

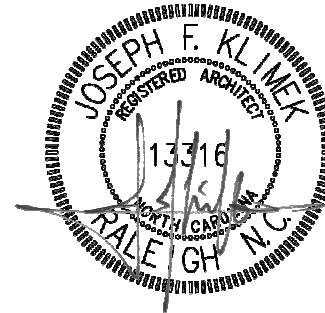
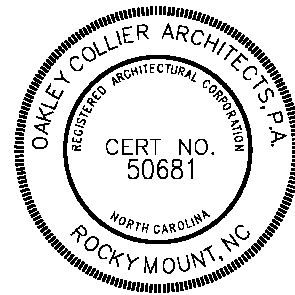
Project Manual

New Storage Facility for

5N2 FOOD MINISTRIES INC.

17247 NC 27 W SANFORD, NORTH CAROLINA
Sanford, NC 27332'

Date: 11/24/2025



PERMIT SET

November 2025

Architect's Project Number: 25003

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SECTION 03 05 16
UNDERSLAB VAPOR BARRIER - STEGO

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sheet vapor barrier under concrete slabs on grade.

1.02 REFERENCE STANDARDS

- A. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2024.
- B. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2017 (Reapproved 2023).

PART 2 PRODUCTS

2.01 MATERIALS

- A. Underslab Vapor Barrier:
 - 1. Water Vapor Permeance: Not more than 0.010 perms (0.6 ng/(s m² Pa)), maximum.
 - 2. Thickness: 15 mils (0.4 mm).
 - 3. Product:
 - a. Stego Industries LLC; Stego Wrap Vapor Barrier (15-mil):
www.stegoindustries.com/#sle.
- B. Accessory Products: Vapor barrier manufacturer's recommended tape, adhesive, mastic, etc., for sealing seams and penetrations in vapor barrier.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E1643.
- B. Install vapor barrier under interior slabs on grade; lap sheet over footings and seal to foundation walls.
- C. Lap joints minimum 6 inches (150 mm).
- D. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions.
- E. No penetration of vapor barrier is allowed except for reinforcing steel and permanent utilities.
- F. Repair damaged vapor retarder before covering with other materials.

END OF SECTION

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**SECTION 03 15 21
TERMITE BARRIER - STEGO**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Termite-resistant vapor barrier sheet.

1.02 REFERENCE STANDARDS

- A. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2024.
- B. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2017 (Reapproved 2023).

PART 2 PRODUCTS

2.01 TERMITE BARRIER SHEET

- A. Termite-Resistant Vapor Barrier Sheet: Plastic sheet complying with ASTM E1745, Class C; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs, and for exclusion of subterranean termites.
- B. Accessory Products: Barrier sheet manufacturer's recommended tape, adhesive, etc., for sealing seams and penetrations in termite barrier.
- C. Manufacturer: Stego Technology LLC; Pango Wrap with Pango Tape: www.stegoindustries.com/#sle.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that soil surfaces are unfrozen.
- B. Verify final grading is complete.

3.02 INSTALLATION - BARRIER SHEET

- A. Comply with ASTM E1643.
- B. Lap joints 6 inches (150 mm), minimum. Seal joints, seams, penetrations, and edges at adjacent materials with manufacturer's recommended products and follow manufacturer's written instructions.

3.03 PROTECTION

- A. Protect sheet materials from damage after completed installation.
- B. Repair damage to installed sheet materials with manufacturer's recommended products and according to the manufacturer's written instructions.

END OF SECTION

**SECTION 03 35 11
CONCRETE FLOOR FINISHES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Slip-resistant coatings.

1.02 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's sealed packaging, including application instructions.

1.03 FIELD CONDITIONS

- A. Maintain light level equivalent to a minimum 200 W light source at 8 feet (2.5 m) above the floor surface over each 20 foot (6 m) square area of floor being finished.
- B. Do not finish floors until interior heating system is operational.
- C. Maintain ambient temperature of 50 degrees F (10 degrees C) minimum.

PART 2 PRODUCTS

2.01 COATINGS

- A. Slip-Resistant Coating:
 - 1. Plastic Aggregate: Finely ground polymer for addition to coatings for slip resistance.
 - a. Products:
 - 1) Dayton Superior Corporation: www.daytonsuperior.com/#sle.
 - 2) Euclid Chemical Company: www.euclidchemical.com/#sle.
 - 3) SpecChem, LLC: www.specchem.com/#sle.
 - 2. Natural Aggregate: Finely ground stone for addition to coatings for slip resistance.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that floor surfaces are acceptable to receive the work of this section.
- B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

3.02 GENERAL

- A. Apply materials in accordance with manufacturer's instructions.

3.03 COATING APPLICATION

- A. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.
- B. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.
- C. Apply coatings in accordance with manufacturer's instructions, matching approved mock-ups for color, special effects, sealing and workmanship.

3.04 PROTECTION

- A. Protect installed coatings from subsequent construction operations.
- B. Do not permit traffic over unprotected floor surface.

END OF SECTION

**SECTION 05 40 00
COLD-FORMED METAL FRAMING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Formed steel stud interior wall framing.

1.02 REFERENCE STANDARDS

- A. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members; 2016, with Supplement (2020).
- B. AISI S240 - North American Standard for Cold-Formed Steel Structural Framing; 2015, with Errata (2020).
- C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- E. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2020.
- F. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2015.
- G. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2020 (Reapproved 2024).
- H. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 ADMINISTRATIVE REQUIREMENTS

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Design Requirements: Design cold-formed framing systems, components and connectors to withstand specified design loads in compliance with ICC (IBC), ASCE 7, applicable building code, AISI S100, and AISI S240.
- B. Design Criteria: In accordance with applicable codes.
 - 1. Able to tolerate movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
 - 2. Able to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

2.02 MATERIALS

- A. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S240.

2.03 STRUCTURAL FRAMING COMPONENTS

- A. Wall Studs and Track Sections: AISI S240; c-shaped studs and u-shaped track sections in stud-matching nominal width and compatible height.
- B. Jamb Studs: AISI S240; manufactured, engineered, c-shaped with wide flanges, designed to replace conventional double-stud framing at openings.
- C. Headers: AISI S240; manufactured, engineered one-member or two-member assemblies, with wide flanges, designed to replace conventional box or nested header framing at openings.
 - 1. Jamb Mounting Clips: Manufacturer's standard.

2.04 CONNECTIONS

- A. Performance Requirements: Provide connections in compliance with requirements of AISI S240.
- B. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S240.
- C. Structural Performance: Maintain load and movement capacity required by applicable building code and specified design criteria.
- D. Movement Connections: Provide mechanical anchorage devices that accommodate movement using slotted holes, shouldered screws or screws and anti-friction or stepped bushings, while maintaining structural performance of framing. Provide movement connections where indicated on drawings.
- E. Fixed Connections: Provide nonmovement devices for tie-down to foundation, floor-to-floor tie-down, roof-to-wall tie-down, joist hangers, gusset plates, and stiffeners.
- F. Bridging Connections: Provide mechanical load-transferring devices that accommodate wind load torsion and weak axis buckling induced by axial compression loads. Provide bridging connectors where indicated on the drawings.

2.05 MISCELLANEOUS CONNECTIONS

- A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot-dip galvanized per ASTM A153/A153M.
- B. Anchorage Devices: Powder actuated and Drilled expansion bolts.

2.06 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.
- B. Galvanizing Repair: Touch up bare steel with zinc-rich paint in compliance with ASTM A780/A780M.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Install structural members and connections in compliance with ASTM C1007.

3.02 INSTALLATION OF STUDS

- A. Install wall studs plumb and level.
- B. Construct corners using minimum of three studs. Install double studs at wall openings, door and window jambs.
- C. Provide deflection allowance in stud track, directly below horizontal building framing at non-loadbearing framing.
- D. Attach cross studs to studs for attachment of fixtures anchored to walls.
- E. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.

3.04 TOLERANCES

- A. Studs - Vertical Alignment (Plumbness): 1/960 of span or 1/8 inch in 10 ft (3.2 mm in 3000 mm), in accordance with ASTM C1007.
- B. Studs - Maximum Variation from True Position: 1/8 inch (3.2 mm) in accordance with ASTM C1007.

- C. Stud Spacing: 1/8 inch (3.2 mm) from the designated spacing, provided that the cumulative error does not exceed the requirements of the finishing materials in accordance with ASTM C1007.

END OF SECTION

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**SECTION 06 10 53
MISCELLANEOUS ROUGH CARPENTRY**

PART 1 GENERAL

1.01 SECTIONS INCLUDES

- A. Preservative-treated wood materials.
- B. Fire-retardant-treated wood materials.
- C. Communications and electrical room mounting boards.
- D. Concealed wood blocking, nailers, and supports.

1.02 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- B. AWPA M4 - Standard for the Handling, Storage, Field Fabrication and Field Treatment of Preservative-Treated Wood Products; 2023.
- C. AWPA U1 - Use Category System: User Specification for Treated Wood; 2025.
- D. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. PS 20 - American Softwood Lumber Standard; 2025.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data:
 - 1. Pressure-preservative treatment.
 - 2. Field-applied preservative treatment product data and application instructions.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org), and that provides grading service for species and grade specified. Provide lumber stamped with grade mark unless otherwise indicated.

2.02 PRESSURE-PRESERVATIVE TREATMENT (PPT)

- A. Factory-treat wood members in accordance with AWPA U1 and use category indicated.
- B. Kiln-dry wood after treatment with waterborne preservative to maximum moisture content of 19 percent for lumber and 15 percent for plywood.
- C. Perform fabrication such as cutting, boring, milling, and surfacing to maximum extent practicable before treatment.
- D. Label preservative-treated wood with marking as required by AWPA U1 and ICC (IBC). Unless otherwise permitted by standard U1 and the building code, marking shall include the phrase: AWPA U1, accredited inspection agency's mark, and shall identify treating plant, type of preservative, retention, and end use.
- E. Field Treatment for Cuts and Holes in Preservative-Treated Wood: Comply with AWPA M4.

2.03 ACCESSORIES

- A. Metal and Finish of Fasteners:
 - 1. Preservative-Treated Wood:
 - a. Nails, timber rivets, wood screws, and lag screws - general use: Hot-dip galvanized steel complying with ASTM A153/A153M Class D.

2. Untreated Wood: Unfinished steel.
- B. Sill Gasket on Top of Foundation Wall: 1/4 inch (6 mm) thick, plate width, closed cell plastic foam from continuous rolls.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to greatest extent possible; clearly separate scrap for use on-site as accessory components, including shims, bracing, and blocking.

3.02 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.
- C. Provide the following specific nonstructural framing and blocking:
 1. Cabinets and shelf supports.
 2. Wall brackets.
 3. Handrails.
 4. Grab bars.
 5. Towel and bath accessories.
 6. Wall-mounted door stops.

3.03 SITE-APPLIED WOOD TREATMENT

- A. Apply preservative treatment to field-cut surfaces in accordance with manufacturer's instructions wherever cuts, holes, sawing, or other fabrication of wood members is required after pressure-preservative treatment.
- B. Apply preservative treatment in accordance with manufacturer's instructions.
- C. Allow preservative to dry prior to erecting members.

END OF SECTION

**SECTION 07 92 00
JOINT SEALANTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Joint backings and accessories.

1.02 REFERENCE STANDARDS

- A. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2025.

