

1.0 - GENERAL

1.1 Related Documents

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

1.2 Summary

- A. Section Includes: Kawneer Aluminum Entrances and Storefronts, glass and glazing, hardware and components.
  - 1. Type of Aluminum Entrance:  
500 Swing Door; Wide stile, 5" (127 mm) vertical face dimension, 1-3/4" (44.5 mm) depth, high traffic applications.
  - 2. Type of Storefront:  
Thermal Barrier (Trifab® VG 451T);  
Kawneer IsoLock® Thermal Break with a 1/4" (6.4 mm) separation
- B. Related Sections:
  - 1. Section 07910 "Joint Sealants" for joint sealants installed as part of the aluminum storefront system.
  - 2. Section 08710 - Finish Hardware
  - 3. Section 08810 - Glass and Glazing

1.3 Definitions

- A. Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufacturers Association (AAMA) – AAMA Glossary (AAMA AG).

1.4 Performance Requirements

- A. General Performance: Aluminum-framed entrance and storefront system shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:
  - 1. Design Wind Loads: Determine design wind loads applicable to the Project from basic wind speed indicated in miles per hour, according to ASCE 7, Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.
    - a. Basic Wind Speed (MPH): (120)
    - b. Importance Factor (I, II, III): (1.15)
    - c. Exposure Category B
- B. Entrance System Performance Requirements:

1. Wind loads: Provide entrance system; include anchorage, capable of withstanding wind load design pressures based on the 2021 International Building Code.
2. Air Infiltration: The test specimen shall be tested in accordance with ASTM E 283. Air infiltration rate shall not exceed 0.06 cfm/ft<sup>2</sup> (0.3 l/s · m<sup>2</sup>) at a static air pressure differential of 6.24 psf (300 Pa).
3. Water Resistance: The test specimen shall be tested in accordance with ASTM E 331. There shall be no leakage at a minimum static air pressure differential of 8 psf (383 Pa) as defined in AAMA 501.
4. Uniform Load: A static air design load of 20 psf (958 Pa) shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.
5. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than: .60 with SHGC not to exceed .25.
6. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than:
  - a. Glass to Exterior – 70 frame and 69 glass (low-e)
  - b. Glass to Center – 62 frame and 68 glass (low-e)
  - c. Glass to Interior – 56 frame and 67 glass (low-e)
7. Sound Transmission Class (STC) and Outdoor-Indoor Transmission Class (OITC): When tested to AAMA Specification 1801 and in accordance with ASTM E1425 and ASTM E90, the STC and OITC Rating shall not be less than:
  - a. Glass to Exterior – 38 (STC) and 31 (OITC)
  - b. Glass to Center – 37 (STC) and 30 (OITC)
  - c. Glass to Interior – 38 (STC) and 30 (OITC)

#### 1.5 Submittals

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, hardware, finishes, and installation instructions for each type of aluminum frame storefront system indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware, and attachments to other work, operational clearances and installation details.
- C. Samples for Initial Selection: For units with factory-applied color finishes including samples of hardware and accessories involving color selection.
- D. Samples for Verification: For aluminum framed entrance system and components required.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for each type of aluminum-framed storefront.

- F. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed systems, made from 12" (300 mm) lengths of full-size components and showing details of the following:
  - 1. Joinery, including concealed welds.
  - 2. Anchorage.
  - 3. Expansion provisions.
  - 4. Glazing.
  - 5. Flashing and drainage.
- G. Other Action Submittals:
  - 1. Entrance Door Hardware Schedule: See Section 08710. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

1.6 Quality Assurance

- A. Installer Qualifications: An installer which has had successful experience with installation of the same or similar units required for the project and other projects of similar size and scope.
- B. Manufacturer Qualifications: A manufacturer capable of providing aluminum framed storefront system that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.
- C. Source Limitations: Obtain aluminum framed storefront system through one source from a single manufacturer.
- D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum framed storefront system and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements." Do not modify size and dimensional requirements.
  - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Build mockup for type(s) of storefront elevation(s) indicated, in location(s) shown on Drawings.
- F. Structural-Sealant Glazing: Comply with ASTM C 1401, "Guide for Structural Sealant Glazing" for design and installation of structural-sealant-glazed systems.
- G. Structural-Sealant Joints: Design reviewed and approved by structural-sealant manufacturer.

1.7 Project Conditions

- A. Field Measurements: Verify actual dimensions of aluminum framed storefront openings by field measurements before fabrication and indicate field measurements on Shop Drawings.

1.8 Warranty

- A. Manufactures Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty.
1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.

2.0 - PRODUCTS

2.1 Manufacturers

- A. Basis-of-Design Product:
1. Kawneer Company Inc.
  2. Trifab® 451T (thermal) Storefront System
  3. 2" x 4-1/2" (50.8 mm x 114.3 mm) System Dimensions
  4. Glass: Center, Exterior or Interior
- B. Subject to compliance with requirements, provide a comparable product by the following:
1. Manufacturer: YKK to meet or exceed the criteria specified.
- C. Substitutions: Refer to Substitutions Section 01360 for procedures and submission requirements
1. For pre-approval: Submit written requests ten (10) days prior to bid date.
  2. Certificates: Submit certificate(s) certifying substitute manufacturer (1) attesting to adherence to specification requirements for storefront system performance criteria, and (2) has been engaged in the design, manufacturer and fabrication of aluminum storefronts for a period of not less than ten (10) years.
- D. Substitution Acceptance: Acceptance will be in written form as an addendum or post bid documented by a formal change order signed by the Owner and Contractor and approved by Architect. No exceptions. No other substitutions will be considered post bid.

2.2 Materials

- A. Aluminum Extrusions: Alloy and temper recommended by aluminum storefront manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.090" wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 alloy and temper.
- B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim hardware, anchors, and other components.
- C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

- D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
  - 1. Weather Seals: Provide weather stripping with integral barrier fin or fins of semi-rigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 701/702.
- E. Sealant: For sealants required within fabricated storefront system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.  
Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data.

### 2.3 Storefront Framing System

- A. Thermal Barrier (Trifab® VG 451T):
  - 1. Kawneer IsoLock® Thermal Break with a 1/4" (6.4 mm) separation consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections.
    - a. Thermal Break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.
- B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposed shall be stainless steel.
- D. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action
- E. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- F. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle storefront material and components to avoid damage. Protect storefront material against damage from elements, construction activities, and other hazards before, during and after storefront installation.

### 2.4 Glazing Systems

- A. Glazing: As specified in Division 08810 Section "Glass and Glazing."
- B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, extruded EPDM rubber.
- C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
- D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

- E. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:
1. Structural Sealant: ASTM C 1184, single-component neutral-curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by a structural-sealant manufacturer for use in aluminum-framed systems indicated.
    - a. Color: To be selected by Architect.
  2. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.
    - a. Color: Matching structural sealant as selected by Architect.

## 2.5 Accessory Materials

- A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section "Joint Sealants."
- B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30 mil (0.762 mm) thickness per coat.

## 2.6 Fabrication

- A. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
1. Profiles that are sharp, straight, and free of defects or deformations.
  2. Accurately fit joints; make joints flush, hairline and weatherproof.
  3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
  4. Physical and thermal isolation of glazing from framing members.
  5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  6. Provisions for field replacement of glazing.
  7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- B. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- C. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.
- D. Storefront Framing: Fabricate components for assembly using manufactures standard installation instructions.
- E. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.7 Aluminum Finishes

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Factory Finishing:
  - 1. Kawneer Permafluor™ (70% PVDF), AAMA 2605, Fluoropolymer Coating (Color to be selected by Architect).

## 3.0 - EXECUTION

### 3.1 Examination

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight framed aluminum storefront system installation.
  - 1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
  - 2. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76 mm) of opening.
  - 3. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
  - 4. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 Installation

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing aluminum framed storefront system, accessories, and other components.
- B. Install aluminum framed storefront system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- C. Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.
- D. Install aluminum framed storefront system and components to drain condensation, water penetrating joints, and moisture migrating within sliding door to the exterior.
- E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

### 3.3 Field Quality Control

- A. Manufacturer's Field Services: Upon Owner's written request, provide periodic site visit by manufacturer's field service representative.

3.4 Adjusting, Cleaning, And Protection

- A. Clean aluminum surfaces immediately after installing aluminum framed storefronts. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- B. Clean glass immediately after installation. Comply with glass manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION



1.0 - GENERAL

1.1 Work Included

- A. Furnish and install aluminum architectural windows complete with hardware and all related components as shown on drawings and specified in this section.
- B. All windows shall be equal to Winco (4410) SH-AW/HC65, Single Hung and Fixed as Basis of Design. Other manufacturers requesting approval to bid their product as an equal must submit the following information at least ten days prior to bid. Comply with Section 01360 - Product Substitution.
  - 1. If requested, a sample window (size and configuration) as per requirements of Architect.
  - 2. Detail cuts and product data.
  - 3. Test reports documenting compliance with requirements of this section.
- C. Glass and Glazing
  - 1. All units shall be factory glazed.

1.2 Related Work

- A. Section 08420 - Entrances and Storefronts
- B. Section 07910 - Caulking and Sealant

1.3 Testing and Performance Requirements

- A. Test Units
  - 1. Air, water, and structural test unit shall conform to requirements set forth in ANSI/AAMA/NWDA 101/I.S.2-97.
- B. Test Procedures and Performances
  - 1. All windows shall conform to ANSI/AAMA/NWDA 101/I.S.2-97 requirements for referenced window type in section 1.01B. In addition, the following specific performance requirements shall be met.
  - 2. Air Infiltration Test
    - a. With window sash and ventilators closed and locked, test unit in accordance with ASTM E 283, at static air pressure of 6.24 psf.
    - b. Air infiltration shall not exceed .3 cfm per square foot.
  - 3. Water Resistance Test
    - a. With window sash and ventilators closed and locked, test unit in accordance with ASTM E 331, at static pressure difference of 12 psf.
    - b. There shall be no uncontrolled water leakage.
  - 4. Uniform Load Deflection Test
    - a. With window sash and ventilators closed and locked, test unit in accordance with ASTM E 330, at a static air pressure difference (positive and negative) of 65 psf.
    - b. During the course of the test, no member shall deflect more than 1/175 of its span.
  - 5. Uniform Load Structural Test

- a. With window sash and ventilators closed and locked, test unit in accordance with ASTM E 330 at a static air pressure difference of 97.5 psf.
- b. At conclusion of test there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms or actuating mechanisms, nor any other damage which would cause the window to be inoperable.
- 6. Condensation Resistance Test (CRF)
  - a. With window sash closed and locked, test unit in accordance with AAMA 1503.1.
  - b. Condensation Resistance Factor (CRF) shall not be less than 50.
- 7. Thermal Transmittance Test (Conductive U-Value)
  - a. With window sash closed and locked, test unit in accordance with AAMA 1503.1.
  - b. Conductive thermal transmittance (U-Value) shall not be more than 0.59 BTU/hr/sf per degrees F.
- 8. Life Cycle Test
  - a. Tested in accordance with AAMA 910, there shall be no damage to fasteners, parts, support arms, activating mechanisms, or any other damage, which would make the window inoperable. Subsequent air infiltration and water resistance tests shall not exceed specified requirements.

#### 1.4 Quality Assurance

- A. Provide test reports from AAMA accredited laboratory certifying the performance as specified in Section 1.05.
- B. Test reports shall be accompanied by the window manufacturer's letter of certification stating that the tested window meets or exceeds the afore mentioned criteria for the appropriate ANSI/AAMA/NWWDA 101/I.S.2-97.

#### 1.5 Submittals

- A. Contractor or window manufacturer shall submit shop drawings, finish samples, test reports, and warranties, per requirements of architect.
  - 1. Shop Drawings: Include typical unit elevations, full or half-scaled detail sections and typical installation details. Include type of glazing, screening, and window finish.
  - 2. Product Data: Manufacturer's specifications, recommendations and standard details for window units.
  - 3. Samples of materials may be requested without cost to owner, i.e. frame sections, corner samples, mullions, extrusions, anchors, and glass.

#### 1.6 Delivery, Storage, and Handling

- A. Store and handle windows and other components in strict compliance with manufacturer's instructions.
- B. Protect units against damage from the elements, construction activities and other hazards before, during, and after installation.

#### 1.7 Warranties

- A. Total Window System
  - 1. The responsible contractor shall assume full responsibility and warrant for one year the satisfactory performance of the total window installation which includes that of the windows, hardware, glass (including insulated units),

- glazing, anchorage and setting system, sealing, flashing, etc. as it relates to air, water and structural adequacy as called for in the specifications and approved shop drawings.
2. Any deficiencies due to such elements not meeting the specifications shall be corrected by the responsible contractor at his expense during the warranty period.

## 2.0 - PRODUCTS

### 2.1 Materials

- A. Aluminum
  1. Extruded aluminum shall be 6063-T6 alloy and temper, with a tensile strength of 24,000 PSI.
- B. Hardware
  1. Extruded aluminum auto-spring catch shall be provided at the sill of the window to hold the sash in the closed position.
- C. Balances
  1. Balances shall be high performance sash balances that are tested in accordance with AAMA 902, "Voluntary Specification for Sash Balances"
  2. Balances shall meet all minimum Class 5 requirements with a minimum .30 Manually Applied Force ratio (MAF)
  3. Balances shall be of appropriate size and capacity to hold sash in position in accordance with 101-88, section 2.2.3.3.2, and AAMA 902, section 8.1.
  4. Balances shall be attached to locking carrier system, which slides on rails extruded in the jamb frame. Mounting brackets that are screw attached to sash are not acceptable.
- D. Weatherstrip
  1. Each vent shall have one row of heavy fin seal wool pile weather stripping and one row of ridged vinyl installed in specially designed weather strip pocket in the extrusion.
- E. Thermal Barrier
  1. All exterior aluminum shall be separated from interior aluminum by ridged, structural pour in place thermal barrier. For purposes of this specification, a structural thermal barrier is defined as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.
  2. Specified hardware shall not bridge the thermal barrier.
- F. Glass
  1. Insulated glass shall be 1" Thick consisting of ¼" Tinted exterior, ½" air spacer, and ¼" interior. Solar Gray or Solar Bronze having a Max SHGC of 0.25
  2. Bug Screen

### 2.2 Fabrication

- A. General
  1. Mechanical fasteners and hardware items shall not bridge thermal barriers. Thermal barriers shall align at all frame and vent corners.
- B. Frame
  1. All aluminum frame extrusions shall have a minimum wall thickness of .063.

2. Main frame sill members shall have a minimum wall thickness of .090.
  3. The main frame depth shall not be less than 4"
  4. Frame components shall be assembled by means of mechanical fastening with screws. Joinery to be sealed with small joint sealant.
- C. Ventilator
1. All sash frame extrusions shall have a minimum wall thickness of .080.
  2. Each corner shall be assembled by means of mechanical fastening with screws. Joinery is sealed with small joint sealant.
  3. Each vent shall have one row of heavy fin seal wool pile weather-stripping and one row of ridged vinyl installed in specially designed weather strip pocket in the extrusion.
- D. Glazing
1. All windows shall be factory pre-glazed.
  2. All units shall be glazed with butyl tape, silicone cap bead on the exterior, with glazing vinyl and extruded snap-in aluminum glazing bead on the interior.
- E. Finish
- Finish Manufacturer's standard 2 coat Fluoropolymer 70% Kynar paint system complying with AAMA 2605. Color is to be selected by Architect from a selection of at least 10 standard colors.

### 3.0 - EXECUTION

#### 3.1 Inspection

- A. Job Conditions
1. Verify that openings are dimensionally correct and within allowable tolerances. Openings must be plumb, level, and clean. Provide a solid anchoring surface that is in accordance with approved shop drawings.

#### 3.2 Installation

- A. Use only skilled craftsmen for work to be done in accordance with approved shop drawings and specifications.
- B. Set square and level aligning window faces in a single plane for each opening. Windows and materials must be set square and level. Adequately anchor window so when subjected to normal thermal movement, specified building movement, and specified wind loads, so windows will maintain a permanent position.
- C. Adjust windows for proper ease of operation after installation has been completed.
- D. Contractor furnish and apply sealant, per manufacturers recommendations, to provide a weather tight installation at all opening perimeters. Wipe off excess material and leave all exposed surfaces and joints clean and smooth.

#### 3.3 Protection and Cleaning

- A. After completion of window installation, windows shall be inspected, adjusted, and left in working order. Windows shall be left clean, free of labels, dirt, etc. Protection from this point shall be the responsibility of the General Contractor until Substantial Completion.

1.0 - GENERAL

1.1 Related Documents

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

1.2 Summary

- A. This Section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.
- B. This Section includes the following:
  - 1. Hinges
  - 2. Continuous hinges
  - 3. Key control system
  - 4. Lock cylinders and keys
  - 5. Lock and latch sets
  - 6. Exit devices
  - 7. Closers
  - 8. Overhead holders
  - 9. Miscellaneous door control devices
  - 10. Door trim units
  - 11. Protection plates
  - 12. Weatherstripping for exterior doors
  - 13. Thresholds
- C. Related Sections: The following Sections contain requirements that relate to the following sections.
  - 1. Section 08110: Hollow Metal Doors and Frames
  - 2. Section 08215: Wood Doors
- D. Products furnished but not installed under this Section to include:
  - 1. Cylinders for locks on entrance doors.
  - 2. Final replacement cores and keys to be installed by Owner.

1.3 References

- A. Standards of the following as referenced:
  - 1. American National Standards Institute (ANSI)
  - 2. Door and Hardware Institute (DHI)
  - 3. Factory Mutual (FM)
  - 4. National Fire Protection Association (NFPA)
  - 5. Underwriters' Laboratories, Inc. (UL)
    - a. UL 10C - Fire Tests Door Assemblies
  - 6. Warnock Hersey
- B. Regulatory standards of the following as referenced:
  - 1. Department of Justice, Office of the Attorney General, *Americans with Disabilities Act*, Public Law 101-336 (ADA).
  - 2. CABO/ANSI A117.1: *Providing Accessibility and Usability for Physically Handicapped People*, 2010 edition.

1.4 Submittals

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification sections.
- B. Product data including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements. For items other than those scheduled in the "Headings" of Section 3, provide catalog information for the specified items and for those submitted.
- C. Final hardware schedule coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
  - 1. Final Hardware Schedule Content: Based on hardware indicated, organize schedule into vertical format "hardware sets" indicating complete designations of every item required for each door or opening. Use specification heading numbers with any variations suffixed a, b, etc. Include the following information:
    - a. Type, style, function, size, and finish of each hardware item.
    - b. Name and manufacturer of each item.
    - c. Fastenings and other pertinent information.
    - d. Location of each hardware set cross-referenced to indications on Drawings both on floor plans and in door and frame schedule.
    - e. Explanation of all abbreviations, symbols, and codes contained in schedule.
    - f. Mounting locations for hardware.
    - g. Door and frame sizes and materials.
    - h. Keying information.
    - i. Cross-reference numbers used within schedule deviating from those specified.
      - 1) Column 1: State specified item and manufacturer.
      - 2) Column 2: State prior approved substituted item and its manufacturer.
  - 2. Submittal Sequence: Submit final schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work that is critical in the Project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by door hardware, and other information essential to the coordinated review of schedule.
  - 3. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.
- D. Provide samples if requested of each type of exposed hardware unit in finish indicated and tagged with full description for coordination with schedule. Submit samples prior to submission of final hardware schedule.
  - 1. Samples will be returned to the supplier. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated in the Work, within limitations of keying coordination requirements.
- E. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- F. Contract closeout submittals:
  - 1. Operation and maintenance data: Complete information for installed door hardware.
  - 2. Warranty: Completed and executed warranty forms.

1.5 Quality Assurance

- A. Single Source Responsibility: Obtain each type of hardware (latch and locksets, hinges, closers, etc.) from a single manufacturer.
  - 1. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that employs an experienced Architectural Hardware Consultant (AHC) who is available for consultation to Owner, Architect, and Contractor, at reasonable times during the course of the Work.
  
- B. Coordination Meetings:
  - 1. Contractor to set up and attend the following:
    - a. Lock distributor to meet with the Owner to finalize lock functions and keying requirements and to obtain final instructions in writing.
    - b. Lock distributor and lock, closer and exit device manufacturer to meet with the installer prior to beginning of installation of door hardware. Instruct installer on proper installation of specified products.
  
- C. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 requirements of authorities having jurisdiction.
  - 1. Provide only items of door hardware that are listed and tested by UL or Warnock Hersey for given type/size opening and degree of label. Provide proper latching hardware, door closers, approved-bearing hinges and seals whether listed in the Hardware Schedule or not. All hardware to comply with State and local codes and UL 10C.
  - 2. Where emergency exit devices are required on fire-rated doors, (with supplementary marking on doors' UL labels indicating "Fire Door to be equipped with Fire Exit Hardware") provide UL label on exit devices indicating "Fire Exit Hardware".
  
- D. All hardware is to comply with Federal and State Handicap laws.
  
- E. Substitutions: Request for substitutions of items of hardware other than those listed as "acceptable and approved" shall be made to the architect in writing no later than fourteen (14) days prior to bid opening. Approval of substitutions will only be given in writing by Addenda. Requests for substitutions shall be accompanied by samples and/or detailed information for each manufacturer of each product showing design, functions, material thickness and any other pertinent information needed to compare your product with that specified. Lack of this information will result in a refusal.

1.6 Product Handling

- A. Tag each item or package separately with identification related to final hardware schedule, and include basic installation instructions with each item or package.
  
- B. Packaging of door hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packed in same container.
  
- C. Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.
  
- D. Deliver individually packaged door hardware items promptly to place of

installation (shop or Project site).

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

1.7 Warranty

- A. Special warranties:
  - 1. Door Closers: Thirty year period
  - 2. Locks and Cylinders: Three year period
  - 3. Exit Devices: Two year period

1.8 Maintenance

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

2.0 - PRODUCTS

2.1 Manufactured Units

(\*Denotes preferred manufacturer)

A. Hinges:

- 1. Acceptable manufacturers:
  - a. Ives\*
  - b. Bommer
  - c. McKinney
- 2. Characteristics:
  - a. Templates: Provide only template-produced units.
  - b. Screws: Provide Phillips flat-head screws complying with the following requirements:
    - 1) For metal doors and frames install machine screws into drilled and tapped holes.
    - 2) For wood doors and frames install threaded-to-the-head wood screws.
    - 3) For fire-rated wood doors install #12 x 1-1/4 inch, threaded-to-the-head steel wood screws.
    - 4) Finish screw heads to match surface of hinges or pivots.
  - c. Hinge pins: Except as otherwise indicated, provide hinge pins as follows:
    - 1) Out-Swing Exterior Doors: Non-removable pins.
    - 2) Out-Swing Corridor Doors with Locks: Non-removable pins.
    - 3) Interior Doors: Non-rising pins.
    - 4) Tips: Flat button and matching plug. Finished to match leaves.
  - d. Size: Size hinges in accordance with specified manufacturer's published recommendations.
  - e. Quantity: Furnish one pair of hinges for all doors up to 5'-0" high. Furnish one hinge for each additional 2-1/2 feet or fraction thereof, unless otherwise specified in Hardware Headings.

B. Continuous Hinges:

- 1. Acceptable manufacturers:
  - a. Ives\*
  - b. Select Products
  - c. Pemko
- 2. Characteristics:
  - a. Continuous gear hinges to be manufactured of extruded 6063-T6 aluminum alloy with anodized finish, or factory painted finish as



- scheduled.
    - b. All hinges are to be manufactured to template. Uncut hinges to be non-handed and to be a pinless assembly of three interlocking extrusions applied to the full height of the door and frame without mortising.
    - c. Vertical door loads to be carried on chemically lubricated polyacetal thrust bearings. The door and frame leaves to be continually geared together for the entire hinge length and secured with a full cover channel. Hinge to operate to a full 180°.
    - d. Hinges to be milled, anodized and assembled in matching pairs. Fasteners supplied to be steel self-drilling, self-tapping 12-24 x 3/4" screws.
    - e. Provide UL listed continuous hinges at fire doors. Continuous hinges at fire doors (suffix -FR) to meet the required ratings without the use of auxiliary fused pins or studs.
- C. Cylinders:
- 1. Acceptable manufacturers:
    - a. Match existing Sargent keying system
  - 2. Characteristics:
    - a. Except as otherwise indicated, provide new master key system for project.
    - b. Metals: Construct lock cylinder parts from brass or bronze, stainless steel, or nickel silver.
    - c. Comply with Owner's instructions for master keying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.
      - 1) Permanently inscribe each key with number of lock that identifies cylinder manufacturer's key symbol, and notation, "DO NOT DUPLICATE".
    - d. Key Material: Provide keys of nickel silver only.
    - e. Key Quantity: Furnish (3) change keys for each lock, (5) master keys for each master system, (5) grandmaster keys for each grandmaster system, (10) construction master keys, (2) construction Control Keys.
      - 1) Furnish one extra blank for each lock.
      - 2) Furnish construction master keys to General Contractor.
      - 3) Deliver keys to Owner.
- D. Mortise Locksets and Latchsets: as scheduled.
- 1. Acceptable manufacturers:
    - a. Sargent 8200 Series\*
    - b. Or Approved Equal
  - 2. Required Features:
    - a. Chassis: Cold-rolled steel, handing field-changeable without disassembly.
    - b. Latchbolts: 3/4-inch throw stainless steel anti-friction type.
    - c. Lever Trim: Through-bolted, accessible design, cast or solid rod lever as scheduled. Spindles: Independent break-away.
    - d. Thumbturns: Accessible design not requiring pinching or twisting motions to operate.
    - e. Deadbolts: Stainless steel 1-inch throw.

- f. Strikes: 16 gage curved stainless steel, bronze or brass with 1" deep box construction, lips of sufficient length to clear trim and protect clothing.
- g. Scheduled Lock Series and Design: **FIELD VERIFY AND MATCH EXISTING LEVER DESIGN.**
- h. Certifications:
  - 1) ANSI A156.13, 1994, Grade 1 Operational, Grade 1 Security.
  - 2) ANSI/ASTM F476-84 Grade 30 UL Listed.

E. Exit Devices:

- 1. Acceptable manufacturers:
  - a. Sargent 80 Series\*
  - b. Or Approved Equal
- 2. Characteristics:
  - a. Exit devices to be UL Listed for life safety. Exit devices for fire rated openings to have "UL" labels for "Fire Exit Hardware."
  - b. Exit devices mounted on labeled wood doors to be mounted on the door per the door manufacturer's requirements.
  - c. All trim to be thru-bolted to the lock stile case.
  - d. Lever trim to be solid case material with a break-away feature to limit damage to the unit from vandalism. Lever design to match locksets.
  - e. All exit devices to be made of brass, bronze, stainless steel, or aluminum material, powder coated, anodized, or plated to the standard architectural finishes to match the balance of the door hardware.
  - f. Provide glass bead conversion kits to shim exit devices on doors with raised glass beads.
  - g. All exit devices to be one manufacturer. No deviation will be considered.
  - h. All series exit devices to incorporate a fluid damper, which decelerates the touchpad on its return stroke and eliminates noise associated with exit device operation. All exit devices to be non-handed. Touchpad to extend a minimum of 1/2 of the door width and to extend to the height of the cross rail housing for a "no pinch" operation. Plastic touchpads are not acceptable. All latchbolts to be the deadlocking type. Latchbolts to have a self-lubricating coating to reduce wear. Plated or plastic coated latchbolts are not acceptable. Plastic linkage and "dogging" components are not acceptable.
  - i. Surface vertical rod devices to be UL labeled for fire door applications without the use of bottom rod assemblies. Where bottom rods are required for security applications, the devices to be UL labeled for fire doors applications with rod and latch guards by the device manufacturer.
  - j. Exit devices to include impact resistant, flush mounted end cap design to avoid damage due to carts and other heavy objects passing through an opening. End cap to be of heavy-duty metal alloy construction and provide horizontal adjustment to provide alignment with device cover plate. When exit device end cap is installed, no raised edges will protrude.

- F. Closers and Door Control Devices:
1. Acceptable manufacturers:
    - a. Sargent 281 Series\*
    - b. Or Approved Equal
  2. Characteristics:
    - a. Door Closers shall be cast construction, minimum 1 ½" closer piston diameter, manufactured in USA, to be certified to exceed ten million (10,000,000) full load cycles by a recognized independent testing laboratory and shall have minimum ten year service record in K-12 school environments. Requests for approval for surface door closers shall be accompanied by project references. Approval shall be solely at the architect's discretion. All closers (overhead, surface and concealed) to be of one manufacturer and carry manufacturer's thirty year warranty
    - b. Door closers to have fully hydraulic, full rack and pinion action.
    - c. All closers to utilize a stable fluid withstanding temperature range of 120°F to -30°F without seasonal adjustment of closer speed to properly close the door. Closers for fire-rated doors to be provided with temperature stabilizing fluid that complies with standards UBC 7-2 (1997) and UL 10C.
    - d. Spring power to be continuously adjustable over the full range of closer sizes, and allow for reduced opening force for the physically handicapped. Spring power adjustment (LCN Fast™ Power Adjust) allows for quick and accurate power adjustment and visually shows closer power size settings by way of dial adjustment gauge located on closer spring tube. Hydraulic regulation to be by tamper-proof, non-critical valves. Closers to have separate adjustment for latch speed, general speed and back check.
    - e. All closers to have solid forged steel main arms (and forearms for parallel arm closers) and where specified to have a cast-in solid stop on the closer shoe ("CUSH"). All parallel arm mounted closers to have "EDA" type arms or, where door travel on out-swing doors must be limited, use "CUSH" or "SCUSH" type closers. Auxiliary stops are not required when "CUSH" type closers are used. Provide drop plates where top rail of door is not sufficient for closer mounting. Provide "cush shoe supports" and "blade stop spacers" where dictated by frame details.
    - f. Access-Free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped provide adjustable units complying with ADA and ANSI A-117.1 provisions for door opening force.
    - g. Closers to be installed to allow door swing as shown on plans. Doors swinging into exit corridors to provide for corridor clear width as required by code. Where possible, mount closers inside rooms.
    - h. Powder coating finish to be certified to exceed 100 hours salt spray testing by ETL, an independent testing laboratory used by BHMA for ANSI certification.

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

- G. Protective Plates:
1. Acceptable manufacturers:
    - a. Ives\*
    - b. Trimco
    - c. Rockwood Manufacturing
  2. Characteristics:
    - a. Provide manufacturers standard exposed fasteners for door trim units consisting of either machine screws or self-tapping screws.
    - b. Materials:
      - 1) Metal Plates: Stainless Steel, .050 inch (U.S. 18 gage).
    - c. Fabricate protection plates not more than 2 inches less than door width on push side and not more than 1 inch less than door width on pull side.
    - d. Heights:
      - 1) Kick plates to be 8 inches in height.
      - 2) Mop plates to be 6 inches in height.
      - 3) Kick plates and Mop plates to be 1" less than bottom rail height where applicable.
- H. Thresholds:
1. Acceptable manufacturers:
    - a. Zero\*
    - b. Pemko\*
    - c. National Guard Products, Inc.
  2. Types: Indicated in Hardware Headings.
- I. Door Seals/Gasketing:
1. Acceptable manufacturers:
    - a. Zero\*
    - b. Pemko\*
    - c. National Guard Products, Inc.
  2. Types: Indicated in Hardware Headings.

## 2.2 Materials And Fabrication

- A. Manufacturer's Name Plate: Do not use manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise acceptable to Architect.
1. Manufacturer's identification will be permitted on rim of lock cylinders only.
- B. Base Metals: Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units by applicable ANSI/BHMA A156 series standards for each type of hardware item and with ANSI/BHMA A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods for those indicated, except as otherwise specified.
- C. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
1. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.

2. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including "prepared for paint" surfaces to receive painted finish.
3. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent no standard units of type specified are available with concealed fasteners.
4. Use thru-bolts for installation of all exit devices, closers, and surface-mounted overhead stops. Coordinate with wood doors and metal doors and frames. Where thru-bolts are used, provide sleeves for each thru-bolt as a means of reinforcing the work, or provide sex nuts and bolts.

### 2.3 Hardware Finishes

- A. Match items to the manufacturer's standard color and texture finish for the latch and lock sets (or push-pull units if no latch or lock sets).
- B. Provide finishes that match those established by ANSI or, if none established, match the Architect's sample.
- C. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
- D. Provide protective lacquer coating on all exposed hardware finishes of brass, bronze, and aluminum, except as otherwise indicated. The suffix "-NL" is used with standard finish designations to indicate "no lacquer."
- E. The designations used to indicate hardware finishes are those listed in ANSI/BHMA A156.18, "Materials and Finishes," including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.
  1. **FIELD VERIFY AND MATCH EXISTING HARDWARE FINISH.**

## 3.0 - EXECUTION

### 3.1 Installation

- A. Mount hardware units at heights indicated in following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by Architect.
  1. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.
  2. "Recommended Locations for Builders Hardware for Custom Steel Doors and Frames" by the Door and Hardware Institute.
  3. NWWDA Industry Standard I.S. 1.7, "Hardware Locations for Wood Flush Doors."
- B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 9 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.

- C. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- E. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements specified in Division 7 Section "Joint Sealers".
- F. Weatherstripping and Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

3.2 ADJUSTING, CLEANING, AND DEMONSTRATING

- A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
  - 1. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to function properly with final operation of heating and ventilating equipment.
- B. Clean adjacent surfaces soiled by hardware installation.
- C. Door Hardware Supplier's Field Service:
  - 1. Inspect door hardware items for correct installation and adjustment after complete installation of door hardware.
  - 2. Instruct Owner's personnel in the proper adjustment and maintenance of door hardware and hardware finishes.
  - 3. File written report of this inspection to Architect.

HARDWARE SCHEDULE

HARDWARE SET: A

EACH TO HAVE:

6	HINGE	5BB1HW 4.5 X 4.5 NRP 630	IVE
2	POWER TRANSFER	EPT10	VON
1	REMOVABLE MULLION	L980S x 651 kit	SAR
1	ELEC PANIC HARDWARE	56-8810-TB	SAR
1	ELEC PANIC HARDWARE	56-8804-TB	SAR
2	CYL/CORE	AS REQUIRED	
2	SURFACE CLOSER	MC-CPS 351 TB	SAR
2	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	MULLION SEAL	139N PSA	ZER
1	RAIN DRIP	142AA (AS REQ'D)	ZER
2	MEETING STILE	328AA-S (PAIR)	ZER
1	GASKETING	8144SBK PSA	ZER
2	DOOR SWEEP	8198AA	ZER
1	THRESHOLD	65A	ZER
1	CREDENTIAL READER	BY SECURITY/ACCESS CTRL SYSTEMS	
2	DOOR CONTACT	BY SECURITY/ACCESS CTRL SYSTEMS	
1	POWER SUPPLY	BY SECURITY/ACCESS CTRL SYSTEMS	

COORDINATE HARDWARE WITH ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.

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

HARDWARE SET: B

EACH TO HAVE:

3	HINGE	5BB1HW 4.5 X 4.5 NRP 630	IVE
1	POWER TRANSFER	EPT10	VON
1	ELEC PANIC HARDWARE	56-8804-TB	SAR
1	CYL/CORE	AS REQUIRED	
1	SURFACE CLOSER	MC-CPS 351 TB	SAR
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	RAIN DRIP	142AA (AS REQ'D)	ZER
1	GASKETING	8144SBK PSA	ZER
1	DOOR SWEEP	8198AA	ZER
1	THRESHOLD	65A	ZER
1	CREDENTIAL READER	BY SECURITY/ACCESS CTRL SYSTEMS	
1	DOOR CONTACT	BY SECURITY/ACCESS CTRL SYSTEMS	
1	POWER SUPPLY	BY SECURITY/ACCESS CTRL SYSTEMS	

COORDINATE HARDWARE WITH ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.

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

HARDWARE SET: C

EACH TO HAVE:

3	HINGE	5BB1HW 4.5 X 4.5 NRP 630	IVE
1	POWER TRANSFER	EPT10	VON
1	EU MORTISE LOCK	8271 LNL	SAR
1	CYL/CORE	AS REQUIRED	
1	SURFACE CLOSER	MC-CPS 351 TB	SAR
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	RAIN DRIP	142AA (AS REQ'D)	ZER
1	GASKETING	8144SBK PSA	ZER
1	DOOR SWEEP	8198AA	ZER
1	THRESHOLD	65A	ZER
1	CREDENTIAL READER	BY SECURITY/ACCESS CTRL SYSTEMS	
1	DOOR CONTACT	BY SECURITY/ACCESS CTRL SYSTEMS	
1	POWER SUPPLY	BY SECURITY/ACCESS CTRL SYSTEMS	

COORDINATE HARDWARE WITH ELECTRICAL, SECURITY AND ACCESS CONTROL SYSTEMS.

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

HARDWARE SET: D

EACH TO HAVE:

3	HINGE	5BB1HW 4.5 X 4.5 NRP 630	IVE
1	CLASSROOM DEAD LOCK	4877	SAR
1	CYL/CORE	AS REQUIRED	
1	PUSH PLATE	8200 4" X 16"	IVE
1	PULL PLATE	8303 10" 4" X 16"	IVE
1	SURFACE CLOSER	MC-P10 351 TB	SAR
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	FLOOR STOP	FS18S	IVE
1	RAIN DRIP	142AA (AS REQ'D)	ZER
1	GASKETING	8144SBK PSA	ZER
1	DOOR SWEEP	8198AA	ZER
1	THRESHOLD	65A	ZER

HARDWARE SET: E

EACH TO HAVE:

1	CONT. HINGE	224XY	IVE
1	CLASSROOM DEAD LOCK	4877	SAR
1	CYL/CORE	AS REQUIRED	
1	PUSH PLATE	8200 4" X 16"	IVE
1	PULL PLATE	8303 10" 4" X 16"	IVE
1	SURFACE CLOSER	MC-P10 351 TB	SAR
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	FLOOR STOP	FS18S	IVE

TEMPLATE CLOSER FOR 180/MAX DEGREE SWING AS WALL CONDITION ALLOWS.

