .187 over treads. All floor sheets shall be isolated from the base assembly with an EPDM thermal break gasket.
2. Floors shall be insulated with two-part polyurethane water-impervious foam insulation. If glass fiber insulation is used an underfloor liner shall be provided. An underfloor liner shall also be provided when the bottom of the unit is used as an air tunnel, when the unit is outdoors and installed on a roof curb, or where the bottom of the unit is exposed to the outdoors.
3. Underfloor liner shall be fabricated of 20-gauge G-90 galvanized steel.
4. To allow for added protection from ruptured coils or piping, floors in specified section(s) shall include a 1 ¼" floor drain piped through the perimeter base. The drain connection through the perimeter base shall be 1 ¼" MPT stainless steel.

F. Wall and roof panels standard construction
1. Panels shall be 2" thick double-wall construction. Panel joints shall be sealed with an industrial EPDM gasket to form water and airtight seal.
2. Panels shall be individually removable for service without removing the roof or compromising the integrity of the cabinet wall. Panels shall be joined with 5/16" bolts that can be removed and refastened. Panel attachment with screws is not acceptable. All panels shall utilize thermal break construction between the exterior panel and the interior liner and between the panels and the base and roof frames.
3. For long-term durability, exterior panels shall be a minimum 16 gauge G90 galvanized steel
4. Interior liners shall be a minimum 20 gauge G90 galvanized steel smooth. Panel liners shall be of a single-piece construction and attached to the exterior panels with a full thermal break. To allow for cleaning, no fasteners shall be used on the exposed liner surface. Single wall units are not acceptable

G. Wall and roof panels
1. Interior wall and ceiling panels shall be 2" thick double-wall construction. Panel joints shall be sealed with an industrial EPDM gasket to form water and airtight seal.
2. Panels shall be individually removable for service without removing the roof or compromising the integrity of the cabinet wall. Panels shall be joined with 5/16" bolts that can be removed and refastened. Panel attachment with screws is not acceptable. All panels shall utilize thermal break construction between the exterior panel and the interior liner and between the panels and the base and roof frames.
3. Interior liners shall be a minimum 16 or 20-gauge G90 galvanized steel. Panel liners shall be of a single piece construction and attached to the exterior panels with a full thermal break. To allow for cleaning, no fasteners shall be used on the exposed liner surface. Single wall units are not acceptable.
4. Liquidtite, rigid steel or aluminum conduit (LFMC): NEC 350, UL-94V, UL360, ASTM-e162 and ASTM-e662; interlocked steel/aluminum with PVC jacket shall be used throughout.

5. Fittings: Liquidtite: NEMA FB1, UL514B; steel, zinc plated shall be used throughout. Must be UL and C-UL listed

H. Insulation
1. All wall and roof panels shall be insulated with glass fiber insulation with an R value of 4.2/inch.

I. Access doors shall be provided into all sections of the air-handling unit as indicated in the plan documents. Doors shall be sized as shown on plan drawings, shall be a minimum 2" thick with R13 polyurethane foam insulation and shall be double wall construction using the same material type as the corresponding section. Doors shall comply with the requirements of UL 1995 and NFPA 90. The door frame shall be 0.125" extruded 6063-T5 aluminum. Each door shall be mounted with adjustable die cast aluminum hinges. All doors and mounting frames shall incorporate a thermal break design and the doors shall seal to a replaceable extruded EPDM sponge rubber gasket. Doors shall open against static pressure or shall include a pressure relief feature on the door latch.
1. The door latch assembly shall consist of a roller cam compression arm with a chrome plated steel inner handle and glass fiber/nylon composite outer handle. One {tool operated} {key operated} lock shall be provided on each fan section access door. All doors shall have a minimum of two latches.

J. The entire unit, including walls, roof, doors, joints, and seams shall include thermal break construction. This construction shall be supported by tested performance producing no condensation on the exterior surface when the air tunnel temperature is 50°F DB under the following exterior conditions
1. $(Th - 50) / (Th - Tdp) < 3.4$.
2. Th = Ambient dry bulb temperature (°F) external to housing
3. Tdp = Ambient dew point temperature (°F) external to housing.

2.4 FAN ASSEMBLIES – DIRECT DRIVE FAN ARRAY

A. Fan Arrays shall be direct-drive, non-overloading SWSI plenum fans designed for industrial duty and suitable for continuous operation.
1. Fans shall be arranged in an array using one or more welded structural steel assemblies and shall be of the size and quantity specified in the unit schedule. Screwed or riveted frames are unacceptable. Fan assemblies shall be attached directly to base structural members.
2. Fan wheels shall have a minimum of 12 airfoil blades for superior sound characteristics and shall be constructed of aluminum to reduce rotational weight and vibration. Fan blades shall be extruded aluminum for uniformity and improved vibration characteristics.
3. Each fan and motor assembly shall be independently isolated within the structural assembly using 1-inch deflection spring isolators. Isolators shall be mounted in a three-point arrangement that provides both vertical and horizontal (thrust) isolation and shall not require field adjustment. If hard mounted or rubber in shear is used in place of internal spring isolations, external isolation of the entire unit is required.
4. A fan inertia base shall be provided or the fan structure shall exceed an equivalence of 2x mass of the total rotating parts of the fan array. Fan and motor assemblies shall be designed such that no natural frequencies exist within the operating RPM range of the fan, eliminating the need for "lockout" frequency settings in the variable speed drive. The purchasing contractor will be responsible for all costs associated with externally isolating any unit that does not include individual fan isolation.
5. All fan arrays shall meet the minimum motor efficiency, maximum brake horsepower and total motor horsepower values scheduled. All fans shall be selected to operate at a point no higher than 90% of the peak static pressure rating as defined by the fan performance curve at the

selected operating speed. Manufacturer must ensure maximum fan RPM is below the first critical speed. Fans shall be Class 2 construction.

6. All fan and motor assemblies shall be dynamically balanced by the manufacturer to a maximum allowable vibration of 0.040 inches per second at design RPM and a maximum 0.080 inches per second overall vibration limit to bring the fan balance in conformance to a BV-5 Grade G1 per ANSI/AMCA 204. In addition, the manufacturer shall insure that no critical frequencies exist in the fan operating range by varying motor speed in 1Hz increments from design RPM to 50% of design RPM

B. Motors
1. Electrical characteristics and horsepower shall be as specified on the project schedule.
2. Motors shall be Premium Efficiency per NEMA MG1 Table 12-12 TEFC type, shall have NEMA Class F insulation, shall meet NEMA Standard MD-1 Inverter Duty rating, and shall be designed to withstand 1600V peak voltage spikes and rise times $\geq$0.1 microseconds.
3. Motors shall have grease-lubricated ball bearings designed to deliver a minimum L10 life of 250,000 hours at full load and the maximum operating RPM of the associated fan. Grease zerks and spring-loaded grease relief valves shall be provided in each motor to allow easy bearing lubrication without damaging the seals due to over lubrication.
4. For efficient operation in a direct drive application, motors shall be capable of operating greater than 60HZ to at least the design operating speed of the fan.
5. Motors shall be factory wired to a motor control center for connection to a disconnect switch or VFD. The motor control center shall include for each motor circuit a control device providing overload protection, short circuit protection and a manual disconnect means, and all circuits shall be wired to a common main panel terminal block. All motors shall operate at all times and be controlled in unison, maintaining a consistent and uniform airflow pattern over coils, filters and other devices.
6. Each motor shall be provided with a shaft grounding device to harmlessly bleed potential induced shaft voltages to ground

C. Warranty
1. All rotating parts shall be warranted by the unit manufacturer for a full five (5) years from date of unit start-up.

2.5 FAN ARRAY CONTROLS

A. Fan arrays shall be controlled using a common control signal, such as the duct static control signal, to modulate the fan speed.

2.6 FAN SPEED CONTROL (NON ECM ARRAYS)

A. Each variable air volume supply and return fan array shall be provided with an individual variable frequency drive as specified under division 23.

B. Each variable air volume supply and return fan array shall be provided with an individual variable frequency drive. Drives shall be remote mounted with adequate ventilation provided. The VFD shall be self-contained, totally enclosed in a NEMA 1 ventilated cabinet and capable of operation between 0 and 40 degrees C. The VFD shall be 95% efficient at 100% rated output power, 60 Hz. The VFD shall be UL listed

2.7 UNT SOUND POWER

A. Fan sound power levels (dB) for the unit shall not exceed values as specified on the equipment schedule.

B. Unit manufacturer shall provide certified inlet, supply and casing radiated, sound power levels based on the final unit configuration

2.8 COILS

A. Provide complete coil section(s) with service access door(s) as shown on the plan drawings. Coil connections shall extend through the section casing for ease of installation. Coil connections must be sealed from both the inside and exterior surfaces of the panel with the sleeve of the inner seal covering the pipe within the depth of the panel, all to minimize leakage and condensation. An integral double wall galvanized stainless steel air seal which completely seals around the coil casing and extends to the unit pressure bearing surface shall be provided. Air seals/safing materials that are mechanically fastened to the inner liner of the cabinet only shall be constructed of 16 gage materials to match the material type in the appropriate section and shall be gasketed and have fasteners every 3 inches.

B. Multiple, “stacked” coil arrangements must be constructed so as to allow independent removal of any coil without the removal of another within the coil bank.

C. All coils shall meet or exceed the capacities specified on the mechanical schedule and all water coil performances shall be certified in accordance with the AHRI Forced Circulation Air Heating and Air-Cooling Coil certification program which is based on AHRI Standard 410. Face velocities shall not exceed those specified on the mechanical schedule.

D. All cooling coil sections shall include a double sloped drain pan constructed from 304L stainless steel. All corners shall be welded watertight. Coils shall rest on stainless steel supports. The pan shall have a minimum pitch of 2" from high point to the bottom of the drain outlet connection, providing at least a 1/8” per foot slope. The drain pan shall be insulated with a 2-part sprayed on polyurethane, water impervious foam. Insulation shall be applied to the entire under side of the drain pan and coil section base assembly. If multiple stacked coils are used, intermediate drain pans are required. Intermediate pans shall be insulated and drained with 3/4” copper down-comers to the main pan.

E. Water coils shall be of a staggered tube design with high efficiency plate-type fins for maximum performance. All coils shall be tested with 400 psig compressed air under clear water. Coils shall be designed to operate at 300 psig internal pressure and up to 250ºF. Tubes shall be 5/8" diameter, seamless 0.020” wall copper, mechanically expanded into full drawn fin collars for a continuous compression bond over the full finned length for high-efficiency performance. Coil casings shall be a minimum 16 gauge galvanized steel. Coil casing reinforcements shall be required for fin lengths over 42". Coil fins shall be 0.0075" thick aluminum. Coils shall be serviceable using 0.25" M.P.T. drain and vent taps on the supply and return headers. Threaded seamless red brass coil connections shall be brazed to copper supply and return headers

2.9 FILTERS

A. Provide complete filter section(s) with filter racks and service access door(s) as shown on the plan drawings. Holding frames provided for medium efficiency applications will be either upstream or downstream accessible. Holding frames provided for high-efficiency applications will be upstream accessible, only. Holding frames shall be constructed from heavy gauge galvanized steel and shall be equipped with polyurethane foam gaskets. Frames shall be installed with vertical stiffeners and appropriate frame-to-frame sealant to provide a rigid leak-tight assembly. An integral air seal that completely seals around the filter frame assembly and extends to the unit pressure bearing surface shall be provided. Air seals/safing materials that are mechanically fastened to the inner liner of the cabinet only shall be constructed of 16 gage materials to match the material type in the appropriate section and shall be gasketed and have fasteners every 3 inches.

Filter fasteners shall be capable of being installed without the requirement of tools, nuts or bolts. The holding frame shall be designed to accommodate standard-size filters with the application of the appropriate type fastener. The filter rack shall be designed to use standard 24”x24” and 12”x24” filters only. Odd-sized filters are not allowed. Holding frame assemblies shall be sized to meet or exceed the face area specified by the mechanical schedule.

B. Angle filter racks shall be provided. Angle racks shall be fabricated from a minimum 16 gauge galvanized steel. Angle racks shall be applied in medium efficiency filter applications and will be either upstream or side accessible. Upstream access filter racks shall have one central access cover per row of filters, centered in the unit for easy access. Side access filter racks over 72" long shall include an angle center reinforcement support. Filter racks shall be sized to meet or exceed the area specified in the mechanical schedule. The filter rack shall be designed to use standard 24”x20” and 12”x20” filters only. Odd-sized filters are not allowed.

C. Gauges
   1. A Magnehelic differential pressure gauge shall be provided factory-installed for measuring the pressure drop across each filter bank-single stage. The gauge shall be a diaphragm-actuated dial type, 4¾" O.D., with white dial, black figures and graduations and pointer zero adjustment.
   2. An inclined differential pressure gauge shall be provided factory installed for measuring the pressure drop across each filter bank-single stage. The gauge shall be liquid filled inclined type with black figures, graduations and pointer zero adjustment.

D. Medium efficiency pleated filters shall be 2" thick, 30% efficient MERV 8 as rated by ASHRAE Standard 52.1 test methods. Filter media shall be of the non-woven cotton fabric type. The filter shall have an average efficiency of 25-30 %. Filters shall be UL900 Class2 listed .

E. High efficiency, rigid mini-pleat filters shall be 4” deep, totally rigid, and disposable type. Each filter shall consist of water-laid micro-fine fiberglass media formed with closely spaced pleats. The enclosing frame shall be double-walled water-resistant beverage board. The filter media shall have an average efficiency of 65% as rated by ASHRAE Standard 52.1 test methods. Filters shall be UL900 Class 2 listed.

2.10 DAMPERS

A. Mixing box and economizer outdoor air return air openings shall be airfoil low-leak dampers, Damper shall be parallel blade type. The frame shall be fabricated from 16 gauge galvanized steel. The damper shall meet the leakage requirements of ASHRAE Std. 90.1 and of the International Energy Conservation Code by leaking less than 3 CFM/sq. ft. at 1” of static pressure, and shall be AMCA licensed as a Class 1A damper.

B. Mixing box and economizer outdoor air, return air openings shall be airfoil low-leak dampers. Damper shall be parallel blade type. Damper frame shall be 0.125” thick aluminum hat channel. Damper shall meet the leakage requirements of ASHRAE Std. 90.1 and of the International Energy Conservation Code by leaking less than 3 CFM/sq. ft. at 1” of static pressure, and shall be tested in accordance with AMCA Standard 500-D

2.11 ELECTRICAL POWER AND CONTROLS

A. Unit operating voltage shall 460V, 3 phase, 60Hz. All wiring and electrical equipment supplied by the manufacturer shall conform to and be installed in accordance with the requirements of UL1995.

Provide copper wires, bus bars, and fittings throughout, except the internal wire of the control transformer may be aluminum if copper termination is provided. Identify power supply terminals with permanent markers. The maximum temperature of terminals shall not exceed 167°F (75°C) when the equipment is tested in accordance with its rating. Wiring shall be run in plated flexible metal conduit.

B. Mount a permanent nameplate on the unit to display the manufacturer, serial number and model number, date of manufacture, horsepower, current rating and voltage

2.12 UNIT TESTING AND QUALITY CONTROL

A. The fans shall be factory run tested to insure design integrity and proper RPM. All electrical circuits shall be tested to ensure correct operation before shipment of unit. Units shall pass all quality control checks and be thoroughly cleaned prior to shipment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine roughing-in for steam, hydronic, and condensate drainage piping systems and electrical services to verify actual locations of connections before installation.

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

3.2 INSTALLATION

A. Concrete Bases: Install floor mounting units on 8-inch high concrete bases. See Division 23 Section “Basic HVAC Materials and Methods” for concrete base materials and fabrication requirements.

B. Install modular indoor air-handling units with the following vibration-control devices. Vibration-control devices are specified in Division 23 Section "Mechanical Vibration and Seismic Controls."
   1. Units with Internally Isolated Fans: Secure units to anchor bolts installed in concrete bases.
   2. Floor-Mounted Units: Support on concrete bases using neoprene pads. Secure units to anchor bolts installed in concrete bases.
   3. Floor-Mounted Units: Support on concrete bases using housed-spring isolators. Secure units to anchor bolts installed in concrete bases.