PART 2 PRODUCTS

2.01 JOINT SEALANT APPLICATIONS

- A. Scope:
 - 1. Exterior Joints:
 - a. Coordinate all sealing with Pre-Engineered Metal Building provided by others.
 - b. Seal the following joints:
 - 1) Wall expansion and control joints.
 - 2) Joints between doors, windows, and other frames or adjacent construction.
 - 3) Joints between different exposed materials.
 - 4) _____.
 - 2. Interior Joints:
 - a. Do not seal interior joints indicated on drawings as not sealed.
 - b. Do not seal gaps and openings in gypsum board and suspended ceilings
 - c. Do not seal through-penetrations in sound-rated assemblies that are also fire-rated assemblies.
 - 3. Do Not Seal:
 - a. Intentional weep holes in masonry.
 - b. Joints indicated to be covered with expansion joint cover assemblies.
 - c. Joints where sealant installation is specified in other sections.

2.02 JOINT SEALANTS - GENERAL

2.03 ACCESSORIES

- A. Sealant Backing Materials, General: Materials placed in joint before applying sealants; assists sealant performance and service life by developing optimum sealant profile and preventing three-sided adhesion; type and size recommended by sealant manufacturer for compatibility with sealant, substrate, and application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

- A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

- B. Provide joint sealant installations complying with ASTM C1193.
- C. Install bond breaker backing tape where backer rod cannot be used.
- D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- E. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

END OF SECTION

**SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-fire-rated hollow metal doors and frames.
- B. Thermally insulated hollow metal doors with frames.

1.02 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames; 2025.
- C. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2024.
- D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.
- E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2025.
- F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2025.
- G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2024.
- 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; 2023.
- I. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

PART 2 PRODUCTS

2.01 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.
- B. 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.

2.02 HOLLOW METAL DOORS

- A. Type HM-X , Exterior Doors: Thermally insulated.
 - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 1 - Standard-duty.
 - b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 - d. Door Face Metal Thickness: 20 gauge, 0.032 inch (0.8 mm), minimum.
 - 2. Door Thickness: 1-3/4 inches (44.5 mm), nominal.
- B. Type HM , Interior Doors, Non-Fire-Rated:
 - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).

- a. Level 1 - Standard-duty.
 - b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 - d. Door Face Metal Thickness: 20 gauge, 0.032 inch (0.8 mm), minimum.
2. Door Thickness: 1-3/4 inches (44.5 mm), nominal.

2.03 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Frame Finish: Factory primed and field finished.
- C. Exterior Door Frames: Full profile/continuously welded type.
 1. Weatherstripping: Separate, see Section 08 71 00.
- D. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
 1. Terminated Stops: Provide at interior doors; closed end stop terminated 6 inch (150 mm), maximum, above floor at 45 degree angle.

2.04 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Factory Finish: Complying with ANSI/SDI A250.3, manufacturer's standard coating.
 1. Color: As selected by Owner from Manufacturer's standard color range..

2.05 ACCESSORIES

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

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Coordinate frame anchor placement with wall construction.
- C. Install door hardware as specified in Section 08 71 00.
- D. Touch up damaged factory finishes.

END OF SECTION

**SECTION 08 33 23
OVERHEAD COILING DOORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Exterior coiling doors.

1.02 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2025.

PART 2 PRODUCTS

2.01 COILING DOORS

- A. Exterior Coiling Doors Type OHD: Steel slat curtain.
 - 1. Capable of withstanding positive and negative wind loads of 20 psf (940 Pa) without undue deflection or damage to components.
 - 2. Sandwich Slats: Manufacturer's standard, with core of foamed-in-place polyurethane insulation; minimum R-value of 4.88 (RSI-value of 0.86).
 - a. Vision Lites: Dual pane glazed.

2.02 MATERIALS

- A. Metal Curtain Construction: Interlocking slats.
 - 1. Curtain Bottom for Slat Curtains: Fitted with angles to provide reinforcement and positive contact in closed position.
 - 2. Weatherstripping for Exterior Doors: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure of exterior doors.
 - 3. Steel Slats: Minimum thickness, ___ gauge, ___ inch (___ mm); ASTM A653/A653M galvanized steel sheet.
- B. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.
- C. Lock Hardware:
 - 1. Slide Bolt: Provide on single-jamb side, extending into slot in guides, with padlock on one side.
 - 2. Manual Chain Lift: Provide padlockable chain keeper on guide.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

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**SECTION 09 21 16
GYPSUM BOARD ASSEMBLIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Acoustic insulation.
- B. Gypsum wallboard.

1.02 REFERENCE STANDARDS

- A. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2024.
- B. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2024.
- C. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2024.
- D. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.
- E. GA-216 - Application and Finishing of Gypsum Panel Products; 2024.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.

2.02 BOARD MATERIALS

- A. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 - 1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - a. Mold resistant board is required at all locations.
 - 3. Thickness:
 - a. Vertical Surfaces: 5/8 inch (16 mm).

2.03 GYPSUM BOARD ACCESSORIES

- A. Acoustic Insulation: ASTM C665; preformed mineral-fiber, friction fit type, unfaced; thickness 2 inches (50.8 mm).

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.

3.03 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

END OF SECTION

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**SECTION 09 51 00
ACOUSTICAL CEILINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

1.02 REFERENCE STANDARDS

- A. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2022.
- B. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2023.

PART 2 PRODUCTS

2.01 ACOUSTICAL UNITS

- A. Acoustical Panels, Type A1: Painted mineral fiber, with the following characteristics:
 - 1. Applications: ALL CEILING TILE.
 - 2. Classification: ASTM E1264 Type A.
 - 3. Size: 24 by 24 inches (610 by 610 mm).
 - 4. Thickness: 3/4 inch (19 mm).
 - 5. Moisture Resistant Material.
 - 6. Panel Edge: Square.
 - 7. Suspension System: Exposed grid.
- B. Acoustical Panels, Type A1: Mineral fiber with membrane-faced overlay, with the following characteristics:

2.02 SUSPENSION SYSTEMS

- A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold-down clips, stabilizer bars, clips, and splices as required.

PART 3 EXECUTION

3.01 INSTALLATION - SUSPENSION SYSTEM

- A. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- B. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- C. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- D. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- E. Support fixture loads using supplementary hangers located within 6 inches (152 mm) of each corner, or support components independently.
- F. Do not eccentrically load system or induce rotation of runners.

3.02 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.

- D. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- E. Cutting Acoustical Units:
 - 1. Make field cut edges of same profile as factory edges.

END OF SECTION

**SECTION 09 91 23
INTERIOR PAINTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
 - 1. Mechanical and Electrical:
 - a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
 - 5. Floors, unless specifically indicated.
 - 6. Glass.
 - 7. Concealed pipes, ducts, and conduits.

1.02 REFERENCE STANDARDS

- A. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.

PART 2 PRODUCTS

2.01 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready-mixed, unless intended to be a field-catalyzed paint.
 - 1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Supply each paint material in quantity required to complete entire project's work from a single production run.
 - 3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

2.02 PAINT SYSTEMS - INTERIOR

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Test shop-applied primer for compatibility with subsequent cover materials.
- D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
 - 1. Gypsum Wallboard: 12 percent.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.

- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- F. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

END OF SECTION

**SECTION 12 32 00
MANUFACTURED WOOD CASEWORK**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured standard casework, with cabinet hardware.
- B. Countertops.

1.02 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- C. BHMA A156.9 - Cabinet Hardware; 2020.
- D. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.
- E. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

PART 2 PRODUCTS

2.01 CASEWORK, GENERAL

- A. Quality Standard: AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Plastic Laminate Faced Cabinets: Premium Grade.

2.02 FABRICATION

- A. Assembly: Shop assemble casework items for delivery to site in units easily handled and to permit passage through building openings.
- B. Construction: As required for selected grade.
- C. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.

2.03 PLASTIC-LAMINATE-CLAD CASEWORK

- A. Plastic-Laminate-Clad Casework: Solid wood and wood panel construction; each unit self-contained and not dependent on adjacent units or building structure for rigidity; in sizes necessary to avoid field cutting except for scribes and filler panels. Include adjustable levelers for base cabinets.
 - 1. Style: Flush overlay. Ease doors and drawer fronts slightly at edges.
 - 2. Cabinet Nominal Dimensions: Unless otherwise indicated, provide cabinets of widths and heights indicated on drawings, and with following front-to-back dimensions:
 - a. Base Cabinets: 22 inches (559 mm).
 - b. Tall Cabinets: 22 inches (559 mm).
 - c. Wall Cabinets: 16 inches (406 mm).
 - 3. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline.
 - a. Finish: Matte or suede, gloss rating of 5 to 20.

2.04 COUNTERTOPS

- A. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
 - 1. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.

2.05 CABINET HARDWARE

- A. Manufacturer's standard types, styles and finishes.

- B. Comply with BHMA A156.9 requirements.
 - 1. Acceptable base materials for plated finishes include brass, bronze, and steel.

END OF SECTION

SECTION 220000 – SINGLE SECTION PLUMBING

A. GENERAL

1. GENERAL CONDITIONS

- a. Drawings, all Contract Documents, and Division-1 Specifications sections, apply to work of this Section.
- b. Where the term "Contractor" is used it shall mean the Plumbing Contractor.
- c. Contractors bidding on this section are notified that they shall hold a license for Plumbing as issued by the North Carolina State Board of Examiners of Plumbing and Heating Contractors.
- d. Reference shall be made to the Architectural, Structural, Heating and Air-conditioning, and Electrical drawings and specifications for details of building construction and for coordination with other parts of construction.
- e. Contractor shall visit the job site before the submission of a bid and familiarize himself with existing conditions. Submission of a bid will be considered as evidence that the Contractor has visited the site and is familiar with existing conditions.

2. BIDDING

- a. See General conditions.

3. SCOPE OF THE WORK

- a. The work to be done under this contract consists of furnishing all labor, materials, equipment, devices, appliances, tools, transportation, and services as required, and in performing all functions to completion and leave ready for operation the installation of the plumbing work in strict accordance with these specifications and applicable drawings and subject to the terms and conditions of the contract.
- b. Obtain all permits and make all test.

4. INTENT

- a. It is the intention of the specifications and drawings to call for finished work, tested, and ready for operation. Work shall be installed in accordance with the drawings and specifications using skilled workmen.
- b. It shall be the responsibility of this Contractor upon discovering any discrepancies in the drawings or specifications or points of conflict therein, to immediately notify the Owner who will clarify such discrepancies or conflicts in writing before the work progresses beyond said point. No extras will be allowed because of failure to properly notify the Owner.

5. CODE, PERMITS AND INSPECTIONS

- a. All work under this specification shall comply with all local and state codes, laws, ordinances and regulations. Wherever the drawings and specifications are in excess of such laws, ordinances and regulations, the drawings and specifications shall hold.

- b. Contractor shall obtain permits and arrange all inspections necessary for the installation of this work, paying all fees in connection therewith, and furnishing the Owner with certificates of inspection from all authorities having jurisdiction.
- c. No piping or other construction shall be covered up or concealed until it has been inspected, tested and approved. The Contractor shall furnish all labor, materials, water, fuel, equipment, and apparatus and bear all expenses of such tests as are hereinafter specified for the work under this section of the specifications.