HARDWARE SET: F

EACH TO HAVE:

1	CONT. HINGE	224XY	IVE
1	CLASSROOM DEAD LOCK	4877	SAR
1	CYL/CORE	AS REQUIRED	
1	PUSH PLATE	8200 4" X 16"	IVE
1	PULL PLATE	8303 10" 4" X 16"	IVE
1	SURFACE CLOSER	4111 SCUSH MC TBWMS	LCN
1	MOP PLATE	8400 6" X 1" LDW B-CS	IVE
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE

HARDWARE SET: G

EACH TO HAVE:

1	CONT. HINGE	224XY	IVE
1	CLASSROOM DEAD LOCK	4877	SAR
1	CYL/CORE	AS REQUIRED	
1	PUSH PLATE	8200 4" X 16"	IVE
1	PULL PLATE	8303 10" 4" X 16"	IVE
1	SURFACE CLOSER	4111 EDA MC TBWMS	LCN
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE

HARDWARE SET: H

EACH TO HAVE:

1	CONT. HINGE	224XY	IVE
1	PUSH PLATE	8200 4" X 16"	IVE
1	PULL PLATE	8303 10" 4" X 16"	IVE
1	SURFACE CLOSER	4111 EDA MC TBWMS	LCN
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE



HARDWARE SET: J

EACH TO HAVE:

3	HINGE	5BB1WT 5 X 7 NRP	IVE
1	TURN I/S DEAD LOCK	L4876 -LB	SAR
1	DOOR PULL, 3/4" RND	8102HD 8" STD	IVE
1	WALL STOP/HOLDER	FS495	IVE
1	GASKETING	8144SBK PSA	ZER

USE "TOP OF DOOR" MOUNTING OPTION FOR FS495, SEE INSTALLATION INSTRUCTIONS.

HARDWARE SET: K

EACH TO HAVE:

6	HINGE	5BB1HW 4.5 X 4.5 NRP 630	IVE
1	CONST LATCHING BOLT	FB51P (HMD)	IVE
1	DUST PROOF STRIKE	DP1	IVE
1	STOREROOM LOCK	8204 LNL	SAR
1	CYL/CORE	AS REQUIRED	
2	OH STOP	100S	GLY
2	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	GASKETING	8144SBK PSA	ZER
1	ASTRAGAL	43STST (ACTIVE LEAF)	ZER
2	DOOR SWEEP	8198AA	ZER
1	THRESHOLD	65A	ZER

HARDWARE SET: L

EACH TO HAVE:

3	HINGE	5BB1HW 4.5 X 4.5 NRP 630	IVE
1	CORRIDOR LOCK W/ OUTSIDE INDICATOR	8225 LNL LB	SAR
1	CYL/CORE	AS REQUIRED	
1	SURFACE CLOSER	MC-CPS 351 TB	SAR
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	RAIN DRIP	142AA (AS REQ'D)	ZER
1	GASKETING	8144SBK PSA	ZER
1	DOOR SWEEP	8198AA	ZER
1	THRESHOLD	65A	ZER

HARDWARE SET: M

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5 NRP	IVE
1	STOREROOM LOCK	8204 LNL	SAR
1	CYL/CORE	AS REQUIRED	
1	SURFACE CLOSER	4111 SCUSH MC TBWMS	LCN
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE

HARDWARE SET: N

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5 NRP	IVE
1	STOREROOM LOCK	8204 LNL	SAR
1	CYL/CORE	AS REQUIRED	
1	OH STOP	90S	GLY
1	MOP PLATE	8400 6" X 1" LDW B-CS	IVE
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE

HARDWARE SET: P

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5 NRP	IVE
1	STOREROOM LOCK	8204 LNL	SAR
1	CYL/CORE	AS REQUIRED	
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE

HARDWARE SET: Q

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5 NRP	IVE
1	OFFICE/ENTRY LOCK	8205 LNL	SAR
1	CYL/CORE	AS REQUIRED	
1	OH STOP	90S	GLY
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE

HARDWARE SET: R

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5 NRP	IVE
1	PRIVACY W/DEADBOLT	V20-8265-LNL LB	SAR
1	MOP PLATE	8400 6" X 1" LDW B-CS	IVE
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE

HARDWARE SET: S

EACH TO HAVE:

6	HINGE	5BB1 4.5 X 4.5	IVE
1	CONST LATCHING BOLT	FB51P (HMD)	IVE
1	DUST PROOF STRIKE	DP1	IVE
1	TURN I/S DEAD LOCK	L4876 -LB	SAR
2	DOOR PULL, 3/4" RND	8102HD 8" STD	IVE
2	OH STOP & HOLDER	100H	GLY

HARDWARE SET: T

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	CLASSROOM LOCK	8237LNL	SAR
1	CYL/CORE	AS REQUIRED	
1	WALL STOP	WS401/402CVX	IVE

HARDWARE SET: U

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	PRIVACY W/DEADBOLT	V20-8265-LNL	SAR
1	SURFACE CLOSER	MC-CPS 351 TB	SAR
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE

HARDWARE SET: V

EACH TO HAVE:

3	HINGE	5BB1 4.5 X 4.5	IVE
1	STOREROOM LOCK	8204 LNL	SAR
1	CYL/CORE	AS REQUIRED	
1	SURFACE CLOSER	MC 351 TB	SAR
1	KICK PLATE	8400 8" X 2" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE

END OF SECTION

1.0 - GENERAL

1.1 Scope

The work under this section consists of all glass and glazing.

1.2 Quality

- A. Glazing shall be provided to comply with Table 5.3.1 Building Envelope Requirements - Climate Zone 1 of the Alabama Building Energy Conservation Code, and the 2021 International Building Code.
- B. Glazing for Fire-Rated Door and Window Assemblies: Glazing tested per NFPA 252 and NFPA 257, as applicable, for assemblies complying with NFPA 80 and listed and labeled per requirements of authorities having jurisdiction.
- C. Safety Glazing Products: Comply with size, glazing type, location, and testing requirements of 16 CFR 1201 for Category I and II glazing products, and requirements of authorities having jurisdiction.
- D. Glazing Industry Publications: Comply with glass product manufacturers' recommendations and the following:
  - 1. GANA Publications: GANA Laminated Division's 'Laminated Glass Design Guide' and GANA's 'Glazing Manual.'
  - 2. IGMA Publication for Insulating Glass: IGMA TM-3000, 'Glazing Guidelines for Sealed Insulating Glass Units.'
- E. Insulating-Glass Certification Program: Indicate compliance with requirements of Insulating Glass Certification Council on applicable glazing products.

1.3 Samples

Submit for approval samples of each kind of glass required. Each sample shall bear a label indicating the kind and quality of the glass and the manufacturer. **Only 1 sample each is required.**

1.4 Warranty

- A. Warranty for Coated-Glass Products: Manufacturer's standard form, signed by coated-glass product primary manufacturer or manufacturer/fabricator, as applicable, agreeing to replace coated-glass units that display peeling, cracking, and other deterioration in metallic coating under normal use, within 10 years of date of Substantial Completion.
- B. Warranty for Laminated Glass: Manufacturer's standard form, signed by laminated-glass product manufacturer/fabricator, agreeing to replace laminated-glass units that display edge separation, delamination, and blemishes exceeding those allowed by ASTM C 1172, within five years of date of Substantial Completion.
- C. Warranty for Insulating Glass: Manufacturer's standard form, signed by insulating-glass product manufacturer/fabricator, agreeing to replace insulating-glass units that exhibit failure of hermetic seal under normal use evidenced by the obstruction of vision by dust, moisture, or film on interior surfaces of glass, within 10 years of date of Substantial Completion.
- D. Installer's Warranty: Form acceptable to Owner, signed by glass product Installer, agreeing to replace glass products that deteriorate, or that exhibit damage or

deterioration of glass or glazing products due to faulty installation, within 2 years of date of Substantial Completion.

## 2.0 - PRODUCTS

### 2.1 Manufacturer

Glass products shall be as manufactured by Vitro Architectural Glass., Guardian Industries, Inc., or Pre-approved equal. Laminated pattern glass shall be as manufactured by North American Glass Fabrication. Fire-rated, safety-rated wired glass shall be manufactured by Technical Glass Products, Pilkington or SaftFirst.

### 2.2 Materials

Glass shall be as defined in, and in accordance with Code of Federal Regulations 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.

- A. Compound for face glazing, or where shown or indicated as compound shall be an oleo-resinous knife grade elastic glazing compound such as Tremco's Trem-glaze, Pecora's M-242, or Dap-1012.
- B. Sealant where shown or indicated shall be Tremco "Mono," Dow Corning 780, or GE's construction sealant.
- C. Tape where shown or indicated shall be Tremco's 440 Tape, Curtis 606 Tape, or Warflex's "Sealing Tape."
- D. Neoprene setting blocks as approved by glass manufacturer Shore "A" Hardness approximately 70 to 90.
- E. Neoprene spacer shims as approved by glass manufacturer Shore "A" Hardness approximately 40 to 60.
- F. Neoprene glazing beads as approved for aluminum store front and doors.
- G. Color of compound, sealant, tape, etc. shall be as selected.
- H. Glare reducing glass shall be 1/4" thick Solargray, Solargreen, or Solarbronze as selected.
- I. Glare reducing Tempered Safety glass shall be 1/4" thick Solargray, Solargreen, or Solarbronze as selected. When multiple small glass panes are used in the same door or sidelight, provide one (1) only Decal and furnish certificate verifying the use of Safety Glass in other panels.
- J. Interior Tempered Safety Glass shall meet 16CFR1201 Test Requirements, Cat. 1 and/or Cat. 2 as applicable. Etch label and furnish certificate verifying the use of Tempered Safety Glass.
- K. 1" insulating Glass - Pre-assembly Low-E unit consisting of 1/4" float glass exterior lite, 1/2" dehydrated air space and clear 1/4" float glass with Low-E interior lite meeting performance requirement for Class A or Class B Accelerated Test as specified in ASTM E744 with no visible fog. Match color on metal spacer to glazing frame. As selected by Architect. Provide minimum SHGC of .25.
  - 1. Solarban 70 Solar Gray + Clear
  - 2. Solarban 60 Solar Gray + Clear
  - 3. Solarban 70 Solar Bronze + Clear

*(See corresponding SHGC and U-Value below when used with metal frame)*

### 3.0 - EXECUTION

#### 3.1 Preparation

- A. Immediately prior to glazing, all surfaces shall be wiped clean and free of protective coatings, moisture, and dust. All glazing shall be done when the temperature is 35° F or above.
- B. All sash shall be checked prior to glazing to make certain that the opening is square, plumb, and secured in order that uniform face and edge clearances are maintained. Inspect all butt and miter joints. If these joints are open, they shall be sealed with sealant prior to glazing. All ventilators shall be properly adjusted. Maintain 1/8" minimum bed clearance between glass and sash on both sides.
- C. All glass indicated in non-rated doors shall be tempered with etched label.
- D. All glass indicated in rated doors shall be fire safety glass with etched label.

#### 3.2 Setting

- A. Glazing preparation and procedures shall be as outlined in the Glazing Manual of the Flat Glass Jobbers Association.
- B. Glass shall be set without springing, and with an equal bearing the entire width and length of each piece.
- C. The actual sizes required shall be determined by measuring the frames to receive the glass. All glass shall be factory labeled.
- D. Glass shall be properly cut and set in accordance with the best practice of the trade.
- E. Center glass in glazing rabbet to maintain recommended clearances at perimeter for expansion and contraction, each face of glass.

#### 3.3 Protection

Immediately after installation, a marker letter shall be placed upon each pane of glass for protection against careless breakage. All broken, cracked, scratched, or otherwise damaged glass shall be replaced.

#### 3.4 Cleaning

- A. Upon completion of the project, all glass shall have paint, dirt, and other stains removed; glass shall then be washed clean and polished.
- B. Labels on glass shall not be removed until final approval is obtained, and glass is ready for cleaning.

END OF SECTION

1.0 - GENERAL

1.1 Summary

- A. Related Documents: General and Supplementary Conditions of the Contract, Division 1 General Requirements, and Drawings are applicable to this Section.
  
- B. Section Includes:
  - 1. Porcelain Tile
  - 2. Ceramic Tile
  - 3. Quarry Tile
  - 4. Glass Tile
  - 5. Specialty Tile
  - 6. Installation Products; adhesives, mortars, grouts and sealants
  - 7. Waterproof membranes
  - 8. Crack Isolation membranes
  - 9. Thresholds, trim, cementitious backer units and other accessories specified herein.
  - 10. Tile and grout care and maintenance recommendations.

1.2 References

- A. American National Standards Institute (ANSI):
  - 1. A108.1 - Installation of Ceramic Tile in a Mortar Bed
  - 2. A108.5 - Installation of Ceramic tile with Dry-Set Portland Cement or Latex-Portland Cement
  - 3. A108.10 - Installation of Grout in Tile work
  - 4. A108.13 - Installation of Membranes for Thin-Set Ceramic Tile
  - 5. A118.3 - Chemical Resistant, Water-Cleanable, Tile-Setting and-Grouting Epoxy and Water-Cleanable Tile-Setting Epoxy Adhesive
  - 6. A118.4 - Latex-Portland Cement Mortar
  - 7. A 118.5 - Chemical-Resistant Furan Mortar and Grout.
  - 8. A118.6 - Ceramic Tile Grouts
  - 9. A118.7 - Polymer Mortified Cement Grouts
  - 10. A118.10 – Load-Bearing, Bonded Waterproofing Membranes for Thin-Set Ceramic Tile and Dimension Stone Installations
  - 11. A136.1 - Organic Adhesives for Installation of Ceramic Tile
  - 12. A137.1 - Ceramic Tile
  
- B. American Society for Testing and Materials (ASTM):
  - 1. C 136 - Sieve Analysis of Fine and Coarse Aggregates
  - 2. C 144 - Aggregate for Masonry Mortar
  - 3. C 150 - Portland Cement
  - 4. C 207 - Hydrated Lime for Masonry Purposes
  - 5. C 373 - Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products
  - 6. C 503 - Marble Dimensional Stone (Exterior)
  - 7. C 623 – Young’s Modulus, Shear Modulus, and Poisson’s Ratio for Glass and Glass-Ceramics by Resonance
  - 8. C 627 – Robinson Floor Test for Tile Service Level
  - 9. C 847-95 Metal Lath
  - 10. C 933-96a Welded Wire Lath
  - 11. C 1028 - Static Coefficient of Friction of Ceramic Tile and Other like Surfaces by the Horizontal Dynamometer Pull-Meter Method

12. D 87 - Melting Point of Petroleum Wax (Cooling Curve)
  13. D 226 - Asphalt Saturated Organic Felt Used in Roofing and Waterproofing
  14. D 4397 - Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
  15. E-90 and E-413 for STC (Sound Transmission Class), E-492 and E-989 for IIC (Impact Insulation Class) – Sound Deadening Underlayments
- C. TCA Handbook for Ceramic Tile Installation by Tile Council of America, latest edition

### 1.3 Submittals

- A. Submit shop drawings, product data, and samples under provisions of Section 01350.
- B. Shop Drawings:
1. Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, thresholds, and setting details.
  2. Locate and detail expansion and control joints.
- C. Submit product data, specifications, and instructions for using mortars, adhesives and grouts.
- D. Samples:
1. Submit color samples illustrating full color range of each type tile.
  2. Grout: Submit manufacturer's full range of standard and designated color samples for each type for Architect's selection.
- E. Submit following Informational Submittals:
1. Certifications specified in Quality Assurance article.
  2. Qualification Data: Manufacturer's and installer's qualification data.
  3. Manufacturer's instructions.
- F. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

### 1.4 Quality Assurance

- A. Single Source Responsibility:
1. Obtain each type and color tile material required from single source.
  2. Obtain setting and grouting materials from one manufacturer to ensure compatibility.
  3. Furnish a 10 year guarantee from installation material manufacturer. The guarantee is inclusive of installation materials, finish product, and labor.
  4. Obtain prefabricated edge protection and transition and movement profiles from one manufacturer to ensure compatibility.
  5. Obtain membrane from same manufacturer as setting material or from manufacturer approved by setting material manufacturer to ensure compatibility.
- B. Manufacturer Qualifications:
1. Tile: Minimum 5 years experience in manufacture of tile products.
  2. Setting Materials: Minimum 10 years experience in manufacture of setting and grout materials specified.

- C. Installer Qualifications: Specializing in tile work having minimum of 5 years successful documented experience with work comparable to that required for this Project.
- D. Certifications:
  - 1. Maintain one copy each of all Referenced standards and specifications on site. Include the TCA Handbook, ANSI A108 Series, ANSI A118 Series ANCI A136.1 and ANSI A137.1 and others as specified under paragraph References.
  - 2. Submit manufacturer's certifications that mortars, adhesives, and grouts are suitable for intended use.
- E. Conform to ANSI- Recommended Standard Specifications for Ceramic Tile - A137.1.
- F. Conform to TCA Ceramic Tile: The Installation Handbook.

1.5 Delivery, Storage, and Handling

- A. Deliver materials in manufacturer's unopened containers, fully identified with name, brand, type, and grade.
- B. Protect materials from contamination, dampness, freezing, or overheating in accordance with manufacturer's instructions.
- C. Broken, cracked, chipped, stained, or damaged tile will be rejected, whether built-in or not.
- D. Protect mortar and grout materials against moisture, soiling, or staining.

1.6 Environmental Requirements

- A. Comply with requirements of referenced standards and recommendations of material manufacturers for environmental conditions before, during, and after installation.
- B. Do not begin installation until building is completely enclosed and HVAC system is operating and maintaining temperature and humidity conditions consistent with "after occupancy" conditions for a minimum of 2 weeks.
- C. Maintain continuous and uniform building temperatures of not less than 50 degrees F during installation nor more than 100 degrees F.
- D. Ventilate spaces receiving tile in accordance with material manufacturers' instructions.

1.7 Warranty

- A. Special Project Warranty: Submit a written warranty, executed by the Contractor, Installer, and Manufacturer, agreeing to repair or replace tile that fails in materials or workmanship within the specified warranty period.
  - 1. Warranty Period: 1 year after date of Substantial Completion.



## 1.8 Extra Materials

- A. At completion of project, deliver to Owner extra stock of materials used on project as follows:
  - 1. Provide 10% of each size, color, and surface finish of tile.
  - 2. Six lineal feet of each color and type of base.
- B. Store in location as directed by Owner.
- C. Ensure materials are boxed and identified by manufacturer, type, and color.

## 1.9 Maintenance Data

- A. Submit maintenance data under provisions of Section 01910.
- B. Include cleaning methods, cleaning solutions recommended, stain removal methods, and polishes and waxes recommended.

## 2.0 - PRODUCTS

### 2.1 Manufacturers

- A. Acceptable Manufacturer: Daltile Corporation or pre-approved equal.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01360 received 10 days prior to bid.

### 2.2 Products

- A. Ceramic Wall Tile
  - 1. Manufacturer: Daltile
  - 2. Product: Color wheel linear
  - 3. Color: See finish schedule
  - 4. Size: See finish schedule
  - 5. Finish: Semi-gloss
  - 6. Pattern: As indicated on drawings.
  - 7. Trim Units: Matching bead, bullnose, cove and base shapes in sizes coordinated with field tile.
- B. Porcelain Floor Tile
  - 1. Manufacturer: Daltile
  - 2. Product: Keystone Mosaics
  - 3. Color: See finish schedule
  - 4. Size: See finish schedule
  - 5. Finish: Matte
  - 6. Pattern: As indicated on drawings.
  - 7. Trim Units: Matching bead, bullnose, cove and base shapes in sized coordinated with field tile.

### 2.3 Setting Materials

- A. Organic Adhesive: ANSI A136.1, thinset bond type; use Type I in areas subject to prolonged moisture exposure.
- B. Epoxy Adhesive: ANSI A118.3, thinset bond type.
- C. Mortar Bed Materials:
  - 1. Portland cement: ASTM C150, type 1, gray or white.

2. Hydrated Lime: ASTM C207, Type S.
  3. Sand: ASTM C144, fine.
  4. Latex additive: As approved.
  5. Water: Clean and potable.
- D. Mortar Bond Coat Materials:
1. Dry-Set Portland Cement type: ANSI A118.1.
  2. Latex-Portland Cement type: ANSI A118.4.
  3. Epoxy: ANSI A118.3, 100 percent solids.
- E. Epoxy Grout: ANSI A118.8, 100 percent solids epoxy grout; color to be selected.
- F. Waterproofing Membrane at Floors: Membrane in accordance with ANSI A118.10.
- G. Membrane at Walls: No. 15 (6.9 kg) asphalt saturated felt, ASTM D226, Type
- H. Membrane at Walls: 4 mil (0.1 mm) thick polyethylene film, ASTM D4397.
- I. Membrane at Walls: Reinforced asphalt paper.
- J. Cementitious Backer Board: ANSI A118.9; High density, cementitious, glass fiber reinforced with 2 inch (50 mm) wide coated glass fiber tape for joints and corners:
1. Thickness: 1/2 inch (13 mm).

#### 2.4 Miscellaneous Materials

- A. Temporary Protective Coating: Provide product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout, is compatible with tile and mortar/grout products, and is easily removable after grouting is completed without damaging grout or tile.
1. Petroleum paraffin wax, fully refined, tasteless, odorless, containing at least 0.5 percent oil with a melting point of 120-degree F to 140-degree F per ASTM D 87.
  2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as a temporary protective coating for tile.

#### 2.5 Finishing Edge Protection Profiles

- A. Manufacturer - Schluter Systems or pre-approved equal. Comply with Section 01360 - Product Substitution and submit at least 10 days prior to Bid. All other approved products shall be notified in writing via addendum.
- B. Products:
1. Schluter: Deco Radius
  2. Corners provide matching outside corners as required.
  3. Material and Finish: Satin anodized aluminum.
  4. Height as required
  5. Location as noted on drawings

#### 2.6 Mixing Mortar and Grout

Mix mortars and grouts in accordance with manufacturer's instructions.

## 3.0 - EXECUTION

### 3.1 Examination

- A. Verify that all wall surfaces are free of substances which would impair bonding of setting materials, smooth and flat within tolerances specified in ANSI A137.1, and are ready to receive.
- B. Verify that sub-floor surfaces are dust-free, and free of substances which would impair bonding of setting materials to sub-floor surfaces, and are smooth and float within tolerances specified in ANSI A137.1.
- C. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.
- D. Verify that required floor-mounted utilities are in correct location.

### 3.2 Preparation

- A. Clean substrates.
- B. Wet down or wash dry, dusty surfaces and remove excess water immediately prior to application of tiles.
- C. Prepare surfaces in strict accordance with instructions of manufacturer whose setting materials or additives are being used.
- D. Acid Based Cleaners: Use not permitted.
- E. Scarify concrete substrates with blast track equipment if necessary to completely remove curing compounds or other substances that would interfere with proper bond of setting materials. Clean and maintain substrate in condition required by setting material manufacturer.
- F. Do not seal substrate unless required by manufacturer.
- G. Prime substrate when required by manufacturer.
- H. Membrane
  - 1. Flash membrane up adjacent walls and restraining surfaces.
  - 2. Use preformed cove, corners, and expansion joint flashing.
  - 3. Allow membrane to cure as prior to setting tile.
  - 4. Do not allow construction traffic on membrane.
- I. Apply primer-sealer to wood and plywood subfloors when recommended by setting materials manufacturer.
- J. Blending: For tile exhibiting color variations within the ranges selected during sample submittals, verify that tile has been blended in factory and packaged accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

- K. Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent adhesion or staining of exposed tile surfaces by grout, protect exposed surfaces of tile against adherence of mortar and grout by precoating them with a continuous film of temporary protective coating indicated below, taking care not to coat unexposed tile surfaces:
1. Petroleum paraffin wax or grout release.

### 3.3 Installation

- A. Cement Board Substrate
1. Place rough side out and fasten with galvanized or resin coated gypsum board screws at 8 inches on center in field of panel and at 6 inches on center at edges.
  2. Provide 1/4 inch gap above floor or fixture lip for flexible caulking.
  3. Maintain manufacturer's required space between board edges.
  4. Fill joints by applying tile setting material and joint reinforcement.
- B. Vapor Retarder:
1. Extend vapor retarder to extremities of areas indicated to be protected from vapor transmission.
  2. Secure in place with mechanical fasteners or adhesives.
  3. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose mineral-fiber insulation.
  4. Seal vertical joints in vapor retarders over framing by lapping not less than two wall studs.
  5. Fasten vapor retarders to framing at top, end, and bottom edges, at perimeter of wall openings, and at lap joints; space fasteners no greater than 16 inches apart.
  6. Seal joints in vapor retarders caused by pipes, conduits, electrical boxes and similar items penetrating vapor retarders with vapor retarder tape.
  7. Repair tears and punctures in vapor retarder immediately before concealing it with the installation of cementitious backer units.
- C. Membrane:
1. Install membrane with products or methods approved in writing by membrane manufacturer when joining, sealing, fastening, or adhering sheet membranes.
  2. Flash membrane to cure prior to setting tile.
  3. Do not allow construction traffic on membrane.
- D. Crack Isolation Membrane
1. Install crack isolation membrane over cracks of up to 1/8 inch or greater in substrates. Apply a 12 inch wide strip centered on crack. Install in accordance with manufacturer's recommendations.
  2. Install membrane with products or methods approved in writing by membrane manufacturer when joining, sealing, fastening, or adhering sheet membranes.
- E. Waterproofing
1. Install waterproofing in strict compliance with manufacturer's instructions.
  2. Flash waterproofing up adjacent walls in accordance to manufacturer's details, to a height of 4 inches.
  3. Flood test waterproof membranes after fully cured.

4. Field Quality Control water test when required.
- F. Tile Installation, General
1. Install tile materials in accordance with ANSI A137.1, other referenced ANSI and TCA specifications, and TCA "Handbook for Ceramic Tile Installation", except for more stringent requirements of manufacturer or these Specifications.
  2. Cut and fit tile tight to protrusions and vertical interruptions and treat with a compatible sealant as specified in Section 07900
  3. Form corners and bases neatly.
  4. Work tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joint watertight, without voids, cracks, excess mortar, or grout.
  5. Prepare surface, fit, set, bond, grout and clean in accordance with applicable requirements of ANSI standards and Tile Council of America.
- G. Layout
1. Lay out work to pattern indicated so that full tile or joint is centered on each wall and no tile of less than half width need be used. Do not interrupt pattern through openings. Lay out tile to minimize cutting and to avoid tile less than half size.
  2. For heights stated in feet and inches, use courses of full tile to produce nearest attainable heights without cutting tile.
  3. No staggered joints will be permitted.
  4. Align joints in tile in both directions.
  5. Align joints between floor and base tile.
  6. Make joints between sheets of tile exactly same width as joints within sheet.
  7. File edges of cut tile smooth and even.
  8. Cut and fit tile at penetrations through tile. Do not damage visible surfaces. Carefully grind edges of tile abutting built-in items. Fit tile at outlets, piping and other penetrations so that plates, collars, or covers overlap tile.
  9. Extend tile work into recesses and under or behind equipment and fixtures, to form complete covering without interruptions, except as otherwise indicated. Terminate work neatly at obstructions, edges and corners without disrupting pattern or joint alignments.
  10. Accurately form intersections and returns.
  11. Form internal angles coved and external angles bullnosed.
- H. Thin Set Method, Floors and Walls
1. Apply mortar or adhesive with notched trowel using scraping motion to work material into good contact with surface to be covered. Maintain 90 percent coverage on back of tile and fully bed all corners.
  2. Apply only as much mortar or adhesive as can be covered within allowable windows as recommended by mortar or adhesive manufacturer or while surface is still tacky.
  3. When installing large tiles, ceramics or mosaics, trowel small quantity of mortar or adhesive onto back of each tile or sheet of tiles.
  4. Set tiles in place and rub or beat with small beating block.
  5. Beat or rap tile to ensure proper bond and also to level surface of tile.
  6. Align tile to show uniform joints and allow to set until firm.
  7. Clean excess mortar or adhesive from surface of tile with wet cheese cloth (not a sponge) while mortar is fresh.
  8. Allow face mounted tile to set until firm before removing paper and before grouting.

9. Sound tile after setting. Replace hollow sounding tiles.

I. Thick Bed Method, Horizontal Surfaces

1. Apply slurry bond coat approximately 1/16 inch thick to substrate surface using flat trowel.
2. Place thick bed mortar, 1-1/4 inch thick nominally onto slurry bond coat while coat is still wet and tacky.
3. Spread prepared mortar approximately one-half desired bed thickness and then lay reinforcing mesh.
4. Lap wire 3 inches and place additional mortar on top of wire to bring bed to required thickness.
5. Rod and compact mortar with steel trowel.
6. Before placing tiles on green or wet screed bed, apply slurry bond coat approximately 1/16 inch thick to mortar using flat trowel.
7. Apply mortar skim coat to back of each tile or sheet of tile immediately prior to placing on bed.
8. Place tiles in wet slurry coat before surface dries maintaining uniform joints.
9. After each tile or sheet of tiles is laid, beat tile with wooden block or rubber mallet to level surface and embed tiles.
10. Perform beating before mortar takes initial set.
11. Pitch surface to drain where required.
12. On hardened screed or mortar bed, install tiles by thin bed method.
13. Sound tiles after setting. Replace hollow sounding tiles.
14. Clean excess mortar or adhesive from surface of tile with wet cheese cloth (not a sponge) while mortar is fresh.

J. Grouting

1. Allow tiles to set a minimum of 48 hours before grouting.
2. If bonding materials are rapid setting, follow manufacturer's recommendations.
3. Install in accordance with grout manufacturer's recommendations and ANSI A108.10.
4. Pack joints full and free before mortar takes initial set.
5. Clean excess grout from surface with wet cheesecloth as work progresses. Do not use hydrosponges.
6. Cure after grouting by covering with Kraft or construction paper for 72 hours. Install sealant in vertical wall joints at interior corners.

K. Marble Threshold

1. Provide thresholds at wall or framed openings to other building areas not receiving tile.
2. Set one piece threshold in adhesive without voids, full width of door opening.
3. Point threshold base flush with adjoining tile floors.
4. Cope ends to fit door frame profile.

L. Control Joints and Other Sealant Usage

1. Install control joints where tile abuts retaining surfaces such as perimeter walls, curbs, columns, wall corners and directly over cold joints and control joints in structural surfaces conforming to architectural details.
2. Install control joint in floors at spacings as indicated in TCA Installation Handbook, unless noted otherwise.
3. Rake or cut control joints through setting bed to supporting slab or structure. Keep joints free of mortar.
4. Install in accordance with TCA Installation Handbook.

5. Fill joints with self-leveling polyurethane sealant and backing material specified in Section 07910.
6. Fill joints around toilet fixtures with white silicone sanitary sealant. Refer to Section 07910.

M. Expansion Joints:

1. Keep expansion joints free of mortar and grout.
2. Use manufacturer's expansion joint flashing when covering expansion joints with waterproof or crack isolation membranes.
3. Provide expansion joints directly over changes in material, over control and expansion joints in substrate, at juncture of floors and walls, at other restraining surfaces such as curbs, columns, bases, and wall corners, and where recommended by TCA EJ171 Expansion Joint requirements.
4. Install sealant in expansion joints.
5. Provide sealant material at items penetrating tile work, unless otherwise indicated.
6. Provide sealants and related materials in accordance with cited ANSI and TCA requirements.

3.4 Adjusting

Sound tile after setting. Replace hollow sounding units.

3.5 Cleaning

- A. Clean excess mortar from surface with water as work progresses. Perform cleaning while mortar is fresh and before it hardens on surfaces.
- B. Sponge and wash tile diagonally across joints. Polish with clean dry cloth.
- C. Remove grout haze following recommendation of mortar additive manufacturer. Do not use acids for cleaning.
- D. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to brick and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

3.6 Protection

- A. Prohibit traffic from floor finish for 72 hours after installation.
- B. Where temporary use of new floors is unavoidable, supply large flat boards or plywood panels for walkways over Kraft paper.
- C. Protect work so that it will be without any evidence of damage or use at time of acceptance.

END OF SECTION

## ACOUSTICAL PANEL CEILINGS - SECTION 09510

### 1.0 - GENERAL

#### 1.1 Related Documents

Drawings and general conditions of Contract, including General and Supplementary Conditions and Division-1 Specification sections apply to work of this section.

#### 1.2 Summary

##### A. Section Includes:

1. Acoustical ceiling panels.
2. Exposed grid suspension system.
3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings.

##### B. Related Sections:

1. Section 09260 - Gypsum Board
2. Section 09910 - Painting
3. Division 15 Sections - Mechanical Work
4. Division 16 Sections - Electrical Work

##### C. Substitutions:

1. Prior Approval: Unless otherwise provided for in the Contract documents, proposed product substitutions may be submitted no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review of the proposal for acceptability and approved products will be set forth by the Addenda. If included in a Bid are substitute products which have not been approved by Addenda, the specified products shall be provided without additional compensation.
2. Submittals which do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); Underwriters' Laboratories Classified Acoustical performance; Panel design, size, composition, color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards.  
*See Section 01360 – Product Substitution for submittal process information and Product Substitution Form.*

#### 1.3 References

##### A. American Society for Testing and Materials (ASTM):

1. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
2. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
3. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
4. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
5. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.



6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
7. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
8. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.
9. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems.
10. ASTM E 1264 Classification for Acoustical Ceiling Products.
11. ASTM E 1477 Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
12. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
13. ASTM E 119 Standard Test Methods for Fire Tests of Building Construction and Material.

- B. ASHRAE Standard 62.1-2004, "Ventilation for Acceptable Indoor Air Quality"

#### 1.4 Submittals

- A. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.
- B. Samples: Minimum 6 inch x 6 inch samples of specified acoustical panel; 8 inch long samples of exposed wall molding and suspension system, including main runner and 4 foot cross tees.
- C. Shop Drawings: Layout and details of acoustical ceilings. Show locations of items which are to be coordinated with, or supported by the ceilings.
- D. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.
- E. If the material supplied by the acoustical subcontractor does not have an Underwriter's Laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of and replaced with complying product at the expense of the Contractor performing the work.

#### 1.5 Quality Assurance

- A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.
- B. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
  1. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 for Class A products.
    - a. Flame Spread: 25 or less
    - b. Smoke Developed: 50 or less

- 2. Fire Resistance Ratings: As indicated by reference to design designations in UL Fire Resistance Directory, for types of assemblies in which acoustical ceilings function as a fire protective membrane and tested per ASTM E 119.
  - a. Protect lighting fixtures and air ducts to comply with requirements indicated for rated assembly.
- C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.6 Delivery, Storage, and Handling

- A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.7 Project Conditions

A. Space Enclosure:

All ceiling products and suspension systems must be installed and maintained in accordance with Armstrong written installation instructions for that product in effect at the time of installation and best industry practice. Prior to and after installation, the ceiling product must be kept clean and dry, in an environment that is between 32°F (0°C) and 120°F (49°C) and not subject to Abnormal Conditions within the space or with interfacing construction such as walls or soffits. Abnormal conditions include exposure to chemical fumes, vibrations, moisture, excessive humidity, or excessive dirt or dust buildup.

HumiGuard Plus Ceilings: Installation of the products shall be carried out where the temperature is between 32°F (0° C) and 120°F (49° C). It is not necessary for the area to be enclosed or for HVAC systems to be functioning. All wet work (plastering, concrete, etc) must be complete and dry. The ceilings must be maintained to avoid excessive dirt or dust buildup that would provide a medium for microbial growth on ceiling panels. Microbial protection does not extend beyond the treated surface as received from the factory, and does not protect other materials that contact the treated surface such as supported insulation materials.

1.8 Warranty

- A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace acoustical panels that fail within the warranty period. Failures include, but are not limited to:
  - 1. Acoustical Panels: Sagging and warping as a result of defects in materials or factory workmanship.
  - 2. Grid System: Rusting and manufacturer's defects
  - 3. Acoustical Panels with BioBlock Plus or designated as inherently resistive to the growth of micro-organisms installed with Armstrong suspension systems: Visible sag and will resist the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.
- B. Warranty Period Humiguard:

1. Acoustical panels and grid systems with HumiGuard Plus or HumiGuard Max performance supplied by one source manufacturer is thirty (30) years from date of substantial completion.
- C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

#### 1.9 Maintenance

- A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.
1. Acoustical Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed.
  2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

### 2.0 - PRODUCTS

#### 2.1 Manufacturers

- A. Ceiling Panels:  
Armstrong World Industries, Inc. USG or pre-approved equal.

#### 2.2 Acoustical Ceiling Units

- A. Acoustical Panels Type L1 (without fire guard): Product:  
Dune, 1774
1. Surface Texture: Medium
  2. Composition: Mineral Fiber
  3. Color: White
  4. Size: 24in X 24in X 5/8in
  5. Edge Profile: Angled Tegular for interface with Prelude XL 15/16" Exposed Tee.
  6. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.55.
  7. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 35
  8. Emissions Testing: < 13.5 ppb of formaldehyde when used under typical conditions required by ASHRAE Standard 62.1- 2007, "Ventilation for Acceptable Indoor Air Quality"
  9. Flame Spread: ASTM E 1264;
  10. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.85.
  11. Dimensional Stability: HumiGuard Plus - Temperature is between 32°F (0° C) and 120°F (49° C). It is not necessary for the area to be enclosed or for HVAC systems to be functioning. All wet work (plastering, concrete, etc) must be complete and dry.
  12. Antimicrobial Protection: BioBlock Plus - Resistance against the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.

B. Acoustical Panels Type L2: Product: Calla, 2824

1. Surface Texture: Medium
2. Composition: Mineral Fiber
3. Color: Grey Stone (MGS)
4. Size: 24in x24in x 7/8in
5. Edge Profile: Square Tegular Lay-In for interface with Prelude XL 15/16" Exposed Tee
6. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.60.
7. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 35
8. Emissions Testing: < 13.5 ppb of formaldehyde when used under typical conditions required by ASHRAE Standard 62.1-2007, "Ventilation for Acceptable Indoor Air Quality"
9. Flame Spread: ASTM E 1264; Fire Resistive
10. Dimensional Stability: HumiGuard Plus - Temperature is between 32°F (0° C) and 120°F (49° C). It is not necessary for the area to be enclosed or for HVAC systems to be functioning. All wet work (plastering, concrete, etc) must be complete and dry.
11. Antimicrobial Protection: BioBlock Plus - Resistance against the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.

B. Acoustical Panels Type ML: Product: Clean Room VL, 868

1. Surface Texture: Smooth
2. Composition: Mineral Fiber
3. Color: White
4. Size: 24in X 24in X 5/8in
5. Edge Profile: Square Lay-In for interface with Prelude Plus XL Fire Guard 15/16" Exposed Tee.
6. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, N/A.
7. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 40
8. Emissions Testing: < 13.5 ppb of formaldehyde when used under typical conditions required by ASHRAE Standard 62.1- 2007, "Ventilation for Acceptable Indoor Air Quality"
9. Flame Spread: ASTM E 1264; Fire Resistive
10. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.80.
11. Dimensional Stability: HumiGuard Plus - Temperature is between 32°F (0° C) and 120°F (49° C). It is not necessary for the area to be enclosed or for HVAC systems to be functioning. All wet work (plastering, concrete, etc) must be complete and dry.
12. Antimicrobial Protection: BioBlock Plus - Resistance against the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.