C. Arrange installation of units to provide access space around modular indoor air-handling units for service and maintenance.

D. Equipment assembly to be supervised by a direct employee of the AHU manufacturer or by a manufacturer certified service organization. Provide supervision for as long a period of time as is necessary to ensure proper assembly or onsite training.

3.3 CONNECTIONS

A. Comply with requirements for piping specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to air-handling unit to allow service and maintenance.

C. Connect piping to modular indoor air-handling units mounted on vibration isolators with flexible connectors.

D. Connect condensate drain pans using NPS 1-1/4, Type M copper tubing. Extend to nearest equipment or floor drain. Construct deep trap at connection to drain pan and install cleanouts at changes in direction.

E. Chilled-Water Piping: Comply with applicable requirements in Division 23 Section "Hydronic Piping." Install shutoff valve and union or flange at each coil supply connection. Install balancing valve and union or flange at each coil return connection.

F. Duct installation and connection requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connections.

G. Electrical: Comply with applicable requirements in Division 26 Sections for power wiring, switches, and motor controls.

H. Ground equipment according to Division 26 Section "Grounding and Bonding."

I. Tighten electrical connectors and terminals according to manufacturers' published torque-tightening values. If manufactures' torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installations, including piping and electrical connections.
   1. Leak Test: After installation, fill water and steam coils with water, and test coils and connections for leaks. Repair leaks and retest until no leaks exist.
   2. Charge refrigerant coils with refrigerant and test for leaks. Repair leaks and restest until no leaks exist.
   3. Fan Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new units, and retest.
   4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Prepare test and inspection reports in writing.

3.5 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

B. Final Checks before Start-Up:
   1. Verify that shipping, blocking, and bracing are removed.
   2. Verify that unit is secure on mountings and supporting devices and that connections to piping, ducts, and electrical systems are complete. Verify that proper thermal-overload protection is installed in motors, controllers, and switches.
   3. Perform cleaning and adjusting specified in this Section.
   4. Disconnect fan drive from motor, verify proper motor rotation direction, free fan wheel rotation, and smooth bearing operations. Reconnect fan drive system, align belts, and install belt guards.
   5. Verify that bearings, pulleys, belts, and other moving parts are lubricated with factory-recommended lubricants.
   6. Verify that outdoor- and return-air mixing dampers open and close, and maintain minimum outdoor-air setting.
   7. Comb coil fins for parallel orientation.
   8. Verify that proper thermal-overload protection is installed for electric coils.
   9. Install new, clean filters.
   10. Verify that manual and automatic volume control and fire and smoke dampers in connected duct systems are in fully open position.

C. Starting procedures for modular indoor air-handling units include the following:
   1. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated rpm. Replace fan and motor pulleys as required to achieve design conditions.
   2. Measure and record motor electrical values for voltage and amperage.
   3. Manually operate dampers from fully closed to fully open position and record fan performance.

3.6 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Comply with requirements in Division 23 Section "Testing, Adjusting, and Balancing" for air-handling system testing, adjusting, and balancing.

3.7 CLEANING

A. After completing system installation and testing, adjusting, and balancing modular indoor air-handling unit according to manufacturer's written instructions, clean internally to remove foreign material and construction dirt and dust. Clean fan wheels, cabinets, dampers, coils, and filter housings, and install new, clean filters.

3.8 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain modular indoor air-handling units. Refer to Division 01 Section "Closeout Procedures."

END OF SECTION 23 0725

SECTION 31 3116
TERMITE CONTROL

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Chemical soil treatment.

1.02 RELATED REQUIREMENTS

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

B. Related work specified elsewhere includes:
   1. Section 03 3100 - Concrete.
   2. Section 31 2000 - Earth Moving.

1.03 DESCRIPTION OF WORK

A. Work described in this section includes soil treatment for termite control, for use and application below any new on-grade interior floor slabs, and also where any existing slabs may be opened or removed for any new, repair, replacement, or other subgrade work at interior of building and/or within interior perimeter exterior walls.

1.04 REFERENCE STANDARDS

A. Title 7, United States Code, 136 through 136y - Federal Insecticide, Fungicide and Rodenticide Act; 2006.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate toxicants to be used, composition by percentage, dilution schedule, intended application rate.
   1. Include the EPA-Registered Label for termiticide products

C. Manufacturer's Instructions: Indicate caution requirement.

D. Qualification Data: For Installer of termite control products.

E. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's record information, including the following:
   1. Date and time of application.
   2. Moisture content of soil before application.
   3. Brand name and manufacturer of termiticide.
   4. Quantity of undiluted termiticide used.
   5. Dilutions, methods, volumes, and rates of application used.
   6. Areas of application.
   7. Water source for application.

F. Submit completed forms for required warranties, guarantees, and bonds for acceptance, prior to beginning work.

G. Warranty: Submit warranty and ensure that forms have been completed in Owner's name.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing this type of work and:
   1. Having minimum of three (3) years documented experience.
   2. Licensed in accordance with regulations of governing authorities for application of soil treatment solution in the State in which the Project is located.

B. In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for work, including preparation of substrate and application.

C. Source Limitations: Obtain termite control products through one source and from a single manufacturer for each product.

D. Use only termiticides which bear a Federal registration number of the U.S. Environmental Protection Agency.
   1. Formulate and apply termiticides according to the EPA-Registered Label.

E. Mix treatment solution on site, in presence of Contractor's Superintendent, using clean potable water and new termiticide delivered to site in undamaged, original, unopened, and factory-sealed containers.

1.07 REGULATORY REQUIREMENTS

A. Conform to applicable code for requirements for application, application licensing, and authority to use toxicant chemicals, and comply with EPA regulations.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of toxicants where required.

1.08 SEQUENCING

A. Apply toxicant immediately prior to installation of vapor barrier under slabs-on-grade.

1.09 JOB CONDITIONS

A. Restrictions: Do not apply soil treatment solution until excavating, filling and grading operations are completed, except as otherwise required in construction operations.

B. Environmental Limitations: To insure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.

1.10 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide five year installer's warranty against damage to building caused by termites.
   1. Provide paid-up and bonded guarantee for a period of five (5) years from date of treatment, signed by the Applicator and Contractor. Paid-up guarantee shall include annual inspection during the five (5) years and an agreement to renew the bond annually after the five (5) years is up, on payment by the Owner of an annual fee.
   2. Inspect annually and report in writing to Owner. Provide inspection service for 5 years from Date of Substantial Completion.
   3. A specimen of the form of guarantee and the bond shall be submitted for approval before the work begins.

C. Soil Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work consisting of applied soil termiticide treatment will prevent infestation of subterranean termites, including Formosan termites (Coptotermes formosanus). If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.
   1. Warranty Period: Five years from date of Substantial Completion.

D. Wood Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work consisting of applied wood termiticide treatment will prevent infestation of subterranean termites, including Formosan termites (Coptotermes formosanus). If subterranean termite damage is discovered during warranty period, repair or replace damage caused by termite infestation and treat replacement wood.
   1. Warranty Period: 12 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 CHEMICAL SOIL TREATMENT

A. Toxicant Chemical: EPA Title 7, United States Code, 136 through 136y approved; synthetically color dyed to permit visual identification of treated soil.

B. Manufacturers/Products: Subject to compliance with requirements, provide one of the following termiticide products:
   1. Aventis Environmental Science USA LP; Product "Termidor".

2. Bayer Environmental Science Corp; Product "Premise 75, Premise Pre-Construction, or Premise Pro": www.nobugs.com.
3. Nisus; Product "Bora-Care": www.nisuscorp.com.
4. Syngenta Professional Products: www.syngentaprofessionalproducts.com.

C. Termiticide: Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.

D. Diluent: Recommended by toxicant manufacturer.
1. Fuel oil will not be permitted as a dilutent.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that soil surfaces are unfrozen, sufficiently dry to absorb toxicant, and ready to receive treatment.

B. Verify final grading is complete.

C. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control.
1. Proceed with application only after unsatisfactory conditions have been corrected.

3.02 PREPARATION:

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparation before beginning application of termite control treatment. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.

B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.
1. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.03 APPLICATION - CHEMICAL TREATMENT

A. Comply with requirements of U.S. EPA and applicable state and local codes.
1. Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

B. Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.

C. Spray apply toxicant in accordance with manufacturer's instructions.

D. Apply toxicant at following locations:
1. Under Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment.
a. Under slab-on-grade structures, treat soil before concrete footings and slabs are placed, using the following rates of application (unless manufacturer recommends otherwise):
1) Apply four (4) gallons of chemical solution per ten (10) linear feet to soil in critical areas under slab, including entire inside perimeter inside of foundation walls, along both sides of interior partition walls, around plumbing pipes and

electric conduit penetrating slab, and around interior column footers.

2) Apply one (1) gallon of chemical solution per ten (10) square feet as an overall treatment under slab and attached slab areas where fill is soil or unwashed gravel. Apply 1-1/2 gallons of chemical solution to areas where fill is washed gravel or other coarse absorbent material.

3) Apply four (4) gallons of chemical solution per ten (10) linear feet of trench, for each foot of depth from grade to footing, along outside edge of building. Dig a trench six (6) inches to eight (8) inches wide along outside of foundation to a depth of not less than twelve (12) inches. Punch holes to top of footing on not more than twelve (12) inches on center and apply chemical solution. Mix chemical solution with the soil as it is being replaced in trench

2. In Crawl Spaces: Soil under and adjacent to foundations as previously indicated. Treat adjacent areas including around entrance platform, porches, and equipment bases. Apply overall treatment only where attached concrete platform and porches are on fill or ground.
   a. In crawl-space and basement structures, treat soil along exterior and interior walls of foundations with shallow footings as specified above for exterior of slab-on-grade structures. Treat soil under or around crawl-space structures using the following rates of application (unless manufacturer recommends otherwise):
      1) Apply four (4) gallons of chemical solution per ten (10) linear feet of trench along inside of foundation walls, along both sides of interior partitions, and around piers and plumbing. Do not apply an overall treatment in crawl spaces.
      2) Apply four (4) gallons of chemical solution per ten (10) linear feet of trench, for each foot of depth from grade to footing, along outside of foundation walls.
      3) Apply one (1) gallon per ten (10) square feet of soil surface as an overall treatment, where attached concrete structures are on fill or ground.
3. Foundations: At Both Sides of Foundation Surface: Adjacent soil including soil along the entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating the slab, and around interior column footers, piers, and chimney bases; also along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
4. At hollow masonry foundations or grade beams:
   a. Treat voids at rate of two (2) gallons per ten (10) linear feet (unless manufacturer recommends otherwise), poured directly into the hollow spaces.
5. Masonry: Treat voids.
6. At expansion joints, control joints, and areas where slabs will be penetrated:
   a. Apply at rate of four (4) gallons per ten (10) linear feet of penetration (unless manufacturer recommends otherwise).
7. Soil Within 10 feet (3 m) of Building Perimeter For a Depth of 1 foot .

E. Under slabs, apply toxicant immediately prior to installation of vapor barrier.

F. At foundation walls, apply toxicant immediately prior to finish grading work outside foundations.

G. Apply extra treatment to structure penetration surfaces such as pipe or ducts, and soil penetrations such as grounding rods or posts.

H. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

I. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

J. Re-treat disturbed treated soil with same toxicant as original treatment.
   1. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

K. If inspection or testing identifies the presence of termites, re-treat soil and re-test.

L. Post signs in areas of application warning workers that soil termiticide treatment has been applied. Remove signs when areas are covered by other construction.

3.04 PROTECTION

A. Do not permit soil grading over treated work.

END OF SECTION

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SECTION 32 1816.13
EPDM/TPV PLAYGROUND PROTECTIVE SURFACING

PART 1 - GENERAL

1.01 WORK SCOPE

A. Furnish labor, material, and equipment necessary to install the poured-in-place, resilient surfacing system as shown on the drawings and specified herein.

B. Work shall include, but not be limited to the following: layout; excavation; backfill; furnishing and installing of base material; furnishing and installing of poured-in-place, resilient surfacing and all other incidental work to provide a complete resilient surfacing system.

C. Poured in place playground surfacing shall consist of a polyurethane binder mixed with recycled rubber, which will make up the attenuation cushion layer. The attenuation cushion layer is capped with EPDM or TPV granules, mixed with a polyurethane binder creating the Wear Course.

D. Surfaces shall comply with ADA and CPSC guidelines as well as ASTM Standards. Manufacturer is to be certified by IPEMA, a third-party testing organization for playground surfaces and equipment.

1.02 PERFORMANCE REQUIREMENTS

A. Area Safety: Poured in place within playground use zones shall meet or exceed the performance requirements of the CPSC, ADA and Fall Height Test ASTM F1292-18. The surface must yield both a peak deceleration of no more than 200 G-max and a Head Injury Criteria (HIC) value of no more than 1,000 for a head-first fall from the highest accessible portion of play equipment being installed as shown on drawings. IPEMA certification is required. (ASTM F1292-18, section 15 The laboratory test used to determine critical fall height shall have been conducted on surfacing material samples identical in design, materials, components, and thickness and manufactured as the installed playground surface).

B. Accessibility: NOTE: Children’s outdoor play areas shall be in compliance with the Uniform Federal Accessibility Standards (UFAS) FED-STD-795 and the Architectural and Engineer Instructions (9AEI) Design Criteria.

C. The requirements of the Americans with Disabilities Act. Accessibility Guidelines (ADAAG) 28 CFR Part 36 that provide equal or greater accessibility than the requirements of UFAS must also be met in children’s outdoor play areas.

D. Poured in place surfaces intended to serve as accessible paths of travel for persons with disabilities shall be firm, stable and slip resistant, and shall meet the requirements of ASTM F 1951-14 and ASTM F1292-18.

1.03 APPLICABLE STANDARDS

A. ASTM International

B. ASTM D2047- Standard test method for determining the static coefficient of friction of ceramic tile and other like surfaces by the horizontal dynamometer pull meter method. This standard replaces ASTM C1028.

C. ASTM D412 – Standard test methods for vulcanized rubber and thermoplastic rubbers and thermoplastic elastomers-tension.

D. ASTM D624 - Standard test method for tear strength of conventional vulcanized rubber and thermoplastic elastomers.

E. ASTM D2859 – Standard test method for flammability of finished textile floor covering materials.

F. ASTM E303 – Standard test method for measuring surfacing frictional properties using the British Pendulum tester.

G. ASTM F1292-18 – Standard specification for impact attenuation of surface systems under and around playground equipment.

H. ASTM F1951 – Standard specification for determination of accessibility of surface systems under and around playground equipment.

I. Poured in place surfaces shall be manufactured and installed by trained, experienced company employees or certified installers who have successfully completed the “Certified Installers Training Program”.

1.04 SUBMITTALS: THE FOLLOWING SHALL BE SUBMITTED

A. The Contractor shall submit a complete set of the material submittals, as required, including manufacturer’s name and address, specific trade names, catalog and model numbers, illustrations and descriptive material, and samples of the proposed material for this project clearly marked as to proposed items for approval by the Owner’s representative.

B. Products submitted as equal must include hard copies of manufactures written specifications, warranty, purchase and use of materials.

C. Manufacturer’s descriptive data and installation instructions.

D. Manufacturer’s details showing depths of wear course and sub-base materials, anchoring systems and edge details.

E. Upon request, a listing of at least five installations where products similar to these proposed for use have been installed and have been in service for a minimum period of three years. The list shall include owner or purchaser, address of installation, date of installation, contact person, and phone number.

F. A signed statement by an authorized official certifying that the surfacing system meets the requirements of ASTM F1292-18, section 15 for a head-first fall from the highest accessible portion of the specified playground equipment.

G. A signed statement from the manufacturer of the poured in place surfacing attesting that all materials under this section shall be installed only by the Manufacturer’s Trained Installers.

H. A Certificate of Insurance shall be provided by the Manufacturer for poured in place surfacing for use as playground safety surfacing, covering general and product liability, of not less than $1,000,000 for each occurrence, $2,000,000 general aggregate, with an excess/umbrella liability of $25,000,000. The issuing underwrite shall be AA rated.