6. DRAWINGS AND SPECIFICATIONS

- a. The plumbing drawings show the general arrangement of all piping, equipment and appurtenances and shall be followed as closely as actual building construction will permit.
- b. Plumbing work shall conform to the requirements shown on all the drawings. Architectural and Structural drawings shall take precedence over Plumbing drawings. Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall investigate the structural and finish conditions affecting the work and shall arrange his work accordingly, providing such fittings, valves and accessories as may be required to meet such conditions.
- c. The drawings and specifications are complementary each to the other and what is called for by one shall be as binding as if called for by both.
- d. Omission of particular reference to any item necessary for a complete installation and proper operation thereof, shall not relieve the Contractor of the responsibility of furnishing same.

7. COORDINATION OF WORK

- a. The Contractor shall coordinate the work with other contractors on the project. All work shall be so arranged that there will be no delay in the proper installation and completion of any part or parts of all piping systems and equipment. Work shall be installed in proper sequence with other trades, and without unnecessary delays.
- b. The layout shown shall be followed as closely as circumstances will permit but the Contractor must lay out his work so as not to conflict with other trades and to avoid any unnecessary cutting of or damage to walls, floors or other parts of his equipment.
- c. Whenever interferences might occur, before installing any of the work in question, the Contractor shall consult with other contractors and shall come to an agreement with them as to the exact location and level of his piping and other parts of his equipment.
- d. Locations of pipes, equipment, and appurtenances shall be adjusted to accommodate the work to interferences anticipated and encountered. The Contractor shall determine the exact route and location of each pipe prior to fabrication. Lines, which pitch, shall have right of way over those which do not pitch. Lines whose elevations cannot be changed shall have right of way over lines whose elevations can be changed.
- e. Offsets and changes in direction in pipes shall be made as required to maintain proper head room and pitch of sloping lines whether or not indicated on the drawings. The Contractor shall furnish and install all accessories as required to effect these offsets and changes in direction.

8. EQUIPMENT AND MATERIALS

- a. Catalog numbers and trade names in these specifications and noted on the drawings are intended to describe the material, devices or apparatus wanted. Similar materials, devices or apparatus of other manufacturers, if of equal quality, capacity and character, may be substituted on the written approval of the Owner. If the Contractor fails to comply with the provisions of this paragraph, he shall be required to furnish all materials and equipment as specified.
- b. All materials shall be new and bear the manufacturer's name, trade name and the UL Label in every case where a standard has been established for the particular material. The equipment to be furnished shall be essentially the standard product of a manufacturer regularly engaged in the production of the required type of equipment, and shall be the manufacturer's latest approved design.
- c. Equipment and materials shall be delivered to the site and stored in original containers, suitably sheltered from the elements, but readily accessible for inspection until installed.
- d. Equipment and materials of the same general type shall be of the same make throughout the work to provide uniform appearance, operation and maintenance.
- e. Equipment shall be tightly covered and protected against dirt, water and chemical or mechanical injury and theft. Damage or defects developing before acceptance of the work shall be made good at the Contractor's expense.
- f. Dimensions: It shall be the responsibility of the Contractor to insure that items to be furnished fit the space available. He shall make necessary field measurements to ascertain space requirements, including those for connections, and shall furnish and install such sizes and shapes of equipment that the final installation shall suit the true intent and meaning of the drawings and specifications.

9. EQUIPMENT ACCESSORIES

- a. The Contractor shall furnish and install all equipment, accessories, connections and incidental items necessary to fully complete the work, ready for use, occupancy and operation by the Owner.
- b. Supports: The Contractor shall support plumb, rigid and true to line all work and equipment furnished under this section. The Contractor shall study thoroughly all general, structural, mechanical and electrical drawings, shop drawings, and catalog data to determine how equipment, fixtures, piping, etc., are to be supported, mounted or suspended and shall provide extra steel bolts, inserts, pipe stands, brackets and accessories for proper support whether or not shown on the drawings.

10. CUTTING, PATCHING, AND REPAIRING

- a. In new construction, the General Contractor will provide all openings in wall, floor, and roof construction required by the Plumbing Contractor for installation of his work, provided complete information is furnished to the General Contractor at the time required. Failure to provide necessary information will necessitate provisions of additional required openings, chases, recesses, etc., by Plumbing Contractor at his own expense, and he shall be fully responsible for the proper cutting and patching of such construction as approved and directed by the Owner.
- b. Where pipes or conduit pass through walls, floors, or roofs, sleeves shall be furnished by this Contractor and installed, except as noted otherwise, by the trade furnishing and installing the material in which they are located. Location of sleeves, inserts, and supports

shall be as directed by this Contractor who will also insure that they are properly installed. Sleeves shall be neatly sawed, sheared, or cut with wheeled cutters. No flame cutting will be permitted.

- c. Each trade shall bear the expense of all cutting, patching, repairing or replacing of the work of other trades required because of his fault, error or tardiness or because of any damage done by him.
- d. Under no circumstances shall the Contractor cut any structural beam or support without prior approval and instructions from the Owner.
- e. If Plumbing Contractor installs Plumbing work through exposed finish walls, ceiling or floor after they are in place, the Plumbing Contractor shall close excess openings around his work to match finish surface.

11. SHOP DRAWINGS AND SUBMITTAL DATA

- a. The Contractor shall submit to the Owner after the award of the contract, a folder containing catalog cuts and descriptions giving name of manufacturer, trade name, type, catalog number and location in work, of all equipment which he proposes to use in the execution of the contract.
- b. Approval is solely for the purpose of determining suitability and will in no way absolve the Contractor of his responsibility for the correctness of measurements, quantities, or performance. Approval of shop drawings shall not constitute a change in the contract requirements.
- c. Shop drawings must comply with the requirements of all regulatory bodies having jurisdiction.
- d. Contractor shall furnish at least five (5) copies of submittal data. Three (3) copies will be returned to the Contractor. If the Contractor desires the return of more than three (3) copies, additional copies shall be furnished at the time of original submission.

12. WORKMANSHIP

- a. The work throughout shall be executed in the best and most thorough manner, under the periodic observation of and to the satisfaction of the Owner and Engineer who will jointly interpret the meaning of the drawings and specification, and shall have the power to reject any work or materials which, in their judgment, are not in full accordance therewith.

13. SINGULAR

- a. In all cases where a device or piece of equipment is referred to herein or on the drawings in the singular number, it is intended that such reference shall apply to as many such devices as are required to complete the installation.

14. USE OF THE WORD "PROVIDE"

- a. Herein, where the word "Provide" is written in these specifications, provide shall be understood to mean provide complete in place, that is, "Furnish and Install".

15. SUPERVISION AND SUPERINTENDENCE

- a. The Contractor shall, during the progress of the work, maintain a competent superintendent, who shall not be change d except if he proves unsatisfactory to the

Contractor or the Owner. Efficient supervision shall be given to all work under this contract.

B. PRODUCTS

1. EXCAVATION, TRENCHING, AND BACKFILL

- a. Unless noted otherwise on the drawings, the Plumbing Contractor shall do all excavation and backfill required for his work. Unless otherwise shown, provide separate trenches for each sanitary sewer, storm sewer, and water line. Lay all pipe in open trenches except when the Owner gives written permission for tunneling.
- b. Sheeting, Bracing, and Water Removal: Sheet and brace trenches, and remove water as necessary to fully protect workmen and adjacent structures and permit proper installation of the work. Comply with all local regulations or, in the absence thereof, with the provisions of the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America, Inc. Under no circumstances lay pipe or install appurtenances in water. The trench shall be kept free from water until pipe joint material has hardened. The presence of ground water in the soil or the necessity of sheeting or bracing trenches shall not constitute a condition for which any increase may be made in the contract price. Sheeting shall not be removed until the trench is substantially backfilled.
- c. Rock Excavation: The material to be excavated is assumed to be earth and debris encountered in the project area. If rock should be encountered, an agreed extra compensation will be allowed. Earth shall include all material that can be removed by a 3/4-yard power shovel. Rock is defined as rock, stone, hard shale in original ledge, boulders, masonry and rock fragments over nine (9) cubic feet in volume, and cannot be removed by power shovel or without the use of explosives or drills.
- d. Blasting: The written consent and approval of method from the Owner must be obtained before explosives are used, and if used, all local regulations, laws, and ordinances shall be observed. Cover blasts with heavy timbers or mats and set off no blast within twenty-five (25) feet of pipe already laid in the trench. Protect pipe already laid with earth backfill.
- e. Grading Trench Bottoms: Grade the bottom of trenches evenly to insure uniform bearing for the full length of all pipes. Cut holes as necessary for joints and joint making. Excavate all rock, cemented gravel, or other hard materials to at least four (4) inches below the pipe at all points. Refill to grade with sand or fine gravel firmly compacted.
- f. Backfill trenches only after piping has been inspected, tested and locations of pipe and appurtenances have been recorded. Backfill by hand around pipe and for a depth of one (1) foot above the pipe using earth without rock fragments or large stones, and tamp firmly in layers not exceeding six (6) inches in thickness, taking care not to disturb the pipe or injure the pipe coating. Compact the remainder of the backfill thoroughly with a rammer of suitable weight or with an approved mechanical tamper, in layers not exceeding six (6) inches in thickness. All cinders and rubbish shall be prohibited from all trenches.

All fill within the building shall be compacted to 95 per cent of the maximum standard Proctor density.

2. SANITARY, WASTE, AND VENT LINES

- a. The following lines and fittings shall be Schedule 40 PVC:

Underfloor and underground waste lines

- b. The following lines and fittings shall be Schedule 40 PVC:

Above floor sanitary waste lines

Above floor vent lines

- c. Installation:

- i. Piping of sizes shown shall be run as indicated on the drawings. All extensions above the roof shall be made according to code and as detailed on the drawings. Soil waste and vent stacks shall be run in partitions and suspended above ceilings where indicated. Vertical vent pipes shall be connected together into one main vent stack or riser above the fixtures and vented as indicated on riser diagrams. Vents and branch vent lines shall be free from drops or sags and be graded and connected so as to drip back into the soil or waste pipe by gravity. Where vent pipes connect to the horizontal soil or waste pipe, the vent branch shall be taken off above the center line of the pipe and the vent pipe extended vertically or at an angle of forty-five (45) degrees to the vertical before off-setting or connecting to branch, main waste or soil vent.
- ii. Vents from any fixture or line of fixtures, when connected to a vent line serving other fixtures, shall be extended at least six (6) inches above the flood level rim of the highest of such fixtures to prevent use of the vent line as a waste. Extensions of vent pipes through a roof shall be terminated not less than twelve (12) inches above the roof.
- iii. Horizontal drainage piping shall be installed in practical alignment at the grade shown on the drawings, but in no case less than a uniform grade of 1/8 inch per foot for sizes 3" and larger. For sizes 2" and smaller grade shall be not less than 1/4 inch per foot.
- iv. Changes in direction in drainage piping shall be made by the appropriate use of forty-five (45) degrees wyees, half-wyees, or long sweep quarter, sixth, eighth, or sixteenth bends. Sanitary tees or short quarter bends may be used when two (2) fixtures are installed back to back and have a common drain. Straight tees, elbows, and crosses may be used on vent lines. No change in direction of flow greater than ninety (90) degrees shall be made. Where different sizes of drainage pipes or pipes and fittings are to be connected, standard increasers and reducers of proper size shall be used. Reduction of the size of drainage piping in the direction of flow is prohibited.
- v. Drilling and tapping of house drains, soil, waste or vent pipes, and the use of saddle hubs and bands are prohibited.
- vi. Cross-connections or any fixtures, devices, or construction which will permit backflow connections between a water distribution system and any part of the drainage system shall not be installed.
- vii. All piping shall be made permanently gas and water tight. Any fitting or connection which has an enlargement, chamber, or recess with a ledge or shoulder or reduction of the pipe area that offers an obstruction to flow through the pipe shall not be installed. Threaded joints shall be made with a lubricant on the male thread only.