2.3 Suspension Systems (WITHOUT FIRE GUARD CEILING TILES)

- A. Components: All main beams and cross tees shall be commercial quality hot-dipped galvanized aluminum as per ASTM A 653. Main beams and cross tees are double-web steel construction with type exposed flange design. Exposed surfaces chemically cleansed, capping pre-finished galvanized aluminum in baked polyester

paint. Main beams and cross tees shall have rotary stitching (exception: extruded aluminum or stainless steel).

1. Structural Classification: ASTM C 635 HD.
  2. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise.
  3. Acceptable Product: Prelude XL 15/16" Exposed Tee as manufactured by Armstrong World Industries, Inc.
- B. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
- C. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least time three design load, but not less than 12 gauge.
- D. Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations, including light fixtures, that fit type of edge detail and suspension system indicated. Provide moldings with exposed flange of the same width as exposed runner.

#### 2.4 Suspension System for Use with Clean Room VL 868

- A. Components: All main beams and cross tees shall be commercial quality hot-dipped galvanized aluminum as per ASTM A 653. Main beams and cross tees are double-web steel construction with type exposed flange design. Exposed surfaces chemically cleansed, capping pre-finished galvanized aluminum in baked polyester paint. Main beams and cross tees shall have rotary stitching (exception: extruded aluminum or stainless steel).
1. Structural Classification: ASTM C 635 HD.
  2. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise.
  3. Acceptable Product: Prelude Plus XL Fire Guard 15/16" Exposed Tee as manufactured by Armstrong World Industries, Inc.
- B. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
- C. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least time three design load, but not less than 12 gauge.
- D. Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations, including light fixtures, that fit type of edge detail and suspension system indicated. Provide moldings with exposed flange of the same width as exposed runner.

### 3.0 - EXECUTION

#### 3.1 Examination of Adjoining Work

Do not proceed with installation until all wet work or work that has become wet such as concrete, CMU, terrazzo, plastering and painting has been completed and thoroughly dried out.

3.2 Preparation

- A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.
- B. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.
  - 1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.3 Installation

- A. Install suspension system and panels in accordance with the manufacturer's instructions, and in compliance with ASTM C 636 and with the authorities having jurisdiction.
- B. Suspend main beam from overhead construction with hanger wires spaced 4'-0" on center along the length of the main runner. Install hanger wires plumb and straight. Main beams are to be supported with hanger wires within 8" of vertical surface terminations.
- C. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.
- D. Vertical Wall or soffit surfaces intended to be paint finished shall receive the first coat of primer or block fill prior to installation of wall moulding.
- E. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.
- F. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

3.4 Adjusting and Cleaning

- A. Replace damaged and broken panels.
- B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage.
- C. Ceiling Touch-Up Paint, (Item #5760, 8oz. bottles) (Item #5761, quart size cans), "global white" latex paint should be used to hide minor scratches and nicks in the surface and to cover field tegularized edges that are exposed to view.
- D. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

1.0 - GENERAL

1.1 Related Documents

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

1.2 Summary

A. Section Includes:

1. Non-perforated metal ceiling panels
2. Acoustical backing
3. Suspension systems
4. Accessories: provide other necessary items including devices for attachment overhead construction, secondary members, splines, splices, connecting clips, wall connectors, wall angles, and other devices required for a complete installation.
5. Supplemental support framing: Provide fully engineered secondary framing as required to meet code, conforming to layout shown in drawings, to support direct-hung metal ceilings suspension system.

B. Related Sections / Work:

1. Sections 05 40 00 – Cold-Formed Metal Framing
2. Sections 09 20 00 – Plaster and Gypsum Board
3. Sections 09 50 00 – Acoustical Ceilings
4. Sections 09 90 00 – Paintings and Coatings
5. Division 23 – Heating, Ventilating and Air Conditioning
6. Division 26 – Electrical

C. Substitutions

1. Prior Approval: Unless otherwise provided for in the Contract documents, proposed product substitutions may be submitted no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review of the proposal for acceptability and approved products will be set forth by the Addenda. If included in a Bid are substitute products which have not been approved by Addenda, the specified products shall be provided without additional compensation.
2. Submittals which do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5);

Underwriters' Laboratories Classified Acoustical performance; Panel design, size, composition, color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards. See Section 01360 – Product Substitution for submittal process information and Product Substitution Form.

D. Qualification Data:

1. Test Reports: Certified reports from independent agency substantiating structural compliance to windloads and other governing requirements.
2. Certificates:
  1. Data substantiating manufacturer and installer qualifications.
  2. Certified data attesting fire rated materials comply with specifications.
3. Manufacturer's Instructions: Detailed installation instructions and maintenance data.

1.3 References

A. American Society for Testing and Materials (ASTM)

1. E 84 – "Standard Test Method for Surface Burning Characteristics of Building Materials"
2. E 488 – "Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements"
3. B 209 – "Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate"
4. C 423 – "Sound Absorption and Sound Absorption Coefficients by Reverberation Room Method"
5. E 580 – "Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Moderate Seismic Restraint"
6. C 635 – "Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings"
7. C 636 – "Recommended Practice for Installation of Metal Ceiling Suspensions Systems for Acoustical and Lay-in Panels"
8. A 641 – "Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire"
9. A 653 – "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip process"
10. E 1264 – "Classification for Acoustical Ceiling Products"



11. E 1477 – "Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by use of Integrating-Sphere Reflectometers"
12. D 1044 – "Practice for Abrasion Resistance"
13. D 1002 – "Practice for Adhesion Resistance"

#### 1.4 Submittals

- A. Product Data: Manufacturer's published literature, including specifications.
- B. Product Certification: Manufacturer's certifications that products comply with specified requirements and governing codes including product data, laboratory test reports and research reports showing compliance with specified standards.
- C. Shop Drawings: Submit shop drawings for reflected ceiling plans (RCP's), drawn to scale, and indicating penetrations and ceiling mounted items. Show the following details:
  1. Reflected Ceiling Plan(s): Indicating metal ceiling layout, ceiling mounted items and penetrations.
  2. Suspension System, Carrier and Component Layout.
  3. Details of system assembly and connections to building components.
- D. Samples for Verification: Full-size units (or as specified below) of each type of ceiling assembly indicated; in sets for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics. Submit samples for each type specified.
  1. 11" square metal panel units.
  2. 11" long samples of each exposed molding or trim.
  3. 11" long samples of each suspension component.

#### 1.5 Quality Assurance

- A. Manufacturer/Installer Qualifications:
  1. Provide metal ceiling system components produced by a single manufacturer with a minimum 5 years' experience in actual production of specified products and with resources to provide consistent quality in appearance and physical properties, without delaying the work.
  2. Provide suspension system components produced by a single manufacturer to provide compatible components for a complete metal ceiling system installation.
  3. Perform installations using a firm with installers having no less than 3 years of successful experience on projects of similar size and requirements.
- B. Regulatory Requirements:
  1. Fire Rating Performance Characteristics: Install system to provide a flame spread of 0 - 25, complying with certified testing to ASTM E 84.

2. Structural Criteria: Install and certify system to comply with structural and wind load requirements of governing codes.
  3. Installation Standard for Suspension System: Comply with ASTM C 636.
- C. Mock-Up: Prior to beginning installation erect a mock-up section, where directed, using all system components.
- D. Pre-installation Conference: Conduct a conference, prior to start of installation, to review system requirements, shop drawings, and all coordination needs.

#### 1.6 Delivery, Storage and Handling

- A. Deliver system components in manufacturer's original unopened packages, clearly labeled.
- B. Store components in fully enclosed dry space. Carefully place on skids, to prevent damage from moisture and other construction activities.
- C. Handle components to prevent damage to surfaces and edges, and to prevent distortion and other physical damage.

#### 1.7 Project Conditions

- A. Begin system installations only after spaces are enclosed and weather-tight, and after all wet work and overhead work have been completed.
- B. Prior to starting installations, allow materials to reach ambient room temperature and humidity intended to be maintained for occupancy.

#### 1.8 Warranty

- A. Provide specified manufacturer's warranty against defects in workmanship, discoloration, or other defect considered undesirable by the Architect or Employer.
- B. This warranty shall remain in effect for a minimum period of one (1) year from date of initial acceptance.

#### 1.9 Maintenance & Extra materials

- A. Maintenance Instructions: Provide manufacturer's standard maintenance and cleaning instructions for finishes provided.
- B. Extra Materials: Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents. Only typical system components are included with attic stock.
  1. Acoustical Metal Ceiling Pan Units: Full-size units equal to two percent (2%) of amount installed.
  2. Ceiling Suspension System Components: Quantity of each grid and exposed component equal to two percent (2%) of amount installed.

## 2.0 - PRODUCTS

### 2.1 Manufacturer

- A. Box linear metal panel ceiling system manufactured by CertainTeed Architectural or equal.
- B. See Section 01360 – Product Substitution for submittal information and Product Substitution Form.

## 2.2 System materials

- A. Linear metal panel ceiling system for exterior installations:
- B. Panel Profile Type: Box 6, roll formed, .032" exterior thick aluminum with square edges; 5-5/32" wide, 5/8" deep with 27/32" reveal to form a 2" module.
- C. Panel length: **(Standard 12')(minimum 3' – maximum 16')**
- D. Closure: Flat Recessed Closure: 5/8" wide roll-formed aluminum hat-shaped closure panel to snap-fit between ceiling panels.
- E. Recessed Closure required for exterior applications.
  - a. Finish: Black

## 2.3 Linear Suspension System:

- A. Carrier: Universal hat-shaped, .038" roll-formed aluminum section with hook-shaped tabs spaced to receive ceiling panels at 2" on-center and 27/32" apart. Support holes spaced 4" on-center. Finish: Factory-applied black enamel.
- B. Hanger Wire: 12 gage galvanized carbon steel hanger wire.
- C. Seismic/Wind Uplift Compression Struts: 1-1/2" (38 mm) deep, 16 Ga., cold-rolled steel "C" channels.
- D. Perforations: Non-perforated only
- E. Panel Finish:
  - a. Decorated Wood-Look Powder Coat
- F. Film (.025", interior only)
- G. Wood Veneer (interior only)

## 2.4 Accessory materials

- A. Panel End Caps: Formed, stamped, or milled end caps with matching finish
- B. Panel Splice: Formed aluminum insert designed to snap-fit between ends of two ceiling panels. Finish: to match panel

## 3.0 - EXECUTION

### 3.1 Examination

- A. Examine substrates and structural framing to which acoustical metal panels attach or abut, with installer present, for compliance with requirements specified in this and other Sections that affect installation and anchorage, and other conditions affecting performance of metal panel ceilings.

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

### 3.2 Preparation

- A. Coordination: Furnish layouts for cast-in-place anchors, clips, and other ceiling anchors whose installation is specified in other Sections.
- B. Measure each ceiling area and establish layout of acoustical metal pan units to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width units at borders and comply with layout shown on reflected ceiling plans.
- C. Survey substrate for wall attachment to assure squareness and proper elevation for wall panel installation.

### 3.3 Installation

- A. General: Install acoustical metal pan ceilings, per manufacturers shop drawings provided, per manufacturer's written instructions and to comply with publications referenced below.
  - 1. CISCA "Ceiling Systems Handbook"
  - 2. Standard for Ceiling Suspension System Installations - ASTM C 636
  - 3. Standard for Ceiling Suspension Systems Requiring Seismic Restraint - ASTM E 580
  - 4. IBC (International Building Code) Standard for Seismic Zone for local area
- B. Suspend ceiling hangers from building's approved structural substrates and as follows:
  - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
  - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, counter-splaying, or other equally effective means.
  - 3. Where width of ducts and other construction within ceiling plenum produce hanger spacings that interfere with location of hangers at spacing required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Utilize supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
  - 4. Where used secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure; that are appropriate for substrate; and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

5. Space hangers not more than 48" on-center, along each member supported directly from hangers, unless otherwise indicated; and provide hangers not more than 12" from ends of each member. Supply supporting calculations from licensed Structural Engineer verifying hanger spacing meets all requirements, when spacing exceeds those recommended.
  6. Level grid to 1/8" in 10' from specified elevation(s), square and true.
  7. Adjust suspension system runners so they are square (within .5 degree from 90 degrees) and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- C. Secure bracing wires to ceiling suspension members and to support acceptable to Architect/Engineer and/or inspector. Suspend bracing from building's structural members and/or structural deck, as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs (unless directed otherwise).
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical metal pan. Method of edge trim attachment and design of edge trims to be approved by Architect.
1. Screw attach moldings to substrate at intervals not more than 18" on-center and not more than 6" from ends, leveling with ceiling suspension system to a tolerance of 1/8" in 10'. Miter corners accurately and connect securely.
  2. Do not use exposed fasteners, including pop rivets, on moldings and trim without prior written approval, or unless detailed otherwise.
- E. Scribe and cut acoustical metal panel units for accurate fit at penetrations by other work through ceilings. Stiffen edges of cut units as required to eliminate evidence of buckling or variations in flatness exceeding referenced standards for stretcher-leveled metal sheet.
- F. Install acoustical metal panel units in coordination with suspension system. Fit adjoining units to form flush, tight joints. Scribe and cut units for accurate fit at borders and around construction penetrating ceiling.

### 3.4 Adjusting and Cleaning

- A. Adjust components to provide uniform tolerance.
- B. Replace all ceiling panels that are scratched, dented or otherwise damaged.
- C. Clean exposed surfaces with non-solvent, non-abrasive commercial type cleaner.

### 3.5 Attic Stock

- A. Provide 5% of all products specified sizes and colors. Store at location as directed by Owner.

END OF SECTION

RESILIENT RUBBER BASE AND ACCESSORIES- SECTION 09653

1.0 - GENERAL

1.1 Related Documents

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. The Construction Waste Management plan prepared by the Construction Manager for coordination of waste material recycling is hereby incorporated by the reference as requirement of this section. Work under this section shall conform to the provisions outlined in the Plan and shall conform with the local recycling Standards to provide a coordinated effort to maximize reuse of waste materials.

1.2 Submittals

- A. Submit for the approval of the Architect samples of each color and type of material. Mark each sample with the manufacturer's name, type material, pattern, color, catalog number, thickness, name of contractor, and name of project.

1.3 Delivery and Storage

- A. Deliver materials to site in manufacturer's original, unopened containers clearly marked with manufacturer's brand name, color, and pattern numbers, and production run color code. Care shall be taken to prevent damage and freezing during delivery, handling, and storage.
- B. Store materials at site for at least 24 hours before installation.
- C. Maintain temperature of spaces where materials are stored and are to be installed at not less than 60° for at least 24 hours before installation. Thereafter, maintain a minimum temperature of 60°F.

2.0 - PRODUCTS

2.1 General

- A. Materials shall be uniform in thickness and size with accurately cut edges. No seconds, off-goods, or remnants will be allowed.
- B. Colors shall be uniform throughout.
- C. Materials within each area shall be from one production run as indicated by cartons bearing the same manufacturer's color code.
- D. Interior finish materials shall comply with flame spread limitations and smoke production limitations as follows. Tests shall be performed by an independent testing laboratory.

Walls and Ceilings	Flame Spread Smoke Production	25 or less ASTM E-84. 350 or less ASTM E-84.
Floors	Flame Spread Smoke Production	75 or less ASTM E-84. 350 or less ASTM E-84.

2.2 Manufacturers

- A. Rubber Base Manufacturers
  - 1. Tarkett (Basis of Design)
  - 2. Roppe

3. Flexco
4. Mannington

B. Transition Material Manufacturers:

1. Tarkett
2. Roppe
3. Flexco
4. Mannington

C. Requests for substitution shall be considered in accordance with provision of Section 01360 and received by Architect at least 10 days prior to bid.

2.3 Wall Base Materials

A. Rubber Base shall be 4" high x running length. Rubber base shall be Johnsonite, Roppe or approved equal. Base type and color as specified on Finish Legend.

B. Adhesives, including primer, shall be as manufactured or recommended by the manufacturer of the materials used.

C. Outside corners are to be mitered. V-cut back of base strip to two thirds of its thickness and fold. Use Tool # 532 cove base groover gunlach or equal. Inside corners are to be mitered.

**4' lengths or less and pre-mitered corners are not acceptable**

D. Provide caulk to fill in at bullnose corners.

2.4 Floor Transition Materials

A. Provide transition strips tapered to meet abutting materials on drawings.

2.5 Adhesives:

A. Wall Base Adhesives shall be as manufactured or recommended by the manufacturer of the materials used. Provide epoxy at "wet areas".

1. Wall Base Adhesives
  - a. Tarkett/Johnsonite 960 Wall Base Adhesive for porous surfaces
  - b. Tarkett/Johnsonite 946 Premium Contact Adhesive for non-porous surfaces
  - c. Tarkett/Johnsonite 965 Flooring and Tread Adhesive
  - d. Tarkett/Johnsonite 996 Two-Part Epoxy Adhesive
  - e. Tarkett/Johnsonite 975 Two-Part Urethane Adhesive
2. Caulk: Color Rite Inc.

B. Floor Transitions: Adhesives shall be as manufactured or recommended by the manufacturer of the materials used.

3.0 - EXECUTION

3.1 Inspection

Surfaces to receive rubber base shall meet the minimum requirements established by the rubber base manufacturer. Examine surfaces and correct defects before starting applications.

3.2 Precautions During Installations

A. Spaces in which rubber base material is being set shall be closed to traffic and to other work until the base is firmly set.

- B. Where solvent-based adhesive is used, safety sparkproof fans shall be provided and operated when natural ventilation is inadequate. Smoking shall be prohibited.

3.3 Installation

- A. Install rubber base materials only after all finishing operations have been completed. Moisture content of concrete slabs, building air temperature and relative humidity must be within limits recommended by rubber base manufacturer.
- B. Mix and apply adhesive in accordance with the manufacturer's instructions. Cover the area evenly and only to the extent which can be covered with rubber base material in the recommended working time of the adhesive.
- C. Base shall be applied in such a manner that the entire under- surface shall be securely bonded in place. Base shall be laid tightly so that each piece is in contact with the adjoining pieces and all joints are in true alignment.
- D. Apply resilient base to permanent walls, cabinets, and fixtures in rooms or areas as specified. Install base in as long lengths as practicable. Press down so that bottom cove edge follows floor. Scribe accurately to abutting materials.

3.4 Adjustments

Inspect and make necessary adjustments after heat is applied continuously in finished areas. Any portion of the rubber base which has not seated in a level plane with surrounding base and all damaged, imperfect, or improperly installed base shall be warmed, carefully removed, and new base of the same color and thickness substituted.

3.5 Cleaning and Waxing

Remove stains from base and clean as required and recommended by manufacturer.

3.6 Surplus Materials

Unused runs and one full carton of materials shall be left at the job and turned over to the Owners.

END OF SECTION



1.0 – GENERAL

1.1 Related Documents

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

1.2 Summary

- A. This section includes the following:
  - 1. Resinous flooring system as shown on the drawings and in schedules.
- B. Related sections include the following:
  - 1. Cast-in-Place Concrete, Section 03300

1.3 System Description

- A. The work shall consist of preparation of the substrate, the furnishing and application of a seamless flooring system with decorative flake broadcast and chemical resistant topcoat.
- B. The system shall have the color and texture as specified by the Owner with a nominal thickness of 60 Mils. It shall be applied to the prepared area(s) as defined in the plans strictly in accordance with the Manufacturer's recommendations.
- C. 4 inch Cove base to be applied where noted on plans and per manufacturers standard details unless otherwise noted

1.4 Submittals

- A. Product Data: Latest edition of Manufacturer's literature including performance data and installation procedures.
- B. Samples: A 6 x 6 inch square sample of the proposed system. Color, texture, and thickness shall be representative of overall appearance of finished system subject to normal tolerances.

1.5 Quality Assurance

- A. The Manufacturer shall have a minimum of 10 years' experience in the production, sales, and technical support of epoxy and urethane industrial flooring and related materials.
- B. The Applicator shall have experience in installation of the flooring system as confirmed by the manufacturer in writing in all phases of surface preparation and application of the product specified. Qualifications of applicator must be submitted to Architect by the General Contractor for approval within 24 hours after acceptance of bid. Architect reserves the right to reject applicator if they do not meet the specified qualifications and/or cannot provide documentation from manufacturer.

- C. No requests for substitutions shall be considered that would change the generic type of the specified System.
- D. System shall be in compliance with requirements of United States Department of Agriculture (USDA), Food, Drug Administration (FDA), and local Health Department.
- E. A pre-installation conference shall be held between Applicator, General Contractor, manufacturer and the Owner for review and clarification of this specification, application procedure, quality control, inspection and acceptance criteria and production schedule.

1.6 Product Delivery, Storage, And Handling

- A. Packing and Shipping  
All components of the system shall be delivered to the site in the Manufacturer's packaging, clearly identified with the product type and batch number.
- B. Storage and Protection
  - 1. The Applicator shall be provided with a dry storage area for all components. The area shall be between 60 F and 85 F, dry, out of direct sunlight and in accordance with the Manufacturer's recommendations and relevant health and safety regulations.
  - 2. Copies of Material Safety Data Sheets (MSDS) for all components shall be kept on site for review by the Architect or other personnel.
- C. Waste Disposal
  - 1. The Applicator shall be provided with adequate disposal facilities for non-hazardous waste generated during installation of the system.

1.7 Project Conditions

- A. Site Requirements
  - 1. Application may proceed while air, material and substrate temperatures are between 60 F and 85 F providing the substrate temperature is above the dew point. Outside of this range, the Manufacturer shall be consulted.
  - 2. The relative humidity in the specific location of the application shall be less than 85 % and the surface temperature shall be at least 5 F above the dew point.
  - 3. The Applicator shall be supplied with adequate lighting equal to the final lighting level during the preparation and installation of the system.
- B. Conditions of new concrete to be coated with specified flooring material.
  - 1. Concrete shall be moisture cured for a minimum of 7 days and have fully cured for 28 days in accordance with ACI-308 prior to the application of the coating system pending moisture tests. Outside of these parameters manufacturer shall be consulted.
  - 2. Concrete shall have a light steel trowel finish (a hard steel trowel finish is neither necessary or desirable).
  - 3. Sealers and curing agents should not be used.

4. Concrete surfaces on grade shall have been constructed with a vapor barrier to protect against the effects of vapor transmission and possible delamination of the system.

C. Safety Requirements

1. Other trades shall be removed during the application of the product and 72 hours after completion

**2.0 – PRODUCTS**

2.1 Manufacturers

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

1. Basis-of-Design Product: Subject to compliance with requirements, provide BPI Spartacote Chip Pure Seamless Floor System. Not all manufacturers produce all categories and types of resinous flooring systems.
  - a. Also pre-approved are:  
 Sherwin Williams – Aqua Armor Decorative Mosaic Flooring  
 Stonhard – Stontec ERF
2. Other Products must be approved prior to Bid and must be submitted in compliance with Section 01360 - Product Substitution.

2.2 Flooring

A. Spartacote Chip Pure Seamless Floor System (60 mil floor system),

1. System Materials:
  - a. Primer: Primer/Scratch Coat 160 sq. ft/gal
  - b. Base resin: Pigmented Body Coat 65 sq. ft/gal
  - c. Broadcast Aggregate: Broadcast Chips (size and quantity determined by selection of architect)
  - d. Grout Coat: MVT Tolerant UV Stable Glaze 160 sq. ft/gal
  - e. Top Coat: Surface Build Top Coat UV- Finish to be selected by Architect
  - f. Color: See Finish Legend
2. Cove base (4 inch high with 2 inch diameter radius, smooth texture)
  - a. Cove resin; Cove Gel, Spartacote Broadcast quartz mixed with resin and troweled in place
  - b. Overlay Spartacote Chip Pure Floor System to match floor
  - c. Cove termination strip: clear plastic with 1/8" lip

2.3 Product Requirements

Material: Spartacote Resin	2-component epoxy
Density	12.70 lbs./gallon
VOC Content, Mixed	
Volume Solids	59%
Flash Point: Part A	>212°F
Part B	170 °F

Mixing Ratio	1:4 by Vol.
Pot Life, Approximate	60 minutes @ 75°F
Open to Foot Traffic	After 16 hrs. at 73°F
Curing Temperature	Minimum 50°F
Full Cure & Max. Resistance	7 days
Hardness, Shore D ASTM-D-2240	70-75
Compressive Strength ASTM-C- 579	6500 psi
Flexural Strength ASTM-C-580	2100 psi
Adhesion To:	110 psi
-New concrete (5 days)	550 psi
-Moist concrete (28 days)	580 psi
-Dry concrete (28 days)	

### 3.0 – EXECUTION

#### 3.1 Examination

- A. Examine substrates, areas and conditions, with Applicator present, for compliance with requirements for maximum moisture content, installation tolerances and other conditions affecting flooring performance.
- B. Verify that substrates and conditions are satisfactory for flooring installation and comply with requirements specified.

#### 3.2 Preparation

##### A. General

1. Existing concrete surfaces shall be free of oil, grease, curing compounds, loose particles, moss, algae growth, laitance, friable matter, dirt, and bituminous products
2. Mechanical surface preparation
  - a. Shot blast all surfaces to receive flooring system with a mobile steel shot, dust recycling machine (Blastrac or equal). All surface and embedded accumulations of paint, toppings hardened concrete layers, laitance, power trowel finishes and other similar surface characteristics shall be completely removed leaving a bare concrete surface having a minimum profile of CSP 3-5 as described by the International Concrete Repair Institute.
  - b. Floor areas inaccessible to the mobile blast machines shall be mechanically abraded to the same degree of cleanliness, soundness and profile using diamond grinders, needle guns, bush hammers, or other suitable equipment.
  - c. Wherever a free edge will occur, including doorways, wall perimeters, expansion joints, columns, doorways, drains and equipment pads, a ¼ inch deep by 3/16 inch wide keyways shall be cut in.
  - d. Cracks and joints (non-moving) greater than 1/4 inch wide are to be chiseled or chipped-out and repaired per manufacturer's recommendations.

3. At spalled or worn areas, mechanically remove loose or delaminated concrete to a sound concrete and patch per manufactures recommendations.

### 3.3 Application

#### A. General

1. The system shall be applied in six distinct steps as listed below:
  - a. Substrate preparation
  - b. Cove application
  - c. Primer Application
  - d. Topping/overlay application with flake aggregate broadcast.
  - e. Grout coat application
  - f. Topcoat application to thickness to reach even texture matching accepted sample
2. Immediately prior to the application of any component of the system, the surface shall be dry and any remaining dust or loose particles shall be removed using a vacuum or clean, dry, oil-free compressed air.
3. The handling, mixing and addition of components shall be performed in a safe manner to achieve the desired results in accordance with the Manufacturer's recommendations.
4. The system shall follow the contour of the substrate unless pitching or other leveling work has been specified by the Architect.
5. A neat finish with well-defined boundaries and straight edges shall be provided by the Applicator.

#### B. Cove

1. Cove will be placed with the broadcast flake to match selected color and size at 4 inches in height unless otherwise noted on drawing with a 1 inch radius
2. The cove will be smooth with no texture above mid-radius

#### C. Topping

1. The topping shall be applied as a self-leveling system as specified. The primer must be applied and will not be a lift coat. The topping shall be applied in one to two lifts with a minimum thickness of 60 mils.
2. The topping shall be comprised of three components, a resin, hardener and filler as supplied by the Manufacturer.
3. The hardener shall be added to the resin and thoroughly dispersed by suitably approved mechanical means.
4. The topping shall be applied over horizontal surfaces using a pin rake, trowels or other systems approved by the Manufacturer.
5. Flake shall be broadcast into the wet material to excess.
6. Allow material to fully cure. Vacuum, sweep and/or blow to remove all loose aggregate.

#### D. Grout coat and Topcoat

1. The grout coat shall be mixed and applied per manufacturer recommended procedure.
2. The grout coat shall be comprised of two components, a resin, hardener.
3. The grout coat will be applied at the rate of 160 sf per gallon.
4. The top coat shall be mixed and applied per manufacturer recommended procedure.
5. The top coat shall be comprised of two components, a resin, hardener.
6. The top coat will be applied at a rate to achieve selected texture.
7. The finish floor will have a uniform texture free of dry or smooth areas that do not match the selected texture. The finished thickness shall be 60 mils.

### 3.4 Field Quality Control

#### A. Tests, Inspection

The following tests shall be conducted by the Applicator:

1. Temperature  
Air, substrate temperatures, relative humidity, and, if applicable, dew point.
2. Perform moisture tests on concrete as follows:
  - a. Perform calcium chloride moisture tests in accordance with ASTM D1869 a minimum of twice for the first 1000 sq. ft and once for each additional 1000 sq. ft of area to be coated. Provide a written report of these test results including a letter of acceptance from the manufacturer.
  - b. Perform PH tests alongside each calcium chloride moisture tests. Provide a written report of these test results including a letter of acceptance from the manufacturer.

#### B. Coverage Rates

Rates for all layers shall be monitored by checking quantity of material used against the area covered.

#### C. Provide daily reports including detailed days activities, materials used with batch numbers and environmental conditions

### 3.5 Cleaning And Protection

- A. Cure flooring material in compliance with manufacturer's directions, taking care to prevent their contamination during stages of application and prior to completion of the curing process.
- B. Remove masking. Perform detail cleaning at floor termination, to leave cleanable surface for subsequent work of other sections.

END OF SECTION

1.0 - GENERAL

1.1 Scope

The work under this Section consists of all carpet, labor, metal strip, and all accessories required to properly install carpet in quality, workmanlike manner.

1.2 Submittals

- A. The carpet contractor shall submit to the Architect samples of all materials with complete color specifications specified herein.
- B. Carpet subcontractor shall submit to Architect a seam layout for approval before being approved as a subcontractor.

1.3 Manufacturer

Carpet manufacturer shall have been manufacturer of this type carpet continuously for period of five (5) years.

1.4 Test Requirements

Meets FHA requirements as prescribed in "Use of Materials Bulletin" No. 44b, dated April 23, 1969, for HEAVY TRAFFIC.

Certified to pass Flame Spread Rating in accordance with provisions of State Fire Marshall's regulations.

1.5 Guarantees and Warranties

- A. Carpet manufacturer and installer must submit certification guaranteeing carpet and installation against defects for a period of two (2) years from date of final acceptance of the Contract, or from occupancy of the building, whichever is earlier.
- B. Carpet manufacturer shall guarantee carpet against wear for a period of Fifteen (15) Years minimum from date of final acceptance of the Contract, or from occupancy of the building, whichever is earlier.
- C. Carpet manufacturer shall guarantee static generation of no more than 3.5 KV as tested under AATCC-134.
- D. Manufacturer must submit certification guaranteeing carpet against edge ravel for a period of Fifteen (15) Years from date of final acceptance of the Contract, or from occupancy of the building, whichever is earlier.

1.6 Maintenance Instruction

The carpet manufacturer shall furnish three (3) copies of a complete Maintenance Manual for Owner's use.

1.7 Manufacturers

CPT – 1 Interface, Upload 161660AK00; Color: See Finish Legend.  
CPT – 2 Interface, Source Material 163290AK00; Color: See Finish Legend.  
CPT – 3 Interface, On Line 138700AK00; Color: See Finish Legend.

2.0 - PRODUCTS

2.1 Materials

- A. All carpet shall be first quality of American manufacture and all yarn shall be of

Domestic origin.

**UPLOAD – CPT - 1**

Style Name	Upload
Style Number	161660AK00
Product Type	Modular Carpet Tile (25 cm x 1m)
Construction	Engaged Tufted Pattern Loop
Fiber Type	100% Recycled Content Nylon
Dye Method	100% Solution Dyed
Gauge	1/10 /in.
Stitches Per Inch	8.50 /in
Tufted Pile Height	0.14 in.
Tufted Yarn Weight	19 oz/ sq. yd
Finished Pile Thickness	0.08 /in
Density	8,550 oz/ sq yd.
Protective Treatments	Protekt
Primary Backing	Glasbac
Recommended Installation	Ashlar, Herringbone
Post-Consumer Recycled Content	10.31%

Performance Specifications

Methenamine Pill Test (DOC FF-1-70)	Pass
Flooring Radiant Panel (ASTM E-648)	Class I
Smoke Density (ASTM E-662)	Less than 450
Static Control (AATCC-134)	Less than 3.5 kV
CRI Green Label Plus	GLP 9968

Warranty Information

15-Year Standard Carpet Warranty

**SOURCE MATERIAL – CPT - 2**

Style Name	Source Material
Style Number	163290AK00
Product Type	Modular Carpet Tile (25 cm x 1m)
Construction	Tufted Textured Loop
Fiber Type	100% Recycled Content Nylon
Dye Method	100% Solution Dyed
Gauge	1/12 /in.
Stitches Per Inch	11.00 /in.
Tufted Pile Height	0.13 in.
Tufted Yarn Weight	17 oz/sq yd.
Finished Pile Thickness	0.08 /in.
Density	7,747 oz/ sq yd.
Protective Treatments	Protekt
Primary Backing	Glasbac
Recommended Installation	Ashlar, Herringbone
Post Consumer Recycled Content	9.46%



Performance Specifications

Methenamine Pill Test (DOC FF-1-70)	Pass
Flooring Radiant Panel (ASTM E-648)	Class I
Smoke Density (ASTM E-662)	Less than 450
Static Control (AATCC-134)	Less than 3.5 kV
CRI Green Label Plus	GLP 9968

Warranty Information

15-Year Standard Carpet Warranty

**ONLINE – CPT - 3**

Style Name	On Line
Style Number	138700AK00
Product Type	Modular Carpet Tile (25cm x 1m)
Construction	Tufted Textured Loop
Fiber Type	100% Recycled Content Nylon
Dye Method	100% Solution Dyed
Gauge	1/12 /in.
Stitches Per Inch	11.00 /in.
Tufted Pile Height	0.15 /in.
Tufted Yarn Weight	22 oz/sq yd.
Finished Pile Thickness	0.12 /in.
Density	6,146 oz/sq yd.
Protective Treatments	Protekt
Primary Backing	Glasbac
Recommended Installation	Ashlar, Herringbone
Post Consumer Recycled Content	11.2%

Performance Specifications

Methenamine Pill Test (DOC FF-1-70)	Pass
Flooring Radiant Panel (ASTM E-648)	Class I
Smoke Density (ASTM E-662)	Less than 450
Static Control (AATCC-134)	Less than 3.5 kV
CRI Green Label Plus	GLP 2271

Warranty Information

15-Year Standard Carpet Warranty

- B. Provide white metal aluminum wrap around edge strip at termination edge of carpet where transitioning to other floor finish.
- C. Interior finish materials shall comply with critical radiant flux, flame spread limitations and smoke production limitations as follows. If a separate underlayment is used with any floor finish materials, the underlayment and the finish material shall be tested as a unit or equivalent provisions taken as to the effect of the underlayment on the flammability characteristics of the floor finish material. Tests shall be performed by an independent testing laboratory.

Carpet on floors in Group I Occupancies shall satisfactorily withstand a minimum critical radiant flux of 0.45 watts/sq cm when tested in accordance with NFPA 253.

Carpet on floors in other than Group I Occupancies shall satisfactorily withstand a minimum critical radiant flux of 0.22 watts/sq. cm when tested in accordance with NFPA 253.

### 3.0 - EXECUTION

#### 3.1 Inspection

- A. Examine subfloors prior to installation to determine that surfaces are smooth and free from cracks, holes, ridges, and other defects that might prevent adhesive bond or impair durability or appearance of the flooring material.
- B. Inspect subfloors prior to installation to determine that surfaces are free from curing, sealing, parting and hardening compounds; residual adhesives; adhesive removers; and other foreign materials that might prevent adhesive bond. Visually inspect for evidence of moisture, alkaline salts, carbonation, dusting, mold, or mildew.
- C. Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.
- D. Failure to call attention to defects or imperfections will be construed as acceptance and approval of the subfloor. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

#### 3.2 Preparation

- A. Smooth concrete surfaces, removing rough areas, projections, ridges, and bumps, and filling low spots, control or construction joints, and other defects as recommended by the flooring manufacturer.
- B. Remove paint, varnish, oils, release agents, sealers, and waxes. Remove residual adhesives as recommended by the flooring manufacturer. Remove curing and hardening compounds not compatible with the adhesives used, as indicated by a bond test or by the compound manufacturer's recommendations for flooring. Avoid organic solvents.
- C. Perform subfloor moisture testing in accordance with ASTM F 2170, "Standard Test Method for Determining Relative Humidity in Concrete Slabs Using in-situ Probes to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive flooring. [Relative humidity shall not exceed 80%.][MVER shall not exceed 5 lbs./1000 sq. ft./24 hrs.] On installations where both the Percent Relative Humidity and the Moisture Vapor Emission Rate tests are conducted, results for both tests shall comply with the

allowable limits listed above. Do not proceed with flooring installation until results of moisture tests are acceptable. All test results shall be documented and retained.

- D. Perform pH tests on concrete floors regardless of their age or grade level. All test results shall be documented and retained.
- E. Vacuum or broom-clean surfaces to be covered immediately before the application of flooring. Make subfloor free from dust, dirt, grease, and all foreign materials.

### 3.3 Installation

- A. All materials to be installed by craftsmen with at least 5 years commercial experience and must show evidence of having satisfactorily installed jobs of this size. Installer must be a CFI (Certified Floorcovering Installer) or FCIB (Floor Covering Installation Board) Certified Installer.
- B. Direct Glue-Down Method - Direct lamination to the sub-floor with **NO PAD**. Use primer and cement as recommended by carpet manufacturer.
- C. All seams shall receive a coating of latex edge sealer as approved by the manufacturer. All seams must be kept to a minimum and shall be invisible.
- D. After installation clean up all dirt, scraps, debris and vacuum. Remove any spots.
- E. Installation of carpet shall be delayed until final stages of project construction to insure that goods are not soiled and stained during project completion. Rooms shall be locked immediately after installation of carpet and traffic is not to be allowed in these areas.
- F. Installation of all carpet tile is to be as noted on Finish Legend.
- G. Carpet Tile Glue Down Method – shall be done as a “Continuous Spread” method. **“Grid-Set” method is unacceptable.**
- H. Dye lots – If more than one dye lot is used, verify customer satisfaction with all lots prior to installing carpet. Make sure to inspect all carpet prior to installation. Carpet from a single dye lot is preferred.

### 3.4 Damages

Carpet contractor shall be responsible for any damages to structure thru fault of installers.