I. IPEMA Certification mandatory

1.05 DELIVERY, STORAGE AND HANDLING:

A. Materials and equipment shall be delivered and stored in accordance with the manufacturer’s recommendations.

1.06 PROJECT SITE CONDITIONS:

A. Poured in Place surfacing must be installed on a dry sub-surface, with no prospect of rain within the initial drying period, and within the recommend temperature range of the manufacturer. Installation in weather condition of extreme heat, cold (less than 55°F), and/or high humidity may affect cure time, and the structural integrity of the final product. Immediate surrounding sites must be reasonably free of dust conditions or this could affect the final surface look.

1.07 SEQUENCING AND SCHEDULING:

A. Poured in Place surfacing shall be installed after all playground equipment, shade structures, signs and any other items that will be within the surfacing area. Coordinate with General Contractor.

B. Surface installation coordinated by manufacturer representative.

1.08 WARRANTY:

A. Poured in Place surface shall maintain required impact attenuation characteristics and be guaranteed against defects in workmanship AND material for a limited five-year period or as specified and agreed upon per alternate contract. Warranty will be specific to maintenance requirements and performance standards of completed product. Warranty is void if not installed by Manufacturers Trained and Certified Poured in Place Surfacing Installers.

1.09 TESTING:

A. NOTE: Critical Fall Height Four feet through [10] feet ([304.8] cm) have been tested in accordance with Section 15 – Critical Fall Height Test Procedure of ASTM F1292-18.

PART 2 – PRODUCTS

SAFETY SURFACING SHALL CONSIST OF BOTH RECYCLED AND SYNTHETIC MATERIALS MEETING THE REQUIREMENTS OF THIS SPECIFICATION.

2.01 PRODUCT SCOPE

A. Poured in Place Surface: The poured in place surface shall consist of recycled rubber mixed with a polyurethane binder, then capped with EPDM or TPV granules mixed with an aliphatic binder or aromatic binder.

B. It shall consist of a uniform material manufactured in such a way that the top portion meets the requirements specified herein for wear surface.

C. The type of safety surfacing shall be a poured-in-place system and shall be indicated on the drawings.

2.02 ATTENUATION CUSHION LAYER SECTION

A. Impact attenuation cushion layer consists of these materials; recycled styrene butadiene rubber (SBR) and/or cryogenic crumb rubber and/or pre consumer postindustrial reclaimed scrap rubber adhered with a 100% solids polyurethane binder to form a resilient porous material.

B. Strands of SBR may vary from 0.02 inch (0.5 mm) – 0.08 inch (2 mm) in thickness by 0.12 inch (3 mm) – 0.79 inch (20 mm) in length.

C. Chunk Premium Black Rubber Granules are 5/8” granules: This rubber is pre-consumer, post-industrial, reclaimed rubber, granulated through a 5/8” screen and contains less than 2% dust.

D. SBR Crumb Rubber (5-9 Mesh) using sieve analysis ASTM D5644 with a fiber content of .1% or less mixed in.

E. Binder shall be between 7-12% of the total weight of the material and shall provide 100 % coating of the particles.

F. The attenuation cushion layer shall be compatible with the wear course and must meet requirements herein for impact attenuation.

2.03 WEAR COURSE

A. The EPDM wear course shall consist of Ethylene Propylene Diene Monomer. The TPV wear course shall consist Thermal Plastic Vulcanized granules both shall be mixed with polyurethane binder formulated to produce an even, uniform, seamless surface. Installation of surfacing shall be seamless (unless otherwise agreed upon by owner).

B. EPDM or TPV shall be peroxide cured with a EPDM or TPV content of 26% and shall include a processing aid to prevent hardness with 26% poly content to maintain dynamic testing characteristics, weatherization and UV stability or TPV granules.

C. ASTM D2240 (Shore A) hardness of 55-65, not less than 26 percent rubber hydrocarbons.

D. Size of EPDM or TPV granules shall be 1-4mm across. Binder shall be not less than 20% of total weight of rubber used in the wear surface and shall provide 100% coating of the particles.

E. Thickness of wear course shall be a minimum .5” (0.5 inch (12.7 mm)).

F. The wear course shall be porous.

2.04 BINDER

A. No Toluene Diphenyl Isocyanate (TDI) shall be used.

B. No filler materials shall be used in urethane such as plasticizers and the catalyzing agent shall contain no heavy materials.

C. Weight of polyurethane shall be no less than 8.5 lbs. /gal (1.02 Kg/1) and no more than 9.5 lbs. /gal (1.14 Kg/1).

D. Manufacturer is permitted to modify the type of urethane required to match extreme weather conditions. Substitutions must be equal to or exceed original quality.

2.05 GT IMPAX ADVANTAGE INSERTS

A. Insert – Thermal Plastic Vulcanized angular granules with a (Shore A) hardness of 65° A ± 5 and particle size between .5-0.06 inch (1.5 mm) shall be used.

B. Thickness of the Insert shall be .5”

C. Insert shall be porous.

D. Aromatic or aliphatic urethane to be used as a binder.

E. Location –Insert to be installed under swings, swing bays, slide exits (unless otherwise noted in drawings). Customer to approve location of wear mat inserts.

F. Standard Color .5-1.5mm to be used. Colors include four standard colors: Terra Cotta Red, Blue, Green, and Beige.

G. Size: Swing bay use locations shall have TPV Inserts inclusive of all outside bay structure poles. Singular swings and slide exits shall be 4’x4’x.5” in thickness.

2.06 MATERIALS

A. Wear Course - EPDM or TPV Granules
   1. Manufacturers:
      a. Soflex Rubber and Urethane Sdn. Bhd.
      b. Nantong Hongfei Rubber Products Co. LTD
      c. Rosehill Polymers
   2. As Distributed by: GT Impax (800) 235-2440
   3. Location Used: Playground Area

B. Attenuation cushion layer – GT Impax Shredded and/or Chunk Rubber
   1. As Distributed BY: GT Impax (800) 235-2440
   2. Location Used: Playground Area

C. Binder – Aromatic VORAMER MR Products
   1. Manufacturer: DOW Chemical
   2. As Distributed By: GT Impax (800) 235-2440
   3. Location Used: Playground Area

D. Binder – Aromatic Urethane Stobielast® S 1020
   1. Manufacturer: Stockmeier Urethanes, USA, Inc.
   2. As Distributed By: GT Impax (800) 235-2440
   3. Location Used: Playground Area

E. Binder – Aliphatic Urethane Premium, Non-Ambering
   1. Manufacturer: Accella Polyurethane Systems
   2. As Distributed By: GT Impax (800) 235-2440
   3. Location Used:Playground Area

F. Chunk Premium Black Rubber Granules
   1. Manufacturer: American Recycling Center, Inc. (989) 725-5100 655 Wabassee Drive, Owosso, MI 48867
   2. As Distributed By: GT Impax (800) 235-2440
   3. Location Used: Playground Area

PART 3 – EXECUTION

3.01 SITE PREPARATION (OWNER OR OWNERS REPRESENTATIVE SHALL)

A. Finished Grade/Slope: Verify that finished elevations or adjacent areas are as indicated on the architectural or site plans, that the appropriate sub-grade elevation has been established for the safety surface to be installed, and that the subsurface has been installed per architectural, site or equipment plans while meeting accessibility and use zones requirements.

B. Aggregate Sub Base: Tolerance of aggregate sub-base shall be within .5" in depth. Verify that aggregate sub-base has been fully compacted. Per ADA Guidelines: compacted Aggregate sub-base – 4" of .75" minus irregular stone with fines compacted to 95% in 2" watered lifts.

C. Concrete Sub-Base: Tolerance of concrete or bituminous sub-base shall be with .125" (0.12 inch (3 mm)) in 10' (120.08 inch (3050 mm)). Per ADA Guidelines: Concrete a minimum of 3' – 4' at a minimum 2500 PSI. Concrete must cure for 7 days prior to application of attenuation cushion layer. Concrete must cure 21 days if wear course is to be applied directly to concrete surface. If poured in place surfacing is installed, verify that the concrete sub- base has cured (all areas appear white in color usually at 7 days) and that all concrete curing compounds and other deleterious substances that might adversely affect adhesion have been removed. Surface shall be clean and dry.

D. Asphalt Sub-Base: Asphalt cure time requires 21-28 days. Once the new asphalt has cured, it must be pressure washed prior to the surfacing being installed. The contractor shall be responsible for flooding the pad to ensure proper slope and tolerance. Any areas holding enough water to cover a flat nickel shall be patched prior to the arrival of our installation crews.

E. Drainage: Verify that sub-surfacing drainage, if required, has been installed to provide positive drainage.

3.02 INSTALLATION

A. Poured in Place Surfacing: Components of the poured in place surfacing shall be mixed on site in a rotating tumbler to ensure components are thoroughly mixed and are in accordance with manufactures recommendations. Installation of surfacing shall be seamless up to 2,000 sq feet (2.15285 sq cm) per day. Material shall cover all foundations and fill around all elements penetrating the surface.

B. Attenuation Cushion Layer: Whenever practical, attenuation cushion layer of surfacing material shall be installed in one continuous pour on the same day of up to 2,000 sq feet (2.15285 sq cm). When a second pour is required, step the seam (see detail) and fully coat the step of the previous work with polyurethane binder to ensure 100% bond with new work. Apply adhesive in small quantities so that new attenuation cushion layer can be placed before the adhesive dries.

C. Wear Course: Wear course must be quality peroxide cured EPDM granules or TPV granules. Wear surface shall be bonded to attenuation cushion layer. If necessary, additional primer will be used between the attenuation cushion layer and wear course. Apply adhesive to attenuation cushion layer in small quantities allowing the wear course to be applied before adhesive dries. Surface shall be hand troweled to a smooth, even finish. Expect continuous and seamless up to 2,000 sq feet (2.15285 sq cm) per day (contact sales representative for seamless in excess of 2,000 square feet). Where seams are required due to color change, size or adverse weather, a step configuration will be constructed to maintain wear course integrity. The edge of initial pour shall be coated with adhesive and wearing surface mixture shall be immediately applied. Pads with multiple seams are encouraged to include a topcoat of urethane before being placed into use. Butt joint seams are not acceptable except for repairs. Under special conditions and with Owners written approval seams may be permitted in same color pad. Consult with Manufacturer for specific applications.

D. Perimeter: For installations over existing concrete, the perimeter shall be saw cut to provide a keyway 1" deep x 1" wide, or formed during the pour, with surfacing rolled down into the void. Primer adhesive must be applied to all sides of the void. When connecting to a concrete curb or border, the inside vertical edge shall be primed with adhesive and the final 2" of the attenuation cushion layer shall be tapered to allow the wear surface material to be 1.5"– 2" thick where it joins the concrete.

E. Asphalt: When installing over new asphalt, a curb or other type of border is recommended around the entire pad to separate the new surface from other ground materials. Primer adhesive must be applied to the inside vertical edge of the border before poured in place surface installation.

F. Asphalt: When installing over existing asphalt, a keyway cut of 1" deep by 1" side for the poured in place to taper into and terminate with required ADA slope.

G. Thickness: Construction methods such as the use of measured screeds or guides shall be employed to ensure that the full depth of specified surfacing material is installed. Surfacing system thickness throughout the playground equipment use zone shall be as required to meet the impact attenuation requirements specified herein.

H. Clean Up: Manufacturer installers shall work to minimize excessive adhesive on adjacent surfaces or play equipment. Spills of excess adhesive shall be promptly cleaned.

I. Protection: The safety surface shall be allowed to fully cure in accordance with Manufacturer's instructions. The surface shall be protected by the owner from all traffic during the curing period of at a minimum of 48 hours or as instructed by the Manufacturer.

J. Manufacturer Services: For poured in place safety surfacing, a Manufacturer's representative who is experienced in the installation of playground safety surfacing shall be provided. The representative shall supervise the installation to ensure that the system meets the impact attenuation requirements as specified herein.

3.03 SITE AREA CLEANUP

A. The site shall be kept clean and free of tools, trash, and debris and installation materials daily. Products may be stored on site during installation with appropriate protective measures and approval by the Owner's representative.

END OF SECTION

9/1/2022

GT Events Specifications

General System Specifications:

The uprights shall be factory drilled to ensure accurate placement of components and ease of installation. Field drilling and measuring are not required. GT Events are direct bolt products NOT a clamp system. All uprights shall receive factory installed aluminum post caps and shall be shipped with a factory applied label indicating proper surfacing level.

All decks and components shall connect to support posts by means of a through-bolt connection for strong, durable connections. Deck/Collar attachments shall not be acceptable.

Manufacturer shall offer the following warranties on the materials and components of its system:

- LIFETIME LIMITED WARRANTY ON SUPPORT POSTS (UPRIGHTS)
- 15 YEAR LIMITED WARRANTY ON PUNCHED STEEL DECKS, PIPES, RAILS, LOOPS AND RUNGS
- 15 YEAR LIMITED WARRANTY ON ROTOMOLDED POLYETHYLENE COMPONENTS
- LIFETIME LIMITED WARRANTY ON POWERLOCK AND HARDWARE

Manufacturer shall be ISO 9001/2008 certified

Manufacturer shall show IPEMA certification of compliance for each component that the product conforms with the requirements of ASTM F1487-17

Motion

Solo Spinner
SOLO SPINNER WELD ASSEMBLY: Shall be an all welded assembly fabricated from 3 1/2" (4" O.D.) schedule 40 (.226" wall) galvanized steel pipe, 1/4" thick hot rolled steel, 3/16" hot rolled steel, and 3 1/2" O.D. 11 gauge (.120" wall) galvanized steel pipe. The Solo Spinner Weld Assembly shall be coated after fabrication with a custom formula of TGIC polyester powder coating in conformance with the specifications outlined herein.
HUB BEARING ASSEMBLY: The Hub Weld Assembly shall be an all welded assembly fabricated from machined 3" (.300" wall) black steel pipe and 1/4" thick hot rolled steel plate. Two heavy duty, permanently lubricated and sealed bearings shall be press fit into the Hub Weld Assembly. The Hub Bearing Assembly shall be coated after fabrication with a custom formula of TGIC polyester powder coating in conformance with the specifications outlined herein. SHAFT WELD ASSEMBLY: Shall be an all welded assembly fabricated from machined 2.0000" O.D. cold rolled steel, 1/4" hot rolled steel plate, and 11 gauge (.12") galvanized steel sheet. The Shaft Weld Assembly shall be coated after fabrication with a custom formula of TGIC polyester powder coating in conformance with the specifications outlined herein. X-POD STEP SURFACE AND POST TOPPER: Shall be molded EPDM with a 90 durometer. POWDER COAT FINISH: Shall be an electrostatically applied custom formula of TGIC polyester powder. All components will be free of sharp edges and excess weld spatter and shall be cleaned in a four stage solvent / zirconium based bath system (free of iron phosphate), as a rust inhibitor, and a zirconium conversion coating to prevent flash rusting before coating. In addition, all welds shall be protectively coated with ZRP, a zinc rich primer that forms a rust-resistant barrier layer over each weld prior to application of the powder coating. The powder coating shall have a super tough finish with maximum exterior durability and will have superior adhesion characteristics. Typical characteristics are: Two coat process to achieve 3.0 - 5.0 mil thickness and oven cured between 350 degrees Fahrenheit. Pencil Hardness H (ASTM D-3363), Impact (ASTM D-2794- 69), Wedge Bend (ASTM D-522-68), Adhesion (Cross Hatch ASTM D-3359 & Knife Scratch ASTM D-2197), Environmental (Stain Resistance ASTM D-1308, Humidity ASTM D-2247 - 87, Salt Spray ASTM B-117 & Fadeometer 300 hours with no loss of gloss), Over-bake Stability 100% at 350 degrees Fahrenheit for 10 minutes. HARDWARE: All nuts, bolts, screws, inserts, and lock washers used in the assembly of all play equipment, shall be stainless steel, yellow dichromate plated steel, blue-coat plated steel, mechanically galvanized or powder coated/yellow dichromate plated steel. All primary fasteners shall be 300 series stainless steel. Fasteners with yellow dichromate treatment have an electro deposited, 99.9% pure zinc substrate applied from a specially formulated solution sealed with a yellow dichromate top coat designed to work in conjunction with the zinc plating. Yellow dichromate has a 320% longer life to white corrosion and 275% longer

to red corrosion than does hot-dip galvanizing. NOTE: All weights are based on average comparisons of each part.
SPECIFICATIONS: GAMETIME® has a policy of continuous improvement and reserves the right to discontinue or change specifications without notice

Symphony

HARMONIC CHIMES
HARMONIC CHIMES :
Each chime is made with heavy duty, anodized aluminum. Each instrument is supplied with four durable mallets with coated steel cables.
SPECIFICATIONS: GAMETIME® has a policy of continuous improvement and reserves the right to discontinue or change specifications without notice.