All burrs or cutting shall be removed and pipe shall be reamed or filed out to not less than the original diameter.

- viii. Floor connections for water closets and other fixtures shall be made by means of an approved brass, or iron flange, caulked, into the drainage pipe. The connection shall be bolted, with an approved gasket or approved setting compound between the fixture base and the connections.

3. WATER PIPING, COLD AND HOT

- a. Copper tubing, water, ASTM Specification B-88-55, Type K and Type L.
- b. Soldered joint fittings, wrought type, American Standard Specification B-16 22-1951. Fittings to be of same manufacturer as copper tubing.
- c. Silver Solder: 15% silver, 80% copper, 5% phosphorous conforming to ASTM B 260-52T.
- d. 95/5 Solder: 95% tin, 5% antimony.
- e. Above-ground Piping: Seamless, type L, hard drawn copper with wrought copper fittings.
- f. Underground Piping: Piping shall be seamless, type K, soft copper with wrought copper fittings.
- g. Valves: Valves shall have the name and trademark of the manufacturer and the guaranteed working pressure cast on the body of the valve. All valves shall be of one manufacturer and identified by manufacturer's catalog number stamped on a metal disk located under the valve handle nut. Valves shall be bronze NIBCO S-111 or approved equal.
- h. Installation:
 - i. All piping shall be provided with identification in accordance with ANDI A13.1-1981 standards. Markers shall be located at each wall, floor, and ceiling penetration, and at every 20ft. Markers shall be fully legible from floor level showing medium contained in pipe, and direction of flow.
 - ii. Contractor shall provide hot and cold water mains with branches and risers complete from point indicated on plans running to all fixtures and other outlets indicated. Mains and branches shall be run generally as shown on the drawings. Contractor shall provide all interior water piping, branches, and risers as shown on the drawing and shall make connections to all plumbing fixtures, hose bibbs, wall hydrants, and other points requiring water under this and other divisions of the specifications.
 - iii. All water mains and branches shall be pitched at least one (1) inch in twenty-five (25) feet toward fixtures. The piping installation shall be arranged so that the entire system can be drained through fixture supply connections. Unions shall be installed at the connections to each piece of equipment to allow removal of equipment without dismantling connecting piping.
 - iv. Size of all water piping shall be as shown on the drawings. Sizes for connections to fixtures and equipment shall be not less than shown in the schedules on the drawings.
 - v. Plumbing Contractor shall be held responsible for any damage to any work installed by others caused by leaks or improper installation of the piping system. The

Contractor shall coordinate his work with that of the Heating Contractor and where interference occurs, shall procure approval from the Owner before installation of the work.

- vi. Provide eighteen (18) inch high air chambers at fixtures with flush valves. At other fixtures air chambers shall be eighteen (18) inches high. Pipe size for air chambers shall be same as supply to fixture.
- vii. Soldered or Bronzed Joints: Joints 1-1/4 inches and larger shall be made with silver solder. For joints less than 1-1/4 inches and all valves (regardless of size) use 95/5 solder. Also use a non-corrosive paste flux in accordance with manufacturer's instructions. All joints shall be thoroughly cleaned with emory cloth and reamed cut before assembly. Acid core solder will not be permitted.
- viii. Pipe penetrations through floor slabs and fire rated walls shall be restored to the slab or fire rated wall's original rating and shall be sealed with impervious non-combustible materials sufficiently tight to prevent transfer of smoke or combustion gases from one side of the wall or slab to the other in accordance with UL methods.
- ix. As appropriate to the penetration size and location, provide firestopping using one of the following:
 - x. High-temperature non-shrink grout shall be installed in accordance with recommendations of ACI, CSI and the manufacturer's specifications.
 - xi. Fill openings with Thermafiber Safing insulation.
 - xii. Caulk full depth of wall or floor with 3M fire barrier; material - No. 25 caulk or 303 putty.
 - xiii. Penetrations through existing construction shall be neatly drilled or cut, and the opening completely filled around the penetrating pipe with the approved firestopping material. Solid masonry and concrete walls as well as concrete slabs shall be core drilled. Diameter of core drilled holes shall be from 3/4 inch to 1-1/2 inch bigger than the outside diameter of pipe. Pipe shall be secured within 18 inches of the penetration, both sides, from other than the fire wall or slab itself.

4. OPEN ENDS

- a. This Contractor shall keep all ends of piping including those extending above the roof, drains, and fixture branches closed with caps or plugs so as to prevent dirt from building materials from getting into pipes and traps during construction.

5. HANGERS, ANCHORS, AND GUIDES

- a. All piping in building shall be rigidly supported from the building structure by means of approved hangers and supports. Piping shall be supported to maintain required grading and pitching of lines, to prevent vibration, and to secure piping in place and shall be so arranged as to provide for expansion and contraction.
- b. Generally, pipe hangers shall be attached to 1-1/2" x 1- 1/2" x 1/4" angles supported between joists or supported from clamps attached to bar joists. Use trapeze hangers, 1-1/2" x 1-1/2" x 1/4" angles, where possible and lines can be grouped. Trapeze hanger to be supported from joists by beam clamps.
- c. Spacing of hangers shall not be greater than the following:

- b. All fixtures shall have the manufacturer's guarantee label or trademark indicating first quality. All enameled ware shall bear the manufacturer's symbol signifying acid resisting enamel.
- c. Quantities: The Contractor is referred to the Architectural and Plumbing drawings for the quantities of fixtures to be furnished under this division of the specifications which shall be deemed to include all plumbing fixtures shown of the type described hereinafter, complete with all necessary trimmings.
- d. All supply fittings to lavatories, urinals, and water closets through wall to valve and to fixture shall be chrome plated brass, complete with chrome plated escutcheon.
- e. The fixtures herein, specifying catalog numbers, show the type and quality of plumbing fixture desired in each instance. Owner approved equal fixtures of the following manufacturers will be acceptable.

Fixtures	American-Standard, Kohler, Eljer, Elkay, Just
Trim	As for fixtures plus Chicago Faucet, Sloan, Delta, Symmons, McGuire
Seats	Church, Beneke, Olsonite
Carriers	Josam, Wade, Zurn
Floor Drains	Josam, Wade, Zurn
Cleanouts	As for floor drains
Water Cooler	Halsey Taylor, Elkay, Sunroc
Water Heater	Rudd, State, A.O. Smith

- f. All fixtures shall be white
- g. Refer to drawings for fixture schedule.

C. EXECUTION

1. ELECTRICAL CONNECTIONS OF EQUIPMENT

- a. Wiring from disconnect switches, junction boxes, panel board circuit breakers, etc. up to mechanical equipment shall be by the electrical contractor. Final electrical connections to plumbing equipment shall be by this contractor.
- b. Control wiring and control connections for plumbing systems is by this Contractor.

2. PROTECTION DURING CONSTRUCTION

- a. Plumbing fixtures and trim shall be protected against damage or injury due to building materials, acid, tools, equipment, or any causes incidental to construction.
- b. The finished surface of each fixture shall be covered with building paper or similar protection. All fixtures damaged by any cause, and any trim with marred or scratched finish shall be replaced at nocost to the Owner. The fixture and fixture trim protection shall be removed at the completion of construction.

3. TESTS

- a. Concealed work shall remain uncovered until required tests have been completed, but if necessary, tests on portions of the work may be made and those portions of the work may be concealed after being proved satisfactory. Repairs of defects that are discovered as a result of inspections or tests shall be made with new materials. Caulking of screwed joints, cracks, or holes will not be accepted. Test shall be repeated after defects have been eliminated.
- b. Drainage System Tests:
 - i. A water test shall be applied to all parts of the drainage systems before the pipes are concealed or fixtures set in place. The test may be applied in sections. All openings of each system to be tested shall be tightly closed except the highest opening above roof, and the entire system shall be filled with water up to the overflow point of this highest opening.
 - ii. All parts of the system shall be subject to not less than ten (10) feet of hydrostatic head except the uppermost ten (10) feet of the piping directly below the opening. The water shall remain in the system for not less than fifteen (15) minutes after which time no leaks at any joint or lowering of the water level at the overflow shall be visible.
- c. Water Supply System:
 - i. A water pressure test shall be applied to all parts of the water supply system before the piping is concealed or before the fixtures are connected. A hydrostatic pressure of not less than one hundred twenty-five (125) pounds per square inch shall be applied to the system, and there shall be no leaks at any point in the system at this pressure. An air or gas test is not acceptable.

4. STERILIZATION

- a. All the new water piping and affected existing water piping, including all valves, fixtures, fittings, and other devices connected hereto, shall be sterilized with a solution containing not less than fifty (50) parts per million of available chlorine. The chlorinating material shall be liquid chlorine gas-water mixture, calcium hypochlorite, sodium hypochlorite, or chlorinated lime and water mixture conforming to the standards of the American Water Works Association and shall be introduced into the system in an approved manner.
- b. The sterilization solution shall be allowed to remain in the system for a minimum period of twenty-four (24) hours, but until pronounced safe and fit for human consumption by the Owner based on samples drawn from the system and tested. During the sterilizing period all valves and outlets shall be opened and closed several times. After sterilization, the solution shall be flushed from the system with clean water until residual chlorine content is not greater than 0.2 parts per million unless otherwise directed. After the system has been flushed, additional samples will be taken and tests made; if the water is found unsafe for human consumption, the sterilization procedure specified herein before shall be repeated.

5. CLEANING AND ADJUSTING

- a. Upon completion of work, all surplus material and rubbish shall be removed from premises. Fixtures shall be cleaned; all valves adjusted; all escutcheons and plates installed; all floor drains cleaned, and all mortar and foreign matter removed from all exposed plumbing work.

- b. Any stoppage or discoloration or other damage to parts of the building, its finish, or furnishing, due to the Contractor's failure to properly clean the piping system shall be repaired by the Contractor without cost to the Owner.

6. EMERGENCY REPAIRS

- a. The Owner reserves the right to make, or have made, repairs to the plumbing system within the guarantee period as required to keep the equipment in operation when the Plumbing Contractor is not available to make the necessary repairs. These necessary repairs shall in no way void the Contractor's guarantee bond nor relieve the Contractor of his responsibilities during the bonding period.

7. PAINTING

- a. All factory finished metal surfaces of plumbing equipment installed that are damaged during construction shall be restored to the original condition.
- b. Contractor shall paint all iron and steel, including pipe hangers, that do not have a factory finish or galvanized finish used for support of equipment. Prime with one coat of oil base primer followed by one coat of oil base finish coat.

8. MAINTENANCE AND OPERATING MANUALS

- a. At the completion of this project the contractor shall furnish the Owner three (3) operating and maintenance manuals containing a brief description of each system and its various components. Instructions must give full details of the operation of all equipment installed, and shall include manufacturer's printed operating and maintenance instructions, detailed data and bulletins covering all material furnished under the contract giving all necessary illustrations and diagrams and a composite schedule of periodic servicing and lubrication requirements and replacement parts.