### 3.5 Surplus Materials

Carpet remnants shall be packaged and delivered to the Owner.

### 3.6 Attic Stock

Provide 5% of each style and color of specified products. Store at location as determined by Owner.

1.0 - GENERAL

1.1 Scope

- A. The work under this section consists of all painting, finishing work and related items.
- B. Paint or Painting shall include sealers, primers, stains, and oil, alkyd, latex and enamel paints and the application of these materials on surfaces prepared to produce a complete job whether or not every item is specifically mentioned. Where items are not mentioned they shall be furnished as specified for similar work.

Only work specifically noted as being excluded shall be left unfinished.

- C. This specification includes field painting of all exposed piping, ductwork, conduit, hangers, mechanical and electrical equipment in finished spaces. A finished space is one listed in the Finish Schedule as having finish materials on walls and/or ceiling.

1.2 List of Proposed Materials

The contractor shall either verify in writing that he intends to apply the products listed in the Paint Schedule, or shall submit for approval a list of comparable materials of another listed approved manufacturer. This submittal shall include full identifying product names and catalog numbers.

1.3 Submittals

As soon as practicable after contract is let, submit for approval a detailed schedule of the paint proposed, listing the name of each product, and the surface to which it will be applied. Omission of any item from the approved schedule shall not relieve Contractor of his obligation.

1.4 Storage of Materials

- A. Deliver all painting materials to job site at least three (3) days before beginning painting, in original unbroken containers showing manufacturers name and type of paint, subject to Architect's inspection and approval.
- B. All materials used on the job shall be stored in a single place. Such storage place shall be kept neat and clean, and all damage thereto or its surroundings shall be made good. Any soiled or used rags, waste, and trash must be removed from the building every night, and every precaution taken to avoid the danger of fire.

1.5 Protection of Other Work

The painting contractor shall furnish and lay drop cloths in all areas where painting is being done to protect floors and other work from damage. He shall be responsible for any damage to other work and shall replace any materials which have been damaged to such an extent that they cannot be restored to their original condition. All damage must be repaired to the satisfaction of the Architect.

1.6 Job, Weather, and Temperature Conditions

- A. Maintain temperature in building at constant 65° F. or above and provide adequate ventilation for escape of moisture from the building in order to prevent condensation mildew, damage to other work, and improper drying.
- B. Exterior painting shall not be done when the temperature is below 50° F., while the surface is damp, or during cold, rainy, or frosty weather, or when the temperature is

likely to drop to freezing within 24 hours. Avoid painting surfaces while they are exposed to hot sun.

- C. Before painting is started in any area, the area shall be broom cleaned and excessive dust shall be removed from all areas to be painted. After painting operations begin in a given area, clean only with commercial vacuum cleaning equipment.
- D. Adequate illumination shall be provided in all areas where painting operations are in progress.

#### 1.7 Inspection of Surfaces

- A. Before starting any work, surfaces to receive paint finishes shall be examined carefully for defects which cannot be corrected by the procedures specified under paint manufacturers recommended "Preparation of Surfaces" and which might prevent satisfactory painting results. Work shall not proceed until such damages are correct.
- B. At areas of existing previously painted surface, the painting contractor shall field verify to assure compatibility between existing paint / coating material and the proposed new paint / coating material prior to procuring such new materials or products. Should a material or product compatibility conflict be discovered, the Contractor shall immediately notify the Architect for direction prior to proceeding with procuring such materials or products.
- C. The beginning of work in a specific area shall be construed as acceptance of the surfaces and the Contractor shall be fully responsible for satisfactory work.

#### 1.8 Cooperation With Other Trades

- A. This work shall be scheduled and coordinated with other trades and shall not proceed until other work and/or job conditions are as required to produce satisfactory results.
- B. The contractor shall examine the specifications for the various trades and shall thoroughly familiarize himself with all provisions regarding painting. All surfaces that are left unfinished by the requirements of other sections shall be painted or finished as part of the work covered by this section.

#### 1.9 Maintenance Material

The contractor shall turn over to the Owner at the final inspection one gallon of each type and final color of the paint used on the project.

### 2.0 - PRODUCTS

#### 2.1 Materials

- A. Except where otherwise specifically stated hereinafter, painting materials shall be products of one of the following manufacturers without substitution of Equal, and shall be in that manufacturer's top grade of the respective type Benjamin Moore, PPG, Sherwin-Williams (Basis of Design). The term top grade refers to the manufacturers advertised line of best quality and not to Professional or maintenance lines. Any deviations from the requirements of this article shall be only by written change order with contract price adjusted accordingly.
- B. If job-mixed paints are used, submit proposed formulas for approval before proceeding with work. Thinning and tinting materials shall be as recommended by the manufacturer of the material used.

- C. Paints and finishing materials shall be free from skins, lumps, or any foreign matter when used, and pigments, fillers, etc., shall be kept well stirred while being applied.
- D. Interior finish materials shall comply with flame spread limitations and smoke production limitations as follows:
  - Walls and Ceilings - Flame Spread - 25 or less ASTM E-84.  
Smoke Production - 350 or less ASTM E-84.

2.2 Colors

- A. Not limited to stock ready-mixed colors. Bring to directed shades or tones by mixing.
- B. In two-coat or three-coat work use slightly different colors for different coats to avoid skipping.
- C. Accent or feature areas when indicated shall be colors as selected. Color spacing and pattern shall be as indicated and/or directed. Maximum three (3) colors per area.
- D. Complete color scheme shall be as indicated on Finish Legend and Schedule.

2.3 Accessory Materials

Provide all required ladders, scaffolding, drop cloths, maskings, scrapers, tools, sandpaper, dusters, cleaning solvents, and waste as required to perform the work and achieve the results specified herein.

3.0 - EXECUTION

3.1 Workmanship

- A. Surfaces shall be clean, dry, and free of oil, grease, dirt, mildew, loose or peeling paint, loose wood particles, and in proper condition for painting. All work shall be carefully done by skilled mechanics. Finished surfaces shall be uniform in coverage, gloss, finish and color, and free from brush marks. All coats shall be thoroughly dry before applying succeeding coats.
- B. Do all work in strict accordance with manufacturer's label directions.
- C. Hand sand woodwork until smooth and free from raised grain and other surface imperfections. First coat shall be applied before erection, to all surfaces, front and back. After woodwork is primed, fill nail holes, cracks, etc., full and smooth with putty. Lightly sand between coats where necessary in accord with good practice. Fully finish the top and bottom edges of doors and other woodwork edges not normally visible. Shellac knots and pitch streaks before painting.
- D. On concrete or masonry, do no painting until the surface has dried to the equivalent of eight days drying time under well ventilated conditions in good drying weather.
- E. Vertical surfaces to Interface with suspended acoustical panel ceiling shall be primed/filled to a minimum of 8" about finish ceiling elevation prior to the installation of the acoustical panel ceiling perimeter wall edge molding/trim.
- F. Wash metal surfaces with mineral spirits to remove any dirt, grease, before applying materials. Where rust or scale is present, use wire brush, or sandpaper clean before painting. Clean shop coats of paint that become marred and touch up with specified primer.

- G. Treat galvanized metal surfaces chemically with compound designed for this purpose, apply as per manufacturer's directions before applying first paint coat.
- H. Remove and protect hardware panels, accessories, device plates, lighting fixtures, factory finished work, and similar items; or provide ample in-place protection. Upon completion of each space, carefully replace all removed items.
- I. Exterior doors shall have tops, bottoms, and side edges finished the same as the exterior faces of these doors.  
  
Interior door shall have vision windows, louvers, grilles, etc. Finished to match door frame.
- J. All closets and the interior of all cabinets shall be finished the same as adjoining room paint or stain unless otherwise scheduled. All other surfaces shall be finished the same as nearest or adjoining surfaces unless otherwise scheduled or directed.

3.2 Schedule

A. Exterior Metals

- 1. Galvanized metal shall be solvent clean with VM&P Naphtha.  
Prime: S-W: Pro-Cryl Low VOC Universal Metal Primer, B66-310  
Finish: Two (2) coats – S-W: Pro Industrial Urethane Alkyd Enamel, Semi-Gloss B54-150 Series
- 2. Non-primed metal shall be cleaned and etched with approved acid and washed with water.  
Prime: S-W Pro Industrial Pro-Cryl Universal Primer, B66-1310  
Finish: Two (2) coats – S-W: Pro Industrial Urethane Alkyd Enamel, Gloss B54-150 Series
- 3. Primed metals shall be inspected, scuffs, and abrasions sanded free of rust and receive full coat of primer. Concealed metal surfaces shall be back primed.  
Prime: S-W Pro Industrial Pro-Cryl Universal Primer, B66-1310  
Finish: Two (2) coats – S-W: Pro Industrial Urethane Alkyd Enamel, Gloss B54-150 Series

B. Interior Metals

- 1. Non-primed metal shall be primed under this section.  
Prime: S-W Pro Industrial Pro-Cryl Universal Primer, B66-1310  
Finish: Two (2) Coats – Pro Industrial Waterbased Alkyd Urethane Enamel, Semi-Gloss, B53-1150
- 2. Primed metal shall have scratches and abrasions sanded free of rust and receive one full coat of primer.  
Prime: S-W Pro Industrial Pro-Cryl Universal Primer, B66-1310  
Finish: Two (2) Coats – Pro Industrial Waterbased Alkyd Urethane Enamel, Semi-Gloss, B53-1150

C. Exposed Exterior Concrete and Concrete and/or Clay Brick Masonry

- Primer: One (1) coat, S-W Loxon Concrete and Masonry Primer/Sealer, A24W8300  
Block Filler: One (1) coat, S-W Pro Industrial Heavy Duty Acrylic Block Filler, B42W151  
Finish: Two (2) coats, S-W A-100 Exterior Latex HP, Flat, A6 Series

- D. Interior Concrete and Concrete Masonry
1. Concrete masonry surfaces shall be filled unless noted otherwise.  
Block Filler: One (1) coat, S-W PrepRite Interior / Exterior Block Filler, B42W46  
Finish: Two (2) coats, ProMar 200 Zero VOC Interior Latex EgShel, B20W12651
  2. Concrete (Cast in Place or Precast)  
Primer: One (1) coat, S-W Loxon Concrete and Masonry Primer/Sealer, A24W8300  
Finish: Two (2) coats, ProMar 200 Zero VOC Interior Latex EgShel, B20W12651
  3. **Concrete Sealer:** Concrete MUST be etched, with H&C® Concrete Etcher or muriatic acid, following label directions.  
  
Reducer/Cleaner --- Aromatic 100, R2K5, or R7K65  
Brush – Use natural bristle brushes  
Roller – Use a ¼” – 3/8” nap woven or other solvent-resistant cover  
Freshly stained or painted surfaces will require cure time before any application of this H&C® High Performance Industrial Clear. Follow manufacturer's instructions and recommendations.
- E. Exposed Ceiling Painting (Dryfall)  
Primer: Pro Industrial Pro-Cryl Primer (1 coat)  
Finish: Waterborne Acrylic Dry Fall Flat (1-2 coats)  
B42W00001

3.3 Material Application

- A. All materials shall be applied in complete accordance with manufacturer's printed instructions.
- B. All coats shall be thoroughly dry before the succeeding coat is applied.

END OF SECTION



## SOLID PLASTIC TOILET COMPARTMENTS - SECTION 10212

### 1.0 - GENERAL

#### 1.1 Summary

- A. Section Includes:  
Solid plastic toilet compartments and urinal screens.
- B. Related Sections:  
Division 01: Administrative, procedural, and temporary work requirements.

#### 1.2 References

- A. ASTM International (ASTM)
  - 1. A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  - 2. B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  - 3. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

#### 1.3 System Description

- A. Compartment Configurations:
  - 1. Toilet partitions: Floor mounted, overhead braced.
  - 2. Urinal screens: Floor mounted.
- B. Solid Plastic Panels: Maximum flame spread/smoke developed rating of 75/450, tested to ASTM E84.

#### 1.4 Submittals

- A. Submittals for Review:
  - 1. Shop Drawings: Include dimensioned layout, elevations, trim, closures, and accessories.
  - 2. Product Data: Manufacturer's descriptive data for panels, hardware, and accessories.
  - 3. Samples: 3 x 3 inch samples showing available colors.

#### 1.5 Quality Assurance

- A. Manufacturer Qualifications: Minimum 5 years' experience in manufacture of solid plastic toilet compartments with products in satisfactory use under similar service conditions.
- B. Installer Qualifications: Minimum 5 years' experience in work of this Section.

#### 1.6 Warranties

Provide manufacturer's 25-year warranty against breakage, corrosion, and delamination under normal conditions.

### 2.0 - PRODUCTS

#### 2.1 Manufacturers

- A. Contract Documents are based on products by Scranton Products.

- B. Other Manufacturers wishing to submit product, must do so at least 10 days prior to bid and comply with Section 01360 – Product Substitution.

## 2.2 Materials

- A. Doors, Panels and Pilasters:
  - 1. High density polyethylene (HDPE), fabricated from polymer resins compounded under high pressure, forming single thickness panel.
  - 2. Waterproof and nonabsorbent, with self-lubricating surface, resistant to marks by pens, pencils, markers, and other writing instruments.
  - 3. 1 inch thick with edges rounded to 1/4 inch radius.
  - 4. Color: To be selected by Architect from manufacturer's full color range.
- B. Aluminum Extrusions: ASTM B221, 6463-T5 alloy and temper.
- C. Stainless Steel: ASTM A167, Type 304.

## 2.3 Hardware

- A. Hinges: Stealth integral hinge from door and pilaster material with exposed metal parts on interior of stall.
- B. Door Strike and Keeper:
  - 1. 6 inches long, fabricate from heavy-duty extruded aluminum with bright dip anodized finish, with wrap-around flanges secured to pilasters with stainless steel tamper resistant Torx head sex bolts.
  - 2. Bumper: Extruded black vinyl.
- C. Latch and Housing:
  - 1. Heavy-duty extruded aluminum.
  - 2. Latch housing: Bright dip anodized finish.
  - 3. Slide latch and paddle.
- D. Coat Hook/Bumper:
  - 1. Combination type, chrome plated Zamak.
  - 2. Equip outswing handicapped doors with second door pull and door stop.
- E. Door Pulls: Chrome plated Zamak.

## 2.4 Components

- A. Doors and Dividing Panels: 55 inches high, mounted 14 inches above finished floor, with aluminum heat-sinc fastened to bottom edges.
- B. Pilasters: 82 inches high, fastened to pilaster sleeves with stainless steel tamper resistant Torx head sex bolt.
- C. Pilaster Sleeves: 3 inches high, 20 gage stainless steel, secured to pilaster with stainless steel tamper resistant Torx head sex bolt.
- D. Wall Brackets: 54 inches long, heavy-duty aluminum, bright dip anodized finish, fastened to pilasters and panels with stainless steel tamper resistant Torx head sex bolts.
- E. Headrail: Heavy-duty extruded aluminum, anti-grip design, clear anodized finish, fastened to headrail bracket with stainless steel tamper resistant Torx head sex bolt and at top of pilaster with stainless steel tamper resistant Torx head screws.

- F. Headrail Brackets: 20 gage stainless steel, satin finish, secured to wall with stainless steel tamper resistant Torx head screws.

### 3.0 - EXECUTION

#### 3.1 Installation

- A. Install compartments in accordance with manufacturer's instructions and approved Shop Drawings.
- B. Install rigid, straight, plumb, and level.
- C. Locate bottom edge of doors and panels 14 inches above finished floor.
- D. Provide uniform, maximum 3/8 inch vertical clearance at doors.
- E. Not Acceptable: Evidence of cutting, drilling, or patching.

#### 3.2 Adjusting

Adjust doors and latches to operate correctly.

END OF SECTION

1.0 - GENERAL

1.1 Related Documents

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

1.2 Related Work Specified Elsewhere

CONCRETE BASE - SECTION 03300

ANCHOR BOLTS - SECTION 05500

1.3 Summary

Extent and location of each type of flagpole is shown on drawings.

1.4 Submittals

Product Data: Submit manufacturer's technical data and installation instructions for each type of flagpole required.

1.5 Quality Assurance

A. Manufacturing Standards: Provide each flagpole as a complete unit produced by a single manufacturer, including fittings, accessories, bases and anchorage devices.

B. Design Criteria: Provide flagpoles and installations constructed to withstand a 90 mph wind velocity minimum when flying flag of appropriate size. Use heavy pipe sizes if required for flagpole type and height shown.

C. Pole Construction: Construct pole and ship to site in one piece if possible. If more than one piece is necessary, provide snugfitting, precision joints with self-aligning, internal splicing sleeve arrangement for weathertight, hairline field joints.

1.6 Delivery, Storage and Handling

A. Spiral wrap flagpoles with heavy Kraft paper or other protective wrapping and prepare for shipment in hard fiber tube or other protective container.

B. Deliver flagpoles and accessories completely identified for installation procedure. Handle and store flagpoles to prevent damage or soiling.

2.0 - PRODUCTS

2.1 Manufacturers

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to the following:

American Flagpole, Div. of Kearney-National.

Concord Industries, Inc.

Ewing International Corporation

2.2 Flagpole Type

Aluminum Flagpoles: Fabricate aluminum flagpoles from seamless extruded tubing complying with ASTM B 241, alloy 6063-T6, having a minimum wall thickness of 3/16" (0.1875"), tensile strength not less than 30,000 psi and a yield point of 25,000 psi. Heat-treat and age-harden after fabrication.

Provide One (1) 30' high cone tapered aluminum flagpoles.

2.3 Flagpole Mounting

- A. Provide manufacturer's standard base system for the type of flagpole installation required.
- B. Base Plate: For anchor-bolt mounting, furnish manufacturer's standard cast metal shoe base of same material as flagpole. Furnish and install anchor bolts and lightning ground spike as required.

Provide manufacturer's standard flash collar, finished to match flagpole.

2.4 Shaft Finish

Aluminum: Fine, directional, mechanical satin polish (NAAMM-32), finished as follows:

Color anodized finish to match Architect's sample, complying with NAAMM-C22A42, Class I (0.7 mil).

2.5 Fittings

- A. Finial Ball: Manufacturer's standard flush seam ball, size as indicated or, if not indicated, to match pole butt diameter.

14 ga. Spun aluminum, finished to match pole shaft.

- B. Truck: Ball-bearing non-fouling, revolving, double-track assembly of cast metal, finished to match pole shaft.

- C. Cleats: Two 9" cast metal cleats with fasteners, finished to match pole shaft.

- D. Halyards: Provide 2 continuous halyards for each flagpole, as follows:

1. Polypropylene, white, braided.

2. Size: 5/16" (No. 10).

- E. Halyard Flag Snaps: Provide 2 swivel snaps per halyard, as follows: Aluminum.

3.0 - EXECUTION

3.1 Installation

- A. Excavation: Excavate for foundation concrete to neat clean lines in undisturbed soil. Provide forms where required due to unstable soil conditions. Remove wood, loose soil, rubbish and other foreign matter from excavation, and moisten earth before placing concrete.

- B. Concrete: Provide concrete composed of portland cement, coarse aggregate and fine aggregate and water, mixed in proportions to attain 28-day compressive strength of not less than 3000 psi, complying with ASTM C94.

- C. Place concrete immediately after mixing. Perform chuting to avoid segregation of mix. Compact concrete in place by use of vibrators. Moist-cure exposed concrete for not less than 7 days, or use a non-staining curing compound in cold weather.

- D. Finish trowel exposed concrete surfaces to smooth, dense surface. Provide positive slope for water runoff to base perimeter.

- E. Flagpole Installation: Install flagpoles as shown and in compliance with final shop

drawings and manufacturer's instructions.

- F. Provide positive lightning ground for each flagpole installation.

END OF SECTION

1.0 - GENERAL

1.1 Scope

The work required under this section consists of room & wall signage.

1.2 Existing Conditions

A. It is the general contractor's responsibility to field verify existing signage before a bid and provide signage that shall match all existing signage types and styles currently installed to provide a continuity of design to the owner as required.

1.3 Submittals

A. Submit a sample of signs, including size, lettering style, materials, and finish.

B. Provide mounting templates.

C. Signs shall conform to requirements as set forth by the AMERICANS WITH DISABILITIES ACT Accessibility Guidelines.

D. Submit the schedule indicating each room name and number indicated on Architectural Drawings with a corresponding space for the Owner's markup for the actual room name and number per school system of each room name and number along with sign type to the Architect for review.

2.0 – PRODUCTS

2.1 Manufacturers

Subject to compliance requirements. Provide products by the following.

1. Leeds Architectural Letters, Inc. (Basis Of Design)
2. Devaney Sign Service, LLC
3. Bellco Sign & Engraving Specialists

2.2 Room and Wall Signs Standards

A. Provide photopolymer signs with Grade II Braille 3/4" numerals and 5/8" Letters to comply with ADA (American Disability Act). Signs shall be color selected from the manufacturer's full line of colors.

B. Room signs with message insert to have 1/16" front plate, minimum 1/32" solid spacer (no tape spacer), and 1/8" back plate.

C. Room Signs (no message slot)- minimum 1/8" thick with 1/32" raised letters.

D. Elevator and Stair Signs to be 6 x 6 and 1/8" thick with 1/32" raised letters.

E. Exterior Signs - Exterior Aluminum .040 thick, factory painted, and text to be silkscreened or inkjet print.

F. Edge Condition - Square Cut.

G. Corners - Round.

- H. Mounting:
1. Sheet Rock – double-sided tape
  2. Block or Brick – double-sided tape and silicone
  3. Signs to be mounted with screws and anchors if specified.
  4. Signs mounted on the wall adjacent to the latch side of the door 60" from floor to centerline of signs and 2" from the edge of the door frame to edge of the sign.

2.3 Typical Signage Schedule (refer to Architectural Signage Plan in construction documents)

- A. All Offices, Classrooms, and Instructional Areas shall be 6" x 8" with a 2-1/2" x 8" changeable clear message insert unless otherwise indicated. **Refer to Item 1.2, Item A for existing signage conditions**
- B. All other interior door signs except corridor and vestibule doors shall be a 6" x 6" with no message strip.
- C. All restrooms shall have a minimum 6" x 8" sign with pictogram area with an additional area for raised copy and Braille.
- D. 6" x 6" signs at all elevators on all floors. (Use Stairs in Case of Fire...etc.) if applicable.
- E. 6" x 6" Stair Sign at every stair on all floors with pictogram if applicable.
- F. 3" x 7" area of refuge sign with raised copy and Braille as indicated on the Life Safety Plans
- G. Provide Framed Signage with Clear View Window. Frame to Match Interior Signage Cover) to accommodate an 8.5 x 11 Landscape Floor Plan. Provide two (2) per Classroom and Assembly Area.
- H. 6" x 6" tactile exit sign at all interior exit doors leading directly to the exterior with raised copy and Braille. (Identified as **EXIT** on signage plan)
- J. Occupant Load Sign to be provided at every Auditorium, Gymnasium, and Cafeteria (**Assembly Areas**) as required by IBC Section 1004.3

2.3 Pictorial Signs

- A. Provide 12" x 18" baked enamel on metal sign with International Symbol for Accessibility Wheelchair and lettering "Physically Handicapped Parking Only." Each sign shall have a "Van Accessible" sign mounted to the post.

2.4 Project Sign - Specification requirements are listed in Section 01030.

3.0 - EXECUTION

3.1 Installation of Signs

Install signs on surfaces and at heights as directed.

END OF SECTION



SECTION 10505 - METAL SPORT, ATHLETIC LOCKERS  
AND STAFF LOCKERS

1.0 - GENERAL

1.1 Related Documents

- A. General Conditions
- B. Division One

1.2 Scope Of Work

- A. **Description:** Furnish and install factory-assembled Heavy-Duty MIG-Welded Metal Lockers, complete, as shown and specified per contract documents.

1.3 Related Work Specified Elsewhere:

- A. Concrete: Section 03320
- B. Rough Carpentry: Section 06100
- C. Finish Carpentry: Section 06210

1.4 Submittals

- A. Refer to Section 01350 - Submittals
- B. Shop Drawings: Submit drawings showing locker types, sizes, quantities, including all necessary details relating to anchoring, trim installation and relationship to adjacent surfaces.
- C. Color Charts: Provide color charts showing manufacturer's available colors. Provide metal samples if requested.
- D. Numbering: Locker numbering sequence will be provided by the approving authority and noted on approved shop drawings returned to the locker contractor.

1.5 Quality Assurance

- A. Manufacturing Standard: Provide metal lockers that are standard products of a single manufacturer, with interchangeable like parts. Include necessary mounting accessories, fittings, and fastenings.
- B. Fabricator Qualifications: Firm experience (**minimum 5 years**) in successfully producing the type of metal lockers indicated for this project, with sufficient production capacity to produce required units without causing delay in the work.
- C. Installer Qualifications: Engage an experienced (minimum 2 years) installer who has successfully completed installation of the type of metal lockers and extent to that indicated for this project.

1.6 Product Handling

- A. All work shall be fabricated in ample time so as to not delay construction process.
- B. All materials shall be delivered to the site at such a time as required for proper coordination of the work. Materials are to be received in the manufacturer's original, unopened packages and shall bear the manufacturer's label.
- C. Store all materials in a dry and well-ventilated place adequately protected from the elements.

1.7 Guarantee

LIFETIME WARRANTY: Submit upon completion of the work, warranty covering all defects in materials and workmanship excluding finish, damage resulting from deliberate destruction and vandalism under this section for the lifetime of the facility.

2.0 - PRODUCTS

2.1 Manufacturers

- A. Subject to compliance with the design, material, method of fabrication and installation as required in this specification section or modified as shown on drawings. Manufacturers offering products which may be incorporated in the work include the following:  
Art Metal Products. (Basis of Design)  
List Industries, Inc.  
Penco Products, "All Welded"
- B. Other Locker manufacturers may submit for preapproval at least 10 days prior to bid. Comply with Section 01360.

2.2 Locker Types

- A. Type 2 - "Champ Athletic Lockers" as manufactured by Art Metal Products or approved equal.
  - 1. Type 2: Double Tier
    - a. Size: 18" wide x 18" deep x 72" high
  - 2. Wardrobe Doors: 14 gauge diamond perforated sheet steel with recessed handle, and multi-point gravity lift-type latching.
  - 3. Box Doors: 14 gauge perforated sheet steel, side hinged with single-point spring bolt latching
  - 4. Sides: Twin-Frame Vertical side panels shall be of integral frame and side wall construction manufactured from solid 16 gauge steel sheet. Sides to be diamond perforated for added ventilation.
  - 5. Tops, Bottoms, Shelves: 16 gauge solid sheet steel
  - 6. Backs: 18 gauge solid sheet steel

## 2.3 Fabrication

### A. Materials:

1. Steel Sheet: All sheet steel used in fabrication shall be prime grade free from scale and imperfections and capable of taking a heavy coat of custom blend powder coat.
2. Fasteners: Cadmium, zinc or nickel plated steel; bolt heads, slotless type; self locking nuts or lock washers.
3. Hardware: Hooks and hang rods of cadmium plated or zinc plated steel or cast aluminum. Coat Rods of stainless steel tube.
4. Handle: Zinc plated, cold rolled finger pull - Type 1  
Handle: Seamless drawn 304 stainless steel recessed handle - Type 2 and Type 3
5. Number Plates: To be aluminum with not less than 3/8" high etched numbers attached to door with two aluminum rivets.

## 2.4 Construction

All lockers shall be factory-assembled, of all **MIG** welded construction, in multiple column units to meet job conditions. **Assembly of locker bodies by means of bolts, screws, or rivets will not be permitted. Welding of knockdown locker construction is not acceptable.** Grind exposed welds and metal edges flush and make safe to touch.

Unibody/Vertical Side Panels: Shall be of integral frame and side wall construction manufactured from solid 16 gauge sheet steel. The one-piece side/frame shall be formed to provide a continuous door strike on the hinge side. An additional continuous vertical door strike shall be achieved at the latch side by MIG welding a 16 gauge full height channel frame member to the integral locker side producing a rigid torque-free welded locker body. The frame shall include a tab which engages a slot in the base locking the side panel and frame into position. Sides to be diamond perforated.

Locker Base: 4" Concrete Curb by others.

## 2.5 Locker Accessories:/Equipment: Type 2/ Type 3/ Type 4/Type 5

Provide Padlock Hasp -Locks by Owner.

- A. Equipment: Furnish each locker with the following items, unless otherwise shown.

Double tier lockers: Openings 30" thru 36" high shall include one double prong ceiling hook and a minimum of two single prong wall hooks.

- B. Finished End Panels (If required): Shall be "Boxed" type formed from 16 gauge cold rolled steel with 1" O.D. double bends on sides and a single bend at top and bottom with no exposed holes or bolts. If lockers have slope tops, end panels must be formed with slope at top to cover the ends of the slope tops. Finish to match lockers. **Provide Boxed Ends at all exposed ends.**

- C. Fillers (if required): Provide where indicated, of not less than 16 gauge sheet steel, factory fabricated and finished to match lockers. **Provide Solid Ends at all corner and filler conditions.**
- 2.6 Finishing: All locker parts to be cleaned and coated after fabrication with a seven stage hot-spray washing process and coated with zirconium-based nanotechnology providing a green alternative to traditional iron phosphate followed by a coat of high grade custom blend powder electrostatically sprayed and baked at 350 degrees Fahrenheit for a minimum of 20 minutes to provide a tough durable finish. Color to be selected from manufacturer's standard list of colors. **Two-Tone Color Combination: Shall be no additional cost with the locker body, frame and trim chosen from one color and the doors may be one of any other color chosen from manufacturers standard selection.**

### 3.0 - EXECUTION

#### 3.1 Installation

- A. General: Installation shall be in strict conformance with referenced standards, the manufacturer's written directions, as shown on the drawings and as herein specified.
- B. Placement: Lockers shall be set in place, plumb, level, rigid, flush and securely attached to the wall (or bolted together if back-to-back) and anchored to the floor or base according to manufacturer's specifications.
- C. Anchorage: About 48" o.c., unless otherwise recommended by manufacturer, and apply where necessary to avoid metal distortion, using concealed fasteners. Friction cups are not acceptable.
- D. Trim: Sloping tops, metal fillers and end panels shall be installed using concealed fasteners. Provide flush, hairline joints against adjacent surfaces.

#### 3.2 Adjustment

Upon completion of installation, inspect lockers and adjust as necessary for proper door operation. Touch-up scratches and abrasions to match original finish.

END OF SECTION

ROD SUPPORTED EXTRUDED ALUMINUM CANOPY SECTION – 10531

PART 1 - GENERAL

- 1.1 Related Documents
  - A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, shall apply to work specified in this section.
  
- 1.2 General Description of Work
  - A. Work in this section shall include design, fabrication and installation of a complete rod supported extruded aluminum canopy system in accordance with the drawings and this specification.
  
- 1.3 References
  - A. Aluminum Design Manual 2000, Specifications & Guidelines for Aluminum Structures.
  - B. ASCE 7, Minimum Design Loads for Buildings and Other Structures.
  - C. American Architectural Manufacturers Association (AAMA)
  - D. American Society for Testing and Materials (ASTM)
  
- 1.4 Related Sections
  - A. Concrete Work - Section 03300
  - B. Masonry Work - Section 04200
  - C. Miscellaneous Metals - Section 05500
  - D. Flashing and Sheet Metal - Section 07600
  - E. Sealants - Section 07900
  
- 1.5 Submittals
  - A. Product Data: Submit manufacturer's product information, specifications and installation instructions for components and accessories.
  - B. Shop Drawings: Submit complete erection drawings showing attachment system, column and gutter beam framing, transverse cross sections, covering and trim details, and optional installation details to clearly indicate proper assembly of components, sealed by a State Registered Structural Engineer registered in the state in which the work is being performed.
  - C. Calculations: Submit complete structural design calculation sealed by State Registered Structural Engineer registered in the state in which the work is being performed.
  - D. Design and engineering of attachment surfaces are not covered in this specification and scope of work.

- 1.6 Quality Assurance
- A. Codes and standards: Comply with provisions of the following except as otherwise indicated: 2021 International Building Code, latest addition with amendments, if any. AWS (American Welding Society) standards for structural aluminum welding.
  - B. Manufacturer: Obtain aluminum covered walkway system from only one (1) manufacturer, although several may be indicated as offering products complying with requirements.
  - C. Installer Qualifications: Firm with not less than three (3) years experience in installation of aluminum walkway covers of type, quantity and installation methods similar to work of this section.
  - D. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication where possible, to insure proper fitting of work.
  - E. Coordination: Coordinate work of this section with work of other sections which interface with covered walkway system (sidewalk, curbs, building fascias, etc.).
- 1.7 Warranty
- A. Provide manufactures standard one-year warranty that shall include, but not limited to, coverage for structural, water tightness and finish beginning the day of Substantial Completion of Installation.

## PART 2 - PRODUCT

- 2.1 Manufacturers  
Canopy shall be Tennessee Valley Metals, Peachtree Protective Covers, Inc., Superior Metals, Mitchell Metals or approved equal as long as they meet or exceed Specifications and adhere to drawing details.
- 2.2 Materials
- A. Aluminum Extrusions: All sections shall be extruded aluminum 6063 alloy, heat treated to T-6 temper.
  - B. Finishes: For factory baked enamel finish, specify AAMA 603.8 standard or custom color.  
  
For fluoropolymer (Kynar) finish, AAMA 605.2, two or three coats.  
  
For satin anodized finish, specify 204.R1 meeting Aluminum Association specification AA-M-10C- 22A21.
- 2.3 Components
- A. Support rods: Rods shall be 2" tubular shapes as per manufacturer's standard. (Rod and clevis is available as an option.)
  - B. Deck: Deck shall be extruded smooth flush faced self-flashing sections interlocking into a composite unit.
  - C. Fascia: Fascia shall be manufacturer's standard shape. Size as indicated on drawings.

- D. Flashing: Flashing shall be .032" aluminum (min.). All thru-wall flashing is completed by others.
- E. Scuppers: Scupper plates shall be used to drain water from the canopy fascia. (Downspouts are available as an option).
- F. Fasteners: All exposed fasteners shall be stainless steel.

2.4 Fabrication

- A. Drainage: Water shall drain directly from the fascia and be diverted by a scupper plate (or into downspout and discharged at ground level).
- B. Deck Construction: Deck shall be manufactured of extruded modules that interlock in a self- flashing manner.

PART 3 - EXECUTION

3.1 Preparation

- A. Erection shall be performed after all concrete, masonry, and roofing work in the vicinity is complete and cleaned.

3.2 Installation

Protective cover shall be erected true to line with adequate slope for drainage. Adequate framing members and/or blocking shall be provided in the wall structure (by others) to safely support the canopy.

3.3 Cleaning

- A. All protective cover components shall be cleaned promptly after installation.

3.4 Protection

- A. Extreme care shall be taken to protect materials during and after installation

END OF SECTION

1.0 - GENERAL

- 1.1 Scope  
The work under this section consists of all toilet accessories.
- 1.2 Samples  
Returnable samples to be furnished upon request.
- 1.3 Manufacturer  
Catalog numbers indicated in the schedule are from Bobrick Company catalog unless indicated otherwise. Equivalent products as manufactured by American Specialties, Inc., or Bradley, will be acceptable.

2.0 - PRODUCTS

- 2.1 List of Fixtures
- A. The following list of accessories is essentially complete; however, the contractor shall examine the drawings carefully and shall supply such items not specifically called for to provide a complete installation.
- B. Fixtures shall be supplied as follows:
1. Feminine Napkin Disposal - Model B-270, surface mounted, stainless steel finish. One per toilet compartment. (Female Only. Mount on opposite wall of toilet paper dispenser.) Provide at all Unisex Toilet locations.
  2. Framed Mirror - Model B-165-1830, surface mounted, stainless steel finish. One per lavatory where noted. Custom mirrors are specified under Section 08810 - Glass and Glazing.
  3. Grab Bars - Model B6806 (or 6861 at Shower Stall as indicated), 1-1/2" diameter, surface mounted with B-2571 anchors at masonry walls, stainless steel finish. Provide per ADA requirements at Handicapped Toilet Compartment and Shower Stall.
  4. Mop and Broom Holder - Model B-223 x 36" surface mount, stainless steel, Type 302 (18-8) satin finish. Holders spring loaded, rubber cam with plated steel retainer. Mounting height 6'-0" floor to top. One per service and/or mop sinks.
  5. Coat hook with bumper - Model B-212, surface mount aluminum casting with satin finish to match stainless steel. Bumper is hard rubber secured with drive screw. Note: provide one (1) in toilet rooms without stalls.
  6. Shower Curtain and Rod - Model B-6047 x width required. Extra heavy-duty stainless steel, Type 304, 18 gauge, 1-1/4" diameter. Vinyl shower curtain: Model # 204-2, white, with Hooks: Model 204-1. One each per shower compartment.
  7. Folding Shower Seat - Model B-5181, Stainless Steel with 1/2" phenolic seat as indicated on drawings.
  8. Electric Hand Dryers - Model XL-SB Excel Xclerator Automatic Stainless Steel, 120V. Installation as per manufacturer's recommended mounting height and per ADA requirements.



9. **Baby** Changing Station (TODDLER) – Model KB200-01 Koala Kare Products; Wall Mounted Horizontally per manufacturer's recommended mounting height and per ADA requirements.

2.2 Finishes

- A. All fixtures specified or cataloged to be stainless steel shall be type 302 (18-8) with satin finish.
- B. All fixtures specified or cataloged to be chrome finish shall be triple plated with heavy chrome over nickel and copper.
- C. Mirrors shall be 1/4" electro-copper backed plate glass.

3.0 - EXECUTION

3.1 Attachment

- A. All fixtures shall be secured to walls or partitions in the most secure method possible. Fixtures mounted singly against concrete block shall be secured with toggle bolts.
- B. The proper mounting accessories shall be furnished with each item.
- C. Contractor shall verify with Architect, the mounting locations and heights before installing accessories.