CONCERT DUO
CONCERT DUO FRONT HDPE PANEL AND CONCERT DUO BACK HDPE PANEL: Shall be 3/4" thick high-density polyethylene.

CONCERT DUO 12 AND CONCERT DUO 15: Shall be constructed of 12" plastic pipe, 15" plastic pipe, and molded plastic lid.

CONCERT DUO SUPPORT ASSEMBLY: Shall be an all welded construction fabricated from 3-1/2" O.D. X .095" (13 gauge) wall galvanized steel tubing and 1/4" thick laser cut steel. The Concert Duo Support Assembly shall be coated after fabrication with a custom formula of TGIC polyester powder coating in conformance with specifications outlined herein.

CONCERT DUO CURVED SUPPORT ASSEMBLY:
Shall be an all welded construction fabricated from 3-1/2" O.D. X .095" (13 gauge) wall galvanized steel tubing and 1/4" thick laser cut steel. The Concert Duo Curved Support Assembly shall be coated after fabrication with a custom formula of TGIC polyester powder coating in conformance with specifications outlined herein.

SPACER WITH INSERTS: Shall be fabricated from 1-5/16" O.D. x .083" (14 gauge) wall galvanized steel tubing and 1.120" threaded insert. The Spacer shall be coated after fabrication with a custom formula of TGIC polyester powder coating in conformance with specifications outlined herein.

POWDER COAT FINISH: Shall be an electrostatically applied custom formula of TGIC polyester powder. All components will be free of sharp edges and excess weld spatter and shall be cleaned in a four stage solvent / zirconium based bath system (free of iron phosphate), as a rust inhibitor, and a zirconium conversion coating to prevent flash rusting before coating. In addition, all welds shall be protectively coated with ZRP, a zinc rich primer that forms a rust-resistant barrier layer over each weld prior to application of the powder coating. The powder coating shall have a super tough finish with maximum exterior durability and will have superior adhesion characteristics. Typical characteristics are: Two coat process to achieve 3.0 - 5.0 mil thickness and oven cured between 350 degrees Fahrenheit. Pencil Hardness H (ASTM D-3363), Impact (ASTM D-2794- 69), Wedge Bend (ASTM D-522-68), Adhesion (Cross Hatch ASTM D-3359 & Knife Scratch ASTM D-2197), Environmental (Stain Resistance ASTM D-1308, Humidity ASTM D-2247 - 87, Salt Spray ASTM B-117 & Fadeometer 300 hours with no loss of gloss), Over-bake Stability 100% at 350 degrees Fahrenheit for 10 minutes.

HARDWARE: All nuts, bolts, screws, inserts, and lock washers used in the assembly of all play equipment, shall be stainless steel, yellow dichromate plated steel, blue-coat plated steel, mechanically galvanized or powder coated/yellow dichromate plated steel. All primary fasteners shall be 300 series stainless steel. Fasteners with yellow dichromate treatment have an electro deposited, 99.9% pure zinc substrate applied from a specially formulated solution sealed with a yellow dichromate top coat designed to work in conjunction with the zinc plating. Yellow dichromate has a 320% longer life to white corrosion and 275% longer to red corrosion than does hot-dip galvanizing. NOTE: All weights are based on average comparisons of each part.

SPECIFICATIONS: GAMETIME® has a policy of continuous improvement and reserves the right to discontinue or change specifications without notice.

PrimeTime Specifications

General System Specifications:

PrimeTime® features 3 1/2" O.D. uprights with a positive bolt-through fastening system utilizing stainless steel tabs. The uprights shall be factory drilled to ensure accurate placement of components and ease of installation. Field drilling and measuring are not required. PrimeTime is a direct bolt system NOT a clamp system. All uprights shall receive factory installed aluminum post caps and shall be shipped with a factory applied label indicating proper surfacing level.

All decks and components shall connect to support posts by means of a through-bolt connection for strong, durable connections. Deck/Collar attachments shall not be acceptable. All climbing attachments shall include a 15"" wide deck entry archway to control deck access to one child at a time and help prevent inadvertent falls.

Manufacturer shall offer the following warranties on the materials and components of its system:

- LIFETIME LIMITED WARRANTY ON SUPPORT POSTS (UPRIGHTS)
- 15 YEAR LIMITED WARRANTY ON PUNCHED STEEL DECKS, PIPES, RAILS, LOOPS AND RUNGS
- 15 YEAR LIMITED WARRANTY ON ROTOMOLDED POLYETHYLENE COMPONENTS
- LIFETIME LIMITED WARRANTY ON HARDWARE

Manufacturer shall be ISO 9001:2008 certified

Manufacturer shall show IPEMA certification of compliance for each component that the product conforms with the requirements of ASTM F1487-17.

General Specifications of Materials:

HARDWARE
All nuts, bolts, screws, inserts, and lock washers used in the assembly of all play equipment shall be stainless steel, yellow dichromate plated steel, blue-coat plated steel, mechanically galvanized or powder coated/yellow dichromate plated steel. All primary fasteners shall be 304 alloy stainless steel. Fasteners with yellow dichromate treatment have an electro-deposited, 99.9% pure zinc substrate applied from a specially formulated solution sealed with a yellow dichromate top coat designed to work in conjunction with the zinc plating. Yellow dichromate has a 320% longer life to white corrosion and 275% longer to red corrosion than does hot-dip galvanizing. All primary stainless steel fasteners shall be Button Head Socket Caps.

GALVANNEAL COATING
All Galvaneal coating shall meet or exceed the specifications of ASTM A-6530-CQ.

POWDER COAT FINISH
Shall be an electrostatically applied custom formula of TGIC polyester powder. All components will be free of sharp edges and excess weld spatter and shall be cleaned in a four stage solvent / zirconium based bath system (free of iron phosphate), as a rust inhibitor, and a zirconium conversion coating to prevent flash rusting before coating. In addition, all welds shall be protectively coated with ZRP, a zinc rich primer that forms a rust-resistant barrier layer over each weld prior to application of the powder coating. The powder coating shall have a super tough finish with maximum exterior durability and will have superior adhesion characteristics. Typical characteristics are: Two coat process to achieve 3.0 - 5.0 mil thickness and oven cured between 350 degrees Fahrenheit. Pencil Hardness H (ASTM D-3363), Impact (ASTM D-2794- 69), Wedge Bend (ASTM D-522-68), Adhesion (Cross Hatch ASTM D-3359 & Knife Scratch ASTM D-2197), Environmental (Stain Resistance ASTM D-1308, Humidity ASTM D-2247 - 87, Salt Spray ASTM B-117 & Fadeometer 300 hours with no loss of gloss), Over-bake Stability 100% at 350 degrees Fahrenheit for 10 minutes.

ROTATIONALLY MOLDED PRODUCTS
All polyethylene shall be linear low-density material with UV-stabilized color and an anti-static compound additive. All rotationally molded products shall meet or exceed the following specifications: ASTM D-1248, type 2, class A and Federal specification LP-390C, type 1, class M, grade 2, category 3; Density (ASTM D- 1505); Brittleness Temperature (ASTM D-746); Tensile Values (ASTM D-638); Flexural Modulus (ASTM D-790);Heat Distortion (ASTM-648); Low Temperature Impact (ARM-STD).

STEEL TUBING
All tubing used to manufacture components shall be an electrical resistance welded, cold rolled, high strength steel tubing. The exterior coating will consist of an in line hot-dipped uniform zinc galvanizing, chromate conversion, and acrylic over-coating. The interior coating will consist of a special organic acrylic modified polyester.

ENTRY WAY
Entry Way shall be fabricated from 1-5/16" O.D. x .083" (14 gauge) wall galvanized steel tubing with 3/16" hot rolled steel formed and stamped mounting tabs. The Entry Way shall be an all welded assembly and shall be coated with a custom formula of TGIC polyester powder, after fabrication in conformance with the specifications outlined herein.

Uprights and Upright Accessories:

BOLT-THROUGH CONNECTION
Each PrimeTime/TotTime component is bolted directly into the upright post and designed to eliminate exposed hardware and protrusions. Minimum tensile strength of the connection shall be 45,000 psi, minimum yield strength shall be 22,000 psi. All necessary connectors shall be engineered, manufactured and factory installed as an integral part of the upright post. For added protection against corrosion, cold galvanizing shall be applied to the edges of each drilled hole.

UPRIGHTS
All upright posts shall have a finished grade line marking to indicate the correct playground safety surface level. All upright posts shall be coated with a custom formula TGIC polyester powder coating in conformance with the specifications outlined herein.

UPRIGHTS - ALUMINUM
Shall be 3.5" outside diameter tubing, 1/8" wall thickness, extruded from 6005-T5 aluminum alloy conforming to ASTM-B-221. Minimum yield strength shall be 35,000 psi and minimum tensile strength shall be 38,000 psi. All upright posts shall have a finished grade line marking to indicate the correct playground safety surface level. All upright posts shall be coated with a custom formula TGIC polyester powder coating in conformance with the specifications outlined herein.

UPRIGHT CAPS
The standard upright cap shall be an aluminum cap, cast from a 383 alloy, powder coated to match the upright. Every upright cap shall be anodized for maximum protection. All upright caps are permanently installed at the factory using aluminum self-sealing rivets.

Punched Steel & Coated Components:

PUNCHED STEEL DECKS
Punched steel decks shall be fabricated from 12 gauge punched steel with a protective P&O finish and other punched steel products shall be fabricated from 11 gauge punched steel with a protective P&O finish. Coated products shall consist of a welded assembly with an oven cured matte finish polyvinyl chloride (PVC) coating with a minimum coating thickness of .080". The PVC coating shall have a hardness of Shore A 83 +/-5 normal durometer range. This material is classed as "Self Extinguishing", meets or

exceeds automotive specifications NVSS302, and contains ultraviolet inhibitors to help prolong the life of the coating. The PVC coating shall contain phthalate levels in concentrations of 1/10 of 1% or lower. For ADA Ramp Accessible decks and ramps, the hole shall measure 1/4" diameter after coating. For standard decks and ramps, the hole size shall measure 1-1/4" diameter after coating.

DECKS - SQUARE
Shall have a minimum surface area of 1,286 square inches, maintaining a full 36" center to center spacing on the upright posts. The 36" square deck shall be fabricated from punched steel in conformance with the specifications outlined herein. The deck frame shall be fabricated from 3/16" x 2-1/2" hot rolled steel with corner supports fabricated from 1/4" x 2-1/2" hot rolled steel. Intermediate supports, fabricated from 1/8" x 1" hot rolled steel, shall be notched and welded at the intersections forming a support grid underneath the entire deck surface. The deck shall be a one-piece welded assembly, coated after fabrication with an oven cured matte finish polyvinyl chloride (PVC) coating in accordance with the specifications herein. Each square deck shall be directly bolted to the upright posts with four 3/8" diameter button head cap screws in accordance with the hardware specifications herein.

DECKS - TRIANGULAR
Shall have a minimum surface area of 556 square inches, maintaining a full 36" center to center spacing on the upright posts. The 36" triangular deck shall be fabricated from punched steel in conformance with the specifications outlined herein. The deck frame shall be fabricated from 3/16" x 2-1/2" hot rolled steel with corner supports fabricated from 1/4" x 2-1/2" hot rolled steel. Intermediate supports, fabricated from 1/8" x 1" hot rolled steel, shall be welded at the intersections forming a support grid underneath the deck surface. The deck shall be a one-piece welded assembly, coated after fabrication with an oven cured matte finish polyvinyl chloride (PVC) coating in accordance with the specifications herein. Each triangular deck shall be directly bolted to the upright posts with three 3/8" diameter button head cap screws in accordance with the hardware specifications herein.

ACCESSIBLE STEP ATTACHMENT
The accessible step attachment shall be a one piece weld assembly made from 11 Ga. punched steel in conformance with the specifications outlined herein. The accessible step shall have a decent of 8" or less, as specified by the Americans with Disabilities Act (ADA). The accessible step shall be finished with a matte PVC coating per the plastisol coating specifications herein. A steel handhold shall be provided on both sides of the step. The handholds shall be bolted directly to the uprights on each side of the step. Handholds shall be fabricated from 1-5/16" O.D. x .083" (14 gauge) wall galvanized steel tubing, with supports fabricated from 1-1/16" O.D. x 15 gauge (.075" thick) galvanized steel tubing. Each handrail shall be a one-piece welded assembly and shall be coated with a custom formula of TGIC polyester powder after fabrication in conformance with the specifications outlined herein.

TRANSFER PLATFORM
The Platform and Steps shall each be made from 11 gauge punched steel with a protective P&O finish in conformance with the specifications outlined herein. The Platform and Steps shall each be a one-piece welded assembly finished with the matte PVC coating per the specifications herein. The steps shall have a minimum of 355 square inches of area per step and shall descend in increments of 8" or less, as specified by the Americans with Disabilities Act (ADA). Handrails and attachment rails shall be fabricated from 1-5/16" O.D. x .083" (14 gauge) wall galvanized steel tubing, with supports fabricated from 1-1/16" O.D. x 15 gauge (.075" thick) galvanized steel tubing and 2" square x 3/16" wall steel tubing. Platform support shall be fabricated from 5" O.D tubing with a 3/16" hot rolled flat steel flange. Handholds, attachment rails and platform supports shall be all-welded assemblies and shall be coated with a custom formula of TGIC polyester powder in conformance with the specifications outlined herein, after fabrication.

Roofs and Arches:

UMBRA ROOF SQUARE
Umbra Roof Square: Shall be rotational molded parts from polyethylene. Polyethylene shall be linear low-density material with UV-stabilized color and an anti-static compound additive. Rotationally molded products shall meet or exceed the following specifications: ASTM D-1248, type 2, class A and Federal specification LP-390C, type 1, class M, grade 2, category 3; Density (ASTM D-1505); Brittleness Temperature (ASTM D-746); Tensile Values (ASTM D-638); Flexural Modulus (ASTM D-790);Heat Distortion

(ASTM-648); Low Temperature Impact (ARM-STD).HARDWARE: All nuts, bolts, screws, inserts, and lock washers used in the assembly of all play equipment, shall be stainless steel, yellow dichromate plated steel, blue-coat plated steel, mechanically galvanized or powder coated/yellow dichromate plated steel. All primary fasteners shall be 300 series stainless steel. Fasteners with yellow dichromate treatment have an electro deposited, 99.9% pure zinc substrate applied from a specially formulated solution sealed with a yellow dichromate top coat designed to work in conjunction with the zinc plating. Yellow dichromate has a 320% longer life to white corrosion and 275% longer to red corrosion than does hot-dip galvanizing. NOTE: All weights are based on average comparisons of each part NOTE: All weights are based on average comparisons of each part. SPECIFICATIONS: GAMETIME has a policy of continuous improvements and reserves the right to discontinue or change specifications without notice.