9. AS BUILT DRAWINGS

- a. Contractor shall keep and maintain in good order a record of any waste, vent, or water piping that deviates from drawings for any reason. This record shall be made available to the Owner on the date of substantial completion and shall be legible and accurate so as to be directly transferable to an as-built reproducible drawing.
- b. Contractor shall provide to the Owner actual dimensions of all waste and water lines installed on exterior of building, giving dimensions to new and/or existing buildings.

10. GUARANTEE

The Contractor shall deliver the system to the Owner complete in first-class operating condition in every respect and shall guarantee the material and workmanship for a period of one (1) year from the date of acceptance. If, during that time, any defect should show up due to defective material, negligence, or want of proper care on the part of the Contractor, he shall furnish such new materials as are necessary to repair such defects and place same in working order at his own expense on receipt of notice of such from the Owner or Owners.

END OF SECTION 220000

SECTION 230000 – SINGLE SECTION MECHANICAL

A. GENERAL

1. GENERAL CONDITIONS

- a. Drawings, all Contract Documents, and Division-1 Specifications sections, apply to work of this section.
- b. Where the term "Contractor" is used, it shall mean the HVAC Contractor.
- c. Contractors bidding on this section are notified that they shall hold licenses for Heating H-2 and H-3 as issued by the State Board of Examiners of Plumbing and Heating Contractors.
- d. Reference shall be made to the Architectural, Structural, Plumbing and Electrical drawings and specifications for details of building construction and for coordination with other parts of construction.
- e. Contractor shall visit the job site before the submission of a bid and familiarize himself with existing conditions. Submission of a bid will be considered as evidence that the Contractor has visited the site and is familiar with existing conditions.

2. BIDDING

- a. The HVAC work shall be included under the General Contract.

3. SCOPE OF WORK

- a. The work to be done under this contract consists of furnishing all labor, materials, equipment, devices, appliances, tools, transportation, and services as required, and in performing all functions to complete and leave ready for operation the installation of the HVAC system in strict accordance with these specifications and applicable drawings; and subject to the forms and conditions of the contract.
- b. The work shall include the following items but is not intended to cover every item in detail. The list is not necessarily a complete list:
 - i. Heat Pump (DX Indoor Unit)
 - ii. Heat Pump (DX Outdoor Unit)
 - iii. Exhaust Fans
 - iv. Pipe Penetrations
 - v. Sheet Metal Work
 - vi. Grilles
 - vii. Insulation

4. INTENT

- a. It is the intention of the specifications and drawings to call for finished work, tested, and ready for operation. Work shall be installed in accordance with the plans and specifications using skilled workmen.

- b. It shall be the responsibility of this Contract or upon discovering any discrepancies in the drawings or specifications or points of conflict therein to immediately notify the Owner who will clarify such discrepancies or conflicts in writing before the work progresses beyond said point. No extras will be allowed because of failure to properly notify the Owner.

5. CODES, PERMITS AND INSPECTIONS

- a. All work under this specification shall comply with all local and state codes, laws, ordinances and regulations particularly Volume III of the North Carolina State Building Code. Wherever the drawings and specifications are in excess of such laws, ordinances and regulations, the drawings and specifications shall hold.
- b. Contractor shall obtain permits and arrange all inspections necessary for the installation of this work, paying all fees in connection there with, and furnishing the Owner with certificates of inspection from all authorities having jurisdiction.
- c. No piping or other construction shall be covered up or concealed until it has been inspected, tested and approved. The Contractor shall furnish all labor, materials, fuel, equipment, and apparatus and bear all expenses of such tests as are hereinafter specified for the work under this section of the specifications.

6. DRAWINGS AND SPECIFICATIONS

- a. The HVAC drawings show the general arrangement of all piping, ductwork, equipment, and appurtenances and shall be followed as closely as actual building construction will permit.
- b. HVAC work shall conform to the requirements shown on all the drawings. Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings and accessories, which may be required. The Contractor shall investigate the structural and finish conditions affecting the work and shall arrange his work accordingly, providing such fittings; valves and accessories as may be required to meet such conditions.
- c. The drawings and specifications are complimentary each to the other and what is called for by one shall be as binding as if called for by both.
- d. Omission of particular reference to any item necessary for a complete installation and proper operation thereof, shall not relieve the Contractor of the responsibility of furnishing same.

7. COORDINATION OF WORK

- a. The Contractor shall coordinate the work with other contractors on the project. All work shall be so arranged that there will be no delay in the proper installation and completion of any part or parts of all piping system and equipment. Work shall be installed in proper sequence with other trades, and without necessary delays.
- b. The layout shown shall be followed as closely as circumstances will permit but the Contractor must lay out his work so as not to conflict with other trades and to avoid any unnecessary cutting of or damage to walls, floors or other supporting structural members.
- c. Whenever interferences might occur before installing any of the work in question, the Contractor shall consult with other contractors and shall come to an agreement with them as to the exact location and level of his piping and other parts of his equipment, subject to final approval of the Owner.

- d. Locations of pipes, equipment, and appurtenances shall be adjusted to accommodate the work to interferences anticipated and encountered. The Contractor shall determine the exact route and location of each duct prior to fabrication. Pipe lines which pitch shall have right of way over ductwork.
- e. Offsets and changes in direction in ducts shall be made as required to maintain proper headroom and to avoid sloping pipelines whether or not indicated on the drawings. The Contractor shall furnish and install all accessories as required to effect these offsets and changes in direction.

8. EQUIPMENT AND MATERIALS

- a. Catalog numbers and trade names in these specifications and noted on the drawings are intended to describe the material, devices or apparatus wanted. Similar materials, devices or apparatus of other manufacturers, if of equal quality, capacity and character, may be substituted on the written approval of the Owner. Proposed substitutions with descriptive data shall be submitted to the Owner at least ten days before the Bid date. If the Contractor fails to comply with the provisions of this paragraph, he shall be required to furnish all materials and equipment as specified.
- b. All materials shall be new and bear the manufacturer's name, trade name and the UL label in every case where a standard has been established for the particular material. The equipment to be furnished shall be essentially the standard product of a manufacturer regularly engaged in the production of the required type of equipment and shall be the manufacturer's latest approve design.
- c. Equipment and materials shall be delivered to the site and stored in original containers suitably sheltered from the elements but readily accessible for inspection until installed.
- d. Equipment and materials of the same general type shall be of the same make throughout the work to provide uniform appearance, operation and maintenance.
- e. Equipment shall be tightly covered and protected against dirt, water and chemical or mechanical injury and theft. Damage or defects developing before acceptance of the work shall be made good at the Contractor's expense.
- f. Dimensions: It shall be the responsibility of the Contractor to insure that items to be furnished fit the space available. He shall make necessary field measurements to ascertain space requirements, including those for connections, and shall furnish and install such sizes and shapes of equipment that the final installation shall suit the true intent and meaning of the drawings and specifications.
- g. Manufacturer's directions shall be followed completely in the deliver, storage, protection and installation of all equipment and materials. The Contractor shall promptly notify the Owner in writing of any conflict between any requirement of the contract documents and the manufacturer's directions and shall obtain the Owner's written instruction before proceeding with the work. Should the Contractor perform any work that does not comply with the manufacturer's directions or such written instruction from the Owner, h e shall bear all costs arising in correcting the deficiencies.

9. EQUIPMENT ACCESSORIES

- a. The Contractor shall furnish and install all equipment, accessories, connections and incidental items necessary to fully complete the work, ready for use, occupancy and operation by the Owner.

- b. Supports: The Contractor shall support plumb, rigid and true to line all work and equipment furnished under this section. The Contractor shall study thoroughly all general, structural, mechanical and electrical drawings, shop drawings, and catalog data to determine how equipment, fixtures, piping, etc. are to be supported, mounted or suspended and shall provide extra steelbolts, inserts, pipe stands, brackets and accessories for proper support whether or not shown on the drawings.

10. CUTTING, PATCHING AND REPAIRING

- a. In new construction the General Contractor will provide all openings in wall, floor, and roof construction required by HVAC Contractor for installation of his work provided complete information is furnished to the General Contractor at the time required. Failure to provide necessary information will necessitate provisions of additional required openings, chases, recesses, etc., by HVAC Contractor at his own expense, and he shall be fully responsible for the proper cutting and patching of such construction as approved and directed by the Owner.
- b. Each trade shall bear the expense of all cutting, patching, repairing or replacing of the work of other trades required because of his fault, error tardiness or because of any damage done by him.
- c. Under no circumstances shall the Contractor cut any structural beam or support without prior approval and instructions from the Owner.
- d. If HVAC Contractor installs HVAC work through exposed finish walls, ceiling or floor after they are in place, the HVAC Contractor shall close excess openings around his work to match finish surface.

11. SHOP DRAWINGS AND SUBMITTAL DATA

- a. The Contractor shall submit to the Owner after award of the contract, a folder containing catalog cuts and descriptions giving the name of the manufacturer, trade name, type, catalog number and location in work of all equipment which he proposes to use in the execution of the contract.
- b. After receiving the approval of the Owner, it shall be the responsibility of the Contractor to verify all dimensions and arrangements of equipment or apparatus with job conditions to insure correct application and installation.
- c. Contractor shall then prepare, or cause to be prepared, shop drawings showing in detail (a) the equipment he has been authorized to install, and (b) the methods by which the installation of his work is to be made. Shop drawings shall show make, model number, capacity, dimensions, construction, and all pertinent data regarding the equipment to be furnished. Shop drawings shall bear Contractor's stamp certifying that he has checked each item of equipment for size, location, capacities and performance that each item meets all conditions indicated on drawings and specified.
- d. The manufacturer's standard drawings will be accepted for manufacturer's standard production items if certified for installation at the location noted. Shop drawings shall be made for all items of equipment, specially fabricated for this contract.
- e. Shop drawings shall be submitted as soon after award of the contract as possible, allowing ample time for checking and processing and the Contractor shall assume responsibility for delays incurred due to rejected items. Failure to submit suitable drawings will not be considered sufficient cause for extension of time.

- f. Approval is solely for the purpose of determining suitability and will in no way absolve the Contractor of his responsibility for the correctness of measurements, quantities, or performance. Approval of shop drawings shall not constitute a change in the contract requirement.
- g. Shop drawings must comply with the requirements of all regulatory bodies having jurisdiction.
- h. Contractor shall furnish at least five (5) copies of submittal data. Three (3) copies will be returned to the Contractor.

12. WORKMANSHIP

- a. The work throughout shall be executed in the best and most thorough manner, under the periodic observation of and to the satisfaction of the Owner and the Engineer who will jointly interpret the meaning of the drawings and specifications and shall have the power to reject any work or materials which, in their judgment, are not in full accordance therewith.

13. SINGULAR

- a. In all cases where a device or piece of equipment is referred to herein or on the plans in the singular number, it is intended that such reference shall apply to as many such devices as are required to complete the installation.

14. USE OF THE WORD "PROVIDE"

- a. Herein, where the word "provide" is written in these specifications, "provide" shall be understood to mean provide complete in place, that is, "furnish and install".

15. SUPERVISION AND SUPERINTENDENCE

- a. The Contractor shall, during the progress of the work, maintain a competent superintendent who shall not be changed except if he proves unsatisfactory to the Contractor or the Owner. Efficient supervision shall be given to all work under this contract.