END OF SECTION

PART 1 - GENERAL

- 1.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.2 SUMMARY:
- A. This Section includes factory prefabricated baseball field equipment and netting systems.
- 1.3 PERFORMANCE REQUIREMENTS
- A. Netting System shall be design in accordance with ASCE 7-10 and the applicable codes as indicated on the structural drawings. Basic wind speed - 105mph; Risk Category - I; wind exposure category - B; and maximum pole deflection under full wind - H/90. Shop drawings shall be stamped by a Structural Engineer registered in the State of Alabama. Loads shall include at a minimum. Dead, Wind and Ice loads on netting.
- 1.4 SUBMITTALS
- A. Product Data: For each type of product indicated, include descriptions of material finishes and physical properties.
- B. Shop Drawings for Netting Systems:
1. Include plans, elevations, component details and dimensions, anchoring and mounting requirements to other work.
  2. Include structural analysis data for poles and netting systems, signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Samples:
1. Submit manufacturer's net samples for initial selection.
- D. Maintenance Data: Include in maintenance manuals.
- 1.5 QUALITY ASSURANCE
- A. Professional Engineer Qualifications: A qualified professional structural engineer currently licensed to practice in the State of Alabama and experienced in providing types of engineering services required.
- B. Installer Qualifications: An experienced installer who has completed netting systems similar in material, design, and extent to that indicated for this Project and whose work has resulted in netting installations with a record of successful in-service performance.
- C. Installer's Responsibilities: Installation of entire netting assembly, including cabling, fittings, and netting.
1. Approved Installers:
    - a. Net Connection: (205) 508.5902, rsenn@netconnectionllc.com
    - b. Containment Systems: (205) 533-7040, tpankey@csnetting.com.
    - c. Prior approval required for other installers.

1.6 COORDINATION:

- A. Coordinate locations of all items of the work for proper installation timing and location. Furnish to other Sections items to be incorporated into the work in conjunction with the work of this Section. Include placement instructions.

1.7 WARRANTY

- A. General Warranty: The Special Warranty specified below shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Special Manufacturer's Warranty: Provide written warranties by Manufacturer of each type of equipment and system in which manufacturer agrees to replace equipment or components that fail in materials, workmanship, or performance within the warranty period. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. GENERAL:
  - 1. "Basis-of-Design" Manufacturers are indicated with specific products below.
    - A. Approved Manufactures:  
Christensen Net Works  
401 Lincoln Street  
Everson, WA 98247  
(800) 330-7980  
Joe.franson@cnwnetting.com
    - B. Prior approval required for other manufacturers.

2.2 NETTING SYSTEMS

- A. System: Provide the following materials and accessories:
  - 1. Provided a complete netting systems including foundations. Stadium structure may be used to support cables coordinate loads and reactions with project team. Provide all materials required for attachment points.
  - 2. Provided stamped engineered shop drawings.
  - 3. Structural Steel: Steel Support pole are to be ASTM A 500 of A252 HSSp steel pipe with a minimum yield of 50,000 psi.
  - 4. Finish: Shop primed with Carbozinc 859 and 2 coats of Carbothane 8845 color to be selected by Owner.
  - 5. Cable: Extra High Strength Steel Strand with a minimum breaking strength of 11,200 lbs. Strand to have a class A galvanized coating with a minimum coating weight of 0.8 oz./sf.
  - 6. Fittings: Utility grade fitting by MacLain Power Systems or approved equal. All hardware is to be of the correct size and strength as recommended by the manufacturer. All strand terminations are to be made using guy grips as manufacture by Preformed Line Products or approved Equal.
  - 7. Miscellaneous connection plates: ASTM A36 steel.

2.3 NETTING: NOTE: Match existing if present.

- A. Description: Backstop Netting
1. Material: #36 Twisted Knotted Nylon (3.625" Stretch Mesh).
  2. Netting cut and square hung to form approx. 1.75" by 1.75" openings.
  3. Weight: 4.0 lbs per 100 SF, 0.085" Dia.
  4. Tensile Strength: 330 pound minimum.
  5. Construction: 3 strand, Z twist primary into S twist secondary.
  6. Weather Treatment: Pressure Dyed Black and Urethane Bonded for extra abrasion and UV resistance.
  7. Edge Treatment: Rope boarder and Riblines: 5/16" braided polyester rope lashed to the edge with #36 braided cord, tensile strength approx. 3,000 lbs.
- B. Description: Outfield Netting
1. Material: #24 Twisted Knotted Nylon (3.625" Stretch Mesh).
  2. Netting cut and square hung to form approx. 1.75" by 1.75" openings.
  3. Weight: 3.4 lbs per 100 SF, 0.073" Dia.
  4. Tensile Strength: 250 pound minimum.
  5. Construction: 3 strand, Z twist primary into S twist secondary.
  6. Weather Treatment: Pressure Dyed Black and Urethane Bonded for extra abrasion and UV resistance.
  7. Edge Treatment: Rope boarder and Riblines: 5/16" braided polyester rope lashed to the edge with #36 braided cord, tensile strength approx. 3,000 lbs.
- C. Description: Batting Cage Netting
1. Material: #72 Twisted Knotted Nylon (3.75" Stretch Mesh).
  2. Netting cut and square hung to form approx. 1.75" by 1.75" openings.
  3. Tensile Strength: 661 pound minimum.
  4. Construction: 3 strand, Z twist primary into S twist secondary.
  5. Weather Treatment: Pressure Dyed Black and Urethane Bonded for extra abrasion and UV resistance.
  6. Edge Treatment: Rope boarder and Riblines: 5/16" braided polyester rope lashed to the edge with #36 braided cord, tensile strength approx. 3,000 lbs.
- D. Description: Football/Soccer Netting
1. Material: #36 Twisted Knotted Nylon (3.625" Stretch Mesh).
  2. Netting cut and square hung to form approx. 4" by 4" openings.
  4. Tensile Strength: 250 pound minimum.
  5. Construction: 3 strand, Z twist primary into S twist secondary.
  6. Weather Treatment: Pressure Dyed Black and Urethane Bonded for extra abrasion and UV resistance.
  7. Edge Treatment: Rope boarder and Riblines: 5/16" braided polyester rope lashed to the edge with #36 braided cord, tensile strength approx. 3,000 lbs.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install the Work of this Section in required locations in accordance with manufacturer's recommendations and approved Shop Drawings.
- B. Install work to lines and levels required, plumb, square, and securely anchored to substrates.
- C. Assembly: Install cable and fittings as indicated on the Drawings.
- D. Lace net to all perimeter and interior backstop cabling from the center out to the edges and from the top down. Install net after backstop cabling has been tightened in place.
  - 1. Netting shall be installed by a Manufacturer approved installer.
  - 2. Tension of installed netting shall be as recommended by the Manufacturer to prevent passages of batted or thrown baseballs.
  - 3. Do not attach netting to rigid structural pipe and supports.

### 3.2 ADJUSTING AND CLEANING

- A. Adjust work to proper alignments.
- B. Replace damaged or defective items.
- C. Clean exposed surfaces according to each manufacturer's written recommendation

END OF SECTION

PART 1 - GENERAL

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

1.2 SUMMARY

A. Provide all equipment and materials, and do all work necessary to furnish and install the field wall padding as indicated on the drawings.

B. RELATED WORK:

1. Section 02800 - Chain Link Fencing

1.3 QUALITY ASSURANCE

A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. National Federation of High Schools (NFHS)
3. ASTM International
4. Manufacturers Data and Recommended Installation Requirements

1.4 SUBMITTALS

A. Manufacturers Product Data

1. Provide manufacturers product data prior to actual field installation work, for Architect and Owner review.

B. Shop Drawings

1. Provide drawings of the manufacturers recommended installation and foundation requirements prior to actual field installation work, for Architect and Owner review.

1.5 QUALITY ASSURANCE

A. Provide Manufacturer's warranties to the Owner and certification made that the product materials meet all applicable grade trademarks or conform to industry standards and inspection requirements.

1.6 PRODUCT DELIVERY AND STORAGE

A. Materials delivered to the site shall be examined for damage or defects in shipping. Any defects shall be noted and reported to the Owner. Replacements, if necessary, shall be immediately re-ordered, so as to minimize any conflict with the construction schedule. Sound materials shall be stored above ground under protective cover or indoors so as to provide proper protection.

## PART 2 - PRODUCTS

### 2.1 Field Wall Padding and Accessories

- A. Basis of Design: ProZone® Premium Field Wall Padding and Accessories as Manufactured and/or Supplied by:
1. Sportsfield Specialties, Inc.  
P.O. Box 231  
41155 State Highway 10  
Delhi, NY 13753  
p. 888-975-3343  
www.sportsfieldspecialties.com
  2. Approved Substitute
- B. COMPONENTS:
1. High Performance 3" Dual-Density Foam Design: 2" Cross-Linked Polyethylene (XPE) Closed Cell Foam & 1" 1690 Polyurethane Foam (Field-Side)
  2. Designed to Provide Soft "Feel" Upon Mild Contact while Safely Absorbing Maximum Impact Velocities.
  3. Non-Hygroscopic, Closed Cell Foam Limits Water Absorption.
  4. Superior Resilience at High Impacts and Multi-Strike Energy Management.
  5. 3/4" Square Edge AdvanTech® Water Resistant Sheathing Panel; All Sides Stained and Sealed with Exterior Grade Finish
  6. High UV Resistant 25 oz./yd<sup>2</sup> Extruded Vinyl:
  7. 5-Year Limited Fade Warranty
  8. Total Weight: 25 oz./yd<sup>2</sup> (ASTM D3776)
  9. Composition: 89% Vinyl Coating, 11% Polyester Fabric (ASTM D751)
  10. Trapezoid Tear: Warp 85 lbs., Fill 64 lbs. (ASTM D751)
  11. Grab Tensile: Warp 249 lbs., Fill 235 lbs. (ASTM D751)
  12. Cold Crack (1/8" Mandrel): -49°F (ASTM D2136)
  13. Abrasion (H18, 1000 gm load): > 1000 Cycles (ASTM D3389-94)
  14. Rot, Mildew and Fungus Resistant
  15. Stainless Steel Staples and Applicable Hardware
  16. Bolt and Back-up Plate Chain Link Fence Attachment Hardware
  17. Impact Testing; Independently Certified: ASTM F2440; 10 lb. x 6.3" Dia. Hemisphere Head Form, 4' Drop Height (Impact Velocity: 10.9 MPH); G-max: 55 Head Injury Criterion (HIC); 159 Head Injury Criterion (HIC)
  18. Impact Test: 10 lb. x 6.3" Dia. Hemisphere Head Form, 5' Drop Height (Impact Velocity: 12.2 MPH); G-max: 68 Head Injury Criterion (HIC); 250 Head Injury Criterion (HIC)
  19. Impact Test: 10 lb. x 6.3" Dia. Hemisphere Head Form, 9' Drop Height (Impact Velocity: 16.4 MPH); G-max: 139 Head Injury Criterion (HIC); 950
  20. 5-Year Manufacturer's Limited Product Warranty
  21. Custom High-Resolution Digitally Printed Graphics
  22. DeltaF® Anti-Wrinkle Technology
  23. Four-Way Stretch Vinyl Perimeter to Prevent Wrinkles in the Vinyl Due to Varying Thermal Expansion and Contraction Rates of the Foam Padding.
- C. Color: To be selected by Owner

PART 3 - EXECUTION

3.1 INSTALLATION OF EQUIPMENT

- A. Field Wall Padding and Accessories shall be installed as recommended per manufacturer's written instructions and as indicated on the drawings. Installer should have a minimum of five (5) protective padding installations or similar experience in the previous three (3) years.

END OF SECTION



1.0 - GENERAL

- 1.1 Scope  
The work of this section consists of furnishing and installing complete, all miscellaneous furnishings and fixture items as indicated.
- 1.2 Submittals  
Shop drawings shall be submitted.
- 1.3 Warranty  
Provide Manufacturer's Standard Warranty where manufacturer warrants that the Goods delivered hereunder shall be of the kind described within this agreement and free from defects in material and workmanship under conditions of normal use for a period of six (6) years. Halotron, CO2 and Water/Water based extinguisher will be warrantied for a period of five (5) years.

2.0 - PRODUCTS

- 2.1 Fire Extinguisher Cabinets (FEC)  
Recessed or semi-recess U.L. approved baked enamel 18 gauge steel cabinet, 24" h. x 10-1/2" w. x 6" d. with 2-1/2" trim. Cabinet door to be baked enamel or epoxy coated with stencil lettering "Fire Extinguisher" equal to J. L. Industries-Panorama #1017 Identity Q horizontal, white w/red letters - type break glass w/cly. lock; Larsen's Mfg. Co.; Amerex Corporation; or approved equal.
- Provide comparable fire rated fire extinguisher cabinets in fire rated walls as per rating indicated.
- 2.2 Fire Extinguisher (FE)
- A. Cabinet Mounted - U.L. approved, 10 pound, tri-class dry chemical for Class A, B, & C fires. Equal to J. L. Industries - Cosmic 10E with hose; Larsen's Mfg. Co.; Amerex Corporation. Provide one with each cabinet.
- B. Wall Mounted - 10 pound, Tri-Class Dry Chemical for Class A, B, C fires, U.L. approved, Model 10 ABCS-1. Manufacturers: J.L. Industries, Larsens, Amerex Corporation.
- C. Provide "K" type fire extinguishers at all kitchen locations.

3.0 - EXECUTION

- 3.1 Installation  
Installation of all items shall be in full conformity with manufacturer's specifications, recommendations, ADA and approved details.
- 3.2 Fire Extinguishers shall be cabinet mounted in areas as indicated. Height shall be 4' from floor to extinguisher handles.
- 3.3 Fire Extinguishers shall be wall mounted in areas as indicated or required so that distance of travel between units does not exceed 75 feet. Each separate area shall have a minimum of one unit. Mounting height shall be 4' from floor to handle.

END OF SECTION

## MISCELLANEOUS FURNISHINGS AND FIXTURES - SECTION 12150

### 1.0 - GENERAL

- 1.1 Scope  
The work of this section consists of furnishing and installing complete, all miscellaneous furnishings, fixtures, and signage items as indicated.
- 1.2 Existing Conditions  
A. It is the general contractor's responsibility to field verify existing signage before a bid and provide signage that shall match all existing signage types and styles currently installed to provide a continuity of design to the owner as required.
- 1.3 Submittals  
Shop drawings shall be submitted.

### 2.0 - PRODUCTS

- 2.1 Building Letters  
Cast aluminum letters, equal to Leeds Architectural Letters, Inc., Select from all available fonts Size: As indicated on drawings, lay-out as indicated. Colors as selected by Architect. Provide flush concealed stud mounting.
- 2.2 Building Plaque  
A. Dedication plaque shall be of cast aluminum. Furnish and install a 24" x 42" plaque with approximately 500 raised letters and raised border. Field shall have stipple finish. Face of letters and borders shall have ground satin finish surface.  
B. Plaque layout and designation shall be furnished by the Architect.
- 2.3 Project Sign - Specification requirements are listed in Section 01030.

### 3.0 - EXECUTION

- 3.1 Installation  
Installation of all items shall be in full conformity with manufacturer's specifications, recommendations, and approved details.
- 3.2 Installation of Building Letters  
Install building letters on surfaces and at heights as directed. Install in accordance with manufacturer's recommendations.
- 3.3 Installation of Plaque(s)  
Install plaque(s) where directed.

END OF SECTION

1.0 – GENERAL

- 1.1 Section Includes
- A. Fixed modular laminate clad casework and components.
  - B. Countertops.
  - C. Mobile storage units, tables and components.
- 1.2 Related Sections
- A. Blocking within walls where indicated: Division 6.
  - B. Millwork, trim, and custom cabinetry: Division 6 and 12.
  - C. Glass: Division 8.
  - D. Base molding: Division 9.
  - E. Sinks and service fixtures, service waste lines, connections, and vents: Division 15.
  - F. Electrical service fixtures: Division 16.
- 1.3 Quality Assurance
- A. Manufacturer: Minimum of 5 years' experience in providing manufactured casework systems for similar types of projects, produce evidence of financial stability, bonding capacity, and adequate facilities and personnel required to perform on this project.
  - B. Manufacturer: Provide products certified as meeting or exceeding ANSI-A 161.1-2000 testing standards.
  - C. All manufactured casework systems, countertops and related items herein specified shall be furnished by one contractor to insure single source responsibility, and integration with other building trades.
- 1.4 Submittals
- A. Comply with Section 01350, unless otherwise indicated.
  - B. Product Data: Manufacturer's catalog with specifications and construction details.
  - C. Shop Drawings: Indicate dimensions, description of materials and finishes, general construction, specific modifications, component connections, anchorage methods, hardware, and installation procedures, plus the following specific requirements.
    - 1. Include production drawings for all casework systems and section drawings of all casework, work surfaces and accessories.
    - 2. Indicate locations of plumbing and electrical service field connection by others.
    - 3. Include layout with units in relation to surrounding walls, doors, windows, and other building components.

4. Coordinate production drawings with other work involved.

D. Casework Samples:

1. Component samples: Two sets of samples for each of the following:  
Decorative laminate color charts / PVC and ABS edgings.

1.5 Product Handling

- A. Deliver completed laminate clad casework, countertops, and related products only after wet operations in building are completed, store in ventilated place, protected from the weather, with relative humidity range of 25 percent to 55 percent.
- B. Protect finished surfaces from soiling and damage during handling and installation with a protective covering.
- C. General Contractor shall be responsible for protection of all casework and tops after installation is complete.

1.6 Job Conditions

- A. Environmental Requirements: Do not install casework until permanent HVAC systems are operating and temperature and humidity have been stabilized for at least 1 week.
  1. Manufacturer/Supplier shall advise Contractor of temperature and humidity requirements for architectural casework installation areas.
  2. After installation, control temperature and humidity to maintain relative humidity between 25 percent and 55 percent.
- B. Conditions: Do not install casework until interior concrete work, masonry, plastering and other wet operations are complete.
  1. Flooring required to be placed under casework and equipment must be installed prior to installation.
  2. Wood or metal blocking (wall grounds) shall be installed within partitions prior to delivery of casework and furnishings to allow for immediate installation on delivery.
  3. Walls and openings shall be plumb, straight and square. Concrete floors shall be level within acceptable trade tolerances. Specifically the floor must be within 1/8" of level per 10 foot run, non-accumulative, when tested with a straight edge in any one direction.
  4. All overhead mechanical, electrical or plumbing rough-in work shall be complete
  5. Ceiling grids (with or without ceiling tiles), overhead soffits, duct work and lighting shall be installed.
  6. Painting shall be complete.
  7. General Contractor shall provide a secure storage area within the building that is clean, dry, well ventilated, protected from direct sunlight and broom clean.

1.7 Warranty

All materials and workmanship covered by this section will carry a five (5) year warranty from date of acceptance.

## 2.0 – PRODUCTS

### 2.1 Manufacturers:

- A. Manufacturer:  
Casework shall be Stevens, Advanced Cabinet Systems or pre-approved equal. Each manufacturer must be able to provide casework (including selected plastic laminate colors) as specified and detailed in drawings and specifications.
- B. Substitutions:
1. Casework of other manufacturers will be considered for pre-approval, providing written request is received and approved at least ten (10) days prior to announced bid date and approved by Addendum. Bidder shall state in writing any deviations from requirements and specifications. The casework shall conform to the configuration, arrangement, design, material quality, joinery, panel thickness, and surfacing of that specified and shown on drawings.
  2. Manufacturer must be Architectural Woodwork Institute (AWI) Premium Certified.
  3. Requests for product substitutions must comply with Section 01360 – Product Substitution Procedures.

### 2.2 Materials

- A. Core Materials:
1. Particleboard up to 7/8 inch thick: Industrial Grade average 47-pound density particleboard, ANSI A 208.1-1999, M-3.
  2. Particleboard 1 inch thick and thicker: Industrial Grade average 45-pound density particle-board, ANSI A 208.1-1999, M-2.
  3. Medium Density Fiberboard 1/4 inch thick: Average 54-pound density grade, ANSI A208.2.
  4. MR Moisture Resistant Particleboard: Average 47-pound density particleboard, ANSI A208.1 1-1999, M-3.
- B. Decorative Laminates: GREENGAURD Indoor Air Quality Certified
1. High-pressure decorative laminate VGS (.028), NEMA Test LD 3-2005.
  2. High-pressure decorative laminate HGS (.048), NEMA Test LD 3-2005.
  3. High-pressure decorative laminate HGP (.039), NEMA Test LD 3-2005.
  4. High-pressure cabinet liner CLS (.020), NEMA Test LD 3-2005.
  5. High-pressure backer BKH (.048), (.039), (.028), NEMA Test LD3-2005.
  6. Thermally fused melamine laminate, NEMA Test LD 3-2005, color to be selected by architect.
- C. Laminate Color Selection: Nevamar, Wilson Art, Formica, Laminart, Arbonite, and Pionite are approved manufacturers. Manufacturer, colors, and pattern shall be selected from premium grade laminate and indicated on finish legend and schedule.

- D. Edging Materials:
  1. 1mm PVC banding, machine applied; match laminate as schedule
  2. 3mm PVC banding, machine applied and machine profiled to 1/8 inch radius; match laminate as scheduled
- E. Glass:
  1. Wall unit full sliding glass doors: 1/4 inch thick laminated safety glass.
  2. Glass insert doors, hinged or sliding wall cabinets: 1/4 inch thick laminated safety glass.
  3. Glass insert doors, hinged or sliding tall or base cabinets. 1/4 inch thick laminate safety glass.
  4. Sliding doors mounted in aluminum track.
  5. Trim glass inserts: Extruded rigid PVC channel and self-locking insert retainer strip.

2.3 Specialty Items

- A. Support Members:
  1. Countertop support brackets: Epoxy powder coated, 11 gauge steel with integral cleat mount opening and wire management opening.
  2. Undercounter support frames: Epoxy powder coated.
  3. Legs: Epoxy powder coated.
  4. Brackets must support minimum of 600 lbs. without use of cross brace.

2.4 Cabinet Hardware

- A. Hinges:
  1. 270 degree five knuckle - epoxy powder coated, institutional grade, 2-3/4 inch overlay type with hospital tip. 0.095 inch thick. ANSI-BHMA standard A156.9, Grade 1..
    - a. Doors 48 inches and over in height have 3 hinges per door.
    - b. Magnetic door catch with maximum 5 pound pull provided, attached with screws and slotted for adjustment.
    - c. Finish to be selected by Architect.
    - d. location for installation shall be noted on schedules on the drawings.
- B. Pulls:
 

One pull shall be: located at the centerline of the drawer, regardless of width, to ensure ease of operation and maximize drawer slide life. Pull design shall comply with the Americans with Disability Act (ADA). Finish to be selected by Architect.

  - a. Anodized aluminum wire pull, 8mm diameter with 96mm O.C. mounting holes
- C. Drawer Slides:
  1. Regular, knee space and pencil: 100-pound load rated epoxy coated steel, bottom corner mounted with smooth and quiet nylon rollers. Positive stop both directions with self-closing feature. Paper storage, 150-pound load rated epoxy coated steel slides.
  2. File: Full extension, 150-pound load rated epoxy coated steel, bottom corner mounted with smooth and quiet nylon rollers. Positive stop both directions with self-closing feature.

- D. Adjustable Shelf Supports:
1. Injection molded transparent polycarbonate friction fit into cabinet end panels and vertical dividers, adjustable on 32mm centers. Each shelf support has 2 integral support pins, 5mm diameter, to interface pre-drilled holes, and to prevent accidental rotation of support. The support automatically adapts to 3/4 inch or 1 inch thick shelving and provides non-tip feature for shelving. Supports may be field fixed if desired. Structural load to 1200 pounds (300 pounds per support) without failure.
- E. Locks:
1. Removable core, disc tumbler, cam style lock with strike. Lock for sliding 3/4 inch thick doors is a disc type plunger lock, sliding door type with strike. Lock for sliding glass/acrylic doors is a ratchet type sliding showcase lock.
  2. Keying:
 

Keying as indicated on drawings shall be:

    - a. Alike Per Room & Master\*\* (100 maximum combinations)

\*\*If Master option is selected; provide 2 Master keys to owner.
  3. Elbow catch or chain bolt used to secure inactive door on all locked cabinets.
- F. Sliding Door Track: Anodized aluminum double channel.
- G. Coat Rods: 1 inch diameter, 14-gauge chrome plated steel installed in captive mounting hardware.
- H. File Suspension System: Extruded molding integral with top of drawer box sides to accept standard hanging file folders.
- I. Mirrors: 1/4 inch thick polished mirror plate.

2.5 Fabrication:

- A. Fabricate casework, countertops and related products to dimensions, profiles, and details shown. Tall Cabinets: All wardrobe cabinets are to be to be 29" deep unless noted otherwise on architectural drawings
- B. All casework panel components must go through a supplemental sizing process after cutting, producing a panel precisely finished in size and squared to within 0.010 inches, ensuring strict dimensional quality and structural integrity in the final fabricated product.
- C. Cabinet Body Construction:
1. All cabinet body construction shall be secured utilizing concealed interlocking mechanical fasteners. Construction must meet requirements in the AWS Manual, Edition 2, including errata through 2016 and appendix section.
    - a. Tops, bottoms and sides of all cabinets are particleboard core.
    - b. Tops, bottoms and sides of sink base units are moisture resistant particleboard core.

- c. Sink Base Countertop substrate shall be 3/4" MR particleboard. Which shall run entire length of sink base unit. Joints or breaks at sink opening shall not be accepted. If necessary breaks shall only be allowed 4' to the right or left of the centerline of the drain.
- 2. Cabinet backs: Minimum 1/4 inch thick particle board core (maximum of 1/2 inch thick particle board)
  - a. Exposed back on fixed: 3/4 inch thick particleboard with the exterior surface finished in VGS laminate as selected.
  - b. Exposed back on fixed: 3/4 inch thick moisture resistant particleboard with the exterior surface finished in VGS laminate as selected.
- 3. Cabinet base and tall units shall have a site-built toe base, constructed of 3/4-inch (minimum) lumber unless otherwise shown on the drawings. Base is 96mm (nominal 4 inch) high unless otherwise indicated on the drawings.
- 4. Base units, except sink base units: Full sub-top. Sink base units are constructed of 3/4 inch moisture resistant particleboard and the base shelf shall be laminated both sides with cabinet liner.
- 5. Side panels and vertical dividers shall receive adjustable shelf hardware at 32mm line boring centers. Mount door hinges, drawer slides and pull-out shelves in the line boring for consistent alignment.
- 6. Exposed and semi exposed edges.  
Edging: 1mm PVC.
- 7. Adjustable shelf core: 3/4 inch thick particleboard up to 36 inches wide, 1 inch thick particleboard over 36 inches wide.  
Front edge: 1mm PVC.
- 8. Interior finish, units with open Interiors: (exposed areas)
  - a. Top, bottom, back, sides, horizontal and vertical members, and adjustable shelving faces that are exposed to receive thermally fused melamine to match exterior laminate.
  - b. Laminate color to be selected by architect.
- 9. Interior finish, units with closed Interiors:
  - a. Top, bottom, back, sides, horizontal and vertical members, and adjustable shelving faces with thermally fused melamine to match other laminate.
  - b. Laminate color to be selected by architect.
- 10. Exposed ends:  
Faced with VGS high-pressure decorative laminate.
- 11. Wall unit bottom:  
Faced with thermally fused melamine laminate. (non-exposed areas only)



12. Balanced construction of all laminated panels is mandatory. Unfinished core stock surfaces, even on concealed surfaces (excluding edges), are not permitted.
13. All wardrobe cabinets are to be 29" deep unless noted otherwise on architectural drawings

D. Drawers:

1. Sides, back and sub front: Minimum 1/2 inch thick particleboard, laminated with thermally fused melamine doweled and glued into sides. Top edge banded with 3mm PVC.
2. Drawer bottom: Minimum 1/2 inch thick particleboard laminated with thermally fused melamine, screwed directly to the bottom edges of drawer box.
3. Paper storage drawers: Minimum 3/4 inch thick particleboard sides, back, and sub front laminated with thermally fused melamine. Minimum 1/2 inch thick particleboard drawer bottoms screwed directly to the bottom edges of the drawer box. Provide PVC angle retaining bar at the rear of the drawer.

E. Door/Drawer Fronts:

1. Core: 3/4 inch thick moisture resistant particleboard at sink units.
2. Provide double doors in opening in excess of 24 inches wide.
3. Faces:
  - a. Exterior: VGS High-pressure decorative laminate.
  - b. Interior: High-pressure cabinet liner CLS.
  - c. All exposed areas to receive matching laminate color as face.
4. Door/drawer edges: 3mm PVC, external edges and outside corners machine profiled to 1/8 inch radius.

F. Miscellaneous Shelving:

1. Core material: 3/4 inch or 1 inch thick particleboard.
2. Exterior: VGS High-pressure decorative laminate.
3. Edges: 3mm PVC (at open storage shelving on metal standards), external edges and outside corners machine profiled to 1/8 inch radius.

2.6 Decorative Laminate Countertops:

- A. All laminate clad countertops shown on drawings for fixed casework shall be constructed with minimum 1-1/6" solid particleboard, except at sink and wet areas.
- Furnish plywood core tops and splashes, two and a half feet each side of center line of all sinks. All tops shall be laminated on the top face with GP50 (.050) high pressure decorative laminate and shall also have BK20 backer sheet creating balanced construction. The plastic laminate tops required for the rail mounted casework shall be constructed the same as the fixed laminate tops in the lengths indicated on the drawings. The rail mounted tops mounted over brackets shall be 1-1/4 inches from the wall to create a continuous grommet behind the back of the top. The rail mounted tops shall be supplied with 3mm PVC on all four edges. Provide tight joint fasteners where needed. All exposed

edges, including edges of backsplash where used, shall have 3mm PVC banding, machine applied with waterproof hot melt adhesive. Exposed edges and corners shall be machine profiled to 1/8" radius for safety. Edging shall be available in colors as listed in Specification. Furnish 4" high backsplashes behind all sinks and as indicated on architectural drawings.

### 3.0 - EXECUTION

#### 3.1 Inspection

The casework contractor must examine the job site and the conditions under which the work under this section is to be performed, and notify the building owner in writing of unsatisfactory conditions. Do not proceed with work under this Section until satisfactory conditions have been corrected in a manner acceptable to the installer.

#### 3.2 Preparation

Condition casework to average prevailing humidity conditions in installation areas prior to installing.

#### 3.3 Installation

A. Erect casework, plumb, level, true and straight with no distortions. Shim as required. Where laminate clad casework abuts other finished work, scribe and cut to accurate fit.

B. Adjust casework and hardware so that doors and drawers operate smoothly without warp or bind.

C. Repair minor damage per plastic laminate manufacturer's recommendations.

#### 3.4 Cleaning

A. Remove and dispose of all packing materials and related construction debris.

B. Clean cabinets inside and out. Wipe off fingerprints, pencil marks, and surface soil etc., in preparation for final cleaning by the building owner.

#### 3.5 Color Selection:

Laminate Color Selection: See Finish Legend and Schedule for color selections.

END OF SECTION

1.0 – General

- 1.1 Scope
  - A. Furnish and install 1" Mini Horizontal Aluminum Blinds (Premium Quality)
  - B. Related Work Specified Elsewhere:
    - 1. Section 06100: Rough Carpentry
    - 2. Section 08570: Aluminum Windows
- 1.2 References
  - A. Flame-Resistant Materials Shall Pass Or Exceed One Or More Of The Following Tests:
    - 1. National Fire Protection Association (NFPA) 701 (small scale for horizontal applications)
    - 2. Department of Transportation Motor Vehicle Safety Standard 302 Flammability of Interior Materials
    - 3. California Administrative Code Title 19
    - 4. Federal Standard 191 Method 5903
- 1.3 Submittals
  - A. Product Data: Manufacturer's descriptive literature shall be submitted indicating materials, finishes, construction and installation instructions and verifying that product meets requirements specified. Manufacturers' recommendations for maintenance and cleaning shall be included.
  - B. Drawings And Diagrams: Wiring diagrams of any motorized components or units, working and assembly drawings shall be supplied as requested.
  - C. Sample: Submit one sample shade of each type specified for approval. Supplied units shall be furnished complete with all required components, mounting and associated hardware, instructions and warranty.
- 1.4 Quality Assurance:
  - A. Supplier: Manufacturer, subsidiary or licensed agent shall be approved to supply the products specified, and to honor any claims against product presented in accordance with warranty.
  - B. Installer: Installer or agent shall be qualified to install specified products by prior experience, demonstrated performance and acceptance of requirements of manufacturer, subsidiary, or licensed agent. Installer shall be responsible for an acceptable installation.
  - C. Provide 1" Mini Horizontal Aluminum Blinds of only one manufacturer for entire project.
- 1.5 Delivery, Storage And Handling:
  - A. Product shall be delivered to site in manufacturer's original packaging.
  - B. Product shall be handled and stored to prevent damage to materials, finishes and operating mechanisms.
- 1.6 Job Conditions:
  - A. Prior to shade installation, building shall be enclosed.

- B. Interior temperature shall be maintained between 60° F. and 90° F. during and after installation; relative humidity shall not exceed 80%. Wet work shall be complete and dry.

- 1.7 Warranty:  
Lifetime Limited Warranty. Specific product warranties available from manufacturer or its authorized agent.

## 2.0 – PRODUCTS

### 2.1 Acceptable Manufacturer

- A. Product: Hunter Douglas “CD60 1” Mini Aluminum Blind”, or pre-approved equal.

- B. Materials:

1. SLATS: 1" wide x .006" thick prior to painting, heat-treated and spring tempered (except 5000 series alloy on metallized finishes) aluminum alloy 6011 with eased corners and manufacturing burrs removed. Furnish not less than nominal 15.2 slats per foot to ensure tight closure and light control. Finish with manufacturer's standard baked-on finish in colors selected by architect from manufacturer's available contract colors utilizing Dust Shield™ finish to inhibit dust build-up for easier maintenance.
2. SLAT SUPPORT: Braided ladders of 100% polyester yarn color compatible with slats and spacing of ladder no more than 20mm.
3. HEADRAIL: U-shaped profile with rolled edges, measuring 1 3/8" x 1 3/8" x .024" constructed of corrosion resistant steel and providing a sleek beveled edge valance-free design. Internally fit with components required for specified performance and designed for smooth, quiet, trouble-free operation. Headrail finish to be standard baked-on polyester and to match slats. Ends fitted with .024" steel end lock with adjustable tab for centering blinds.
4. BOTTOM RAIL: Steel, with corrosion-resistant finish formed with double-lock seam into closed oval shape for optimum beam and torsional strength. Ends fitted with color-coordinated engineered polymer caps. Color-coordinated engineered polymer tape buttons secure the ladder and cord. Bottom Rail finish to be standard baked-on polyester color coordinated to slats.
5. LIFTING MECHANISM: Crash proof steel cordlocks with corrosion-resistant finish, two-ply polyester cord filler in braided polyester jacket lift cords, cord equalizers, cordlock adapter, and Break-Thru® safety tassel. Located on either side of individual blind unit as per architect's request.
6. TILTING MECHANISM: Permanently lubricated die-cast worm and gear type tilter gear mechanism in fully enclosed housing with clutch action to protect ladder tapes from over rotation of the solid steel, corrosion resistant tilt rod.
7. TILT CONTROL WAND: Tubular shaped 7/16" diameter extruded clear plastic, ribbed for positive grip and detachable without tools. Located on either side of individual blind unit as per architect's request.

8. MOUNTING HARDWARE: Manufacturer's standard .042" steel box brackets with baked-on polyester finish to match headrail with additional support brackets for blinds over 60" wide.

2.2 Fabrication

- A. Blind measurements shall be accurate to within + 1/8" or as recommended in writing by manufacturer.

2.3 Finishes

- A. Slat finish color to be selected by the Architect.
- B. Slat Support braided ladders shall be color coordinated with slat.

3.0 - EXECUTION

3.1 Inspection:

- A. Contractor shall be responsible for inspection on site, approval of mounting surfaces, installation conditions and field measurement for this work.
- B. Other Interacting Trades shall receive drawings of shade systems, dimensions, assembly and installation methods from contractor upon request.

3.2 Installation:

- A. Installation shall comply with manufacturer's specifications, standards and procedures as detailed on contract drawings.
- B. Adequate Clearance shall be provided to permit unencumbered operation of shade and hardware.
- C. Clean finish installation of dirt and finger marks. Leave work area clean and free of debris.

3.3 Demonstration:

- A. Demonstrate operation method and instruct owner's personnel in the proper operation and maintenance of the blinds.

END OF SECTION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SCOPE OF WORK

- A. Provide labor, materials, equipment, engineering, and installation to provide a new custom aluminum bleacher system in accordance with the following specifications.

B. Minimum acceptable criteria:

1. High Traction Welded Decking System as defined by ANSI/NFSI B101.1 and ANSI/NFSI B101.3 meeting the wet coefficient of friction (COF) of .6 on all walking surfaces. If media blasting is used to obtain the necessary wet (COF) of .6, those surfaces shall be anodized.
2. Design per plan view and sectional view drawings.
3. The overall length of bleachers shall be per architectural drawings.
4. The number of rows shall be per architectural drawings.
5. The rise per row shall be per architectural drawings.
6. The depth per row shall be per architectural drawings.
7. Net seating capacity shall be per architectural drawings.
8. ADA seating shall be per architectural drawings.
9. The riser shall be structurally connected to the decking system panel every 12" longitudinal with a ¼" diameter structural grade rivet. Tek screws are prohibited.
10. One-piece Risers shall interlock to the row above and overlap the rear tread of the row below forming the required overlapping and interlocking riser system. Two-piece and/or wedged-in risers are prohibited.
11. There shall be no gaps or cavities between the riser portion of the decking system and any supports or attachments. There shall be bolt runner covers at all locations between seat supports.
12. Aluminum extrusions must use alloy 6063-T6 and 6061-T6.
13. Understructure members shall be constructed using square tube and aluminum angle extrusions. Vertical columns should have a dimension of 2" x 2" and a minimum wall thickness of 1/8" on all columns except the terminal column which should be 3" x 2". The footboard supports and bases angles should be 2" x 1.5" x 3/16" aluminum angle. All diagonal bracing should be 1.5" x 1.5" x 3/16" aluminum angle.
14. All mating connections to create the understructure framing system shall be welded connections and shall be welded on all sides.
15. All welded connections shall be by certified aluminum welders and inspected at the manufacturer by a licensed Certified Welding Inspector (CWI).
16. All understructure frames shall be treated after fabrication by a system that employs a commercial cleansing and rinse procedure.
17. Aisle and Egress stairs shall have a ½" overlap.
18. At locations where platforms meet end to end, a beveled 4"-wide aluminum threshold extrusion shall be provided to cover the walking surface.
19. Seat support system shall be universally adjustable to any location on the vertical plane of the decking system. There shall be no through bolting of these items.

- 20. All seat support, aisle step supports, aisle handrails, and risers shall be installed from the topside of the decking system. There shall be no through bolting of these items through the riser system.
  - 21. Guardrail system shall be provided by others.
  - 22. Bleacher manufacture must have a written quality control program for manufacturing, shipping, and installation.
  - 23. All walking surfaces shall be fluted non-skid and slip resistant.
- C. Related Sections include the following:
- 1. Division 3 Section "Cast-in place Concrete" for concrete mix design and testing requirements.