UMBRA ROOF PLUG

Umbra Roof Plug: Shall be rotational molded parts from polyethylene. Polyethylene shall be linear low-density material with UV-stabilized color and an anti-static compound additive. Rotationally molded products shall meet or exceed the following specifications: ASTM D-1248, type 2, class A and Federal specification LP-390C, type 1, class M, grade 2, category 3; Density (ASTM D-1505); Brittleness Temperature (ASTM D-746); Tensile Values (ASTM D-638); Flexural Modulus (ASTM D-790);Heat Distortion (ASTM-648); Low Temperature Impact (ARM-STD).HARDWARE: All nuts, bolts, screws, inserts, and lock washers used in the assembly of all play equipment, shall be stainless steel, yellow dichromate plated steel, blue-coat plated steel, mechanically galvanized or powder coated/yellow dichromate plated steel. All primary fasteners shall be 300 series stainless steel. Fasteners with yellow dichromate treatment have an electro deposited, 99.9% pure zinc substrate applied from a specially formulated solution sealed with a yellow dichromate top coat designed to work in conjunction with the zinc plating. Yellow dichromate has a 320% longer life to white corrosion and 275% longer to red corrosion than does hot-dip galvanizing. NOTE: All weights are based on average comparisons of each part NOTE: All weights are based on average comparisons of each part. SPECIFICATIONS: GAMETIME has a policy of continuous improvements and reserves the right to discontinue or change specifications without notice.

Climbers:

COSMIX CLIMBER

This one-piece climber shall be color impregnated linear low density polyethylene with UV-stabilized color and an anti-static compound additives. The climber shall have a nominal wall thickness of 1/4" and utilizes "holes" to allow the user to ascend and descend at their level of ability. The Footbucks shall be all welded construction of SCH. 40 1 7/8" O.D. galvanized steel pipe with a 1/8" X 1" X 1 13/16" flat stainless steel tab and shall be coated with a custom formula of TGIC polyester powder in conformance with the specifications outlined herein, after fabrication. The Cosmix Climber shall include an offset entry archway in accordance with the specifications herein and shall be bolted up singularly to a platform.

RIDGE CLIMBER

The Ridge Climber shall be constructed from impregnated linear low density polyethylene and shall conform to the rotationally molded specifications outlined herein. D rings shall be fabricated from 1-5/16" O.D. x .083" (14 gauge) wall galvanized steel tubing with vertical members fabricated of 1-1/16" O.D. x .075" (15 gauge) wall galvanized steel tubing and 3/16" hot rolled steel formed and stamped mounting tabs. The d rings shall be all welded assemblies. The mounting bracket shall be fabricated of 1/4" x 1" hot rolled steel. The foot buck shall be fabricated from 1 5/16" O.D. x .083" (14 gauge) wall galvanized steel tubing. The mounting bracket, d rings, and foot buck assemblies shall be coated with a custom formula of TGIC polyester powder, after fabrication in conformance with the specifications outlined herein

RIVER ROCK CLIMBER

The River Rock climber utilizes "rock formations" and "natural rock shaped handholds" to allow the user to ascend and descend at their level of ability. This climber can be mounted in two orientations with respect to the specific deck height (please refer installation document). Underside of the climber is provided with additional play activity where users can discover and learn about animals in river rock habitat. River Rock Climber shall be rotationally molded linear low-density polyethylene material and shall conform to the rotationally molded specifications outlined herein. The mounting bracket shall be fabricated of 1/4" x 1" hot rolled steel. All foot bucks shall be fabricated with 1.315" O.D. X 0.083in. (14 gauge) wall galvanized steel tubing. The mounting bracket, enclosure, and

foot buck assemblies shall be coated with a custom formula of TGIC polyester powder, after fabrication in conformance with the specifications outlined herein.

Panels:

TIC-TAC-TOE ENCLOSURE
The cap and game pieces shall be constructed from color impregnated rotationally molded linear low density polyethylene with the "X" & "O" graphics rotationally molded into the material. The rungs shall be fabricated of 1-1/16" O.D. x .075" (15 gauge) wall galvanized steel tubing. The game pieces are also imprinted in Braille for use by those with impaired vision. All rotationally molded polyethylene products shall conform to the rotationally molded specifications outlined herein. Enclosure frame shall be fabricated from 1-5/16" O.D. x .083"(14 gauge) wall galvanized steel tubing and 3/16" formed hot rolled steel tabs. Enclosure shall be an all welded assembly and shall be coated with a custom formula of TGIC polyester powder coating in conformance with the specifications outlined herein, after fabrication.

BONGOS
The Bongos are molded from a color impregnated linear low density polyethylene and shall conform to the rotationally molded specifications outlined herein.

STOREFRONT PANEL (2.08)
The storefront panel shall be fabricated from 14 gauge (.083) Galvaneal steel. The storefront panel frame shall be fabricated from 1" LW (1.315" OD) galvanized steel tubing. The shelf of the panel shall be fabricated from 1" x 3" (14 gauge/.083" wall) hot rolled rectangular steel tubing. The storefront panel shall be an all welded assembly powder coated after fabrication with a custom formula of TGIC polyester in conformance with the specifications outlined herein.

STEERING WHEEL
The plastic steering wheel shall be molded of a durable proprietary plastic. The steering wheel will withstand an impact of over 250 foot-pounds. The steering wheel is approximately 13-3/4" in diameter.

SINGLE GIZMO PANEL
SINGLE GIZMO PANEL
The Single Gizmo panel shall be 3" (bottom) and 4 7/16" (top) thick, color impregnated linear low density polyethylene and shall conform to the rotationally molded specifications outlined herein. Gizmo's shall conform to the Gizmo specifications outlined herein.

RUNG ENCLOSURE
The rung enclosure shall be fabricated of 1-5/16" O.D. x .083" (14 gauge) wall galvanized steel tubing. The vertical rungs shall be fabricated of 1-1/16" O.D. x .075" (15 gauge) wall galvanized steel tubing. The rung enclosure shall be an all welded assembly and shall be coated with a custom formula of TGIC polyester powder coating in conformance with the specifications outlined herein, after fabrication.

LETTER MAZE
LETTER MAZE - Panel shall be color-impregnated linear low density polyethylene and shall conform to the rotationally molded specifications outlined herein. HDPE in 30" diameter opening of the panel shall be made from 1/2" thick (solid) high density, UV-stabilized and color impregnated polyethylene.

Slides:

ZIP SLIDES (SINGLE & DOUBLE BEDWAY, AND RUMBLE & ROLL)
Zip Slides and hoods shall be color impregnated linear low-density polyethylene and shall conform to the rotationally molded specifications outlined herein with double wall construction molded to a minimum .25" wall thickness. Single bedway Zip Slides shall have a minimum inside bed width of 17.5" while double bedway Zip Slides shall have a minimum inside bed width of 16.5" on each bedway. Outside rails are at least 7" high when measured from the centerline of the bedway surface. The angle of descent shall be no greater than 50°. Each Zip Slide works in conjunction with a rotationally molded hood that has an integrated cross bar which force users to a seated position. The exit section of the bedway shall have a minimum 40" radius for a smooth transition from the slide chute to the run-out area. The run-out shall be angled at a maximum of 4° with an integrated drain at 5° to reduce pooling of water. Zip Slides bolt directly to the deck and to the slide hood.

Bernhard

Bernhard TME, LLC ▪ Engineering Division

ADDENDUM #03

Tuscaloosa County Public Building Authority
Tuscaloosa County Department of Human Resources
Tuscaloosa, AL

Bernhard TME Project No. 12-22-0010
Client Project No. ABHM220021

October 11, 2024

Specifications:

1. Refer to Section 220410 Plumbing Piping, Part 2, Paragraph 2.2 Sanitary Waste and Vent Piping, Above Slab on Grade:

   A. **ADD** Subparagraph B Cast Iron Pipe in its entirety.

2. Refer to Section 230725 Modular Indoor Air Handling Units:

   A. **REPLACE** in its entirety with revised section Custom indoor Air Handling Units.

3. Refer to Section 230054 Variable Frequency Drives:

   A. **ADD** section in its entirety.

Drawings:

1. Refer to Sheet P0.01 – LEGENDS, NOTES AND SCHEDULES - PLUMBING

   A. **ADDED** specifications to JC-1 in Plumbing Fixture Connection Schedule.

2. Refer to Sheet P4.01 – PARTIAL FLOOR PLANS - PLUMBING

   A. **REVISED** LAV-2 to LAV-1 in Family Restroom 194.
   B. **REVISED** LAV-2 to LAV-1 in Laundry/Restroom 1100.

3. Refer to Sheet M0.01 – SCHEDULES AND LEGEND – HVAC

   A. **REVISED** AHU Schedule.
   B. **ADDED** Variable Frequency Drive Schedule.

4. Refer to Sheet M4.01 – ENLARGED FLOOR PLANS – HVAC

A. **ADDED** remote VFD to Mechanical Room.

End of Addendum #03

MATCHLINE - SHEET L5.02

(40) LIR SBL
(1,499 sf) CYN TI3
(2) PIS CHI
(2) ILE NEE
(10) ROS CRL
11 L6.00 PIP PLAYGROUND SURFACE
10 L6.00 FENCE AND GATE
9 L6.00 6 INCH CONCRETE CURB
SEE L6.01 FOR PLAYGROUND ENLARGEMENT
6' WIDE GATE
(688 sf) CYN TI3
(108) MUH CAP
SEE ELECTRICAL DRAWINGS FOR PARKING LOT LIGHTS
(27) ROS CRL
(135) MUH CAP
(43) MUH CAP
(5) ULM PRI
(4) ILE SHA
(32) ROS CRL
(4,202 sf) CYN TI3
(27) ILE NEE
(224) LIR SBL
(59) MUH CAP
MATCHLINE - SHEET L5.04
MATCHLINE - SHEET L5.06
(9) ILE NEE
(1) PIS CHI
(36) MUH CAP
(627 sf) CYN TI3
(10) ROS CRL
(27) ILE CRS
(685 sf) CYN TI3
(6) ILE LIB
(14) ROS CRL
(12) ILE NAN
MATCHLINE - SHEET L5.07
EXST. TREES TO REMAIN ALONG PROPERTY EDGE WHERE POSSIBLE.
SEE CIVIL DRAWINGS FOR PERMANENT SEED/SOD IN THIS AREA

PLANT SCHEDULE

CODE	BOTANICAL NAME	COMMON NAME
TREES		
ILE LIB	ILEX X 'CONTY'	LIBERTY™ HOLLY
ILE EM2	ILEX X 'EMILY BRUNER'	EMILY BRUNER HOLLY
LAG WHI	LAGERSTROEMIA INDICA X FAURIEI 'NATCHEZ'	NATCHEZ CRAPE MYRTLE MULTI-TRUNK
LIR EMC	LIRIODENDRON TULIPIFERA 'JFS-OZ'	EMERALD CITY® TULIP POPLAR
PIS CHI	PISTACIA CHINENSIS	CHINESE PISTACHE
QOU NUT	QUERCUS NUTTALLII	NUTTALL OAK
ULM PRI	ULMUS AMERICANA 'PRINCETON'	PRINCETON AMERICAN ELM
SHRUBS		
GAR FRO	GARDENIA JASMINOIDES 'FROSTPROOF'	FROSTPROOF GARDENIA
ILE CRS	ILEX CORNUTA 'CARISSA'	CARISSA CHINESE HOLLY
ILE NEE	ILEX CORNUTA 'NEEDLEPOINT'	NEEDLEPOINT CHINESE HOLLY
ILE SHA	ILEX GLABRA 'SHAMROCK'	SHAMROCK INKBERRY HOLLY
ILE NAN	ILEX VOMITORIA 'NANA'	DWARF YAUPON HOLLY
ROS CRL	ROSA X 'CORAL DRIFT'	CORAL DRIFT ROSE
SHRUB AREAS		
MUH CAP	MUHLENBERGIA CAPILLARIS	WHITE AND PINK MUHLY GRASS
GROUND COVERS		
CYN TI3	CYNODON DACTYLON 'TIF 419'	TIF 419 BERMUDA GRASS
LIR SBL	LIRIOPE MUSCARI 'SUPER BLUE'	SUPER BLUE LILYTURF
MULCH	PINE STRAW MULCH	PINE STRAW MULCH

NOTES

1. CONTRACTOR SHALL HAND WATER ALL PLANT MATERIAL AND SOD DURING CONSTRUCTION UNTIL SUBSTANTIAL COMPLETION HAS BEEN ACHIEVED.
2. CONTRACTOR IS TO PROVIDE ALL TREES WITH SLOW RELEASE WATER BAGS. WATER BAGS ARE TO BE CONSISTENTLY FILLED DURING CONSTRUCTION SO THAT THE TREES WILL HAVE WATER AT ALL TIMES. AT THE TIME OF SUBSTANTIAL COMPLETION, CONTRACTOR IS TO MEET ON SITE WITH OWNER OR OWNER'S MAINTENANCE REPRESENTATIVE TO REVIEW THE INSTRUCTIONS AND THE SCHEDULING OF REFILLING THE BAGS. CONTRACTOR SHALL REFILL ALL BAGS AT THE TIME OF SUBSTANTIAL COMPLETION.
3. ALL DISTURBED AREAS NOT COVERED BY PLANT MATERIAL OR SOD ARE TO BE SEEDED ACCORDING TO CIVIL DRAWINGS. SEE C-DRAWINGS FOR MORE INFORMATION.

SITE FURNISHINGS:

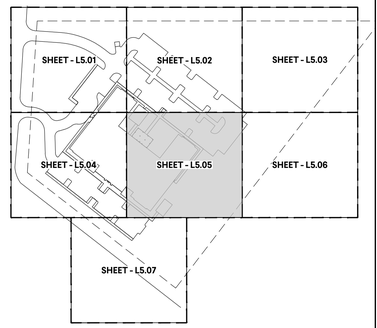
(3) PETOSKEY TRASH RECEPTACLES BY LANDSCAPE FORMS OR APPROVED EQUAL. 1 TO BE PLACED AT FRONT DOOR, 1 AT SIDE DOOR AND 1 ON THE BACK PATIO.

(4) LARCHMONT PICNIC TABLES BY COUNTRY CASUAL OR APPROVED EQUAL. ALL FOUR TABLES ARE TO BE LOCATED ON THE BACK PATIO.

(2) 6' LONG WELLSPRING BENCHES BY LANDSCAPE FORMS OR APPROVED EQUAL. BOTH BENCHES ARE TO BE LOCATED ON THE BACK PATIO.

SEE 02870 SITE FURNISHING SPECIFICATION FOR DETAILS. ALL SITE FURNISHING LOCATIONS TO BE APPROVED BY OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION.

KEY:



NORTH

SCALE: 1 IN = 10 FT

GMC
2400 5th Ave S, Suite 200
Birmingham, AL 35233
T 205.879.4462
GMCNETWORK.COM

ISSUE | DATE
BID SET 09.09.2024
ADDENDUM 03 10/11/2024

DRAWN BY: —
CHECKED BY: —

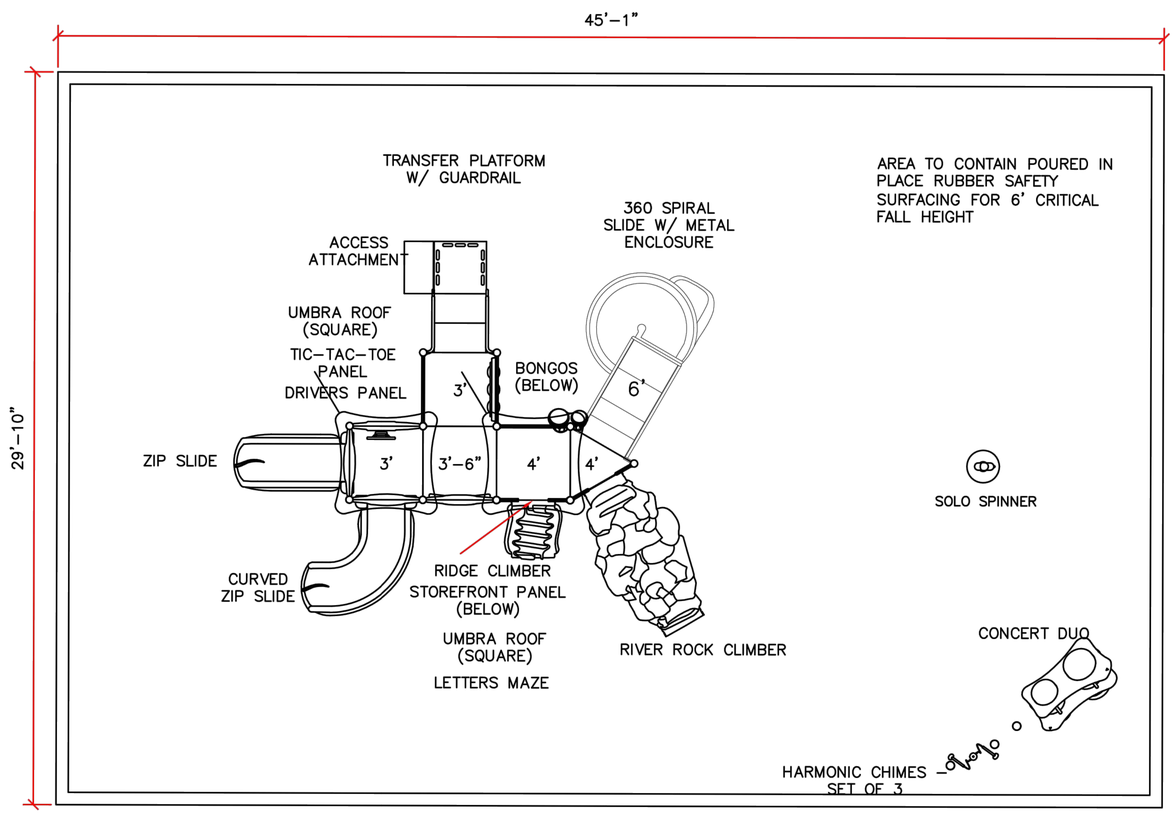
TUSCALOOSA DHR
TUSCALOOSA, AL

GMC Project #: LBHM220019

STATE OF ALABAMA
PATRICK ELIAS RITCHEY
Number 955
LICENSED LANDSCAPE ARCHITECT

LANDSCAPE PLAN

L5.05



PLAYGROUND NOTES:

1. PLAYGROUND TO BE FROM STRUTHER'S RECREATION AS BASIS OF DESIGN.
2. CONTRACTOR TO COORDINATE WITH KIGHT JONES +1(205) 296-2622 FOR PLAYGROUND COMPONENTS.