B. PRODUCTS

1. SPLIT SYSTEM HEAT PUMP (DX OUTDOOR UNIT)

- a. Unit casing shall be galvanized steel, zinc phosphated, baked enamel finish and fully weatherproof.
- b. Condenser coil shall be of non-ferrous construction, aluminum plate fins, mechanically bonded to seamless copper tube, sub-cooling circuitry.
- c. Condenser fans and motors shall be direct drive, propeller type fins, Class B motor insulation, inherent protection, permanently lubricated, resiliently mounted; fans shall have safety guards.
- d. Controls shall be factory wired and include high and low pressure stats, compressor overload devices, short cycling timer (5 min.), discharge line thermostats, oil pressure switches, pressure relief valve, and circuit breakers.
- e. A wire guard shall be provided over the condenser coils for protection from physical damage. The wire guard shall be either factory mounted or field erected.

- f. Compressor shall be hermetically sealed, high efficiency, with special lubricating system, bearing surfaces and motor installation, internal over-current, over temperature, and over-pressure protection and crankcase heater. The compressor shall have a five (5) year warranty.

2. SPLIT SYSTEM HEAT PUMP (DX INDOOR UNIT)

- a. Casing shall be galvanized steel, bonderized with baked enamel finish.
- b. Section shall have forward curved blades, centrifugal type, belt driven. Fan shall be statically and dynamically balanced and shall run on permanently lubricated bearings.
- c. Cooling coils shall be of non-ferrous construction with mechanically bonded aluminum plate fins on copper tube.
- d. Casing shall be insulated with fire retardant insulation in accordance with NFPA 90A. Insulation shall be secured to casing panels with waterproof cement and permanent fasteners.
- e. Condensate drain pan shall be furnished with threaded pipe connections and shall extend completely under the coil section. Internal insulation shall be wrapped waterproof and of rigid closed-cell polyurethane. Insulated copper piping is to be used for condensate drain lines.
- f. Electric heater assembly shall include circuit breakers, automatic re-setting limit switches and heat limiter for primary and secondary over-current and thermal protection.

3. EXHAUST FANS

- a. Bathroom Exhauster: Provide bathroom exhauster, designed for ceiling mounting, of type, size, and capacity as shown in Equipment Schedule. Fans shall be as manufactured by Cook, Carnes, Broan, Nutone, or Penn.
- b. Provide HVI (Home Ventilating Institute) Certified Ratings Seal. Provide galvanized steel housing with fan impeller directly connected to motor, and removable as unit from housing for service. Provide integral backdraft damper in fan discharge. Provide stainless steel louvered grille with flange on intake with thumbscrew attachment to fan housing. Provide permanent split-capacitor motor, permanently lubricated, with grounded cord and plug. Provide junction boxes for electrical connection on housing, and receptacle for motor plug-in.

4. PIPE PENETRATIONS

- a. Pipe penetrations through floor slabs and fire rated walls shall be restored to the slab or fire rated wall's original rating and shall be sealed with impervious noncombustible materials sufficiently tight to prevent transfer of smoke or combustion gases from one side of the wall or slab to the other in accordance with UL methods.
- b. As appropriate to the penetration size and location, provide firestopping using one of the following:

High-temperature non-shrink grout shall be installed in accordance with recommendations of ACI, CSI and the manufacturer's specifications.

Fill openings with Thermofiber Safing insulation.

Caulk full depth of wall or floor with 3M-fire barrier material - No. 25 caulk or 303 putty.

- c. Penetrations through construction shall be neatly drilled or cut, and the opening completely filled around the penetrating pipe with the approved firestopping material. Solid masonry and concrete walls as well as concrete slabs shall be core drilled. Diameter of core drilled holes shall be from 3/4 inch to 1-1/2 inch bigger than the outside diameter of pipe. Pipe shall be secured within 18 inches of the penetration, both sides, from other than the firewall or slab itself.

5. SHEET METAL WORK

- a. Provide all ducts, dampers and accessories as indicated on the drawings and specified herein.
- b. Duct sizes shown on drawings are actual sheet metal sizes. Plans are generally diagrammatic and Contractor shall make take offs as required to install ducts in spaces provided, however, the Contractor shall secure the Owner's approval before re-routing or changing duct sizes.
- c. Sheet metal work shall be constructed in accordance to SMACNA, Inc. Low Velocity Duct Construction Standards.
- d. Dampers, volume (Manual). Provide the manually operated volume control dampers necessary for the proper balancing of the air handling system. They shall have an indicating device with lock to hold the damper in position for proper setting. Wye branch connections to have splitter dampers. All branch ducts to registers shall have a damper.
- e. Ductwork: All low velocity ductwork shall be constructed of galvanized steel in accordance with Table 1 and Plates 5 through 15 of the low velocity duct standard. Galvanized steel shall be of lock forming quality and shall have a galvanized coating of 1 1/4 ounces total for both sides of one (1) square foot of a sheet.
- f. Flexible ductwork: All flexible ductwork within the building envelope shall have a minimum R-value of 6.2. All flexible ductwork outside of the building envelope shall have a minimum R-value of 8.0.
- g. Elbows, Radius: Shall be constructed in accordance with Plate 21, Figure B of the low velocity duct standard.

6. GRILLES

- a. The diffuser, grilles, and registers shall be of type and size shown in the equipment schedule. A white finish shall be provided, unless noted otherwise. Provide with volume control dampers, square-to-round transitions, etc.
- b. Use Carnes, J & J, Metal-Aire, or approved equivalent.

7. INSULATION

- a. Duct Insulation
 - i. All supply, return, and outside air intake duct shall be wrapped with 2" thick 1lb/sf density fiberglass wrap with reinforced aluminum foil vapor barrier. Use Owens-Corning or equal.
 - ii. In addition to ductwrap, all low pressure supply and return ductwork shall be lined for 15 feet downstream from air handling unit with Schuller Permocote Linacoustic Hp or approved equivalent.

- iii. Ductwrap on ductwork outside of the building envelope shall have a minimum R-value of 8.0

C. EXECUTION

1. ELECTRICAL CONNECTION OF EQUIPMENT

- a. Wiring from disconnect switches, junction boxes, panel board circuit breakers, etc. up to mechanical equipment shall be by the electrical contractor. Final electrical connections to mechanical equipment shall be by this contractor.
- b. Control wiring and control connections control for heating and air conditioning systems is by this Contractor.

2. Tests shall be made on all equipment and apparatus furnished under this contract for verification of performance of equipment and systems.

- a. The Contractor shall indicate to the Engineer, at least five days prior to the scheduled time, when he will be prepared for a complete system checkout.
- b. Operating conditions of all controls and major components shall be verified in the presence of the Engineer and the Owner's representative.
- c. Heating and air conditioning system shall be balanced, adjusted and placed into service by personnel skilled as a result of training and experience in working with air distribution systems.
- d. A certified independent test and balance contractor shall perform testing and balancing. The test and balance contractor shall be certified by National Environment Balancing Bureau (NEBB) or Associated Air Balance Council (AABC).
- e. All necessary equipment, forms, reports, etc. required to perform the system testing and balancing shall be as recommended in the above named procedures.
- f. The Contractor shall submit to the Engineer a letter stating the procedures, instruments, forms, etc. to be used for testing and balancing heating and air conditioning systems.
- g. Final balancing data shall be submitted to the Engineer prior to final acceptance. After completion of the work, the Contractor shall state in a letter to the Engineer that the work conforms to plans and specifications. This Letter of Compliance is to be issued prior to final inspection and acceptance by the Owner.
- h. A copy of the approved final balancing data should be included in the Maintenance and Operations Manuals.
- i. After testing, all adjustable pitch motor pulleys shall be replaced with fixed pitch pulleys.

3. PAINTING

- a. Contractor shall paint all iron and steel not having a factory finish or galvanized finish used for support and hanging equipment throughout building. One coat of primer shall be used followed by one coat of oil base paint with colors selected by the Owner.
- b. All painted equipment with damaged areas be painted to match original finish.

4. CLEAN-UP

- a. At the completion of all work, this Contractor shall be responsible for cleaning up all rubbish, leaving the system in perfect operating condition. He shall further clean up

rubbish daily in such a manner that the job shall present a neat appearance. Work shall be accomplished to the satisfaction of the Owner.

5. MAINTENANCE AND OPERATING MANUALS

- a. At the completion of this project the Contractor shall furnish the Owner three (3) operating and maintenance manuals containing a brief description of each system and its various components. Instructions must give full details of the operation of all equipment installed, and shall include manufacturer's printed operating and maintenance instructions, detailed data and bulletins covering all material furnished under the contract giving all necessary illustrations and diagrams and a composite schedule of periodic servicing and lubrication requirements and replacement parts.

6. AS BUILT DRAWINGS

- a. Contractor shall keep and maintain in good order a record of any deviations from drawings for any reason. This record shall be made available to the Owner on the date of substantial completion and shall be legible and accurate so as to be transferable to as-built reproducible drawing.

7. GUARANTEE

- a. The Contractor shall deliver the system to the Owner complete in first-class operating condition in every respect and shall guarantee the material and workmanship for a period of one year from the date of acceptance. If during that time any defect should show up due to defective material, negligence, or want of proper care on the part of the Contractor, he shall furnish such new materials as are necessary to repair such defects and place same in working order at his own expense on receipt of notice of such from the Owner.

END OF SECTION 230000

SECTION 26 00 00 – ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 GENERAL NOTES:

- A. Drawings, all Contract Documents, and Division-1 Specifications sections, apply to work of this section.
- B. Where the term "Contractor" is used, it shall mean the Electrical Contractor.
- C. Contractors bidding on this section must possess a State of North Carolina Electrical Contractor's License. Each bidder shall show his license proposal.
- D. Reference shall be made to the Architectural, Structural, Plumbing and HVAC drawings and specifications for details of building construction and for coordination with other parts of construction.
- E. Contractor shall visit the job site before the submission of a bid and familiarize himself with existing conditions. Submission of a bid will be considered as evidence that the Contractor has visited the site and is familiar with existing conditions.

1.2 BIDDING:

- A. The Electrical work shall be included under the General Contract.

1.3 SCOPE:

- A. The work under this section of the specifications consists of providing all labor, equipment, supplies, and materials, and performing all operations, including trenching, backfilling, compaction, cutting, channeling and chasing necessary for the installation of a complete wiring system in strict accordance with this section of the specifications and the applicable drawings and subject to the terms and conditions of the contract.
- B. The following gives a brief outline of the Electrical work which is further described in the body of the specifications and indicated on the accompanying drawings:
 - 1. Electrical panel, and disconnect switches.
 - 2. Feeder conduits, conductors, and fittings as shown and specified.
 - 3. Lighting fixtures and lamps.
 - 4. Telephone outlets.
 - 5. All power and lighting branch conduit, conductors, outlets, boxes, receptacles, switches and circuit breakers as shown and specified.
 - 6. Electrical power connections complete to all equipment requiring electrical connections.