### 1.3 SYSTEM PERFORMANCE REQUIREMENTS

- A. General: Provide a complete, custom bleacher system of mutually dependent components and assemblies that form a custom system capable of with standing structural and other loads, thermally induced movement, and exposure to weather without failure. Include primary and secondary framing, decking system, seating, handrails, guardrails, and accessories complying with requirements indicated, including those in this Article.
- B. Structural Performance: Provide bleacher system capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
- 1. Design Loads / Structural – Framing Members
    - a. Dead Loading: 6 PSF for understructure
    - b. Live Loads: 100 PSF for understructure
  - 2. Design Loads / Decking System
    - a. Dead Loading: 6 PSF for decking, platforms, stairs, and ramps
    - b. Live Loads: 100 PSF for decking, platforms, stairs, and ramps
    - c. Deflection Limits: engineer assemblies to withstand design loads with deflections no greater than the following:
    - d. Decking, platforms, stairs, and ramps: vertical deflection of L/360
    - e. Sway loads of 24 PLF per row parallel to seat and 10 PLF per row perpendicular to seat run.
  - 3. Design Loads / Handrail / Guardrail
    - a. 100 PLF Vertical
    - b. 50 PLF applied in any direction
    - c. 200 LB Concentrated load any direction
    - d. 50 PSF fencing and infill
  - 4. Design Loads / Seat Boards
    - a. Live Loads: (vertical) 120 pounds per lineal foot

### 1.4 SUBMITTALS

- A. Shop Drawings: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of the following bleacher system components:
- 1. Foundations:
    - a. Footings, slab, and reinforcement.
  - 2. Structural framing:
    - a. Primary and secondary framing including but not limited to the following:
      - 1) Vertical & Horizontal Members
      - 2) Bracing
      - 3) Connecting hardware
  - 3. Tredweld Decking System:

- a. Decking Platforms
  - b. Risers
  - c. Supports for Seats
  - d. Aisle Steps
  - e. Aisle Handrails
  - f. Hardware
- 4. Seating
  - 5. Handrails and Guardrails

#### 1.5 QUALITY ASSURANCE

- A. Concrete Installers Qualifications: An experienced installer who has completed concrete work similar in material, design and extent indicated for this project and whose work has resulted in construction of bleacher system with a record of successful in-service performance. Concrete installation must be certified by bleacher manufacturer.
- B. Erector Qualifications: An experienced erector who has specialized in installing bleacher systems similar in material, design, and the extent indicated for this project. Bleacher erector must be certified by bleacher manufacturer.
- C. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installation of bleacher systems that are similar in material, design, and the extent indicated for this project. All approval drawings shall bear the seal of a registered professional engineer in the state of installation.
- D. Quality Control: Manufacturer's written quality control for manufacturing, shipping and installation shall be submitted prior to award of contract.
- E. Standards and Guidelines: Comply with the latest editions of provisions of the following codes, specifications, and standards, except as otherwise noted or specified:
  - 1. American Concrete Institute (ACI)
  - 2. Aluminum Association of American
  - 3. American Welding society (AWS)
  - 4. Americans with Disabilities Act (ADA)
  - 5. International Building Code (IBC)
  - 6. International Code Council 300 (ICC 300)
- F. Site visitation: Bidder shall be responsible for visiting the job site prior to the bid date to verify site conditions.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Materials and other manufactured items will be packaged and loaded for transport to prevent bending, warping, twisting, and any other surface damage of materials. Care will be taken at the job site to prevent any damage to materials.
- B. Materials must not be stored where they would come in contact with other materials that might cause staining, denting, or any other surface damage.

#### 1.7 WARRANTY



- A. All products after proper erection and under normal use for this type of structure shall carry a one (1) year warranty against all defects in materials and workmanship.

## PART 2 – PRODUCT

### 2.1 MANUFACTURER

- A. Structural Steel Framing Members and Aluminum High Traction Welded Decking System Outdoor Aluminum, Inc., Geneva, AL (Basis of design) 1-800-225-4249.
  - 1. Other acceptable manufacturers:  
Other manufacturers must request approval to bid the specified product and be listed approved to bid via addendum
- B. Being listed as an acceptable manufacturer does not eliminate the requirement to meet all aspects of the specifications contained herein.
  - 1. Substitution Request: Subject to absolute compliance with design parameters.

### 2.2 CONCRETE FOUNDATIONS

- A. Foundations shall be designed in accordance with mix designs per Section 033000- Cast-in-Place Concrete.
- B. Foundations shall be either concrete slab or concrete runners not included in this scope of work.

### 2.3 STRUCTURAL – FRAMING MEMBERS

- A. The understructure of the system shall consist of a series of aluminum frames spaced at intervals of no more than 6'-0" and shall be joined by means of aluminum sway braces.
- B. Each frame shall consist of vertical members, adequate diagonal braces, and horizontal members welded to form the proper rise per row and proper back-to-back spacing between seat rows.
- C. All welded connections shall be by certified aluminum welders and all mating parts shall be welded on all sides to assure adequate strength.
- D. Vertical members shall be constructed on 2" x 2" x 1/8" square tube aluminum for all columns except the terminal column which shall be 3" x 2" x 1/8" square tube aluminum, alloy 6061-T6, mill finish.
- E. Horizontal members shall be constructed of 2" x 1.5" x 3/16" aluminum angle, alloy 6061-T6, mill finish.
- F. Sway braces shall be constructed of 1.5" x 1.5" x 3/16" aluminum angle, alloy 6061-T6, mill finish.

### 2.4 DECKING SYSTEM

- A. Decking System Platforms:
  - 1. Decking system platforms shall consist of extrusions laid side by side to form the tread width. These individual extrusions are then clamped and factory fixture welded. The treads shall be welded in a single pass with .0035 diameter 4043 welding wire, using argon gas. This method will result in a rigid, positively joined tread.

2. Individual tread lengths shall be a maximum length of 37'-6", while the actual length is designed to create the minimum number of expansion seams.
3. Decking shall be attached to the supporting aluminum tube understructure by means of concealed aluminum clips, galvanized bolts, washers, and nuts.
4. Platforms shall have a minimum aluminum wall thickness of .078" and aluminum shall be alloy 6063-T6.
5. Walking surface shall be fluted non-skid, slip resistant, and aesthetically pleasing without showing traffic pattern wear.
6. The rear portion of the platform will turn ninety degrees vertical to accept the next row of decking platforms. The front portion of the platform shall be complete with a female front edge to allow for a positive male-to-female connection of a vertical riser.
7. At locations where platforms meet end to end, a beveled 4"-wide aluminum threshold extrusion shall be provided to cover the walking surface. Threshold shall be beveled on both sides so as not to create a trip hazard and must have a fluted surface to prevent slipping. Threshold must comply with specified deflection criteria and must allow for expansion and contraction once installed.

**B. Decking System Riser:**

1. The decking system riser shall be extruded aluminum; alloy 6063-T6 with a 204 R1 anodized clear finish.
2. The decking system riser @ aisle steps shall be extruded aluminum; alloy 6063-T6 with a powder-coated finish in standard color chosen by the owner.
3. This extrusion shall have a male ridge running continuous at the upper leading edge to interlock with the front portion of the decking system panel.
4. The riser shall be structurally connected to the decking system panel every 12" longitudinal with ¼" diameter structural grade rivet. Tek screws are prohibited.
5. There shall be no gaps or cavities between the riser portion of the decking system and any supports or attachments.

**C. Decking System Seat Supports:**

1. The decking system seat support shall be of extruded aluminum angle.
2. Once installed the seat support shall have no noticeable gaps between the decking system riser and support.
3. Seat support system shall be universally adjustable to any location on the vertical plane of the decking system.

**D. Decking System Aisle Handrails:**

1. The decking system aisle handrails shall be 1-5/8" schedule 40 anodized aluminum pipe.
2. Handrails shall have a center line handrail and the spacing between rails shall not be less than 22" or more than 36". Handrails shall be discontinuous and shall not span more than five rows of seating.

**E. Decking System Hardware:**

1. All bolts, washers and nuts shall be galvanized.
2. End caps shall be of a heavy duty, clamping, aluminum channel design fastened to the ends of extrusions with aluminum rivets. End caps shall close all end openings of extrusions and shall be a full-length piece and match in both color and finish the extrusion to which they attach.
3. All riser fasteners shall be structural ¼" diameter structural grade rivet.

## 2.5 SEATING

### A. Bench Seating:

1. Seats shall be of extruded aluminum with a fluted non-skid surface, alloy 6063 T6, with 204R1 anodized clear finish.
2. Plank shall be 2" x 10" nominal with a wall thickness of .078" (+/- 0.006" industry tolerance) at the smooth surface.
3. Finish size shall be 1-3/4" x 9-1/2".
4. Seats shall attach to the decking system seat supports by means of concealed aluminum clips, galvanized bolts, washers, and nuts.
5. Seat supports shall be installed on centers that will allow for the same design deflection criteria required by code.
6. End caps shall be extruded aluminum and shall match in both color and finish the plank to which they attach. All end caps shall be single piece and shall attach to the underside of the plank with a minimum of two aluminum rivets.

### B. Interkal Stadium Chairs

1. Interkal Aura Stadium Chairs, Solid, shown in architect's plans and specifications as manufactured by Interkal, Kalamazoo, MI. Color selected by architect from Interkal's standard colors.
  - a. Description of System:

The Aura shall be in 22" widths to accommodate capacity requirements. The Aura shall operate freely and quietly and provide for comfort and safety of the occupant. The chairs shall use blow molded, high-density polyethylene seats and backs with U.V. inhibitors and high strength die cast aluminum stanchions for structural integrity and rust-free usage.
  - b. Quality Assurance
    - 1) Deviation - It shall be the responsibility of the bidder to furnish with his bid a list clarifying any and all deviations from these specifications, written or implied, in order that a fair and proper evaluation be made. Those bidders not submitting a list of deviations will be presumed to have bid as specified.
      - Limited Guarantee - The manufacturer shall guarantee all work performed under these specifications to be free from defects for a period of one year.
      - Product Improvements - Seating provided shall incorporate manufacturer's current design improvements at time of shipment.
  - c. Design Criteria
    - 1) In the mounted position the chairs shall be designed to withstand, without damage to components, the forces from the following:
      - a) Swinging Impact Test of two forty-pound sandbags impacting the chair back a total of 50,000 times equally divided between

- b) distances of 6", 8", 10", and 12".  
Vertical Drop Test of a forty-pound sandbag dropped a total of 50,000 times on the seat equally divided between distances of 6", 8", 10", and 12".
- c) Oscillating Test - The seat shall be opened mechanically and released to oscillate to the 3/4-fold position 420,000 times without failure in accordance with ASTM 851-87.
- d) 600 pounds evenly distributed on the seat assembly.
- e) 350 pounds evenly distributed to the front and then to the back of the chair back.
- f) Arm Load Test - Vertical static load test of 250 pounds and lateral static force of 250 pounds.

- 2) Chair materials, finish, strength and operating test results to be certified by an independent testing laboratory.

**d. Materials/Fabrication**

1) Seats and Backs:

- a) Seat and back shall be one-piece, double wall, blow molded, high density polyethylene plastic with a nominal thickness of .125".
- b) Seat and back surfaces shall be free of all external reinforcement ribs and shall be anatomically designed with lightly textured surfaces radii used vertically and horizontally for occupant comfort and safety.
- c) Material shall be color pigmented with manufacturer's standard colors, which shall include ultra-violet inhibitors for indoor or outdoor applications.

2) Seat and Back Supports:

- a) Seat shall be attached to pivot arms with truss head screws attached to threaded inserts.
- b) Back shall be attached through holes cast integrally in the stanchions with two truss head screws attached to threaded inserts.
- c) Insert nuts shall be molded into the plastic seat and back to achieve superior torque and pull-out strength.
- d) There shall be no visible fastening hardware on the seating surface of the seat or back to detract aesthetically or to encumber the occupant with tearing of

- e) clothing or pinching hazards.  
Chairs with exposed attachment hardware on the seating surfaces shall be unacceptable.

3) Seat Mounting/Hinge:

- a) The seat shall oscillate on Nylon bushings pivoting on a cross shaft for extended maintenance free operation.
- b) Cross shaft shall structurally interconnect both chair standards eliminating the plastic seat as the structural member between stanchions.
- c) The self-rising torsion spring shall be attached to the cross shaft and completely enclosed within the seat assembly.
- d) Unoccupied seat shall rest in the 3/4-fold position and accommodate a 110%-fold position for spectator passage within a row.
- e) The chair envelope in the unoccupied position shall not exceed 14-9/16"

4) Stanchions:

- a) Stanchions shall be die cast aluminum providing for rust free standards and arm rests that are cast as an integral part of the stanchions.
- b) Riser mounted stanchions shall accommodate a minimum of 8" to a maximum of 24" rise without additional attachment plates and floor mounted standards shall accommodate a level floor.
- c) Seat cross shaft attachment brackets shall be cast integrally into the stanchions.
- d) Each stanchion shall be designed to maintain proper and constant seat height and back pitch regardless of riser height.
- e) Stanchions shall be designed in such a manner that all integral protrusions shall shed liquids.

e. Finish

1) Finish (Powder):

- a) All metal components shall be chemically cleaned.
- b) Finish shall be a polyester powder coating, electrostatically applied and capable of withstanding 500 hours of U.V., 500 hours salt spray and 500

hours of humidity without visible deterioration.

- c) Acrylic or enamel coatings shall not be acceptable.
- d) Colors shall be selected from manufacturer's standard colors.

f. Accessories

1) Seat/Row Numbers

- a) Anodized aluminum plates 3" x 1-3/4" x .025" thick shall be attached with rivets.
- b) Numbers/letters shall be 1" high and finished in weather resistant black and shall be fitted in a vandal resistant recessed pocket and easily identified when the seat is in the unoccupied condition.

2) Seat Pan Numbers

- a) Anodized aluminum seat pan number plates 2-1/4" x 1" x .025" thick shall be affixed with rivets.
- b) Numbers/letters shall be .75" high and finished in a weather resistant black and shall be fitted in a vandal resistant recessed pocket and easily identified when the seat is in the unoccupied condition.

g. Execution

1) Installation

- a) Stadium Chairs to be installed in accordance with manufacturer's instructions and approved submittal drawings.
- b) All Stadium chairs to be adjusted to smooth and proper operation.

## 2.6 HANDRAILS AND GUARDRAILS

A. Handrail and Guardrail System:

- 1. Aisle handrails shall consist of 1-5/8" schedule 40 anodized pipe.
- 2. All pipe fittings shall be of cast aluminum.
- 3. All other railing shall be provided by others and shall be 42" minimum above the nearest seat on the sides of the stand.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

- A. Before erection proceeds, certified bleacher installer will survey elevations and locations of concrete pads or runners to verify compliance with requirements and bleacher manufacturer's tolerances.

### 3.2 ERECTION

- A. Erect bleacher system according to manufacturer's written instructions and erection drawings.

- B. Do not field cut, drill, or alter structural members without written approval from bleacher system manufacturer's professional engineer.
- C. Set structural framing in locations as indicated.

### 3.3 CLEANING AND PROTECTION

- A. Clean all metal surfaces promptly after installation of work.
- B. Exercise care to avoid damage to protective coatings and finishes.
- C. Remove all excess construction material and dispose of all debris.

END OF SECTION

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1.0 - GENERAL

1.1 Scope

- A. HVAC means Heating, Ventilation and Air Conditioning.
- B. Provisions of this Section apply to all HVAC and Building Management and Control System (BMCS) work.
- C. Include the provisions of General, Supplementary and Special Conditions and provisions of the Specifications shall apply to and form a part of this Section.
- D. Provide all labor, materials, equipment, and services necessary for the completion of all HVAC work shown or specified, except work specifically specified to be done or furnished under other sections of the Specifications. Include performing all operations in connection with the complete HVAC installation in strict accordance with the specification and applicable drawings subject to the terms and conditions of the Contract.
- E. Give required notices, file drawings, obtain and pay for permits, deposits and fees necessary for the installation of the HVAC work. Obtain and pay for inspections required by laws, ordinances, rules, regulations or public authority having jurisdiction. Obtain and pay for certificates of such inspections, and file such certificates with Owner.
- F. "Provide" means to furnish and install, complete and ready for operation.
- G. All equipment shall be U.L. or E.T.L. Listed as an assembly.

1.2 Drawings:

- A. HVAC Drawings are diagrammatic and subject to requirements of Architectural Drawings. HVAC Drawings indicate generally the location of components and are not intended to show all fittings or all details of the work. Coordinate with Architectural, Structural, Electrical, Plumbing and other Building Drawings.
- B. Follow the Drawings closely, check dimensions with Architectural Drawings and field conditions. DO NOT scale HVAC Drawings for location of system components.
- C. Make no changes without Architect's written permission. In case of doubt, obtain Architect's decision before proceeding with work. Failure to follow this instruction shall make the Contractor liable for damage to other work and responsible for removing and repairing defective or mislocated work.
- D. Do not scale Drawings to locate ceiling diffusers. Coordinate with lighting, ceiling grids and/or reflected ceiling plans.

1.3 Applicable Codes And Standards:

- A. Comply with the current editions of the following Codes and Standards:
  - 1. ANSI/ASHRAE 15 - Code for Building Services Piping.
  - 2. ANSI B9.1 - Safety Code for Mechanical Refrigeration.

3. NFPA 70 - National Electrical Code.
4. NFPA 90A - Air Conditioning and Ventilating Systems.
5. NFPA 101 - Life Safety Code.
6. Other Standard as referenced in other Sections of Divisions 15.
7. Local Building Code (International Building Code if no local Building Code in effect).
8. Local Plumbing Code (International Plumbing Code if no local Plumbing Code in effect).
9. Local Gas Code (International Gas Code if no local Gas Code in effect).
10. Local Mechanical Code (International Mechanical Code if no local Code in effect).

1.4 Qualifications Of Subcontractor:

A. The HVAC Contractor shall meet the following qualifications:

1. The HVAC Contractor must be approved by the Architect.
2. The HVAC Contractor shall have been in business as a HVAC Contractor for at least three (3) years prior to Bid Date.
3. The HVAC Contractor shall have a satisfactory experience record with HVAC installations of character and scope comparable with this project and have completed five projects of the same cost (or more) as the cost of this project, and for at least three (3) years prior to the Bid Date shall have had an established service department capable of providing service inspection or full maintenance contracts.
4. Contractor must have bonding capacity for project of this size and must bond the project.

1.5 Conflicts And Interferences:

A. If systems interfere or conflict, the Architect shall decide which equipment to relocate regardless of which was first installed.

1.6 Workmanship:

A. Do all work in a neat and first-class manner. Remove and replace work not done in such manner as directed by the Architect.

1.7 Cooperation:

A. Cooperate with all other crafts. Perform work in a timely manner. Do not delay the execution of other work.

1.8 Visiting Site:

- A. Visit site and become familiar with location and various conditions affecting work. No additional allowance will be granted because of lack of knowledge of such conditions.

1.9 Scheduled Work Hours And Facility Occupancy:

- A. Schedule all connections to existing systems and shutdowns with the Architect/Owner.

2.0 - PRODUCTS

2.1 Materials, Substitutions And Submittals:

- A. Unless otherwise noted, provide new, standard, first-grade materials throughout. Equipment and materials furnished shall be fabricated by manufacturer regularly engaged in their production and shall be the standard and current model for which replacement parts are available. HVAC equipment shall be substantially the same equipment of a given manufacturer which has been in successful commercial use and operation for at least three (3) years.
- B. Where materials or products are specified by manufacturer's name, brand, trade name, or catalog reference, such named materials or products shall be the basis of the Bid, without substitution, and shall be furnished under the Contract unless requests for substitutions are approved as noted below. Where two or more brands are named the choice of these shall be optional with the Contractor.
- C. Substitutions will be considered only if written request for approval has been received by the Architect ten (10) days prior to the date established for receipt of Proposals. Each request shall include the name of the material or equipment for which substitution is proposed, specification section/paragraph number and a complete description of the proposed substitute including drawings, cuts, performance and test data, samples and any other information necessary for evaluation. A statement setting forth any changes in other materials, equipment or other Work that incorporation of the substitute may require shall be included. The burden of proof of the merit of the proposed substitute is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution is final.
- D. If the Architect approves any proposed substitution prior to receipt of Proposals, approval will be set forth in an Addendum. Do not rely upon approvals made in any other manner. Prior approval to be secured for "equal" or "approved equal" manufacturer.
- E. No substitutions will be considered after the Contract has been executed, except as described in the General Conditions.
- F. Submittal data and shop drawings, except controls, shall be submitted at one time, partial submittals will not be considered. Provide submittal in three (3) ring binders with tab sheets for each major item of equipment. Before ordering materials and equipment, submit to Architect and obtain his approval of a detailed list showing each item which is to be furnished by make, trade name, catalog number, or the like; together with manufacturer's specifications, certified prints, and other data sufficient for making comparisons with items specified. When approved, such schedule shall be of equal force with these specifications in that no variation there from shall be allowed except with Architect's written approval. Number of Shop Drawings and procedure shall be as directed by the Architect.

- G. Architect and / or Engineer's approval of submittal data does not relieve the contractor of his responsibility to comply with the contract documents.
- H. It is the responsibility of the Mechanical contractor to coordinate all Electrical requirements of the submitted equipment with the Electrical contractor. Any increase in cost due to a variance between the contract documents and the submitted equipment shall be the responsibility of the Mechanical Contractor.
- J. Similar items of equipment shall be the product of the same Manufacturer.
- K. See section, "ALTERNATES" in other section of the Specifications and Bid accordingly.

2.2 Shop Drawings:

- A. Before starting work, submit and obtain approval of detailed drawings of the following, fully dimensioned (including elevations of ductwork and piping) and drawn not less than 1/4"= 1'-0" scale. Submit one (1) set of paper or bond.
  - 1. Ductwork (do not scale diffuser locations, coordinate with ceiling grids and lighting layout). See Section 15860 "DUCT ACCESSORIES".
  - 2. Complete mechanical equipment and fan room plans showing location of equipment, conduit stubs for motors, floor drains, and equipment pads and foundations.
  - 3. Equipment piping.
- B. Submit complete control and power wiring diagrams for approval before installing controls. See Section 15900 "CONTROLS".

2.3 Record Drawings:

- A. When work starts, obtain white prints of the HVAC Drawings. All corrections, variations, and deviations, including those required by change orders, if any, must be recorded in colored ink or colored pencil at the end of each working day on these drawings. The marked prints shall be available at all times for the Architect's inspection.
- B. Prior to examining the request for final payment or making any response thereto, the Architect shall receive from the Contractor one (1) complete set of the white prints, marked as stated above, indicating the actual completed installation of the work included under this Contract.
- C. The Architect will forward the marked white prints to the Consulting Engineers for review. They will then be returned by the Architect to the Contractor for use in preparing record drawings.
- D. When work is completed Contractor shall purchase from the Architect (At Architects' printing cost) one (1) set of prints of HVAC Drawings for use in preparing record drawings. Contractor shall transfer the information from the marked white prints to the mylar record drawings, removing all superseded data in order to show the actual completed conditions.

1. Accurately shown location, size and elevation of new exterior piping work and its relationship to any existing piping and utilities, obstructions, etc., contiguous to the area of work.
  2. Block out areas modified by change-order and identify them by change-order number.
- E. Ductwork and Control Drawings may be a set of mylar reproducible shop drawings, up-dated to show actual conditions at completion of work.
- F. HVAC piping drawings may be prepared as noted in paragraph "D" above, or HVAC piping may be added to the ductwork shop drawings as noted in paragraph "E" above.

2.4 Motors, Starters And Electrical Equipment:

- A. Provide electrical equipment compatible with the current shown on electrical drawings. Verify current characteristics before ordering equipment.
- B. Should the Contractor with the Architect's and Engineer's approval make changes in electrical equipment from those shown on the Electrical Drawings, he shall be responsible for the coordination and cost of required changes.
- C. Provide factory installed fuses in all equipment requiring fusing for branch circuit protection.
- D. Motors:
1. 1750 RPM open drip-proof construction unless otherwise shown or specified. Integral horsepower three phase motors shall be of premium energy-efficient design with apparent efficiency (power factor X efficiency) not less than ASHRAE 90.1.
  2. All motors served by variable frequency drives ( VFD's) shall be inverter duty rated.
  3. Unless shown otherwise motors less than 1/2 HP shall be single phase, motors 1/2 HP and larger shall be three phase.
  4. Allis-Chalmer, General Electric, Goulds, Louis Allis, and Westinghouse.
- E. Do not run motors until correct overload elements are installed in starters. Trading overload elements for elements of correct size for motors actually furnished shall be included in this Section.
- F. Starters shall be in motor control centers, furnished mounted on packaged equipment or furnished in this section and installed under "ELECTRICAL SECTION" as indicated and/or shown on the Electrical Drawings. All starters furnished with fused control circuit transformers.
- G. Starters shall be equipped with melting alloy terminal overload protection, in a 3 phase. Starters, unless indicated otherwise, shall be across-the-line type with overload and low voltage protection. Starting equipment shall comply with local utility company requirements.
- H. Starters to be Square "D", Allen-Bradley, Cutler-Hammer or approved equal.

- I. For single phase motors provide manual starters equal to Square "D" Class 2510. When installed in equipment rooms provide surface mounted enclosure, and when installed in finished walls outside equipment rooms provide flush mounted enclosure, key operated.
- J. For three phase motors provide magnetic line voltage starters with NEMA I enclosures and melting alloy overload elements.
- K. Provide H-O-A switches, fused control circuit transformers, auxiliary contacts, etc., as shown on control diagrams or required by control sequences and/or arrange for these items to be furnished with the starters or motor control centers specified in Electrical Work.
- L. All starters shall be by the same manufacturer.
- M. Provide thermal overload with equipment for motors 1/2 HP and less at 120/1/60.

2.5 Sleeves:

- A. For pipe through floors inside rated chases or through non-fire-rated walls: 20 gauge galvanized steel, 1/2" larger than pipe or covering.
- B. For uninsulated pipe through fire rated walls or partitions or floors outside chases: Pipe Shields, Inc., Model WFB or approved equal at walls, Model DFB at floors.
- C. For insulated pipe passing through fire rated partitions or walls or floors outside chases: Pipe Shields, Inc., Model WFB-CS for hot lines, VFB-CS-CW for cold lines. Insulation: Calcium silicate for hot lines and foamglass for cold lines, thickness specified for adjacent pipe covering.
- D. For pipe through concrete beams: Schedule 40 black steel pipe, 1/2" larger than pipe or covering. Pipe covering passing through sleeve: calcium silicate in a 24 gauge galvanized steel shield similar to Pipe Shields, Inc. thermal hanger shield. Caulk space between bare pipe insulation jacket and beam with fire retardant rope at both ends of the sleeve and seal with 3M Brand fire barrier caulk CD 25 or Putty 303, thickness and application in strict accord with manufacturer's recommendations, minimum thickness 1".
- E. At Contractor's option, instead of the factory fabricated sleeves specified above for pipe passing through floors and fire rated walls and partitions substitute 20 gauge galvanized steel sleeve 1/2" larger in diameter than pipe or pipe covering and seal one end of sleeve (both ends if both ends are exposed) with 3M Branch Fire Barrier Caulk CP25 or Putty 303, thickness and application in strict accord with manufacturer's recommendations, minimum thickness 1". Where pipe is insulated, insulation shall be continuous thru sleeve, calcium silicate for hot lines and foamglass for cold lines. In exposed areas, after product has dried it shall be sanded smooth for painting under painting section.
- F. Set sleeves before concrete is poured or masonry is erected. In existing construction, grout sleeves firmly in place.
- G. Sleeves for ducts: See Fire Dampers (See Section 15860 "DUCT ACCESSORIES").
- H. Extend sleeves 1-1/2" above finish floor and waterproof.

- I. Where exposed ducts pass through walls and partitions, provide 4" wide 20 gauge galvanized steel closure plates except at grilles and registers. Fit closure plates snugly to duct and secure to wall. Grout around ducts and sound absorbers at equipment room walls.
- J. Where exposed pipes pass through walls and partitions in finished spaces, provide chrome plated F & C plates or escutcheons.

2.6 Access Doors:

- A. Doors in non-fire rated walls and ceilings: 17-gauge steel with hinges and screwdriver latches, Bilco, Milcor, Miami-Carey, or equal. Doors in fire rated walls and ceilings: UL labeled with fire rating equal to fire rating of wall or ceiling. Provide door styles compatible with adjoining surfaces as selected by Architect. Size doors to permit removal of equipment and/or maintenance, minimum size 18" X 18".
- B. Mark lay-in ceilings with paper brads at maintenance access points. Bend ends of brads over above ceiling tile.

3.0 - EXECUTION

3.1 Protection Of Rotating Parts:

- A. Equip exposed belt drives with belt guards with holes for measuring speeds of driven shafts.
- B. Provide exposed couplings with coupling guards.
- C. Equip propeller fans with guards.
- D. Equip inlets and outlets of open centrifugal fans with 1-1/2" #10 Diamond mesh galvanized steel screens.
- E. All motors or other equipment exposed to weather shall be provided with weatherproof covers.

3.2 Protection Of Equipment:

- A. During construction, protect mechanical equipment from damage or deterioration.
- B. When installation is complete, clean equipment and make ready for painting.
- C. During construction all ductwork, piping, and equipment shall be stored in a clean/dry location. Any ductwork or piping stored outside that is not protected shall be removed from the job site. Installed ductwork and piping shall have open ends covered at the end of each work day to prevent dust, dirt, and water from entering the ductwork and piping.

3.3 Installation Of Equipment:

- A. Install equipment to provide normal service access to all components.
- B. Provide sufficient space for removing components, install equipment to provide such clearance.

- C. Install equipment in accordance with manufacturer's instructions. If manufacturer's instructions conflict with contract documents, obtain Architect's decision before proceeding.
- D. All equipment shall be firmly fastened in place:
  - 1. Roof curbs shall be secured to deck and structure and curb mounted items shall be secured to curbs.
  - 2. Pad mounted equipment shall be secured to pads using poured in place anchor bolts or cinch anchors.
  - 3. Vibration isolators shall be secured to floors, pads or structure and equipment shall be bolted to the isolators.

3.4 Equipment Supports:

- A. Provide supports for ductwork, piping and equipment. Hot dip galvanize after fabrication all grillage, supports, etc., located outdoors.
- B. Set all floor-mounted equipment, other than condensate pumps, on concrete pads or rails (as indicated of height shown, but not less than 4" high). Coordinate pad height with condensate drain trap requirements. Chamfer rails and pads 1". Where shown, provide reinforced floating pads mounted on vibration isolators. Form, reinforce and pour any pads and rails required but not shown on Structural and Architectural Drawings.

3.5 Cutting And Patching:

- A. Set sleeves and inserts and lay-out and form openings in walls, beams, girders and structural floors in this Section.
- B. Cut, patch and repair as required to accomplish HVAC Work and finish to match adjacent work. Architect's approval required before cutting any part where strength or appearance of finished work is involved.

3.6 Incidental Work:

- A. Provide all motors incidental to the Mechanical Systems. Wiring of motors, switches and starters is included in "ELECTRICAL SECTIONS".
- B. Do all control wiring required for Mechanical work.
- C. Provide motor starters as specified above.
- D. Submit refrigerant piping diagrams as prepared by the HVAC Contractor and/or refrigeration equipment manufacturer for approval.
- E. Final water connections to services are included in this Section.
- F. Permanent drain connections for AC units, etc., and auto air vents to nearest floor drain are included in this Section.
- H. Door louvers are not included in this Section.



- I. Items obviously omitted from drawings and/or specifications shall be called to attention of the Architect prior to submitting Bid, after award of Contract any changes or rearrangements necessary to complete Contract shall be at no additional cost to Owner.
- J. All return air and exhaust air grilles shall be covered with filter media if they are started and operated during construction.

3.7 Flashing:

- A. General: Furnish all fans curbs, pitch cups, metal base flashing and counter flashing required for HVAC Work. Installation of above items is specified in "ROOFING SECTION" with coordination by HVAC Contractor.
- B. Fan curbs for power roof ventilators are specified with the fans.
- C. Pitch Cups: 20 gauge galvanized steel, at least 8" deep, bases mitered and soldered and extending at least 4" horizontally.
- D. Metal Base Flashing: Galvanized steel for ferrous items, and stainless steel for stainless steel duct and aluminum for aluminum duct. Minimum thickness 22 gauge (0.034") galvanized steel, 20 gauge (0.038") stainless steel, 0.032" aluminum. Bases mitered and soldered extending out at least 4" horizontally and 8" vertically.
- E. Metal Counter Flashing: Of material and gauges specified for base flashing, lapping base flashing at least 3".

3.8 Hvac Installation Of And Connections To Items Furnished By Others Or Specified In Other Sections:

- A. Clothes Dryers: Provide Vents.
- B. Duct Mounted Smoke Detectors: Install in duct.
- C. Domestic Water Heaters: Provide gas flues and combustion air vents.
- D. Kitchen Hoods: Provide exhaust fans and grease duct.

3.9 Painting:

- A. Refinish equipment damaged during construction to new condition.
- B. Paint all non-potable water pipe and insulation yellow in accordance with Plumbing Code using paint of type specified in Painting Section.
- C. Paint un-insulated duct surfaces visible through grilles and registers flat black.
- D. Other painting is specified in "PAINTING SECTION, Finishes Division".

3.10 Pipe Identifications:

- A. Identify all piping exposed to view or accessible through removable ceilings or access panels with plastic snap-on pipe line markers. Color code markers in accordance with ANSI A13.1. Show pipe contents and direction of flow. Markers on lines 8" OD and smaller shall be taped in place; on lines over 8" OD secure with spring clips.

- B. Submit samples of all labels, tags, stencils, chains, etc., for approval.
- C. Protect all factory identification tags, nameplates, model and serial numbers, stenciling, etc., during construction and replace if damaged.
- D. Label Spacing and Extent:
  - 1. On straight run of pipes; Above suspended ceilings space labels approximately 10 feet on center; elsewhere, 20 feet on center.
  - 2. Wherever a pipe enters or leaves a room or building.
  - 3. At change of direction.
  - 4. At main valves and control valves (not equipment valves).
  - 5. On risers, just above and below floors.

3.11 Valve Tags:

- A. 2" X 3" laminated plastic with 1/2" numbers engraved at top indicating type service and valve number, leaving space for further engraving by others. Secure tags with chains to valve yoke or stem, not handles.
- B. Valve tags colors: Brass tags with black numbers.
- C. Valve tag locations: At all valves on mains, risers and branches.
- D. Valve tag numbers: Starting with Number 1, number tags in sequence from the lowest point to the highest point in the building. In existing building extend existing sequences.

3.12 Valve Charts:

- A. In all mechanical rooms, provide charts showing number and locations of all valves, type of service, etc. Frame with aluminum, under glass.

3.13 Equipment Identifications:

- A. Provide 2" X 3" or larger laminated plastic nameplates with 1/2" numbers and letters in colors specified below. Screw tags to equipment in obvious locations. Engrave equipment designation and numbers as shown on plans and drawings on upper half of tags, leaving lower half of tag for future engraving by Owner.
- B. Provide similar nameplates for motor starters furnished under this section.
- C. Secure nameplates with acorn head screws.
- D. Colors:
  - 1. Equipment connected to utility power only - black letters on white nameplates.
  - 2. Equipment connected to emergency power - red letters on white nameplates.

3.14 Exhaust Fan Identifications:

- A. 2" X 3" or larger laminated plastic nameplates with red letters and numbers on white background, identifying type of fans, number according to plans, and rooms served. Engrave on upper half of tag, leaving lower half for engraving by Owner. Fasten with acorn head screws.

3.15 Access Doors:

- A. Provide access doors for valves, fire dampers, dampers, controls, air vents, and other items located above non-lift-out ceilings or behind partitions or walls.

3.16 Use Of Hvac System During Construction:

- A. Ducted HVAC systems may be used during construction as long as the following conditions are met:
  - 1. All AC units shall have filters installed in the AC units that are equal to the filters that are scheduled for each piece of equipment. The contractor shall be responsible for changing the filters in all AC units during construction at a minimum of every 30 days starting from the day the AC units are started. At the completion of the project, the contractor shall replace all filters.
  - 2. All return air and outside air openings shall be protected with temporary filter media. The temporary filter media shall be changed by the contractor. Temporary filter media is required to protect the installed ductwork. During or after construction, if any ductwork is observed without temporary filter media, the contractor shall be solely responsible for cleaning the entire ductwork system and AC unit. Temporary filter media shall be changed bi-weekly at a minimum.
  - 3. All AC units shall have all correct motor overload elements installed and all safeties shall be wired and operational prior to temporary use of the AC unit.
  - 4. Temporary controls and temporary control sequences may be utilized by the contractor until the permanent controls and control sequences are installed. Temporary control methods shall be the sole responsibility of the contractor.
  - 5. All AC units required to have factory start-up shall have factory start-up completed prior to use.
  - 6. The building envelope for the area served by the AC units shall be substantially complete prior to using the AC units during construction.
- B. Ductless split systems shall NOT be used during construction. Protect all indoor sections of ductless split systems during construction to prevent dust, dirt, or water from entering the unit.

3.17 Warranty And Instructions:

- A. See General Conditions - One-Year Warranty.

- B. Contractor shall and hereby does warrant all materials, workmanship and equipment furnished and installed by him to be free from defects for a period of one (1) year after date of substantial completion of the Contract. Should any defects in materials, workmanship, or equipment be made known to Contractor within the one (1) year warranty period, Contractor shall replace such materials, workmanship, or equipment without charge.
- C. All centrifugal, reciprocating, screw or scroll type refrigeration compressors shall bear five (5) year non-pro-rated parts warranty.
- D. All gas fired air furnaces shall bear ten (10) year prorated heat exchanger warranties.
- E. After completion of the work, Contractor shall operate the equipment which he installs for a period of ten (10) working days, as a test of satisfactory operating conditions. During this time, Contractor shall instruct the Owner's operating personnel in the correct operation of the equipment. Furnish necessary oral and written operating instructions to the Owner's representative.
- F. Provide five (5) sets of manufacturer's operating and maintenance manuals and parts lists including nearest manufacturer's sales and service representative by name, address and phone for all equipment and materials furnished. Provide a maintenance schedule listing routine maintenance operations and suggested frequency. Include all warranty dates on equipment and guarantees. Include names, address and phone of any subcontractor and work performed. Bind above items in loose leaf three (3) ring binders with tab for each class of equipment.
- G. During the period of tests, adjust all controls, regulators, etc., to comply with these Specifications.
- H. Supply initial charges of refrigerant, refrigeration lubricating oil; and anti-freeze necessary for the correct operation of the equipment. Maintain these charges during the guarantee period, with no additional cost to the Owner, unless loss of charge is the fault of the Owner.
- I. Make available to the Owner, without additional cost, service and adjustment of the equipment for the guarantee period.
  - 1. Service shall include:
    - a. On call nuisance issues.
    - b. Replenishing refrigerant and antifreeze if loss occurs due to system failure.
  - 2. Service shall not include:
    - a. Routine maintenance of the equipment unless specified in specific equipment specification section(s).