STRUTHERS RECREATION
PO Box 1178
Pelham. AL 35124
p. 205.663.5058
t. 800.221.8869
f. 205.663.5012
www.struthersrecreation.com

Proposed Playground
Tuscaloosa County DHR

Project Manager:
Kight Jones

This play equipment is recommended for children ages
2-5 or 5-12

Minimum Area Required:
45' x 32'

Scale: NTS

This drawing can be scaled only when in an 8 1/2" x 11" format

IMPORTANT: Soft resilient surfacing should be placed in the use zones of all equipment, as specified for each type of equipment, and at depths to meet the critical fall heights as specified by the U.S. consumer Product Safety Commission, ASTM standard F 1487 and Canadian Standard CAN/CSA-Z-614

Drawn By: S. Perry
Date: 08.25.22
Drawing Name: 103055 - A1.1

GMC
2400 5th Ave S. Suite 200
Birmingham, AL 35233
T 205.879.4462
GMCNETWORK.COM

ISSUE | DATE
BID SET | 09.09.2024
ADDENDUM 03 | 10/10/2024
DRAWN BY: —
CHECKED BY: —

TUSCALOOSA DHR
TUSCALOOSA, AL

GMC Project #: LBHM220019

STATE OF ALABAMA
PATRICK ELIAS RITCHEY
REGISTERED LANDSCAPE ARCHITECT
NUMBER 955

1

PLAYGROUND ENLARGEMENT

L6.01

AIR DIRT SEPARATOR SCHEDULE

MARK	SYSTEM	TYPE	MAX FLOW (GPM)	MAX PRESSURE DROP (PSIG)	MAX VELOCITY (FPS)	MINIMUM FLANGE SIZE	ACCESSORIES	BASIS OF DESIGN (ARMSTRONG)
ADS-CH	CHILLED WATER SYSTEM	[A]	191	1.0 PSIG	6 FPS	4"	[1] [2] [3] [4] [5]	DAS-4-R

TYPE:

[A] STANDARD VELOCITY UNIT

NOTE:

1. UNIT SHALL BE ASME RATED (125 PSI)
2. REMOVE 99% DISOLVED OXYGEN AND 100% OF ENTRAINED AIR AFTER 10 PASSES

ACCESSORIES:

[1] BLOW DOWN WITH BRONZE BALL VALVE (STAINLESS STEEL BALL)

[2] SKIM VALVE WITH BRONZE BALL VALVE (STAINLESS STEEL BALL)

[3] STAINLESS STEEL COALESCING MEDIA

[4] HIGH CAPACITY AUTOMATIC AIR VENT

[5] REMOVABLE BOTTOM HEAD

FAN SCHEDULE

MARK	SERVES	LOCATION	TYPE	CFM	E.S.P. IN. W.G.	LIMIT	MOTOR HP	MOTOR V/Ø	ACCESSORIES	INTERLOCK	BASIS OF DESIGN (GREENHECK)
EF-1	SEE PLANS	CORRIDOR	A	2850	0.8	13.9 SONES	1.0	115/1	[1] [2] [3] [4] [5] [6] [7] [8] [9]	AHU-1/BAS	SQ-160-VG

FAN TYPES:

[A] INLINE CENTRIFUGAL EXHAUST FAN, DIRECT DRIVE

FAN ACCESSORIES:

[1] BACKDRAFT DAMPER

[2] FLEXIBLE CONNECTORS

[3] SPRING ISOLATORS

[4] MOTOR SIDE GUARD

[5] BEARING WITH GREASE FITTING

[6] THERMAL OVERLOAD PROTECTION

[7] PREWIRED DISCONNECT SWITCH

[8] ECM MOTOR WITH UNIT MOUNTED CONTROLLER (VARI-GREEN)

[9] ACOUSTICAL HOUSING

FAN SCHEDULE NOTES:

1. LIMIT = DESIGN CRITERIA: MAX. SONES

ONE LINE PIPE SYMBOLS

CHS	CHILLED WATER SUPPLY
CHR	CHILLED WATER RETURN
D	CONDENSATE DRAIN
	BALL VALVE
	BUTTERFLY VALVE (LEVER HANDLE)
	BUTTERFLY VALVE (GEAR OPERATOR)
	GLOBE VALVE
	CHECK VALVE (SWING CHECK)
	CHECK VALVE (BUTTERFLY CHECK)
	CALIBRATED BALANCING VALVE
	VALVE AT RISER
	STRAINER W/ DRAIN VALVE
	UNION
	AIR TERMINAL / FAN COIL UNIT/HOT WATER RETURN CONTROL VALVE (2-WAY) ELECTRIC OR ELECTRONIC
	AIR TERMINAL / FAN COIL UNIT CONTROL VALVE (3-WAY) ELECTRIC OR ELECTRONIC
	CONTROL VALVE (2-WAY) ELECTRIC OR ELECTRONIC
	CONTROL VALVE (3-WAY) ELECTRIC OR ELECTRONIC

ONE LINE PIPE SYMBOLS

	CONTROL VALVE (3-WAY) ELECTRIC OR ELECTRONIC
	EMERGENCY SHUT-OFF VALVE WITH FUSIBLE LINK
	FLEXIBLE PIPE CONNECTOR
	METAL BELLOWS PUMP CONNECTOR
H	AIR VENT (A - AUTO, H - HAND)
	PRESSURE AND TEMPERATURE TAP
	PRESSURE GAUGE
	PRESSURE GAUGE W/ SIPHON
	THERMOMETER W/ INSERTION WELL
	ANCHOR
	PIPE GUIDE
	FLANGE
	ELBOW, TURNED UP
	ELBOW, TURNED DOWN
	RISE OR DROP IN PIPE
	ELBOW
	TEE, SIDE CONNECTION
	TEE, OUTLET UP
	TEE, OUTLET DOWN
	CAPPED OUTLET
	CAPPED PIPE
	CONCENTRIC REDUCER
	ECCENTRIC REDUCER
	DIRECTION OF PITCH
TFD	PIPE TO FLOOR DRAIN
EMS	EMERGENCY MANAGEMENT SYSTEM INSERTION WELL

TWO LINE PIPE SYMBOLS

	ELBOW - FLANGED LONG RADIUS 45°
	ELBOW - FLANGED LONG RADIUS 90°
	ELBOW - WELDED LONG RADIUS 45°
	ELBOW - WELDED LONG RADIUS 90°
	END CAP
	FLANGES - SLIP ON
	FLANGES - WELD NECK
	REDUCERS - FLANGED CONCENTRIC
	REDUCERS - FLANGED ECCENTRIC
	REDUCERS - WELDED CONCENTRIC
	REDUCERS - WELDED ECCENTRIC
	TEE - FLANGED
	TEE - WELDED
	BUTTERFLY VALVE - LEVER OPERATOR
	BUTTERFLY VALVE - WORM GEAR OPERATOR
	BUTTERFLY VALVE - ACTUATOR
	CHECK VALVE - SWING CHECK
	CHECK VALVE - SILENT OR WAFER
	GLOBE VALVE
	STRAINER - Y
	FLEXIBLE CONNECTORS

DUCTWORK SYMBOLS

T	THERMOSTAT
	THERMOSTAT WIRING
H	HUMIDISTAT
TS	TEMPERATURE SENSOR
FM	GPM FLUID FLOW METER
SA	SUPPLY AIR DUCT
RA	RETURN AIR DUCT
EA	EXHAUST AIR DUCT
CFM	CUBIC FEET PER MINUTE
EMS	ENERGY MANAGEMENT SYSTEM
ATC	AUTOMATIC TEMP CONTROLS
CO2	CARBON DIOXIDE
PPM	PARTS PER MILLION
Ø	ROUND DIAMETER
	SHORT (1x) RADIUS ELL (RECTANGULAR OR ROUND) CENTERLINE RADIUS = 1d
	LONG (1.5x) RADIUS ELL (ROUND OR OVAL) CENTERLINE RADIUS = 1.5d
	SQUARE ELL
	ELL WITH TURNING VANES
	STREAMLINE TAP (RECTANGULAR)
Ø	STREAMLINE TAP (ROUND)
Ø	CONICAL TAP
	STRAIGHT TAP
	LATERAL TAP
	MANUAL VOLUME DAMPER
M	MOTORIZED VOLUME DAMPER
FD	FIRE DAMPER (FD)
FD	VERTICAL FIRE DAMPER (FD)
S	SMOKE DAMPER
S FD/S	COMBINATION FIRE / SMOKE DAMPER (FD/S)
20/12	RECTANGULAR DUCT (WIDTH/DEPTH)
	ROUND DUCT OFFSET
RISE	CHANGE IN ELEVATION ("R"-RISE, "F"-FALL)
	FLEXIBLE DUCT
	SUPPLY DUCT UP
	RETURN DUCT UP
	EXHAUST DUCT UP
	SUPPLY DUCT DOWN
	RETURN DUCT DOWN
	EXHAUST DUCT DOWN
	CEILING DIFFUSER
	RETURN AIR GRILLE
	EXHAUST AIR GRILLE
AP	ACCESS PANEL
AP	ACCESS PANEL IN ROUND OR OVAL DUCT

AHU SCHEDULE

MARK	SERVES	TYPE	SUPPLY FAN CFM	E.S.P. IN. W.G.	MIN. OSA CFM	MOTOR HP	MOTOR V/Ø	MOTOR MCA	MOTOR MOCP	COOLING COIL CFM	AIR ENT. °Fdb	AIR ENT. °Fwb	AIR LVG. °Fdb	AIR LVG. °Fwb	GPM	EWT (°F)	MAX FACE VEL. (FPM)	# OF COILS	HEATING COIL CFM	KW	MAX FACE VEL. (FPM)	EAT (°F)	LAT (°F)	ELEC. HEATER MCA	ELEC. HEATER MOCP	FILTERS	ACCESSORIES	BASIS OF DESIGN (ClimateCraft)
AHU-1	OFFICES	I	38000	2.5	6100	(6) @ 10 HP EACH	460/3	89.9	110	38000	78.2	65.4	51.9	51.9	200.0	45.0	501	2	38000	180	607	25	40	226	250	[A]	[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17]	CAH90X144

TYPES:

I: MODULAR VARIABLE VOLUME, HORIZONTAL DRAW THROUGH WITH INTERNAL FAN ISOLATION. DIRECT DRIVE PLENUM FANWALL.

NOTES:

A. SCHEDULED SUPPLY FAN EXTERNAL PRESSURE DOES NOT INCLUDE THE FOLLOWING AIR PRESSURE DROPS IN, "WG":
PRE FILTER: ALL UNITS = 1.00" (CHANGEOUT)
FINAL FILTERS: ALL UNITS = 1.50" (CHANGEOUT)

B. MAXIMUM COOLING COIL WATER PRESSURE DROP = 15 FT.

C. MAX COIL FACE VELOCITY = 500FPM

D. COILS TO BE A MAX FPF = 120, UNLESS REQUIRED NUMBER OF ROWS EXCEEDS 8.

E. EXTERNAL STATIC PRESSURE DOES NOT INCLUDE COILS

F. COOLING CAPACITY BASED ON 45°F ENT. WATER W/ ΔT=15°F

FILTER TYPES: (SEE SPECS.)

[A] 2" THICK PLEATED MERV 8 (100%) FILTERS - ANGLE FRAME & SIDE ACCESS

GENERAL NOTES:

1. MAX DISCHARGE AIR TEMP. (LEAVING UNIT) = 54.5°F.

ACCESSORIES:

[1] REMOTE VARIABLE FREQUENCY DRIVE (SUPPLY FAN)

[2] 2" DOUBLE WALL CONSTRUCTION W/ R-13 INSULATION

[3] FLEX CONNECTIONS AT SUPPLY AND RETURN W/ COPPER JUMPERS

[4] DIRECT DRIVE SUPPLY FANWALL

[5] FAN WALL (EACH FAN CUBE TO HAVE INDEPENDENT BACKDRAFT DAMPER)

[6] COOLING COIL SECTION WITH TYPE 304 S.S. COIL CASING AND S.S. DOUBLE WALL DRAIN PAN

[7] HINGED ACCESS DOORS IN ALL SECTIONS

[8] EACH FAN SECTION TO BE SINGLE POINT WIRING CONNECTION.

[9] PIEZOMETER FAN INLET AFM WITH TRANSMITTER & LCD READOUT (SA)

[10] SERVICE LIGHTS IN ALL ACCESS SECTIONS SHOWN WIRED TO COMMON SWITCH WITH PILOT LIGHT AT FAN ACCESS DOOR.

[11] ALUMINUM TREAD PLATE FLOORING IN ALL ACCESS SECTIONS

[12] COOLING COIL SECTION TO BE PROVIDED WITH UV LIGHT (BY UNIT MFR.)

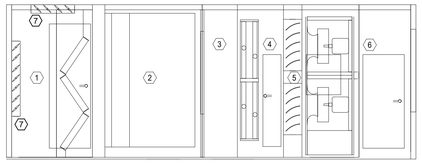
[13] FAN SECTION ACCESS DOOR SAFETY SWITCH

[14] FAN WALL MOTOR SAFETY SCREEN

[15] 6" HIGH BASE RAIL (MIN.)

[16] UNIT MOUNTED RETURN AIR CONTROL DAMPER

[17] UNIT MUST BE ASSEMBLED ONSITE BY MECHANICAL CONTRACTOR. ALL PIECES MUST FIT THROUGH A STANDARD 36" DOOR.



AHU SECTION DESIGNATION

SECTION	REMARK
1	MIXING SECTION W/ANGLE FILTER AND ACCESS DOOR
2	PRE-HEAT COIL SECTION
3	MIXING SECTION
4	CHILLED WATER COOLING COIL SECTION AND ACCESS DOOR
5	BACKDRAFT DAMPER
6	DIRECT DRIVE FAN SECTION WITH ACCESS DOOR
7	UNIT MOUNTED CONTROL DAMPER

NOTE: FACTORY PROVIDED & INSTALLED MARINE LIGHT IN ALL ACCESS SECTIONS.