7. Grounding
 - C. Certified manufacturer's drawings and shop drawings shall be submitted for all equipment except the following for which lists of manufacturers and catalog numbers shall be submitted. Submit one hard copy with digital copies.
 1. Conduit
 2. Conduit fitting
 3. Wiring devices
 4. Wire
 5. Boxes
- 1.4 Applicable Specifications and Standards: The following standards shall be considered as minimum requirements for this project:
 - A. The National Electrical Code.
 - B. The National Electrical Safety Code.
 - C. The North Carolina State Building Code.
 - D. The Underwriter's Laboratories, Inc.
 - E. The National Electrical Manufacturers association.
 - F. The Insulated Power Cable Engineers Association.
 - G. NFPA 99 and 101 Life Safety Code for Health Care Occupancies
- 1.5 Drawings and Specifications:
 - A. The drawings accompanying these specifications and subsequent drawings or detail will form a part of the contract for this work.
 - B. The drawings are diagrammatic and indicate the extent and general arrangement of the outlets and equipment. These drawings shall be followed as closely as possible, but all measurements shall be verified at the job site. Do not scale drawings for location dimensions. Consult the architectural, structural, mechanical, plumbing and equipment drawings and details for this project for exact location of equipment and before starting the work.
 - C. The drawings and specifications are supplementary, one to the other, and material and workmanship indicated, called for or implied by the one and not be the other shall be supplied and installed as if specifically called for by both.
 - D. Omission of particular reference to any item necessary for a complete installation and proper operation thereof, shall not relieve the Contractor of the responsibility of furnishing same.

- E. Discrepancies shown on different drawings, between drawings and specifications or between plans and field conditions shall be promptly brought to the attention of the Engineer for a decision.

1.6 Codes, Permits and Inspections:

- A. The entire installation shall comply with:
 - 1. All laws and ordinances applying to electrical installations.
 - 2. The requirements of the National Electrical Code (latest edition with applicable revisions) where such requirements do not conflict with the laws in effect.
 - 3. The regulations of the power company furnishing the electrical service.
 - 4. In the event of conflict between these codes, requirements, etc., the most stringent shall apply.
- B. The Contractor shall give all required notices, obtain necessary permits, and pay all required fees.
- C. After completion of the work, the Contractor shall furnish to the Owner a certificate of final inspection and approval from the electrical inspection department having jurisdiction.

1.7 Singular:

- A. In all cases where a device or piece of equipment is referred to herein or on the drawings in the singular number, it is intended that such reference shall apply to as many such devices as are required to complete the installation.

1.8 Use of the Word "Provide":

- A. Herein, where the work "Provide" is written in these specifications, provide shall be understood to mean provide complete in place, that is, "Furnish and Install".

1.9 Electric Service:

- A. Voltage: Refer to electrical plans.

1.10 Equipment and Materials:

- A. Catalog numbers and trade names in these specifications and noted on the drawings are intended to describe the material, devices or apparatus wanted. Similar materials, devices or apparatus of other manufacturers, if of equivalent quality, capacity and character, may be substituted on the written approval of the engineer. Proposed substitutions with descriptive data shall be submitted to the engineer at least ten days before the Bid Date. The submissions, if approved by the engineer, will be issued in an addendum before the Bid Opening. If the Contractor fails to comply with the provisions of this paragraph, he shall be required to furnish all materials and equipment as specified.

- B. All materials shall be new and shall bear the manufacturer's name, trade name and the UL label in every case where a standard has been established for the particular material. The equipment to be furnished shall be essentially the standard product of a manufacturer regularly engaged in the production of the required type of equipment and shall be the manufacturer's latest approved design.
- C. Equipment and materials shall be delivered to the site and stored in original containers, suitably sheltered from the elements but readily accessible for inspection until installed.
- D. Equipment and materials of the same general type shall be of the same make throughout the work to provide uniform appearance, operation and maintenance.
- E. Equipment shall be tightly covered and protected against dirt, water and chemical or mechanical injury and theft. Damage or defects developing before acceptance of the work shall be made good at the Contractor's expense.
- F. Dimensions: It shall be the responsibility of the Contractor to insure that items to be furnished fit the space available. He shall make necessary field measurements to ascertain space requirements, including those for connections, and shall furnish and install such sizes and shapes of equipment that the final installation shall suit the true intent and meaning of the drawings and specifications.

1.11 Workmanship:

- A. All work specified herein shall be executed in the best and most workmanlike manner by skilled mechanics. This Contractor shall cover and protect all work and materials throughout the course of the work. He shall be responsible for all damage done to, or caused by, this work until the building is completed and accepted by the Owner, and at completion shall leave the work clean.
- B. This Contractor shall cooperate with all other contractors on the project and shall prosecute the work as fast as the progress of other work will allow. He shall consult with the other trades and be responsible for the proper placing and fitting of this work in advance of, or in connection with other work.

1.12 Modifications:

- A. Instructions that will modify the work will be ordered by the engineer in writing either before or after the signing of the contract. Only such instructions shall be accepted by this Contractor.
- B. Slight relocations of outlets, devices and equipment shall be made by this Contractor as required, at no additional cost to the Owner, for proper coordination of all trades.

1.13 Locations and Measurements:

- A. Outlets, devices, fixtures and appliances have been located and shown as accurately as possible on the drawings. The Contractor shall take necessary measurements in the field for exact locations and match his work to the building construction. The outlets for special appliances must be installed so they will be in the proper location when the appliances are

installed. Necessary information for the proper installation of these special outlets shall be obtained from the Owner by a request in writing.

- B. This Contractor shall furnish and place all metal sleeves necessary for electrical work at the time of or prior to building of the walls or pouring of slabs. He shall be responsible for the locations and sizes of these sleeves. The Contractor shall furnish and install all inserts and hangers required to support conduits, cables, pull boxes, etc. If the sleeves, hangers, inserts, etc. are improperly installed, this Contractor shall do all necessary cutting and patching at his own expense to rectify the errors.

1.14 Excavation and Backfill:

- A. This Contractor shall do all excavation necessary for the installation of this work and shall backfill such excavation promptly. Backfill shall be thoroughly tamped with mechanical tamper in layers not exceeding six (6) inches. Rocks and rubbish are prohibited from trenches.

1.15 Cutting, Patching, and Repairing:

- A. In new construction, the General Contractor will provide all openings in wall, floor and roof construction required by Electrical Contractor for installation of his work, provided complete information is furnished to the General Contractor at the time required. Failure to provide necessary information will necessitate provisions of additional required openings, chases, recesses, etc., by this Contractor at his own expense, and he shall be fully responsible for the proper cutting and patching of such construction as approved and directed by the engineer.
- B. Where pipes or conduit pass through walls, floors, or roofs, sleeves shall be furnished by this Contractor and installed, except as noted otherwise, by the trade furnishing and installing the material in which they are located. Location of sleeves, inserts, and supports shall be as directed by this Contractor who will also insure that they are properly installed. Sleeves shall be neatly sawed, sheared, or cut with wheeled cutters. No flame cutting will be permitted.
- C. Each trade shall bear the expense of all cutting, patching, repairing or replacing of the work of other trades required because of his fault, error or tardiness or because of any damage done by him.
- D. Under no circumstances shall the Contractor cut any structural beam or support without prior approval and instructions from the Owner.
- E. If Electrical Contractor installs electrical work through exposed finish walls, ceiling or floor after they are in place, the Electrical Contractor shall close excess openings around his work to match finish surfaces.

PART 2 - PRODUCTS

2.1 Wiring Methods: Wiring methods shall be:

- A. Rigid Schedule 40 PVC for underground secondary service.
- B. Electrical metallic tubing or MC cable for all systems run above floor inside building.

- C. Rigid Metal Steel Conduit for all systems above floor at exterior.
- D. Liquid-tight flexible conduit for short equipment connections and connections to motors or motor equipment.
- E. Rigid PVC conduit for all systems run under floor or underground.

2.2 Installation Methods:

- A. The installation shall comply with the latest issue of all national, state and local rules and ordinances. The requirements of the latest issue of the National Electrical Code shall be considered a minimum. The state and/or local requirements or the plans and/or specifications shall govern when they exceed their requirements of the National Electrical Code.
- B. All work shall be concealed in walls, partitions, ceilings, and floors unless specifically indicated as being exposed. All conduits run overhead shall be run tight to bottom of joists.
- C. In places where walls are masonry, conduits and boxes shall be installed in the walls as they are erected. Boxes shall be of such depth that conduit entrances may be made without excessive cutting of the masonry. Box openings shall be cut neatly to fit the outline of the boxes and the finish plates shall cover the entire cut opening.
- D. Exposed conduit shall be installed with runs parallel or perpendicular to walls and ceilings with right angle turns utilizing outlet boxes or symmetrical bends.
- E. Conduit installed underground shall have a minimum cover of two (2) feet. Joints in conduit installed underground or under floor shall be made watertight. Conduit under concrete floor slab shall be installed on top of subgrade before stone fill is placed.
- F. Exposed conduits shall be securely fastened in place no more than six (6) feet centers for up through one (1) inch and eight (8) feet for all sizes larger than one (1) inch and hangers, supports or fastenings shall be provided at each elbow and at the end of each straight run terminating at a box or cabinet. Horizontal and vertical conduit runs may be supported by one-hole malleable straps, clamp backs, or other approved device with suitable bolts, expansion shields where needed or beam clamps for mounting to building structure or special brackets. Adjustable hangers may be used to suspend conduits when separately located. Hangers shall be made of durable materials suitable for the application involved.
- G. Conduit ends shall be cut square, threaded and reamed to remove burrs and sharp edges. Field threads shall be of same type and have same effective length as factory cut threads. Conduit joints shall be made with approved couplings. Bends and offsets shall be avoided where possible, but where necessary factory elbows shall be used for one (1) inch and larger. Other offsets and bends shall be made with an approved hickey or conduit bending machine. Conduit deformed or crushed in any way shall not be installed and bends with a radius of less than 3-1/2 inches will not be permitted.
- H. Conduit shall be securely fastened to all sheet metal outlet, junction, cabinets and pull boxes with double galvanized locknuts and insulated bushings, care being observed to see that the full number of threads project through to permit the bushing to be drawn tight against the end of conduit, after the locknuts shall have been made up sufficiently tight to

draw them into firm electrical contact with the box. Insulated bushings of fiber or plastic shall be used on one (1) inch conduit and larger.

- A. During installation, conduit ends shall be capped or plugged to prevent the entrance of foreign matter. The Contractor shall exercise necessary precautions to prevent accumulation of water, dirt or concrete in the conduits during execution of the work. Conduits in which water or other foreign materials have been permitted to accumulate shall be cleaned thoroughly or the conduit run replaced where such accumulation cannot be removed by methods approved by the engineer.
- B. No wires shall be installed until work which might cause damage to the wires or conduits has been completed. Conductors terminating at wired outlets shall extend at least eight (8) inches beyond the outlet to facilitate installation of wiring devices or fixtures.
- C. All taps, splices, and joints for conductors size number eight (8) and larger shall be made by mechanical means. Connectors used shall have Underwriter's Laboratories approval for use at six hundred (600) volts. All conductors size number ten (10) and smaller shall be jointed by non-corrosive flux solder connections using the hot dip method except that ideal "wirenuts" or approved equal, as for example, 3M preinsulated (plastic covered) "Scotchlox", shall be used to connect fixture lead wires to their designated branch circuit in junction boxes. These splices shall be electrically and mechanically secure and installed equal to or exceeding the conductor capacity in each instance. All joints, splices, and taps and other sections or wiring requiring taping shall be taped with at least two (2) layers of approved gum rubber tape which shall be laid on with half lap followed by at least one (1) layer of friction of or plastic tape laid on with half lap. The intent of this specification is that the taping shall be neatly done and form a permanently secured insulation equal to that of the wire.
- D. Minimum wire size for all branch circuits shall be No. 12 AWG.
- E. Minimum size for conduit shall be 1/2 inch.
- F. No wiring will be installed in the telephone conduit. Provide pull wires in each conduit.
- G. Where more than one (1) device is installed at the same location and mounting height, a gang plate shall be used.
- H. Junction and/or pull boxes shall be furnished and installed where necessary to avoid excessive runs or too many bends between outlets.
- I. Powdered soapstone or approved lubricants shall be used to facilitate pulling conductors into conduit.