3.18 Project Close-Out Documents:

- A. Prior to the issuance of a certificate for final payment, submit to Architect and obtain his approval of the following:

1. A letter signed by the subcontractors for HVAC, Electrical, and Temperature Control work stating that they have jointly checked each power circuit and control circuit and mutually agrees that controls and power circuits will function properly.
2. Record drawings - sheet metal work (reproducible).
3. Record drawings - piping (reproducible).
4. Record drawings - control systems (reproducible).
5. Control manufacturer's letter of certification (3).
6. Air balance report (3).
8. Equipment Submittal Data (3).
9. Equipment operating and maintenance manuals (3).
10. Maintenance schedule (3).
11. Equipment warranty dates and guarantees (3).
12. List of Owner's Personnel who have received maintenance instructions.
13. All required factory start-up reports.

END OF SECTION

## TESTING, BALANCING AND ADJUSTING (TBA) - SECTION 15020

### 1.0 - GENERAL

#### 1.1 Scope

- A. Provisions of this section apply to all HVAC work.
- B. All tests shall be witnessed by the Architect in addition to authorities having jurisdiction. A minimum of 48 hour notice is required prior to performance of test.
- C. Provide complete report to Engineer for approval TEN (10) working days prior to Engineer's final site visit.

#### 1.2 Qualifications

- A. All TBA work shall be performed by an independent Test and Balance Agency specializing in Testing, Balancing and Adjusting of HVAC Systems.
- B. All TBA work shall be under supervision of a qualified registered professional engineer regularly engaged in the TBA Agency.
- C. TBA Agency shall be an AABC or NEEB Member and/or shall obtain written approval from the Architect prior to Bidding.

#### 1.3 Approval

- A. Application for approval of the TBA agency shall be submitted prior to Bid.
- B. Submittal information regarding the TBA agency to include:
  - 1. List of at least five (5) projects successfully completed of similar size and scope.
  - 2. Copy of reporting forms to be used for this project indicating scope of TBA work.
  - 3. Name of registered engineer in charge with resume of qualifications. List of personnel that will perform TBA work on project and qualifications.
  - 4. List of instruments to be used with dates of latest calibrations.
  - 5. List of memberships in AABC, NEBB or other similar organizations.

### 2.0 - PRODUCTS

#### 2.1 Instruments

- A. All instruments used for the TBA work shall be calibrated within six (6) months and checked for accuracy prior to start of work.

### 3.0 - EXECUTION

#### 3.1 General Requirements

- A. After HVAC system has been installed, Test, Balance and Adjust System for proper operation, air distribution, flow rates, temperatures and humidities. Correct any noise and/or vibration conditions.
- B. Include a "Deficiency List" with the TBA air and water balance report. Deficiency list shall include TBA items which are not in accordance with Contract Documents.
- C. Perform all tests as required by local codes. Contractor shall furnish testing equipment.
- D. If local Codes are more stringent, local Codes shall govern.

#### 3.2 Air System

- A. When system has been completed, remove all trash and dirt, set grille bars and diffuser patterns for required throws and adjust and balance air duct systems so air quantities at outlets are as directed and distribution from each supply outlet is free from drafts and excessive noise, and uniform over the face of each outlet. Do all testing and balancing with filters blanked to provide pressure drops midway between clean condition and manufacturer's recommended change-out condition. Balance air quantities to within 10% of indicated air quantities.
- B. Make adjustments so dampers and volume adjusters close to air outlets will have the least pressure drop consistent with volume requirements. Obtain additional pressure drop required for balancing of shorter runs by adjusting dampers at branch duct take-offs. Adjustable fan drives shall be used for making final adjustments of total air quantities. Change sheaves on drives larger than 15 HP. Provide additional sheaves as required.
- C. Direct reading velocity meters may be used for comparative adjustment of individual outlets, but measure air quantities in ducts having velocities of 1000 feet per minute or more with pitot tubes. Cap pitot tube openings in low pressure ducts with plastic plugs. Cap pitot tube openings in medium and high pressure ducts and kitchen and laboratory exhaust ducts with Duro-Dyne test ports.
- D. Permanently mark settings of dampers and other volume adjusting devices so they can be restored if disturbed.
- E. When air balancing has been completed, submit to Architect an air balance log, including design and actual air quantities, pressures, etc., in each branch duct and at each grille, register, and outlet. Individual outlet air rates are required for boots on boot-box systems.
- F. Include for each system the following information:
  - 1. Fan rpm, motor amps, motor nameplate amps, and amp rating of starter heater.
  - 2. Total air quantity supplied by each system and/or fan.
  - 3. Total outside air quantity supplied by each system.

4. Provide velocity pressure across each duct mounted smoke detector and list manufacturer's required velocity pressure range.
5. Air flow at all grilles.
6. Static pressure profile thru each air handler.

### 3.3 Coils

- A. Provide the following:
  1. Entering and leaving air temperatures.
  2. Outside air temperature at time of test.
  3. Air pressure drop.

### 3.4 Start-Up and Service

- A. At the beginning of the first heating season, adjust and balance operating phases and repeat at the beginning of the first cooling season or vice-versa, as the case may be, all without charge.
- B. The Contractor and Factory Representative of the AC units and major HVAC equipment shall place every item of such equipment into satisfactory operation with all automatic and safety devices. Further, all adjustment service required shall be performed during the warranty period. Adjustment services does not include lubricating fans or motors and does not include changing filters or adjusting belts.
- C. In addition, submit equipment manufacturers' start-up reports for items listed above. See "Project Close-Out".

END OF SECTION



## MATERIALS AND METHODS - HVAC - SECTION 15050

### 1.0 - GENERAL

#### 1.1 SCOPE:

- A. Include Section 15010, "GENERAL PROVISIONS - HVAC", with this Section.

### 2.0 - PRODUCTS

#### 2.1 MATERIALS:

- A. All pipe, fittings and valves shall be manufactured in the United States of America.

#### 2.2 HVAC DRAIN PIPING:

- A. Standard weight galvanized steel pipe ASTM A-120 with galvanized malleable iron fittings, type "L" hard copper with wrought copper sweat fittings or Schedule 40 PVC, at Contractor's option.
- B. Provide drain traps for AC Unit drain pans. Size traps as required to drain under operating conditions.

#### 2.3 REFRIGERATION PIPING:

- A. ACR hard drawn copper tubing with wrought copper sweat fittings. Joints: Silfossed with continuous flow of dry nitrogen through lines.
- B. Size suction and discharge lines so as to insure oil return at minimum loading.
- C. Small lines 5/8" OD and smaller may be soft copper with flare fittings, provided that all joints are exposed for visual inspection.
- D. Refrigerant piping shall be sized and installed as recommended by the equipment manufacturer. Provide lift traps or double suction risers as required for oil return.

#### 2.4 PIPE HANGERS:

- A. General: Pipe hangers, Grinnell, PHD, Michigan Hanger, or Elcen. Grinnell figure numbers are given for reference. Provide copper clad or plastic coated hangers on bare copper lines. Provide stainless steel or plastic coated hangers in Pool areas subject to chlorine atmosphere.
- B. Equip pipe hangers with vibration isolators as specified under sub-section 2.15 "VIBRATION ISOLATORS".
- C. Pipe hangers for lines 3" and smaller (other than steam and condensate lines), adjustable wrought ring hangers, Grinnell Fig. 97 or wrought clevis hangers, Grinnell Fig. 260.
- D. Pipe hangers for lines 4" and larger (other than steam and condensate lines), adjustable wrought ring hangers, Grinnell Fig. 260.

- E. Parallel piping graded in same direction may be grouped on trapezes. Trapezes for line 4" and smaller, Unistrut P2000 channel, or equal, with rods sized as specified below for largest pipe on trapeze. Guide lines on (but not anchor to) trapezes using Unistrut Series P1100 clamps. Trapezes shall not exceed 3' in length. Space lines to allow at least 3" clear between adjacent pipe or pipe covering and between pipes or pipe covering and rods. Space trapezes as specified for pipe hangers based upon smallest size of pipe on trapeze.
- F. Beam Clamps: Grinnell Fig. 229.
- G. Inserts for hangers in concrete structures: Underwriter's listed cast iron inserts, Grinnell Fig. 282.
- H. For fasteners in existing concrete structures use drilled in expansion anchors with load rating at least 150% of pipe hanger rating (power driven anchors are not acceptable).
- I. Size rods for pipe hangers not smaller than the following: 3/8" rods for pipe up to 2", 1/2" for 2-1/2" and 3" pipe, 5/8" rods for 4" and 5" pipe, 3/4" rods for 6" pipe, and 7/8" rods for 8" and 10" and 12" pipe, 1" rods for 14" and 16" pipe and 1-1/8" rods for 18" pipe.
- J. Space pipe hangers at maximum: 5' intervals for cast iron pipe. Pipe hanger spacing for screwed, solder joint and welded piping: 1/2", 6 ft.; 3/4" to 1-1/4", 8 ft.; 1-1/2" to 2-1/2", 10 ft.; 3", 12 ft.; 4", 14 ft.; 5", 12 ft. 6", 10 ft., 8" and over, 6 ft. Polypropylene and PVC plastic pipe 4 ft. horizontally maximum or as directed by manufacturer if closer, and 10 ft. vertically. Install additional hangers at change of direction and valve clusters.
- K. Install pipe hangers on insulated pipe (other than steam and condensate lines) over pipe covering. Provide factory fabricated insulated pipe shields equal to Pipe Shields, Inc. "Thermal Hanger Shields" at hangers. Provide shield insulation of waterproofed calcium silicate for hot water piping and foamglass for chilled water piping, same thickness as adjacent pipe covering. At Contractor's option, pipe shields may be field fabricated using waterproof calcium silicate or foam glass insulation with ASJ and 20 gauge galvanized steel protector. Shield length: 1.5 times nominal pipe size but not less than 4".
- L. Wrap bare copper refrigerant lines with sheet lead at hangers.

2.5 VIBRATION ISOLATION:

- A. General: Mount all piping and rotating equipment using vibration isolators as specified below. Amber Booth, Korfund, Mason Industries, Peabody, Vibration Eliminator Co., or VMC. Mason Industries part numbers are given for reference. Minimum 95% isolation efficiency.
- B. Isolators for Suspended Equipment: Combination steel spring and rubber in shear isolators, #30N. Static deflections: As required to provide 95% isolation efficiency or 1" static deflection, whichever is greater. Provide isolators for all suspended rotating equipment.
- C. Mount air handling unit sections in contact with concrete pad on single layer of ribbed neoprene on top of housekeeping pads as shown. Neoprene vibration pad shall cover the entire surface of the unit in contact with the concrete pad.

- D. Provide snubbing isolators, similar to those specified above for pipe hangers for flexible connections at fans.
- F. Bellows type flexible connections in water lines: Laminated 3-ply corrugated type 304 stainless joints designed for 150 psig WP. Joints shall be flanged with Van-Stone flanges and have 5" relaxed face-to-face dimension. For each joint furnish a control unit consisting of four plates, two tie bolts with required nuts, 1" deflection springs, washer, and stop and lock nuts. Flexible connections Keflex, Flexonics, or approved equal. Provide samples if specifically requested (samples will be returned to vendor).
- G. Isolators for Pipe Hangers:
  - 1. Equip all pipe hangers on chilled water, hot water and condenser water lines in equipment rooms with 1" static deflection combination neoprene and spring isolators, #PC-30N.
  - 2. Mount piping riser supports on chilled water and hot water lines using 0.1" static deflection all directional neoprene anchors: #ADA.
- H. Mount air handling unit sections in contact with concrete pad on single layer of ribbed neoprene on top of housekeeping pads as shown. Neoprene vibration pad shall cover the entire surface of the unit in contact with the concrete pad.

## 2.6 THERMOMETERS AND GAUGES:

- A. Mercury in glass red reading separable socket industrial thermometers with die cast metal or high impact plastic casings of appropriate pattern for each installation, 9" scale lengths and ranges shown, Palmer, Trerice, Weksler, Marsh or equal. Install thermometers in brass or stainless steel wells. Equip thermometers installed in insulated lines with 1" extension stems or long enough to permit unions to clear insulation whichever is greater.
- B. Where shown install brass thermometer wells with screwed caps. Install wells at an angle to retain oil. Size well to fit thermometers specified.
- C. Enlarge pipe 2" and smaller to 2-1/2" at thermometers and thermometer wells.
- D. Install 4-1/2" dial pressure gauges where shown. Gauges shall have bronze or stainless steel bourbon tubes, 316 stainless steel or brass movement, non-ferrous or phenolic solid front cases, and accuracy not less than 1% of full scale over the entire range. Gauges shall be Ashcroft, Trerice, Weksler, U.S., Marsh or equal. Gauge with minimum bourbon tube diameter of 3". Provide brass or stainless bar stock needle valves for all pressure gauges. Provide siphons for steam gages.
- E. Where shown, provide temperature and pressure measurement plugs and caps, equal to Peteron Equipment Co., Inc. "Pete's plug with Nordel seats and seals", flow design or approved equal. Provide one Pressure and Temperature Kit consisting of 0-100 psi pressure gauge with adapters, two (2) thermometers (25E - 125E F and 0E - 220E F), all in carrying cases.

### 3.0 - EXECUTION

#### 3.1 PIPE INSTALLATION:

- A. Cut pipe square and ream full size after cutting. Clean pipe. Make threaded joints with Teflon tape. Do not spring pipe into place.
- B. Provide welding material and labor in accordance with the welding procedures of the Heating, Piping, and Air Conditioning Contractors' National Association or other approved procedure conforming to the requirements of ANSI B31.9 "Building Service Piping". Employ only welders fully qualified in the above specified procedure and currently certified by recognized testing authority. Use either electric arc or oxyacetylene welding. Provide full perimeter welds at both face end and collar end of each slip-on flange.
- C. Install piping to allow for expansion. Make connections to all equipment to eliminate undue strains in piping and equipment. Furnish necessary fittings and bends to avoid spring of pipes during assembly.
- D. Pitch air conditioning unit drain lines down in direction of flow 1" in 20'.
- E. Install chrome plated floor and ceiling plates on pipe passing through finished surfaces in finished spaces.
- F. Make horizontal water and steam supply line size reductions using eccentric reducers with tops flat in water lines and bottoms flat in steam lines.
- G. Install 3/4" ball or gate valve drains with hose adapters at low points of water piping and at bases of all risers or where shown provide large drains.
- H. Make connections to equipment using screwed unions in sizes 2" and smaller and flanged unions in sizes 2-1/2" and larger. Install unions in all piping connections to each piece of equipment. Provide rubber grommets at pipe penetrations to equipment casings.
- I. Wherever ferrous pipes or tanks and copper tubing connect, provide dielectric insulation unions or couplings, equal to EPCO.
- J. Near heating and air conditioning equipment requiring water valved and capped water outlets of sizes shown, for connection to equipment, including reduced pressure principal backflow preventers shall be provided. Make final connections under HVAC work. Note that all piping and insulation downstream of backflow preventer must be painted yellow.
- K. Run piping concealed, except where specifically shown or specified exposed. Plumb all vertical lines and run mains parallel to building walls unless specifically shown otherwise. All piping shall be run as high as practical and not on the floor unless otherwise indicated.

#### 3.2 INSTALLATION OF VALVES:

- A. Provide shut-off valves in supply and return to each item of equipment. Locate valves to isolate each item to facilitate maintenance and/or removal.
- B. Provide check valve in discharge line adjacent to each pump.

- C. Locate valves in piping connections to boilers, heat exchangers, water heaters, refrigeration machine, etc., so heads and tube bundles can be removed without disconnecting equipment or piping other than union or flange connections immediately adjacent to heat exchangers.
- D. Provide seat to screw adapters where required.

3.3 REFRIGERATION SYSTEM:

- A. Split Systems: When system is complete, but before the pipe covering has been installed, test components with dry nitrogen and make tight at equipment manufacturer's recommended test pressures. Then evacuate the system to 26" Hg. vacuum which the system shall hold for 24 hours. After passing the above tests, charge and leak test under operating conditions using electronic leak detector.
- B. Split and Packaged Systems: Check operation of refrigeration cycle and report head pressure, suction pressure and oil pressure.

END OF SECTION

1.0 - GENERAL

1.1 Scope

- A. Provisions of this section apply to all HVAC work.

2.0 - PRODUCTS

2.1 Specialties – Refrigerant

- A. Install molded desiccant core filter dryer in each liquid line. Provide throw away dryers for lines 1/2" and smaller. Provide replaceable core dryers for lines 5/8" and larger. Dryers shall be Sporlan "Catchall".
- B. Install moisture indicating sight glass in each liquid line.
- C. Service valves: Wing cap valves, Henry, or approved equal.
- D. Expansion valves: Thermostatic valves with external equalizers, Sporlan, or approved equal.
- E. Hot gas bypass valves: Self-contained valves sized to pass gas flow at last step of compressor unloading and shall discharge between expansion valve outlet and distribution. Sporlan, or approved equal.
- G. Install solenoid valve in each liquid and hot gas bypass line where recommended by manufacturer. Hot gas solenoid valve shall be equipped with a high temperature coil.
- H. Install suction line accumulators in all outdoor heat pumps and condensing units where refrigerant lines exceed 85' in length, or where recommended by manufacturer.
- I. Refrigerant circuit access ports located outdoors shall be fitted with locking-type, tamper-resistant caps. Provide owner with any tools necessary to un-lock the caps.

3.0 - EXECUTION

3.1 Installation

- A. Specialties shall be installed in accordance with manufacturer's recommendations.
- B. See Details for mounting instructions and accessories.

END OF SECTION

1.0 - GENERAL

1.1 SCOPE:

- A. Include Section 15010 "GENERAL PROVISIONS - HVAC", with this Section.
- B. Repair existing insulation at points of connection to existing work.
- C. "Exposed" is defined as: Exposed to view when construction is complete. Items which are not "exposed" are "concealed".
- D. "Attic" is defined as any ceiling space that is adjacent to the roof.
- E. Insulate all items subject to sweating or loss of heat.
- F. All insulation shall be installed by licensed applicator and applied in accordance with the Manufacturer's Recommendations.

1.2 INSULATION REQUIREMENTS:

- A. Comply with NFPA 90A.
- B. Pipe hanger shields are specified in Section 15050 "MATERIALS AND METHODS - HVAC".
- C. Use insulation and adhesives with Underwriter's Laboratories flame spread rating not over 25 without evidence of continued progressive combustion, and smoke developed rating not exceeding 50 for all other pipe, duct and equipment insulation.

2.0 - PRODUCTS

2.1 FOAM PLASTIC PIPE COVERING:

- A. Fire retardant foamed plastic pipe covering, maximum K factor at 75EF mean temperature not exceeding 0.27 BTU/(hr) (sq. ft.) (EF/in). Armstrong "Armaflex II", or approved equal.
- B. Pipe covering may be seamless insulation slipped over piping before erection or may be slit longitudinally and installed over erected piping.
- C. Make fitting covers from segments of pipe covering.
- D. Cement all joints and seams in accordance with manufacturer's instruction using Armstrong 520 adhesive.
- E. Fit pipe hangers over insulation (See PIPE HANGERS). Use hanger shields as specified under pipe hangers.
- F. Thermal performance shall be as follows:
  - 1. 1" thick: R=4.2.
  - 2. 2" thick: R=8.0.

2.2 ALUMINUM JACKET PIPING COVER:

- A. 0.010" thick corrugated aluminum jacket with laminated polyethylene and draft paper adhered liner.
- B. Securely rivet jacket in place and band with flat aluminum bands 18" o.c.
- C. Finish fittings on aluminum jacketed lines with 1/8" thick (dry) coat of vinyl acrylic mastic reinforced with glass cloth.

2.3 DUCT INSULATION, INTERNAL:

- A. Glass fiber acoustical/thermal insulation complying with NFPA 90A and UL 181 and having an erosion resistant anti-microbial membrane equal to Johns Manville, Linacoustic ARC<sup>®</sup> on the air side. Edge coating shall be factory applied to the edges of the liner core. Shop fabrication cuts and field cuts or tears shall be coated with Superseal Duct Butter. NRC (1" thick) not less than 0.70, minimum density 3 lb/cu. ft., and maximum friction correction factor at 2000 fpm average velocity 1.15 (per TIMA test method AHS-1S2-76U). Thermal performance shall be as follows:
  - 1. 1" thick: R=4.2.
  - 2. 1 1/2" thick: R=6.3.
  - 3. 2" thick: R=8.0.

2.4 DUCT INSULATION, EXTERNAL FOR CONCEALED:

- A. Formaldehyde free flexible glass fiber insulation with foil-scrim-craft (FSK) facing equal to Johnson Manville Micro-Lite AXG<sup>®</sup>. Flame spread classification, 25 or less, smoke developed rating not exceeding 50. Minimum density, 3/4 lb./cu. ft., 3" thickness, installed R=8.3 minimum.

3.0 - EXECUTION

3.1 HVAC PIPING INSULATION:

- A. Refrigerant Suction Lines and Hot Gas Bypass Lines: "Foam Plastic Pipe Covering", 1" thick. Jacket piping located outdoors or exposed to view with aluminum jacket.
- B. AC Unit Drain Lines: "Foam Plastic Covering", 3/4" thick. Jacket piping located outdoors or exposed to view with aluminum jacket.

3.2 AIR TERMINAL DEVICES:

- A. Ceiling Mounted Supply Diffusers: 2" thick duct insulation on back of diffuser, external for concealed.
- B. Fire Dampers for Internally Lined Ducts and Externally Insulated Ducts: 2" thick duct insulation on all sides, external for concealed.



3.3 DUCT INSULATION INTERNAL (AND EXTERNAL WHERE INDICATED):

- A. Apply in accordance with SMACNA "Duct Liner Application Standard" over full coverage adhesive. Coat all edges with adhesive and seal all punctures or tears with mastic before installing ducts. Cut liner to assure overlapped and compressed longitudinal corner joints. Fasteners shall be sized appropriately for thickness of liner utilized. Provide mechanical fasteners and metal nosings as noted below:
1. For all velocities, provide metal nosings on upstream edge of liner at connections to equipment: Fans, coils, dampers, AC Units, sound absorbers, etc.
  2. For velocities up to 2,000 feet per minute: Start fasteners within 3" of the upstream transverse edges of the liner and 3" from the longitudinal joints and space them a maximum of 12" o.c. around the perimeter of the duct, except that they may be a maximum of 12" from a corner break. Elsewhere locate fasteners a maximum of 18" o.c., except that they shall be placed not more than 6" from a longitudinal joint of the liner nor more than 12" from a corner break.
  3. For velocities from 2,001 to 4,000 feet per minute: Start fasteners within 3" of the upstream transverse edges of the liner and 3" from the longitudinal joints and space them a maximum of 6" o.c. around the perimeter of the duct, except that they may be a maximum of 6" from a corner break. Elsewhere locate fasteners a maximum of 16" o.c., except that they shall be placed not more than 6" from a longitudinal joint of the liner nor more than 12" from a corner break. In addition to the adhesive edge coating of transverse joints, coat and longitudinal joints with adhesive.
  4. For velocities from 4,001 to 6,000 feet per minute: Same as 2 above except that metal nosing shall be installed to secure liner at all upstream transverse edges.
  5. Duct size shown does not include allowance for insulation.
  6. Where ducts are listed to be lined and wrapped, install wrap per section below "Duct Insulation, External, for Concealed Ducts"
- B. Thickness and Extent:
1. Rectangular Return Duct: 1" thick.
  2. Rectangular Exhaust Duct Connected to an ERU: 1" thick.

3.4 DUCT INSULATION, EXTERNAL, FOR CONCEALED DUCTS:

- A. Adhere insulation to duct surface with approved adhesive applied in strips above 6" wide on approximately 12" centers. Flare door staples may be used for securing the insulation until the adhesive sets. Lap jacket and vapor seal all joints and seams with suitable mastic.
- B. On rectangular and flat oval ducts 30" wide and wider, additionally support insulation with weld pins and speed clips 18" on centers. Seal weld pins with mastic and FSK tape.
- C. Thickness and Extent:

1. Supply duct: 2" thick.
2. ERU outside air duct: 2" thick.
3. Exhaust duct connected to exhaust fans.
4. 2 hour fire wrap on grease exhaust duct equal to Firemaster.

NOTE: Conical and straight spin-ins on both lined and unlined ducts shall be insulated. Insulation shall be slit at damper rods, at spin-ins and sealed vapor tight.

3.5 INSULATION WETTED DURING CONSTRUCTION:

- A. Contractor shall replace any and all insulation wetted during construction at his own expense.

END OF SECTION

1.0 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. This section describes the design, performance and installation of an air purification system intended for use as part of another manufacturer's air handling unit or mounted on the duct as shown on the plans, details and equipment schedules.

1.2 REFERENCED CODES & STANDARDS:

- A. The following codes and standards are referenced through out. The edition to be used is that currently enforced by the authority having jurisdiction (AHJ) or in absence of such direction that referenced by the current enforceable IBC code or as indicated by the contract documents, except where specifically referenced by this section of the specifications.

1. ASHRAE Standards 62 & 52
2. National Electric Code NFPA 70
3. UL 867 including ozone chamber test required as of December 21, 2007

1.3 RELATED WORK:

- A. Testing, Adjusting and Balancing
- B. Facility Access and Protection
- C. Ductwork
- D. Filters
- E. Water and Refrigerant Piping
- F. Electrical Wiring
- G. Control Wiring

1.4 QUALITY ASSURANCE:

- A. Basis of design is Top Product Innovations. Global Plasma Solutions and Phenomenal Aire shall be considered equal subject to meeting all specifications herein.
- B. The Air Purification System shall be a product of an established manufacturer within the USA.
- C. A qualified representative from the manufacturer shall be available to inspect the installation of the air purification system to ensure installation in accordance with manufacturer's recommendation.

- D. Technologies that do not address gas disassociation such as UV Lights, Powered Particulate Filters and/or polarized media filters shall not be considered. Uni-polar ion generators shall not be acceptable. "Plasma" particulate filters shall not be acceptable.
- E. Projects designed using ASHRAE Standard 62, IAQ Procedure shall require the manufacturer to provide Indoor Air Quality calculations using the formulas within ASHRAE Standard 62.1-2013 to validate acceptable indoor air quality at the quantity of outside air scheduled with the technology submitted.
- F. The Air Purification System have been tested by UL or Intertek/ETL to prove conformance to UL 867-2007 including the ozone chamber testing and peak ozone test for electronic devices. Manufacturers that achieved UL 867 prior to December 21, 2007 and have not been tested in accordance with the newest UL 867 standard with the ozone amendment shall not be acceptable. All manufacturers shall submit their independent UL 867 test data with ozone results to the engineer during the submittal process. All manufacturers shall submit a copy with their quotation. Contractors shall not accept any proposal without the proper ozone testing documentation.
- G. The maximum allowable ozone concentration per the UL 867-2007 chamber test shall be 0.007 PPM. The maximum peak ozone concentration per the UL 867-2007 peak test as measured 2 inches away from the electronic air cleaner's output shall be no more than 0.0042 PPM. Manufacturers with ozone output exceeding these ozone values shall not be acceptable.

1.5 SUBMITTALS:

- A. Product Data: Submit manufacturer's technical product data for ion generators including:
  - 1. Schedule of plasma generators indicating unit designation, number of each type required for each unit/application.
  - 2. Data sheet for each type of plasma generator, and accessory furnished; indicating construction, sizes, and mounting details.
  - 3. Performance data for each type of plasma device furnished.
  - 4. Indoor Air Quality calculations using the formulas within ASHRAE Standard 62.1-2013 to validate acceptable indoor air quality at the quantity of outside air scheduled (when projects are designed with outside air reduction).
  - 5. Product drawings detailing all physical, electrical and control requirements.
  - 6. Copy of UL 867 independent ozone test.
- B. Operating & Maintenance Data: Submit O&M data and recommended spare parts lists.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver in factory fabricated shipping containers. Identify on outside of container type of product and location to be installed. Avoid crushing or bending.
- B. Store in original cartons and protect from weather and construction work traffic.
- C. Store indoors and in accordance with the manufacturers' recommendation for storage.

1.7 WARRANTY:

- A. Equipment shall be warranted by the manufacturer against defects in material and workmanship for a period of twenty-four months after shipment, whichever occurs first. Labor to replace equipment under warranty shall be provided by the owner or installing contractor.

2.0 - PRODUCTS

2.1 GENERAL:

- A. The air purification system(s) shall be of the size, type, arrangement and capacity indicated and required by the unit furnished and shall be of the manufacturer specified.
- B. Basis of Design: Top Product Innovations Type C unit
- C. All other Suppliers of comparable products requesting prior approval shall:
  - 1. Submit for prior approval in accordance with the requirements of Section 15010.
  - 2. In addition, manufacturers submitting for prior approval for Bi-Polar Ionization must as part of the prior approval request provide their ASHRAE 62.1-2013 calculations that prove conformance to the ASHRAE Standard with the reduction of outside air to the scheduled values. A letter on the manufacturer's letterhead requesting prior approval must accompany the request for prior approval stating their calculations are ASHRAE compliant. A third party validation study performed on a previous installation of the same application shall also be included.
  - 3. Submit independent test data from ETL or UL showing ozone levels produced during the UL 867 ozone chamber test. Manufacturers without this test data shall not be acceptable.

2.2 BI-POLAR IONIZATION DESIGN & PERFORMANCE CRITERIA"

- A. Each piece of air handling equipment, so designated on the plans, details, equipment schedules and/or specifications shall contain a Plasma Generator with Bi-polar Ionization output as described here within.
- B. The Bi-polar Ionization system shall be capable of:
  - 1. Effectively killing microorganisms downstream of the bi-polar ionization equipment (mold, bacteria, virus, etc.).

2. Controlling gas phase contaminants generated from human occupants, building structure and furnishings.
  3. Capable of reducing static space charges.
  4. Increasing the interior ion levels, both positive and negative, to a minimum of 800 ions/cm<sup>3</sup> measured 5 feet from the floor.
- C. The bi-polar ionization system shall operate in a manner such that equal amounts of positive and negative ions are produced. Uni-polar ion devices shall not be acceptable.
1. Air exchange rates may vary through the full operating range of a constant volume or VAV system. The quantity of air exchange shall not be increased due to requirements of the air purification system.
  2. Velocity Profile: The air purification device shall not have maximum velocity profile.
- D. Humidity: Plasma Generators shall not require preheat protection when the relative humidity of the entering air exceeds 85%. Relative humidity from 0 - 100%, condensing, shall not cause damage, deterioration or dangerous conditions within the air purification system. Air purification system shall be capable of wash down duty.
- E. Equipment Requirements:
- F. Electrode Specifications (Bi-polar Ionization):
- a. Each Plasma Generator with Bi-polar Ionization output shall include the required number of electrodes and power generators sized to the air handling equipment capacity. Unit shall be capable of treating 6,000 CFM (C6.0) or 10,000 CFM (C10.0). Bi-polar ionization tubes manufactured of glass and steel mesh shall not be acceptable due to replacement requirements, maintenance, performance output reduction over time, ozone production and corrosion.
  - b. Electrodes shall be energized when the main unit disconnect is turned on and the fan is operating. Electrodes shall be made from carbon fiber to prevent oxidation over time.
  - c. Electrode pair shall provide a minimum of 140 million ions per cubic centimeter (C6.0) or 200 million ions per cubic centimeter (C10.0), both positive and negative ions in equal quantities. Devices providing less than the rated ion densities shall not be acceptable.
- G. Air Handler Mounted Units:
- H. Where so indicated on the plans and/or schedules Plasma Generator(s) shall be supplied and installed. The mechanical contractor shall mount the Plasma Generator and wire it to the AHU control power (24VAC) as instructed by the Air Purification Manufacturer's instructions or line voltage subject to power available. Each unit shall be designed with an integral illuminated LED and dry contacts to prove ion output is operating properly. The dry contacts shall close to prove the ion generator is working properly and may be daisy chained in series such that

only one dry contact per AHU is required to interface to the BAS or the optional DDC controller. Dry contacts proving power has been applied in lieu of the ion output is actually operating, are not acceptable.

I. Plenum/Duct Mounted Units: Where so indicated on the plans and/or schedules, Plasma Generators(s) shall be supplied and installed. The generator shall be installed through the duct wall and into the air stream with the external power head in a convenient location for visual indication of power, removal and servicing, by the mechanical contractor. The dry contacts shall close to prove the ion generator is working properly and may be daisy chained in series such that only one dry contact per duct is required to interface to the BAS or the optional DDC controller.

J. Ionization Requirements:

1. Plasma Generators with Bi-polar ionization output shall be capable of controlling gas phase contaminants and shall be provided for all equipment listed above.

a. The Bi-polar ionization system shall consist of Bi-Polar Plasma Generator and power supply. The Bi-polar system shall be installed where indicated on the plans or specified to be installed and powered by 24VAC.

b. Ionization Output: The ionization output shall be controlled such that an equal number of positive and negative ions are produced. Imbalanced levels shall not be acceptable.

c. Ionization output from each electrode shall be a minimum of 140 million ions/cc (C6.0) and 200 million ions/cc (C10.0) when tested at 1" from the ionization generator.

d. All manufacturers shall provide documentation by an independent NELEC accredited laboratory that proves the product has minimum kill rates for the following pathogens given the allotted time and in a space condition:

- 1) MRSA - >96% in 30 minutes or less
- 2) E.coli - > 99% in 15 minutes or less
- 3) TB - > 69% in 60 minutes or less
- 4) C. diff - >86% in 30 minutes or less

Manufacturers not providing the equivalent space kill rates shall not be acceptable. All manufactures requesting prior approval shall provide to the engineer independent test data from a NELEC accredited independent lab confirming kill rates and time meeting the minimum requirements stated in section 2.2 B, points 6A, 6B and 6C. Products tested only on Petri dishes to prove kill rates shall not be acceptable.

2. Ozone Generation: The operation of the electrodes or Bi-polar ionization units shall conform to UL 867-2007 with respect to ozone generation. There shall be no ozone generation during any operating condition, with or without airflow.

K. Electrical Requirements:

1. Wiring, conduit and junction boxes shall be installed within housing plenums in accordance with NEC NFPA 70. The contractor shall coordinate electrical requirements with air purification manufacturer during submittals.

L. Control Requirements:

1. All Plasma Generators shall have internal short circuit protection, overload protection, and automatic fault reset.
2. Integral airflow sensing shall modulate the Plasma output as the air flow varies or stops. A mechanical air flow switch shall not be acceptable as a means to activate the Plasma device due to high failure rates and possible pressure reversal.
3. The installing contractor shall mount and wire the Plasma device within the air handling unit specified or as shown on the plans. The contractor shall follow all manufacturer IOM instructions during installation.
4. All Plasma devices shall have a means to interface with the BAS system. Dry contacts shall be provided to prove there are ions being produced. Systems providing indication that power is applied to the Plasma device, but not directly sensing the power at the ion output, shall not be acceptable.
5. Plasma systems that use multiple modules with ion output alarm wires wired to the same terminal such that all ion modules must fail to show an alarm status shall not be acceptable.

### 3.0 - EXECUTION

3.1 GENERAL:

- A. The Contractor shall be responsible for maintaining all air systems until the owner accepts the building (Owner Acceptance).

3.2 ASSEMBLY & ERECTION: PLASMA GENERATOR WITH BI-POLAR IONIZATION:

- A. All equipment shall be assembled and installed in a workman like manner to the satisfaction of the owner, architect, and engineer.
- B. Any material damaged by handling, water or moisture shall be replaced, by the mechanical contractor, at no cost to the owner.
- C. All equipment shall be protected from dust and damage on a daily basis throughout construction.

3.3 TESTING:

- A. Provide the manufacturers recommended electrical tests.

END OF SECTION



1.0 GENERAL:

1.0 SCOPE:

- A. Provisions of this Section apply to all HVAC work.

2.0 PRODUCTS:

2.1 VENTS FOR GAS FIRED EQUIPMENT:

- A. **Round** double wall gas vent UL listed for installation with 1" clearance from combustible materials.
- B. Inner wall shall be aluminum and outer wall galvanized steel.
- C. Equipment vents with all necessary fitting and accessories including roof flashing, counter flashing, wall sleeves, firestop spacers, tees, elbows, and (Braidert) weather cap. Support vents in accordance with manufacturer's instructions.
- D. Provide tee for connection of vent from domestic water heater.
- E. Vent shall be full size of appliance draft or of size required by code whichever is larger.

2.2 CONCENTRIC THRU WALL FURNACE VENT AND COMBUSTION AIR:

- A. To be furnished by Furnace Manufacturer, in accordance with A.G.A. and shall be U.L. Listed.
- B. Provide combination air intake/flue pipe and horizontal vent cap.

3.0 EXECUTION:

3.1 INSTALLATION:

- A. Equipment shall be installed in accordance with manufacturer's recommendations.
- B. See Details for mounting instructions and accessories.

END OF SECTION

1.0 - GENERAL

1.1 Scope

- A. Provisions of this Section shall apply to all HVAC work.

2.0 – PRODUCTS

2.1 CONDENSING UNITS - AIR COOLED:

- A. Include one (or more) reciprocating compressor(s), condenser and condenser fan, all enclosed in a single casing. Provide separate refrigerant circuit for each compressor.
- B. Casing: Aluminum or galvanized steel designed for outdoor installation. Galvanized steel casings shall be furnished with enamel over bonderizing. Equip casings with access panels, condenser inlet guards and fan outlet guards. Provide padlock connections for power and control access panels.
- C. Compressors: Scroll type.
- D. Condenser: Aluminum fins securely bonded to seamless copper tubes.  
Condenser Fans: Direct driven propeller fans, resiliently mounted, with weather protected fan motors.
- E. Provide (liquid receiver if condenser coil will not contain entire system charge where 80% full at 100°F.) suction and discharge service valves and liquid stop valve.
- F. Controls: Factory wired and located in a readily accessible location. Provide (2 step) line voltage contactor and both temperature and current sensitive overload devices for compressor motor, cycle timer to limit compressor starts to 5 or 6 minute intervals, oil pressure switch, high and low pressure switches and crankcase heater. Provide low-ambient-start devices and flooding or variable air volume head pressure controls for stable starting and operation in ambient temperature of 10°F. Fan cycling head pressure controls are not acceptable.
- G. Provide five (5) years non-prorated compressor parts warranty.
- H. Manufactured by Trane, Daikin, Carrier or approved equal.