AIR DEVICE LEGEND

MARK	TYPE	LEGEND	RUNOUT	REMARKS	MFG / MODEL
ACD(X) CFM	ARCHITECTURAL SQUARE PLAQUE DIFFUSER	X = ROUND NECK SIZE 4-WAY THROW	ROUND RUNOUT = NECK SIZE		TITUS / OMNI LAY-IN BORDER
E(X) CFM/FD	ALUMINUM CUBE CORE REGISTER (1/2"X1/2"X1/2")	E = EXHAUST R = RETURN T = TRANSFER X = SQUARE NECK SIZE	SEE PLANS	OBD OMIT OBD ON T'S AND UNDUCTED R'S	TITUS / 50F, ALUMINUM BORDER

AIR DEVICE SCHEDULE NOTES

1. CFM = AIR FLOW (TYPICAL ALL AIR DEVICES).
2. COORDINATE BORDER/FRAME TYPE WITH ARCH REFLECTED CEILING PLAN.
3. DIRECTION ARROWS ON DRAWINGS SHOW FLOW PATTERN.
4. USE SUPPLY DIFFUSERS WITH O.B.D. IN DRYWALL OR INACCESSIBLE CEILINGS.
5. USE SUPPLY DIFFUSERS WITHOUT O.B.D. IN LAY-IN OR ACCESSIBLE CEILINGS.

VARIABLE FREQUENCY DRIVE SCHEDULE

MARK	SERVES	ACCESSORIES	BASIS OF DESIGN
VFD-AHU-1	AHU-1	[1] [2] [3] [4] [5] [6]	ABB

ACCESSORIES:

[1] DISCONNECT SWITCH.

[2] BY-PASS THREE CONTACTOR ELECTRO - MECHANICAL.

[3] OUTPUT/LOAD SIDE FILTERS IF LENGTH FROM DRIVE TO MOTOR EXCEEDS MANUFACTURER'S ALLOWABLE LENGTH.

[4] NEMA 1 ENCLOSURE.

[5] HIGH AMBIENT OPERATION - CONTINUOUS OUTPUT RATING = TO 110% OF MOTOR NAMEPLATE FLA'S.

[6] VFD SERVES MULTIPLE MOTORS. SIZE VFD BASED ON SUM OF THE FLA'S OF THE CONNECTED MOTORS. VERIFY MOTOR FLA'S WITH EQUIPMENT MANUFACTURER SUPPLIER.

NOTES:

1. VFD TO BE MOUNTED AND WIRED IN FIELD.

GMC
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Bernhard TME Engineering

ISSUE	DATE
100% CD	2024.09.09
ADDENDUM 2	2024.10.07
ADDENDUM 3	2024.10.11

DRAWN BY: CBO
CHECKED BY: JDD

TUSCALOOSA COUNTY DHR
PROJECT ADDRESS

GMC # ABHM220021

ALABAMA LICENSED ENGINEER No. 34357 PROFESSIONAL MARED D. DEERMAN
10/11/24

SCHEDULES AND LEGEND - HVAC

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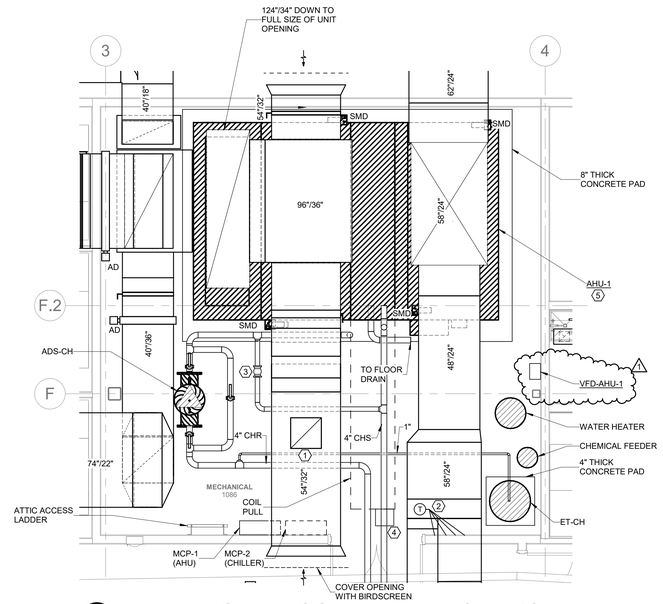

TRUE NORTH

1 ENLARGED FLOOR PLAN - MECHANICAL ROOM - HVAC

SCALE: 1/4" = 1'-0"

KEYED NOTES:

1. 24"/24" RA UP WITH FD
2. THERMOSTATS WITH SETPOINT ADJUSTMENT (TEMPERATURE AND HUMIDITY) SERVING TU1-47, TU1-48, TU1-49, AND TU1-50. REMOTE TEMPERATURE SENSORS LOCATED IN ATTIC. SEE ATTIC PLAN FOR LOCATIONS.
3. 3" BYPASS LINE WITH AUTOMATIC CONTROL VALVE.
4. CHILLED WATER FLOW METER.
5. UNIT TO BE SHIPPED FOR BREAKDOWN CONSTRUCTION AND RE-ASSEMBLED ON SITE BY MANUFACTURER'S REPRESENTATIVE.

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Bernhard TME Engineering

ISSUE	DATE
100% CD	2024.09.09
ADDENDUM 3	2024.10.11
1	

DRAWN BY: CBO
CHECKED BY: JDD

TUSCALOOSA COUNTY DHR
PROJECT ADDRESS

GMC # ABHM220021

ALABAMA LICENSED No. 34357 PROFESSIONAL ENGINEER JARED D. DEERMAN
10/11/24

ENLARGED FLOOR PLANS - HVAC

M4.01

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ADA REQUIREMENTS

THIS APPLIES TO ADA ACCESSIBLE FIXTURES ONLY.

WATER CLOSETS: THE HEIGHT OF WATER CLOSETS SHALL BE 17" TO 19" MEASURED TO THE TOP OF THE TOILET SET. SEATS SHALL NOT BE SPRUNG TO RETURN TO A LIFTED POSITION. THE WATER CLOSET SHALL BE LOCATED 18" FROM THE SIDE WALL TO THE CENTER LINE OF THE BOWL. HAND OPERATED FLUSH CONTROLS SHALL BE MOUNTED ON THE WIDE SIDE OF TOILET AREAS NO MORE THAN 29" ABOVE THE FINISH FLOOR. SEE ARCHITECTURAL DRAWINGS FOR GRAB BAR LOCATIONS.

URINALS: THE URINALS SHALL BE WALL HUNG WITH AN ELONGATED RIM AT A MAXIMUM OF 17" ABOVE THE FINISH FLOOR. HAND OPERATED FLUSH CONTROLS SHALL BE MOUNTED NO MORE THAN 44" ABOVE FINISH FLOOR.

LAVATORIES: LAVATORIES SHALL BE MOUNTED WITH THE RIM OR COUNTER SURFACE NO HIGHER 34" ABOVE THE FINISH FLOOR. PROVIDE A CLEARANCE OF AT LEAST 29" ABOVE THE FINISH FLOOR TO THE BOTTOM OF THE APRON. KNEE SPACE SHALL BE 8" FROM BOTTOM EDGE OF APRON TO THE LEADING EDGE OF THE BOTTOM OF THE BOWL. THE BOTTOM OF THE BOWL SHALL BE A MINIMUM OF 27" ABOVE THE FINISH FLOOR. ALL WATER AND DRAIN PIPING UNDER LAVATORIES SHALL BE INSULATED WITH A FOAM INSERT COVERED WITH A 1/8" VINYL OUTER SHELL. ANGLE STOPS SHALL HAVE A FLIP TOP ACCESS.

FAUCETS - BATHTUB - SHOWER CONTROLS: CONTROLS SHALL BE LEVER HANDLES OPERABLE WITH ONE HAND AND SHALL NOT REQUIRE TIGHT GRASPING, PINCHING, OR TWISTING OF THE WRIST. THE FORCE REQUIRED TO ACTIVATE CONTROLS SHALL BE NO GREATER THAN 5 LBF.

BATHTUB: AN IN TUB SEAT OR A SEAT AT THE HEAD END OF THE TUB SHALL BE PROVIDED. SEATS SHALL BE MOUNTED SECURELY AND SHALL NOT SLIP DURING USE. IN ADDITION TO THE FIXED SHOWER HEAD PROVIDE A HAND HELD SHOWER SPRAY UNIT WITH A HOSE AT LEAST 60" LONG THAT CAN BE USED BOTH AS A FIXED SHOWER HEAD AND AS A HAND HELD SHOWER HEAD. SEE ARCHITECTURAL DRAWINGS FOR GRAB BAR LOCATIONS.

SHOWER: A SEAT SHALL BE PROVIDED IN SHOWER STALLS 36"X36". THE SEAT SHALL BE MOUNTED ON THE WALL OPPOSITE OF THE CONTROLS AND 17" TO 19" FROM THE BATHROOM FLOOR AND SHALL EXTEND THE FULL DEPTH OF THE STALL. SHOWER CONTROLS SHALL BE MOUNTED ON THE WALL OPPOSITE OF THE SEAT AND SHALL BE LOCATED ON THE SAME WALL AS THE SHOWER HEAD, AT MINIMUM HEIGHT OF 38" AND A MAXIMUM HEIGHT OF 48". IN ADDITION TO THE FIXED SHOWER HEAD PROVIDE A HAND HELD SHOWER SPRAY UNIT WITH A HOSE AT LEAST 60" LONG THAT CAN BE USED BOTH AS A FIXED SHOWER HEAD AND AS A HAND HELD SHOWER HEAD. IN A 30"X 60" SHOWER UNIT A FIXED SEAT SHALL BE PROVIDED, IT SHALL BE A FOLDING TYPE AND SHALL BE MOUNTED ON THE WALL ADJACENT TO THE CONTROLS. SEE ARCHITECTURAL DRAWINGS FOR GRAB BAR LOCATIONS.

SINKS: SINKS SHALL BE MOUNTED WITH THE RIM OR COUNTER SURFACE NO HIGHER 34" ABOVE THE FINISH FLOOR. PROVIDE A KNEE CLEARANCE OF AT LEAST 27" HIGH, 30" WIDE, AND 19" DEEP. SINKS SHALL BE A MAXIMUM OF 6 1/2" DEEP. ALL WATER AND DRAIN PIPING UNDER LAVATORIES SHALL BE INSULATED WITH A FOAM INSERT COVERED WITH A 1/8" VINYL OUTER SHELL. ANGLE STOPS SHALL HAVE A FLIP TOP ACCESS.

DRINKING FOUNTAINS / WATER COOLERS: WHERE ONLY ONE DRINKING FOUNTAIN IS PROVIDED ON A FLOOR THERE SHALL BE A DRINKING FOUNTAIN WHICH IS ACCESSIBLE TO INDIVIDUALS WHO USE WHEEL CHAIRS AND ONE ACCESSIBLE TO THOSE HAVING DIFFICULTY BENDING OR STOOPING. THIS CAN BE ACCOMPLISHED BY USING A "HI-LO" FOUNTAIN. LOWEST SPOUT SHALL BE NO HIGHER THAN 36" ABOVE FINISHED FLOOR AND HIGHEST SPOUT SHALL BE MOUNTED AT 40" ABOVE FINISH FLOOR. SPOUTS SHALL BE AT FRONT OF THE UNIT AND SHALL DIRECT THE WATER FLOW IN A TRAJECTORY THAT IS PARALLEL OR NEARLY PARALLEL TO THE FRONT OF THE UNIT. THE SPOUT SHALL PROVIDE A FLOW OF WATER AT LEAST 4" HIGH. CONTROLS SHALL BE FRONT MOUNTED OR SIDE MOUNTED NEAR THE FRONT EDGE. CONTROLS SHALL BE OPERABLE WITH ONE HAND AND SHALL NOT REQUIRE TIGHT GRASPING, PINCHING, OR TWISTING OF THE WRIST. THE FORCE REQUIRED TO ACTIVATE CONTROLS SHALL BE NO GREATER THAN 5 LBF. WALL MOUNTED UNITS SHALL HAVE A CLEAR KNEE SPACE OF BETWEEN THE BOTTOM OF THE APRON AND THE FINISHED FLOOR AT LEAST 27" HIGH, 30" WIDE, AND 17" TO 19" DEEP. FOUNTAINS SHALL NOT PROTRUDE MORE THAN 4" OUT INTO WALKWAYS.

GENERAL NOTES

1. ALL OUTSIDE CLEANOUTS SHALL BE BROUGHT TO GRADE AND EMBEDDED IN 18"X18"X6" THICK CONCRETE PAD. (J.R. SMITH 4258 OR EQUAL.)
2. WHEREVER DISSIMILAR METALS ARE CONNECTED ON WATER LINES, A DIELECTRIC NIPPLE SHALL BE USED.
3. ALL HORIZONTAL WATER AND VENT PIPING IS RUN ABOVE CEILING ON PLAN UNLESS OTHERWISE NOTED.
4. ALL WATER PIPING BELOW SLAB ON GRADE SHALL BE BENT UP AT ENDS SO THAT NO JOINTS OCCUR BELOW FLOOR.
5. COORDINATE ALL PIPE ROUTING TO AVOID CONFLICTS WITH STRUCTURAL, MECHANICAL, AND ELECTRICAL FEATURES OF BUILDING.
6. PLUMBING DRAWINGS ARE DIAGRAMMATIC AND DO NOT SHOW ALL DETAILS OF THE WORK. OBTAIN DIMENSIONS AND PERTINENT INFORMATION FROM ARCHITECTURAL DRAWINGS.
7. ALL WALL HYDRANTS SHALL BE MOUNTED 24" ABOVE FINISH GRADE OR FINISH FLOOR UNLESS OTHERWISE NOTED.
8. INSTALL ALL OUTSIDE VALVES IN CONCRETE OR CAST IRON VALVE BOXES.
9. ALL HORIZONTAL SANITARY PIPING IS RUN BELOW FLOOR ON PLAN UNLESS OTHERWISE NOTED.
10. ALL WATER PIPING INSTALLED IN EXTERIOR WALLS SHALL BE LOCATED ON THE INTERIOR SIDE OF THE EXTERIOR WALL INSULATION.
11. PAVEMENT CUTS, BACKFILLING, AND PATCHING SHALL MEET ALL LOCAL REQUIREMENTS.
12. INSTALL WATER PIPING TO ASME B31.9. PROVIDE PDI SHOCK ARRESTORS ON WATER SUPPLIES TO ALL FIXTURES.
13. CONTRACTOR TO VERIFY EXACT LOCATION OF ALL MECHANICAL EQUIPMENT PRIOR TO ROUGHING MECHANICAL ROOM FLOOR DRAINS, HOSE BIBBS, ETC.
14. ALL FLOOR SINKS TO BE INSTALLED WITH RIM/GRATE FLUSH WITH FINISH FLOOR.