J. The following color code shall be used for all conductors in feeder and branch circuits.

120/240, 1 phase	
Phase A	Black
Phase B	Red
Neutral	White
Ground	Green

Branch circuit conductors shall be factory color coded. Scotch tape of the proper color may be used to identify conductors No. 4 and larger. All feeders, sub-feeders to panels, motor starters and motors shall be completely phased out as to sequences left to right when facing equipment.

- K. Conductors shall be stranded except that sizes No. 10 and smaller may be solid.
- L. All motors with conduit connections shall be connected to conduit system with short length (not more than twenty-four (24) inches of flexible liquid-tight conduit.)
- M. Circuits are shown schematically. Installation shall be as shown on drawings except by written permission of the engineer.
- N. Conductors shall be continuous from outlet to outlet, and no splices shall be made except within outlet or junction boxes.
- O. Conductors for branch circuits whose length from panel to center of load exceeds fifty feet shall be No. 10 AWG unless a larger size is shown on drawings.
- P. All receptacles to be grounded to the raceway system with a No.12 green jumper connected to the bonding screw. Steel City Style G, grounding clips may be used on stamped steel boxes. Bonding jumper shall be installed as the device box is installed.
- Q. A code gauge, green grounding conductor, (considered a non-current-carrying conductor), shall be pulled through the entire raceway system.
- R. PVC conduit shall be UL labeled, shall be rated for 90 degrees C. wiring, and shall be assembled with solvent weld fittings. Bends shall be accomplished with equipment specifically intended for the purpose, and flame-type heating devices shall not be used. Any portion of the conduit, which has been scorched or deformed because of excessive heat, shall be rejected. PVC conduits shall not be run exposed in any locations.

2.3 Materials and Equipment:

- A. All materials used in this work shall be new and listed by the Underwriter's Laboratories, Inc. in every case where a standard has been established for the particular type of the material to be installed. Materials and equipment furnished under this specification shall be the standard products of manufacturers regularly engaged in the manufacture of such equipment and shall be identical.

- B. Electrical Metallic Tubing/Rigid steel conduit: General Electric Electro Galvanized Zinc-Coating.
- C. EMT Fittings: Thomas & Betts - set screw type.
- D. Rigid Fittings: Thread type.
- E. Flexible Conduit: Liquid-tight flexible conduit shall be "Sealtight" type UA as manufactured by American Brass.
- F. PVC Conduit: Type 40, heavy wall rigid.
- G. Insulated Bushings: Rigid conduit - 0-Z Type "A". EMT - Thomas & Betts - "Blue Throat" plastic insulated series.
- H. Insulated Grounding Bushing: 0-Z Type "B".
- I. Pull and Junction Boxes: Pull boxes shall be fabricated from galvanized sheet steel, not less than 16 gauge thick, with covers held in place by corrosion-resistant machine screws. Boxes shall be furnished and installed where indicated on the plans or where necessary to facilitate cable pulling and splicing. Box size shall be as required by N.E.C. for the number of conduits and conductors entering and leaving it. Where feeder splices are to be made, box shall be large enough to provide ample work space. Exposed boxes shall not have extra knockouts.
- J. Outlet Boxes: All outlet boxes shall be galvanized steel, at least 2-1/8" deep and of sufficient size to accommodate devices noted. Boxes for fixtures shall have fixture studs in the center. If flexible connections are to be made, use "Greenfield" with appropriate fittings for ground continuity. Outlet boxes, for wiring devices in finished walls, shall be one-piece, standard, gang-type, of a size to accommodate number of devices noted. Boxes shall have tile rings to bring box openings flush with finished wall or not more than 1/16" back of same. Sheet steel boxes shall be as manufactured by Steel City, Raco, Appleton, Kilark, or approved equal. Exposed boxes shall not have extra knockouts.
- K. Wiring devices shall be as follows:

Unit	Catalog No.	Capacity
One pole switch	See plans	20A 120/277V
Three way switch	See plans	20A 120/277V
Four way switch	See plans	20A 125V
Duplex receptacle	See plans	20A 125V
Ground fault receptacle	See plans	20A 125V

- 1. Equivalent wiring devices shall be as manufactured by P&S, Leviton or Eagle.

2. Wiring device trim plates shall be as noted on the plans.
 3. See plan for additional information.
- L. Wire and Cable: All wiring shall be of copper. Provide the AWG size shown on the drawings with insulation indicated below. Conductors shall conform to latest NEC requirements and meet ASTM specifications. Conductors shall be stranded except that sizes No. 10 and smaller may be solid. Wire size, voltage rating, insulation type and manufacturer shall be clearly marked on the conductor jacket at regular intervals. Conductors with the following types of insulation shall be installed in locations indicated and/or shown on drawings. Conductors and cables shall be as manufactured by Encore Wire Corp., Southwire Company, or General Cable.
1. Type THHN, or THWN for No. 10 and smaller branch circuits. (Circuits of 600 volts or less.)
 2. Type THHN or THWN for No. 8 and larger. (Circuits of 600 volts or less.)
- M. Wire Connectors: Pressure connectors as manufactured by "O-Z" or Thomas and Betts for feeders; and wire nuts by Ideal Industries or "Scotch Lox" by Minnesota-Mining for branch circuits.
- N. Panelboards:
1. All breakers shall be bolt-on type. Breakers shall be thermal magnetic tripped and shall have interrupting capacities required on the drawings. Panelboard shall have asymmetrical fault current rating equal to or greater than panels specified on drawings.
 2. Panelboards shall be provided with size and number of breakers as indicated on plans. Main breakers, where required, shall be top or bottom mounted. Side mounted main breakers or those occupying space which will limit panelboard construction to less than 42 branch circuit poles are precluded.
 3. Single pole breakers for lighting circuit, only, may be quick lag type, equipped with one operating handle, molded in one common case. External connections with internal trip devices for ganging quick lag breakers will not be permitted. All breakers to be thermal magnetic, temperature compensated type and shall be quick-make, quick-break type for manual and automatic operation. When panels are used for switching, breakers shall be specifically approved by Under-writers' Laboratory for such operation.
 4. Conductors in panelboards shall be grouped together and laced with plastic ties in a neat, substantial and approved manner.
 5. A neatly typed directory, properly identifying each circuit, shall be installed in each panelboard. A temporary running directory shall be maintained during construction.
 6. Branch circuits shall be connected in each panel board as indicated on drawings.
 7. All panels shall be marked with its designation and voltage by installing engraved plastic plates with pop rivets. Pressure sensitive plastic tape will not be permitted. Submit sample for approval.

8. Panels shall be Square D or equivalent by General Electric, Siemens, or Eaton. Refer to panel diagrams for required features. Load center type is not acceptable.
- O. Disconnects:
1. Disconnects shall be furnished and installed at locations shown on plans. Refer to schedule on drawings for additional requirements. Disconnects shall be equipped with fusible poles, as indicated, with quick-break operating mechanism. All disconnects shall be equipped with full-cover interlock.
 2. All disconnects shall be provided with provisions for locking of handle in either "on" or "off" position by installation of pad lock as required. All disconnects shall be equipped with positive pressure fuse clips and shall have visible disconnecting blade switches. Disconnects to be furnished with factory-finished paint with appropriate knockouts for conduit connections.
 3. All disconnects shall be heavy duty type.
 4. All disconnects shall be Square D, or equivalent by General Electric, Siemens, or Eaton.
 5. Fusetron, or equal, dual-element fuses shall be used for protection of motor driven equipment.

PART 3 - EXECUTION

3.1 Electrical Connection of Equipment:

- A. Electrical Contractor shall make power connections to all owner supplied equipment. Refer to detail on plans for connections to mechanical and plumbing equipment.
- B. Control wiring for Heating and Air Conditioning Systems is by Heating and Air Conditioning Contractor.

3.2 Lighting Fixtures and Lamps:

- A. Catalog number and names of manufacturers are used to convey the types, performance and quality of fixtures to be supplied. Fixtures of other manufacturers may be acceptable provided they offer equal or superior performance and quality and are approved as substitutions. Approval of substitutions 10 days prior to Bid date required.
- B. Catalog numbers given are not necessarily the total fixture specifications. The general description, type and number of lamps, pertinent details as to the quality and functional operation of the fixture as well as the catalog numbers are to be considered in determining the appearance, performance and quality intended. Any major discrepancies in any particular fixture specification should be reported to the engineer prior to submitting a proposal.
- C. It is intended that a lighting fixture be provided for every lighting outlet shown. Any omission is in error and shall be brought to the attention of the engineer prior to submitting a proposal; otherwise the fixture of intent selected by the engineer shall be furnished and installed at no additional cost to the contract.

3.3 LED Luminaries:

- A. LED driver manufacturers should have a minimum of five years of experience with the manufacture of LED drivers. All drivers shall have a minimum warranty of five years.
- B. Unless noted on the plans, fixtures shall be dimmable down to 10% with standard, electronic, low voltage dimmers.
- C. Minimum color rendering index (CRI) shall be 80. Color temperature and performance shall conform to the parameters established by ENERGY STAR SSL standards (refer to ANSI-C78.377-2008).
- D. Optical design shall be low glare, 50% cut-off.
- E. Rated for 50,000 hours at 70% lumen maintenance.
- F. LED driver shall be high efficiency with a minimum power factor of .90
- G. 5 year, 100% warranty coverage for the driver, LED module, housing and trim. For the 1st year this shall be a complete parts and labor warranty. The 4th and 5th years shall cover parts only.
- H. Refer to drawings for fixture schedule.

3.4 Painting:

- A. Contractor shall paint all iron and steel not having a factory finish or galvanized finish used for support and hanging equipment throughout building. One coat of primer shall be used followed by one coat of oil base paint with colors selected by the Owner.
- B. All painted equipment with damaged areas shall be painted to match original finish.

3.5 Clean-Up:

- A. At the completion of all work, this Contractor shall be responsible for cleaning up all rubbish, leaving the system in perfect operating condition. He shall further clean up rubbish daily in such a manner that the job shall present a neat appearance. Work shall be accomplished to the satisfaction of the engineer.

3.6 Maintenance and Operating Manuals:

- A. At the completion of this project the Contractor shall furnish the Owner operating and maintenance manuals containing a brief description of each system and its various components. These manuals should be in accordance with section 07181. Instructions must give full details of the operation of all equipment installed, and shall include manufacturer's printed operating and maintenance instructions, detailed data and bulletins covering all material furnished under the contract giving all necessary illustrations and diagrams and a composite schedule of periodic servicing and lubrication requirements and replacement parts.

3.7 As Built Drawings:

- A. Contractor shall keep and maintain in good order a record of any deviations from drawings for any reason. This record shall be made available to the Owner on the date of substantial completion and shall be legible and accurate so as to be transferable to as-built reproducible drawing.

3.8 Guarantee:

- A. The Contractor shall deliver the system to the Owner complete in first-class operating condition in every respect and shall guarantee the material and workmanship for a period of one year from the date of acceptance. If during that time any defect should show up due to defective material, negligence, or want of proper care on the part of the Contractor, he shall furnish such new materials as are necessary to repair such defects and place same in working order at his own expense on receipt of notice of such from the Owner.

END OF SECTION 26 00 00

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