PLUMBING FIXTURE CONNECTION SCHEDULE

MARK	FIXTURE	WASTE	CW	HW	REMARKS
WC-1	WATER CLOSET	4"	1"	-	WALL HUNG, HARDWIRED FLUSH VALVE
WC-2	WATER CLOSET	4"	1"	-	WALL HUNG, HARDWIRED FLUSH VALVE, ADA
WC-2	WATER CLOSET	3"	1"	-	FLOOR MOUNTED, HARDWIRED, FLUSH VALVE, ADA
UR-1	URINAL	2"	3/4"	-	WALL HUNG, FLUSH VALVE, ADA
LAV-1	LAVATORY	1-1/4"	1/2"	1/2"	UNDERMOUNT, ADA, WITH TMV SET TO 109°F, HARDWIRED
EWC-1	ELEC WATER COOLER	1-1/2"	1/2"	-	BI-LEVEL, ADA, W/ BOTTLE FILLER
BT-1	BATHTUB	2"	1/2"	1/2"	-
SK-1	SINK	1-1/2"	1/2"	1/2"	12"x27"
SK-2	SINK	1-1/2"	1/2"	1/2"	12"x18"
JC-1	JANITOR'S CLOSET	3"	1/2"	1/2"	24"X24" PRE-CAST, MIFAB FS 1750-175, 8"DIAMETER, 6" DEEP PORCELAIN ENAMELED CAST IRON INTERIOR WITH THREE (3) QUARTER CAST IRON PORCELAIN ENAMELED GRATE AND DOME BOTTOM STRAINER.
WMB-1	WASHING MACHINE BOX	2"	1/2"	1/2"	-
TMV-1	THERMOSTATIC MIXING VALVE	-	1/2"	1/2"	-
REF-1	REFRIGERATOR	-	1/2"	-	WALL SUPPLY BOX
IM-1	ICE MAKER	-	1/2"	-	WALL SUPPLY BOX, PIPE WASTE TO FS
CM-1	COFFEE MAKER	-	1/2"	-	WALL SUPPLY BOX

WATER HAMMER ARRESTOR SCHEDULE

P.D.I. UNITS	A	B	C	D	E	F
FIXTURE UNITS	1-11	12-32	33-60	61-113	114-154	155-330

CLASSIFICATIONS ESTABLISHED BY THE PLUMBING AND DRAINAGE INSTITUTE "STANDARD P.D.I.-WH201". INSTALL WATER PIPING TO ASME B31.9. CLOSED COPPER TUBE CHAMBER WITH PERMANENTLY SEALED 410 kPa (60PSIG) AIR CHARGE ABOVE A DOUBLE O-RING PISTON. TWO HIGH HEAT BUNA-N O-RINGS PRESSURE PACKED AND LUBRICATED WITH FDA APPROVED SILICONE COMPOUND. ALL UNITS SHALL BE DESIGNED IN ACCORDANCE WITH ASSE 1010 FOR SEALED WALL INSTALLATIONS WIHTOUT AN ACCESS PANEL. SIZE AND INSTALL IN ACCORDANCE WITH MANUFACTURERS REQUIREMENTS. UNIT SHALL BE AS MANUFACTURED BY PRECISION PLUMBING PRODUCTS, INC, WATTS, OR SIOUX CHIEF. PROVIDE WATER HAMMERS AT ALL SOLENOID VALVES, ALL GROUPS OR TWO OR MORE FLUSH VALVES, ALL QUICK OPENING OR CLOSING VALVES, AND ALL WASHING EQUIPMENT.

APPROVED MANUFACTURERS:

1. ZURN, WADE, J.R. SMITH, JOSAM, MIFAB

PLUMBING LEGEND

	COLD WATER LINE	FD	FLOOR DRAIN W/ TG
	HOT WATER LINE	MFD	MECHANICAL FLOOR DRAIN W/ TG
	HOT WATER RETURN LINE	A.F.F.	ABOVE FINISH FLOOR
	SOIL OR WASTE LINE BELOW SLAB	CO	CLEAN OUT
	VENT LINE	CW	COLD WATER
	BALL VALVE	EWC	ELECTRIC WATER COOLER
	WATER PRESSURE REGULATOR	FFE	FINISH FLOOR ELEVATION
	CHECK VALVE	GPM	GALLONS PER MINUTE
	UNION	HW	HOT WATER
	PIPE TURNING UP	HWR	HOT WATER RETURN
	PIPE TURNING DOWN	INV	INVERT
	P-TRAP	JC	JANITOR'S CLOSET
CO YCO	CLEANOUT W/ 18" SQUARE CONCRETE PAD	LAV	LAVATORY
HB	HOSE BIBB	NC	NORMALLY CLOSED
WH	WALL HYDRANT	X-#	PLUMBING FIXTURE NUMBER
WCO	WALL CLEANOUT	PSI	POUNDS PER SQUARE INCH
FCO	FLOOR CLEANOUT	PRV	PRESSURE REDUCING VALVE
#	RISER DIAGRAM NUMBER	TG	TRAP GUARD
		UR	URINAL
		VTR	VENT THRU ROOF
		WC	WATER CLOSET

ELECTRIC WATER HEATER SCHEDULE

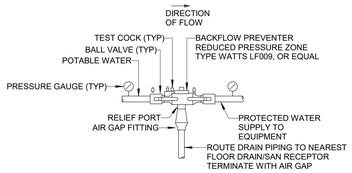
MARK	MANUFACTURER MODEL #	LOCATION	CW	HW	ELECTRICAL KW	ELECTRICAL V/P	GAL.	SET POINT	REMARKS
EWH-1	LET-55 DAK	MECHANICAL 1086	1-1/4"	1-1/4"	4.5	240/1	50	125F	SEE DETAIL 11, THIS SHEET.

PUMP SCHEDULE

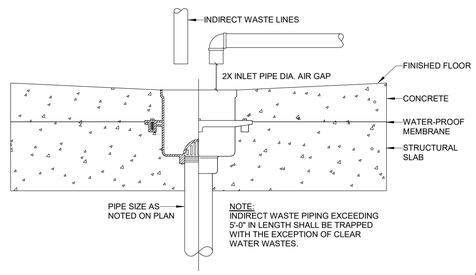
MARK	MODEL NO.	LOCATION	G.P.M.	HEAD (FT.)	ELECTRICAL DATA H.P.	VOLTS	PH	TYPE	REMARKS
RCP-1	GRUNDFOS UPS 15-35 SFC	MECHANICAL 1086	2	8	1/12	115	1	IN-LINE	-

EXPANSION TANK SCHEDULE

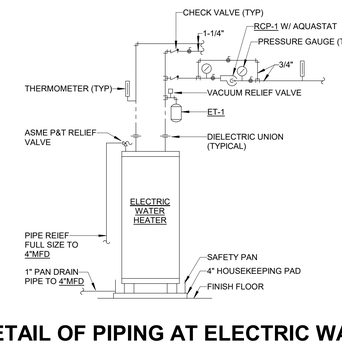
MARK	AMTROL	LOCATION	GALLONS	ACCEPTANCE	REMARKS
ET-1	ST-5C	MECHANICAL 1086	2.1	0.9	-



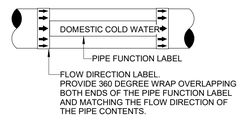
13 DETAIL OF MAKEUP CONNECTION
SCALE:NOT TO SCALE



12 DETAIL OF FLOOR SINK
SCALE:NOT TO SCALE

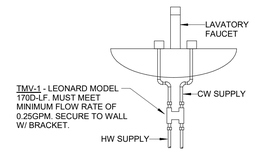


11 DETAIL OF PIPING AT ELECTRIC WATER HEATER
SCALE:NOT TO SCALE

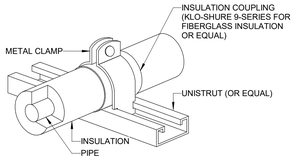


DETAIL NOTES
A. PROVIDE A PIPE LABEL FOR EACH PIPE FUNCTION.
B. PROVIDE AT LEAST ONE LABEL ON EACH PIPE FOR EVERY ROOM THE PIPE PASSES THROUGH.
C. PROVIDE LABELS IN LARGE SPACES ON MAXIMUM 20'-0" CENTERS FOR EVERY PIPE UNLESS OTHERWISE NOTED IN THE SPECIFICATIONS.
D. LABELS TO BE LOCATED IN AN EASILY VISIBLE LOCATION AS THEY WOULD NORMALLY BE SEEN. E.G. ON THE BOTTOM OF PIPES IN THE AIR AND ON THE TOP OR SIDES OF PIPES MOUNTED LOW.
E. LABELS SHALL BE COLOR CODED, PRE-PRINTED, SELF ADHESIVE VINYL FOR MEDICAL GAS PIPING. PRE-TENSIONED LABELS FOR ALL OTHER PIPING.
F. SEE SPECIFICATIONS FOR OTHER REQUIREMENTS AND LIST OF PIPE FUNCTIONS.

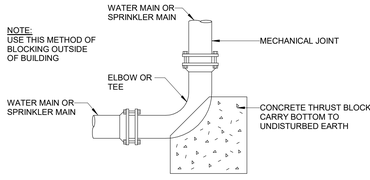
6 DETAIL OF PIPING IDENTIFICATION LABEL
SCALE:NOT TO SCALE



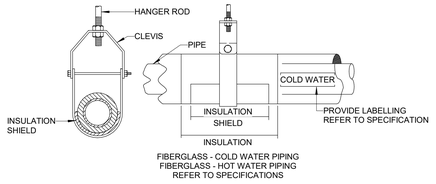
10 DETAIL OF PIPING AT TMV UNDER ADA/PUBLIC LAVATORY
SCALE:NOT TO SCALE



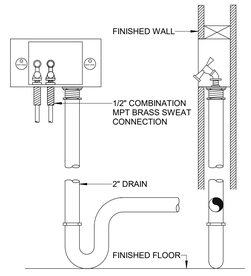
9 STRUT-MOUNTED PIPING SUPPORT INSULATION COUPLING DETAIL
SCALE:NOT TO SCALE



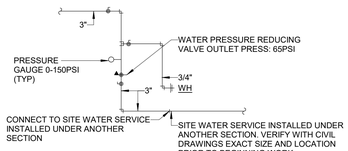
8 DETAIL OF CONCRETE THRUST BLOCK
SCALE:NOT TO SCALE



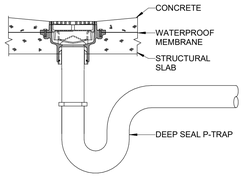
7 DETAIL OF ADJUSTABLE CLEVIS HANGER
SCALE:NOT TO SCALE



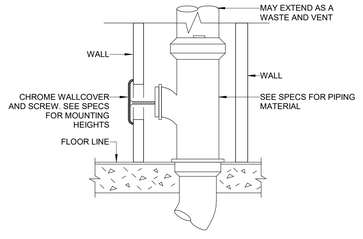
5 DETAIL OF WASHING MACHINE SUPPLY AND DRAIN UNIT
SCALE:NOT TO SCALE



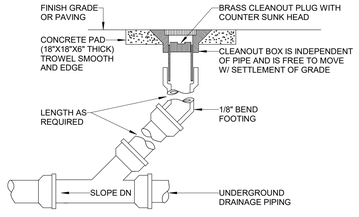
4 DETAIL OF WATER SERVICE ENTRY W/ HB & WH
SCALE:NOT TO SCALE



3 DETAIL OF FLOOR DRAIN
SCALE:NOT TO SCALE



2 DETAIL OF WALL CLEANOUT
SCALE:NOT TO SCALE



1 DETAIL OF CLEANOUT TO GRADE
SCALE:NOT TO SCALE

GMC
2400 5th Avenue South, Suite 200
Birmingham, AL 35233
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Bernhard TME Engineering

ISSUE	DATE
100% CD	2024.09.09
ADDENDUM 3	2024.09.10
1	

DRAWN BY: NEL
CHECKED BY: JDD

TUSCALOOSA COUNTY DHR
PROJECT ADDRESS
GMC # ABHM220021

ALABAMA LICENSED No. 34357 PROFESSIONAL ENGINEER MARED D. DEERMAN
10/11/24

LEGENDS, NOTES AND SCHEDULES - PLUMBING

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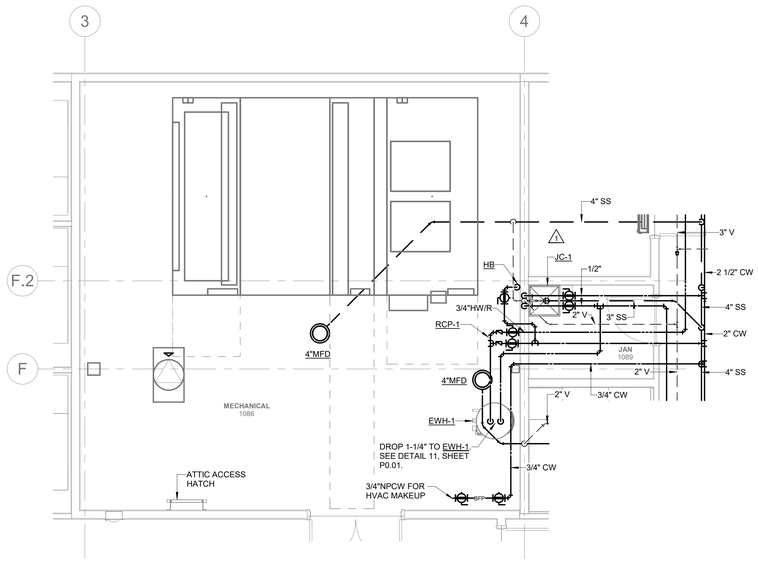
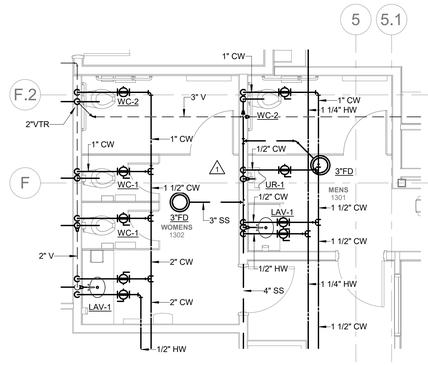
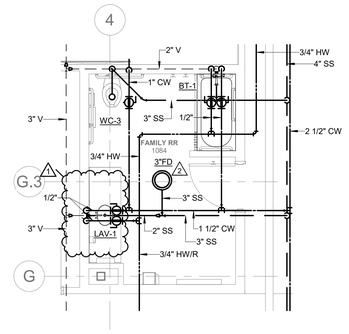


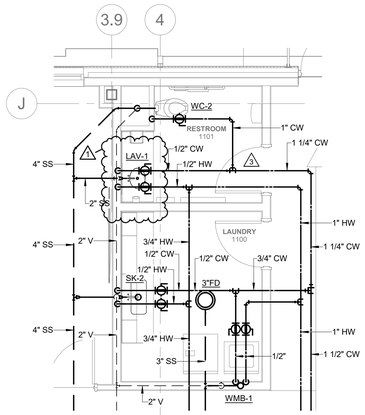
1 ENLARGED PLAN - MECHANICAL ROOM 206 - PLUMBING
SCALE: 1/4" = 1'-0"



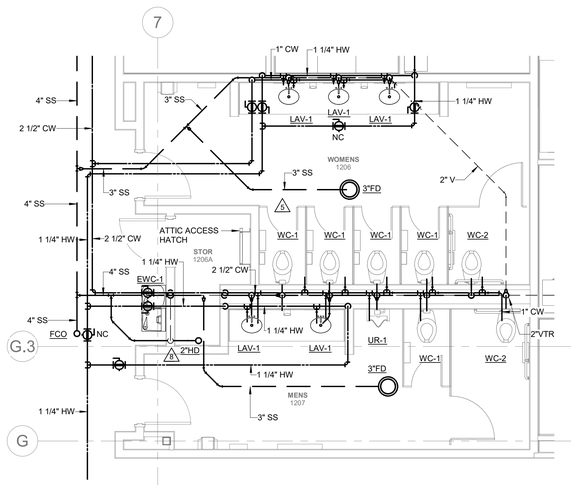
2 ENLARGED PLAN - MAIN RESTROOMS 301/302 - PLUMBING
SCALE: 1/4" = 1'-0"



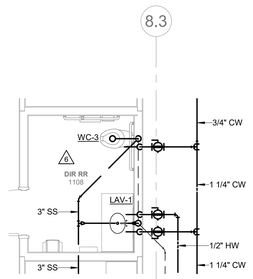
3 ENLARGED PLAN - FAMILY RESTROOM 194 - PLUMBING
SCALE: 1/4" = 1'-0"



4 ENLARGED PLAN - LAUNDRY/RESTOOM - PLUMBING
SCALE: 1/4" = 1'-0"



5 ENLARGED PLAN - MAIN RESTROOMS 319/320 - PLUMBING
SCALE: 1/4" = 1'-0"



6 ENLARGED PLAN - DIRECTOR RESTOOM - PLUMBING
SCALE: 1/4" = 1'-0"

GMC
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Bernhard TME Engineering

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DRAWN BY: NEL
CHECKED BY: JDD

1

TUSCALOOSA COUNTY DHR
PROJECT ADDRESS

GMC # ABHM220021

ALABAMA LICENSED No. 34357 PROFESSIONAL ENGINEER EDWARD D. DEERMAN
10/11/24

PARTIAL FLOOR PLANS - PLUMBING

P4.01

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