3.0 – EXECUTION

3.1 INSTALLATION:

- A. Units shall be installed in accordance with manufacturer's recommendations.
- B. See Details for mounting instructions and accessories.

END OF SECTION

1.0 - GENERAL

1.1 Scope

- A. Provisions of this Section shall apply to all HVAC work.

2.0 - PRODUCTS

2.01 HEAT PUMP OUTDOOR UNITS:

- A. Outdoor units: A single or multiple reciprocating compressors, heat transfer coil, fans and inter connecting piping and controls all enclosed in a single casing. For multiple compressor units provide separate refrigerant circuits.
- B. Casings: Designed for outdoor installation, constructed of not lighter than 20 gauge galvanized steel with baked enamel finish over bonderizing. Provide access panels, condenser inlet guards and fan outlet guards.
- C. Compressors: Welded or bolted hermetic, spring isolated, with reversible oil pumps.
- D. Coils: Aluminum fins securely bonded to seamless copper tubes.
- E. Fans: Direct driven propeller fans with weather protection for fan motors.
- F. Provide suction and discharge service valves, liquid stop valve, solenoid change over valves, and expansion valves.
- G. Controls: Factory wired and located in a readily accessible location. Compressor motor shall have line voltage (multi step) contactor and both temperature and current sensitive overload devices. Include high and low pressure switches, crank case heater, defrost thermostat, and defrost timer.
- H. Mount outdoor units on roof on supports or on grade on poured in place pad as shown.
- I. Provide five (5) year non pro rated compressor parts warranty.
- J. Heat pumps: shall be manufactured by Carrier, Trane, Daikin or approved equal.

2.02 HEAT PUMP - INDOOR UNITS:

- A. Indoor Units: Supply fans, coils, filters, and drip pans, horizontal or vertical as shown.
- B. Casings: Galvanized steel not lighter than 22 gauge, reinforced with angles or formed shapes with baked enamel finish over bonderizing. Casing panels: Removable for access to fans, motors, coils, and bearings. Provide knockouts for piping and electrical connections. Casing shall be insulated with 1" thick neoprene coated duct liner meeting the requirements of NFPA 90A.
- C. Provide statically and dynamically balanced belt or direct driven centrifugal fans with self aligning ball bearings, adjustable speed motor pulley 3 speed, and adjustable motor base. Size belt drives for 50% overload. Fan motor and drive shall be located inside unit cabinet. Provide fan starting relay for each unit.

- D. Coils: Include direct expansion coils, expansion valves, and electric heating coils. Refrigerant coils shall consist of non ferrous fins securely bonded to seamless copper tubes, and shall bear ARI approved ratings.
- E. Drain Pans: Provide corrosion resistant coating and insulating corrosion resistant fill.
- F. Filters: 1" thick throwaway filters. Turn equipment over to Owner with clean filters. Provide filter racks with hinged and latched doors.
- G. Electric Heaters:
  - 1. All heaters shall be listed in the Underwriters Laboratories, Inc. Electrical Appliance and Utilization Equipment list.
  - 2. Heaters shall have ceramic supported nichrome wire elements, flanged mounting plate, NEMA I control box containing contactors for heaters, factory wired to terminal strips and 1/2" insulation between mounting plate and control box. All sheet metal parts in air stream aluminized or galvanized steel. Provide spaces at terminal end of heater so that internal duct insulation will not cause hot spots.
  - 3. Equip heaters with factory wired automatic high limit control and a supplementary independent thermal device to disconnect all power circuits in case automatic high limit fails. Equip heaters shall be supplied with control circuits suitable for 24 volt control, factory wired to terminal blocks in control box.
  - 4. Provide staging as required by Code, but no fewer stages than those shown.
- H. Provide insulated plenum bases as shown.
- I. Units shall be UL listed for scheduled voltage.
- J. Heat pumps: shall be manufactured by Carrier, Trane, Daikin or approved equal.

2.03 HEAT PUMP, THRU-WALL TYPE:

- A. Provide packaged terminal heat pumps of the sizes and capacities shown on the schedule. The units shall be located as shown on the drawings and shall include cabinet/wall sleeve, chassis, outdoor louver, and room cabinet.
- B. All units shall be U.L. listed for safety and ARI certified for performance. Units shall be Trane, Amana, Johnson Controls, Carrier, or approved equal. Over-all dimensions of the wall sleeve with an electrical subbase shall not exceed 43" wide and 21" high. The depth of the sleeve shall match the wall thickness. See Architectural Plans.
- C. The minimum EER or energy efficiency ratio in BTU per hour per watt for each unit must be 8.8 for all sizes. The minimum COP for heat pumps, at 47 °F, must be 2.6 for all sizes.
- D. Heating/Cooling Chassis - Chassis shall be slide-in, plug-in type with a self-contained, hermetically sealed, refrigerant circuit. The chassis shall consist of the following components:
  - 1. Vibration isolated compressor, rifled copper tubed evaporator and condenser coils with high efficiency aluminum plate fins mechanically expanded to the tubes for maximum heat transfer, and a capillary restrictor

type refrigerant metering device. Coils shall be factory tested at 200 PSIG. Heat pump also include reversing valve and charge balancing device.

2. Condenser/Evaporator Fans: One direct drive with a permanent split capacitor two-speed motor. The condenser fan will be propeller type and the indoor evaporator fan will be a centrifugal blower type.
- E. During the Cooling Cycle - The compressor, the outdoor fan motor and the indoor fan motor shall be energized. Condensation accumulated on the evaporator coil shall be drained into the outdoor section where it is to be picked up by the condenser fan and evaporated against the outdoor coil.
  - F. During the Heating Cycle (Reverse Cycle Heat Pump) - The reversing valve, the compressor, the outdoor condenser fan motor and the indoor fan motor shall be energized. Reverse cycle heating shall occur when the outdoor temperatures are above approximately 35° F. A temperature sensing device shall be used to monitor the outdoor coil temperature to limit the frost build-up. A defrost cycle shall be incorporated to reverse the refrigerant flow in order to instantly defrost the evaporator coil. The time required to defrost the outdoor coil shall not exceed five (5) minutes. Once defrosted, this cycle must de-energize and return the unit to normal operation. Condensation accumulated during reverse cycle heating must NOT be evaporated against the indoor coil so as to prevent contamination of the indoor air with pollutants and odors. Condensation must be disposed of using an external drain system. (Provide drain kit.)
  - G. Control - Shall have a four (4) button selector switch containing "Off-Heat-Cool-Fan" and a self-contained, adjustable thermostat with a field adjustable temperature limiting device. Fan speed shall be controlled by a unit mounted switch. A fan cycle shall be incorporated to allow constant fan operation or intermittent fan operation. Intermittent fan operation shall allow the fan to energize only when unit compressor or electric resistance heaters are energized. An adjustable emergency heat switch shall be incorporated to lock out the reverse cycle heating and energize the electric resistance heaters at a specified minimum outdoor temperature.
  - H. Room Cabinet - Shall be sloped top, wrap-around design with an 18 gauge front panel that is phosphatized and coated with a baked on, alkyd melamine corrosion resistant finish to match the wall sleeve. Side panels shall be constructed of polycarbonate material and flame class rated U.L. Standard 494.
  1. Discharge grilles shall be an integral part of the front panel and shall be raised style. Discharge grilles shall be made of the same polycarbonate material as the room cabinet side panels. Grilles shall be sectional, two-position reversible and tamperproof.
  - I. Fresh Air Damper - A positive closing manual fresh air damper must be located within the chassis to provide fresh air during fan operation.
  - J. Filtration - Shall be accomplished using a permanent, aluminum mesh, cleanable filter, viscosine coated to enhance dust collection abilities. Washable foam type filters are not acceptable. Return air shall enter the filter from the bottom of the chassis. Filter shall include return air and outside air.
  - K. Wall Sleeve - Shall be entirely constructed of G-60 galvanized, phosphatized, 18 gauge steel with baked alkyd melamine corrosion resistant finish. Wall sleeves with ordinary enamel finish or those made from polymeric material are not acceptable. Wall sleeves shall be installed through the wall as shown on plans and shall have factory provisions for use of appropriate fastening devices to secure sleeve to the wall. In no event shall fasteners be installed through the basepan in

the bottom of the cabinet/wall sleeve. Provide extended wall sleeve to match width of wall.

- L. Outside Air Louvers - Shall be architectural anodized aluminum of color selected by Architect. Louvers shall be easily installed from the inside of the building after the cabinet/wall sleeve has been installed. Special field fabricated louvers must be approved by the PTAC manufacturer as to free area and air circulation requirements.
- M. Subbase (Electrical) - A 3" electrical subbase shall be furnished. Each electrical subbase shall be U.L. listed and conform to the National Electrical Code. Subbase must have adjustable side channels with pre-drilled adjusting holes and score lines. Subbase shall have four (4) adjustable leveling legs each with 1" adjustment.
- N. Equipment supplier must have an established local complete service department including an adequate supply of parts, and factory trained service personnel.
- O. The hermetically sealed motor compressor assemblies and all components of refrigerating circuits not readily separable there from shall be warranted for a period of four (4) years in addition to the standard one (1) year warranty, for a total of five (5) years.
- P. See Drawings for cooling, heating and auxiliary electrical heat capacities.

#### 2.04 Heat Pump - (MINI-Split)

- A. The Heat Pump system shall be a Trane, Daikin, Carrier or approved equal split system with Variable Speed Inverter Compressor technology. The system shall consist of a ceiling-suspended indoor section with wired, wall mounted controller and a horizontal discharge, single phase outdoor unit.
- B. Quality Assurance
  1. The units shall be tested by a Nationally Recognized Testing Laboratory (NRTL) and shall bear the ETL label.
  2. All wiring shall be in accordance with the National Electrical Code (N.E.C.).
  3. The units shall be rated in accordance with Air-conditioning Refrigeration Institute's (ARI) Standard 210 and bear the ARI Certification label.
  4. The units shall be manufactured in a facility registered to ISO 9001 and ISO 14001, which is a set of standards applying to environmental protection set by the International Standard Organization (ISO).
  5. A dry air holding charge shall be provided in the indoor section.
  6. The outdoor unit shall be pre-charged with R-410a refrigerant.
  7. System efficiency shall meet or exceed 13.0 SEER.
- C. Delivery, Storage and Handling
  1. Unit shall be stored and handled according to the manufacturer's recommendations.
  2. The wireless controller shall be shipped inside the carton with the indoor unit and able to withstand 105°F storage temperatures and 95% relative

humidity without  
adverse effect.

D. Warranty

1. The units shall have a manufacturer's parts and defects warranty for a period one (1) year from date of installation. The compressor shall have a warranty of 6 years from date of installation. If, during this period, any part should fail to function properly due to defects in workmanship or material, it shall be replaced or repaired at the discretion of the manufacturer. This warranty does not include labor.
2. Manufacturer shall have over 25 years of continuous experience in the U.S. market.

E. Performance

1. Each system shall perform in accordance to the ratings shown in the table below. Cooling performance shall be based on 80°F DB, 67°F WB (26.7°C DB, 19.4°C WB) for the indoor unit and 95°F DB, 75°F WB (35°C DB, 29.3°C WB) for the outdoor unit. Heating performance shall be based on 70°F DB, 60°F WB (21.1°C DB, 15.6°C WB) for the indoor unit and 47°F DB, 15°F WB (8.3°C DB, 6.1°C WB) for the outdoor unit.

F. Indoor Unit

1. The indoor unit shall be factory assembled, wired and tested. Contained within the unit shall be all factory wiring and internal piping, control circuit board and fan motor. The unit in conjunction with the wired, wall mounted controller shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, and a test run switch. Indoor unit and refrigerant pipes shall be purged with dry nitrogen before shipment from the factory.

2. Unit Cabinet

The casing shall be ABS plastic and have a Munsell 0.70Y 8.59/0.97 finish. Cabinet shall be designed for suspension mounting and horizontal operation. The rear cabinet panel shall have provisions for a field installed filtered outside air intake connection.

3. Fan

The evaporator fan shall have three high performance, double inlet, forward curve sirocco fans driven by a single motor. The fans shall be statically and dynamically balanced and run on a motor with permanently lubricated bearings. The indoor fan shall consist of four (4) speeds: Low, M1, M2, and Hi.

4. Vane

There shall be a motorized horizontal vane to automatically direct air flow in a horizontal and downward direction for uniform air distribution. The horizontal vane shall provide a choice of five (5) vertical airflow patterns selected by remote control: 100% horizontal flow, 80% horizontal flow (plus 20% downward airflow), 60% horizontal airflow (plus 40% downward airflow), 40% horizontal airflow (plus 60% downward airflow), and swing. The horizontal vane shall significantly decrease downward air resistance for lower noise levels, and shall close the outlet port when operation is

stopped. There shall also be a set of vertical vanes to provide horizontal swing airflow movement selected by remote control.

5. Filter

Return air shall be filtered by means of an easily removable washable filter.

6. Coil

The evaporator coil shall be of nonferrous construction with pre-coated aluminum strake fins on copper tubing. The multi-angled heat exchanger shall have a modified fin shape that reduces air resistance for a smoother, quieter airflow. All tube joints shall be brazed with PhosCopper or silver alloy. The coils shall be pressure tested at the factory. A condensate pan and drain shall be provided under the coil.

7. Electrical

The electrical power of the unit shall be 208 volts or 230 volts, 1 phase, 60 hertz. The system shall be capable of satisfactory operation within voltage limits of 198 volts to 253 volts. The power to the indoor unit shall have an option of being supplied from the outdoor unit, using Mitsubishi Electric A-Control system or separate power source for indoor and outdoor units.

8. Control

- a. The control system shall consist of two (2) microprocessors, one on each indoor and outdoor unit, interconnected by a single non-polar two-wire cable. Field wiring shall run directly from the indoor unit to the wall mounted controller with no splices.
- b. For A-Control, a three (3) conductor 14 ga. AWG wire with ground shall provide power feed and bi-directional control transmission between the outdoor and indoor units.
- c. Where separate power is supplied to the indoor and outdoor units, a two (2) 20 ga. AWG wire shall be run between the units to provide forbid-directional control communication..
- d. The system shall be capable of automatic restart when power is restored after power interruption. The system shall have self-diagnostics ability, including total hours of compressor run time. Diagnostics codes for indoor and outdoor units shall be displayed on the wired controller panel.
- e. The microprocessor located in the indoor unit shall have the capability of monitoring return air temperature and indoor coil temperature, receiving and processing commands from the wired controller, providing emergency operation and controlling the outdoor unit.
- f. The indoor unit shall be connected to a wall mounted wired controller to perform input functions necessary to operate the system. The wired controller shall have a large multi-language DOT liquid crystal display (LCD) presenting contents in eight (8) different languages, including English, French, Chinese, German, Japanese, Spanish, Russian, and Italian.
- g. There shall be a built-in weekly timer with up to eight pattern



settings per day. The controller shall consist of an On/Off button, Increase/Decrease Set Temperature buttons, a Cool/Dry/Fan mode selector, a Timer Menu button, a Timer On/Off button, Set Time buttons, a Fan Speed selector, a Vane Position selector, a Louver Swing button, a Ventilation button, a Test Run button, and a Check Mode button. The controller shall have a built-in temperature sensor. Temperature shall be displayed in either Fahrenheit (°F) or Celsius (°C). Temperature changes shall be by increments of 1°F (1°C) with a range of 67°F to 87°F (19°C to 30°C).

- h. The wired controller shall display operating conditions such as set temperature, room temperature, pipe temperatures (i.e. liquid, discharge, indoor and outdoor), compressor operating conditions (including running current, frequency, input voltage, On/Off status and operating time), LEV opening pulses, sub cooling and discharge super heat.
- i. Normal operation of the wired controller shall provide individual system control in which one wired controller and one indoor unit are installed in the same room. The controller shall have the capability of controlling up to a maximum of sixteen systems at a maximum developed control cable distance of 1,500 feet (500 meters).
- j. The control voltage from the wired controller to the indoor unit shall be 12 volts, DC. The control signal between the indoor and outdoor unit shall be pulse signal 24 volts DC. Up to two wired controllers shall be able to be used to control one unit.
- k. Control system shall control the continued operation of the air sweep louvers, as well as provide On/Off and mode switching. The controller shall have the capability to provide sequential starting with up to fifty seconds delay.

#### G. Outdoor Unit

- 1. The outdoor unit shall be compatible with the three different types of indoor units (PKA - wall mounted, PCA - ceiling suspending, and PLA - four way ceiling cassette). The connected indoor unit must be of the same capacity as the outdoor unit.
- 2. Models PUY-A24NHA and PUY-A36NHA shall have the option to connect to two indoor units, within the same confined space, to improve air distribution (total capacity shall be equivalent to outdoor unit).
- 3. The outdoor unit shall be equipped with a control board that interfaces with the indoor unit to perform all necessary operation functions.
- 4. The outdoor unit shall be capable of operating at 0°F (-18°C) ambient temperature without additional low ambient controls (optional wind baffle may be required).
- 5. The outdoor unit shall be able to operate with a maximum height difference of 100 feet (30 meters) between indoor and outdoor units.
- 6. System shall have a maximum refrigerant tubing length of 165 feet (50 meters) between indoor and outdoor units without the need for line size

changes, traps or additional oil.

7. Models PUZ-A24NHA, PUZ-A30NHA and PUZ-A36NHA shall be pre-charged for a maximum of 70 feet (20 meters) of refrigerant tubing. Model PUZ-A42NHA shall be pre-charged for a maximum of 100 feet (30 meters) of refrigerant tubing. The outdoor unit shall be completely factory assembled, piped, and wired. Each unit must be test run at the factory.

8. Cabinet

The casing shall be constructed from galvanized steel plate, coated with a finished with an electrostatically applied, thermally fused acrylic or polyester powder coating for corrosion protection and have a munsell 3Y 7.8/1.1 finish. The fan grille shall be of ABS plastic.

9. Fan

Models PUZ-A24NHA, PUZ-A30NHA, and PUZ-A36NHA shall be furnished with an AC fan motor. Model PUZ-A42NHA shall have two (2) DC fan motors. The fan motor shall be of aerodynamic design for quiet operation, and the fan motor bearings shall be permanently lubricated. The outdoor unit shall have horizontal discharge airflow. The fan shall be mounted in front of the coil, pulling air across it from the rear and dispelling it through the front. The fan shall be provided with a raised guard to prevent contact with moving parts.

10. Coil

The L shaped condenser coil shall be of copper tubing with flat aluminum fins to reduce debris build up. The coil shall be protected with an integral metal guard. Refrigerant flow from the condenser shall be controlled by means of linear expansion valve (LEV) metering orifice. The LEV shall be control by a microprocessor controlled step motor.

11. Compressor

The compressor for models PUY-A24NHA, PUY-A30NHA and PUY-A36NHA shall be a DC rotary compressor with Variable Compressor Speed Inverter Technology. The compressor for model PUY-A42NHA shall be a scroll compressor with variable speed technology. The compressor shall be driven by inverter circuit to control compressor speed. The compressor speed shall dynamically vary to match the room load for significantly increasing the efficiency of the system which results in vast energy savings. To prevent liquid from accumulating in the compressor during the off cycle, a minimal amount of current shall be intermittently applied to the compressor motor to maintain enough heat. The outdoor unit shall have an accumulator and high pressure safety switch. The compressor shall be mounted to avoid the transmission of vibration.

12. Electrical

The electrical power of the unit shall be 208volts or 230 volts, 1 phase, 60 hertz. The unit shall be capable of satisfactory operation within voltage limits of 198 volts to 253 volts. The outdoor unit shall be controlled by the microprocessor located in the indoor unit. The control signal between the indoor unit and the outdoor unit shall be pulse signal 24 volts DC. The unit shall have Pulse Amplitude Modulation circuit to utilize 98% of input power supply.

### 3.0 - EXECUTION

#### 3.1 Installation

- A. Heat pumps shall be installed in accordance with manufacturer's recommendations.
- B. See details for mounting instructions and accessories.

END OF SECTION

1.0 - GENERAL

1.1 SCOPE

- A. Provisions of this section apply to all HVAC work.

2.0 - PRODUCTS

2.1 SPLIT SYSTEM ENERGY RECOVERY:

- A. Horizontal air handling units: Factory fabricated units having capacity shown. Units consisting in general of a mixing box section, filter sections, cooling coil section, fan section, access sections, diffuser section, energy recovery wheel section, discharge plenum section, drip pan and drain sections, all the product of a single manufacturer. Provide fan sections, mixing box section, filter sections, diffuser section, and coil sections of the same frame size. Units shall have by-pass damper for unoccupied dehumidification cycle. Units shall have single side access.
- B. Casing: Not lighter than 18 gauge galvanized steel, all sections of casing insulated with 2 1/2" thick 3 lb./cu. ft. coated fiberglass insulation. Double wall construction with non perforated 26 gauge galvanized steel liner on air side. Entire unit to be double wall construction.
- C. Drain Pans: Double construction with insulation between pans and 16 gauge type 304 stainless steel inner pan. Drain pan shall slope to drain.
- D. Coil sections shall contain the coils scheduled. Coils shall comply with Section 238216, "COILS".
- E. Provide spacer sections for installing control bulbs between heating and cooling coils.
- F. Provide hinged and latched access doors in casings at fan sections, filter sections, plenum sections and upstream and downstream from cooling coils. Access doors on positive pressure side of casing shall be air tight under 6" WG static pressure. Construct doors with 2" insulation between two (2) sheet 24 gauge galvanized steel. Set doors in frames arranged so that doors will be flush with exterior of casing. Equip each door with at least two (2) hinges and two (2) sets of double acting latches. Latches shall be made from non ferrous metal, with a lever handle on the outside and a lever handle on the inside of the casing. Lever handle on the outside of the casing shall cam over a door pull with a stop. Latches shall be Vent Fabrics #310 Ventlok latch, or equal. Doors shall be reinforced to prevent wracking and warping. Provide 3" butt hinges and weld to doors and to door frames.
- G. Air filters: See Equipment Schedule and "AIR FILTERS". Provide side access filter sections, complying with the requirements under "AIR FILTERS".
- H. Fans: Forward curved, airfoil, centrifugal fans, or plug fans, statically and dynamically balanced to a peak vibration velocity of 0.157 inch/second, with corrosion resistant coating. Bearings shall be self aligning grease lubricated ball bearings. Grease fittings shall be extended to accessible locations after units are

installed. Fan and fan motor shall be mounted on spring isolated base inside unit and snubbing isolators shall be provided for discharge flexible connections. Isolators shall comply with the requirements for "VIBRATION ISOLATORS". Fan motor shall be mounted on an adjustable base and shall be equipped with V belt drive sized for 150% motor nameplate rating, adjustable pitch motor pulley for motors 25 H.P. and smaller.

- I. Heating components shall include gas fired heaters.
  1. Where Scheduled, Heating Components: Room side centrifugal fan with adjustable speed V belt drive sized for 50% overload, heater section with alloy heat exchanger stainless steel ribbon burners, manual gas valves, automatic gas valve, pilot safety, electrically ignited pilot, high limit thermostat and bonnet thermostat. Combustion air and flue gas openings shall be raintight, arranged to permit operation under all normal wind conditions.
  
- J. Enthalpic Plate – Core heat exchanger (where called for)
  1. Energy recovery shall be an integral part of unit from the manufacturer. No field assembly, ducting, or wiring shall be required with the energy recovery option.
  2. Latent and sensible energy transfer shall be provided through a flat-plate heat exchanger core, with a minimum total energy recovery effectiveness of 50% tested and certified to AHRI 1060-2005. No additional moving parts or drive mechanisms shall be required to enable energy recovery.
  3. The heat exchanger frame shall be constructed with extruded 6063 aluminum rails.
  4. The heat exchanger core shall be constructed of a polymer membrane with a 0.5% exhaust air transfer ratio (EATR) tested and certified to AHRI 1060-2005.
  5. The core shall be capable of handling regular contact with liquid water from either condensation or periodic cleaning while maintaining both the energy recovery effectiveness and 0.5% EATR rating.
  6. The core shall be mold and bacteria resistance tested to ISO 846a and 846c with a rating of 0 for both.
  7. The core shall be freeze tolerance tested to 40 freeze thaw cycles from -4°F to +68°F while maintaining both the energy recovery effectiveness and 0.5% EATR rating.
  8. The heat exchanger core shall comply with UL 723 and have a flame spread index of 25 or less and a smoke index of 50 or less.
  9. Stainless steel drain pans shall be provided under entire heat exchanger to catch and drain condensation or water used in periodic cleaning.
  10. Energy recovery media shall be accessible through a 2" thick, foam-injected, double-wall, hinged access door with quarter-turn latches.

11. A face and bypass damper shall be provided in parallel with the media for economizer and frost control.

K. EVAPORATOR CONDENSOR AND REHEAT COILS

1. Evaporator coils shall be constructed of copper tubes mechanically bonded to a configured aluminum plate fin. For units greater than 30 nominal tons cooling, the hot gas reheat coils must be aluminum fin, mechanically bonded to copper tubing. For units 30 tons or less, hot gas reheat coil shall have a series of flat tubes containing a series of multiple, parallel flow microchannels layered between the refrigerant manifolds. Coil construction shall consist of aluminum alloys for fins, tubes, and manifolds in combination with a corrosion-resistant coating.
2. Coils shall be leak tested at the factory to ensure pressure integrity. The evaporator coil, reheat coil and condenser coil shall be leak tested to 500 psig and pressure tested to 500 psig.
3. The condenser coil shall have a fin designed for ease of cleaning.
4. Evaporator coil shall have six interlaced rows for superior sensible and latent cooling.
5. Reheat coil shall be fully integrated into the supply air and fan system and capable of delivering design supply air temperature.
6. To prevent re-evaporation of condensate from evaporator coil, the evaporator coil face and the hot gas reheat coil face shall be separated a minimum of six inches.

- L. Pressure test the assembled unit at the factory or in the field. Test pressure shall be five (5) inches W.G. positive on the fan discharge and five (5) inches W.G. negative on the fan suction side. Allowable total leakage shall be 1% of the fan scheduled air flow. Panel deflection shall be limited to 1/200th of the span. Provide certified factory test results or field test results to the engineer for record.

- M. Trane, RenewAire, Valent, JCI or approved equal.

3.0 - EXECUTION:

3.1 INSTALLATION:

- A. Units shall be installed in accordance with manufacturer's recommendations.
- B. See Details for mounting instructions and accessories.
- C. Manufacturer shall provide field start-up of all units.

END OF SECTION

1.0 – GENERAL

1.1 SCOPE:

- A. Provisions of this section apply to all HVAC work.

2.0 - PRODUCTS

2.1 SPLIT SYSTEM AC WITH CONDENSING UNIT & HOT GAS REHEAT

A. Air Handler:

1. Provide dedicated 100% outside air capable - air handlers per plans and specifications. Capacity and Energy Efficiency shall not be less than scheduled. Unit shall be provided with factory installed options listed below. A matching Condensing unit shall be provided.
2. Unit shall be design certified to conform to appropriate UL Standards by Applied Research Laboratories or other nationally recognized testing laboratory.
3. Cabinet shall be constructed of G-90 galvanized steel with minimum gauge thickness of: Bases; Corner Posts and Tops - 18 gauge; Access Panels - 20 gauge. The interior of the cabinet is to thermally insulated with minimum 2 inch thick foam injected double wall panels with a minimum installed R value of R-13.
4. Constructed of hot dipped galvanized G90 steel that is chemically treated with zinc phosphate, coated with 0.2 to 0.3 MIL polyurethane primer then finished with .07 to .08 MIL polyester top coat. Finish shall meet or exceeds 1,000 hour Salt Spray Test per ASTM B117 97.
5. Control Kit: For field mounting and wiring. To include the blower motor contactor or starter.
6. The high latent heat evaporator coil shall have aluminum plate-fins formed on multiple rows of seamless copper tubing. Thermal expansion valve and hot gas bypass tee shall be factory piped. The expansion valve shall have adjustable superheat. The pump down solenoid valve is to be field installed as close to the expansion valve as possible. The outside air face velocity cannot exceed 320 feet per minute through the evaporator coil. Provide hot gas reheat coil and valves with vari-speed control.
7. The condensate drain pan shall be sloped to comply with ASHRAE Standard 62-1089R and fabricated from stainless steel. The bottom shall then be insulated with 1" fiberglass insulation. The drain pan shall be furnished with single or dual MPT drain fittings positioned at the exterior of the cabinet.
8. Blower wheels shall be fabricated of galvanized or galvalume. Blower housings shall be fabricated of galvanized or epoxy coated steel. The blower wheel shall be mounted on a solid steel shaft supported by sealed ball bearings. The shaft shall be driven by adjustable belt drive sheaves connected to a 1725rpm motor

with sealed ball bearings. Motor shall be O.D.P. premium efficiency.

9. Filters shall be 1 inch or 2 inch thick pleated with hinged and latched access doors.
10. Control Kit: For field mounting and wiring to include the blower motor contactor or starter. Provide stand alone digital controller.

B. Condensing Unit:

1. Provide air cooled reciprocating condensing unit per plans and specifications. Capacity and Energy Efficiency shall not be less than scheduled. Unit shall be provided with factory installed options listed below. A matching Air Handler shall be provided.
2. Unit shall be design certified to conform to appropriate UL Standards by Applied Research Laboratories or other nationally recognized testing laboratory.
3. Cabinet shall be constructed of G-90 galvanized steel with minimum gauge thickness of: Bases - 16 gauge; Corner Posts and Tops - 18 gauge; Access Panels - 20 gauge. The cabinet shall be mounted on two steel rails to facilitate installation.
4. Unit base pan shall be coated with a mastic compound to a uniform ¼" wet depth and air dried to prevent rain or condensate from contacting steel on the bottom of the base pan.
5. Constructed of hot dipped galvanized G90 steel that is chemically treated with zinc phosphate, coated with 0.2 to 0.3 MIL polyurethane primer then finished with .07 to .08 MIL polyester top coat. Finish shall meet or exceeds 1,000 hour Salt Spray Test per ASTM B117 97.
6. All exterior nuts, bolts and washers shall be stainless steel type 304. Exterior screws shall be either stainless steel type 304 or carbon steel coated with Magnigard Silver 17, an epoxy finish containing aluminum flake pigment that meets or exceeds 10,000 hour Salt Spray Test per ASTM B117 97.
7. The unit shall be completely factory assembled, prewired and thoroughly leak and safety control tested prior to shipment. Compressors shall be charged with oil and circuits pressurized with a dry nitrogen holding charge.
8. The refrigerant systems shall include the compressor with crankcase heater, air-cooled condenser coil, filter-dryer, suction line accumulator, site glass and refrigerant pressure service valves. The condenser coils are to be copper tube-aluminum plate fin. The scroll compressor is to be equipped with hot gas bypass for up to 50% capacity reduction. Provide hot gas reheat with variable speed heat pressure control. The refrigerant compressor shall be warranted by the manufacturer for 5 years from date of installation.
9. Internally wired electrical controls shall include the compressor motor contactors or starters with thermal protection (auto-reset) on all inductive loads. Refrigerant controls are to include a high pressure control (manual-reset) head pressure control (auto-reset), head pressure control, field adjustable refrigerant system lockout and compressor anti-short cycle timer.



10. The direct drive condenser air fans designed for vertical air discharge shall be driven by inherently protected sealed ball bearing fan motors.
- C. Unit shall be Trane, or approved equal.

### 3.0 - EXECUTION

#### 3.1 INSTALLATION

- A. Unit shall be installed in accordance with manufacturer's recommendations.
- B. Provide one-year total unit warranty and 5 year compressor only parts warranty.
- C. Provide factory startup.

END OF SECTION 15765

1.0 GENERAL:

1.1 SCOPE:

- A. Provisions of this Section shall apply to all HVAC work.

2.0 PRODUCTS:

2.1 HOT GAS REHEAT PACKAGED ROOF TOP AIR CONDITIONING UNITS (GAS OR ELECTRIC HEATING )

- A. Unit(s) furnished and installed shall be cooling with hot gas reheat as scheduled on contract documents and these specifications. Unit(s) shall consist of insulated weather tight casing with compressor(s), hot gas reheat coil, modulating face and by-pass dampers for hot gas reheat control, air cooled condenser coil, condenser fans, evaporator coil, return air filters, supply motors and drives, and DDC microprocessor controls . The DDC controller must control and modulate Face and By-pass dampers for discharge air temperature, or space temperature, or space humidity control.
- B. Unit(s) shall be factory run tested and fully charged with R-410a.
- C. Unit(s) shall have labels, decals, and/or tags to aid in the service of the unit and indicate caution areas.
- D. Units shall be dedicated downflow or dedicated horizontal airflow as shown on plans.
- E. Wiring internal to the unit shall be colored and numbered for identification.
- F. Cabinet: Galvanized steel, phosphatized, and finished with an air-dry paint coating with removable access panels. Structural members shall be 18 gauge with access doors and removable panels of minimum 20 gauge. **Unit construction shall be Double-wall** with insulation sandwiched between inner and outer wall. No insulation shall be in the airstream. Double wall panels must be easily removable with separable panels to inspect the sandwiched fiberglass insulation. Provide horizontal discharge curbs where required.
- G. Units cabinet surface shall be tested 500 hours in salt spray test in compliance with ASTM B117.
- H. Cabinet construction shall allow for all service/ maintenance from one side of the unit. Insulation on the doors must not be exposed to the airstream. Unit must be double-wall construction.
- I. Cabinet top cover shall be one piece construction or where seams exist, it shall be double hemmed and gasket sealed.
- J. Access Panels: Water and air tight panels with handles shall provide access to filters, heating section, return air fan section, supply air fan section, evaporator coil section, and unit control section.
- K. Downflow unit's base pans shall have a raised 1 1/8 inch high lip around the supply and return openings for water integrity.

- L. Insulation: Provide 1/2 inch thick coated fiberglass insulation sandwiched between outer and inner double walls on all exterior panels in contact with the return and conditioned air stream.
- M. The base of the unit shall have provisions for forklift and crane lifting.
- N. Air Filters: 30% efficient factory installed filters shall mount integral within the unit and shall be accessible thru access panels. Two inch thick pleated media glass fiber disposable media filters shall be provided.
- O. Provide evaporator fan section with forward curved, double width, double inlet, centrifugal type fan.
- P. Provide self-aligning, grease lubricated, ball or sleeve bearings with permanent lubrication fittings.
- Q. Outdoor and Indoor Fan motors shall be permanently lubricated and have internal thermal overload protection.
- R. Outdoor fans shall be direct drive, statically and dynamically balanced, draw through in the vertical discharge position.
- S. Provide shafts constructed of solid hot rolled steel, ground and polished, with key-way, and protectively coated with lubricating oil.
- T. Where scheduled, Provide heavy duty nickel chromium heating elements internally wired. Heater shall have pilot duty or automatic reset line voltage limit controls and any circuit carrying more than 48 amps shall have fuse protection in compliance with N.E.C.
- U. Heater shall be factory supplied and field installed internal to unit cabinet.
- V. Heater shall be UL and CSA listed and approved and provide single point power connection.
- W. Provide configured aluminum fin surface mechanically bonded to copper tubing coil.
- X. Where Scheduled, Heating Components: Room side centrifugal fan with adjustable speed V belt drive sized for 50% overload, heater section with alloy heat exchanger stainless steel ribbon burners, manual gas valves, automatic gas valve, pilot safety, electrically ignited pilot, high limit thermostat and bonnet thermostat. Combustion air and flue gas openings shall be raintight, arranged to permit operation under all normal wind conditions.
- Y. Provide a thermal expansion valve for each refrigeration circuit. Factory pressure test at 450 psig and leak tested at 200 psig.
- Z. Provide drain pan for base of evaporator coil constructed of PVC or galvanized steel with external connections.
- AA. Provide a hot gas reheat coil mounted after the fan discharge with a modulating face and by-pass damper to modulate air thru or around reheat coil as needed to meet programmed air temperature or humidity setpoint. Hot gas reheat coil must be piped in series to condenser coil. Parallel piping is unacceptable.
- BB. **The Hot Gas Reheat Coil must be mounted at least 24" away from the DX coil to prevent radiated heat from evaporating moisture back into the air stream.**
- CC. The DX coil must be **intertwined**; horizontal split coils are not acceptable. The vendor will be responsible for changing the coil out in the field if a horizontal coil is substituted with or without

approved submittals.

- DD. Provide internally finned 3/8 " seamless copper tube mechanically bonded to aluminum fins. Factory pressure tested to 450 psig.
- EE. Provide vertical discharge, direct drive fans with aluminum blades. Fans shall be statically balanced.  
  
Motors shall be permanently lubricated, with integral thermal overload protection in a weather tight casing.
- FF. Compressor(s): Provide scroll compressors with direct drive operating at 3600 rpm. Integral centrifugal oil pump, inlet dirt separator, rolling element bearings, crankcase heater, completely enclosed compression chamber with no leakage paths. Provide suction gas cooled motor with over temperature and over current protection.
- GG. Compressor(s) shall be manufactured by the HVAC unit manufacturer.
- HH. Units shall have cooling capabilities down to 60° F.
- II. Provide with thermostatic temperature control in the compressor windings, to protect against excessive temperatures, high and low pressure conditions.
- JJ. Provide 100% outside air hood with birdscreen and multi position osa damper where required with economizer.
- KK. Provide Differential Enthalpy controlled economizer and barometric relief damper.
- LL. Provide microprocessor unit mounted control (UCM) which when used with an electronic discharge air sensor mounted on the DX coil provides proportional, integral, and derivative supply air control. This UCM shall perform all unit functions by making all heating, cooling and ventilating decisions through resident software logic. The microprocessor shall include several temperature functions. A discharge air sensor mounted after the evaporator coil shall maintain the specified dehumidification temperature. The second temperature sensor shall modulate the hot gas reheat coil face and by pass damper to maintain the specified supply or space air temperature. The third temperature sensor shall monitor suction temperature and lockout compressors to keep the evaporator coil from freezing. The fourth temperature sensor shall monitor liquid line temperature to modulate condenser fans to maintain head pressure. The fifth sensor is a space adjustable temperature or humidity input. The last temperature sensor monitors outdoor air temperature and makes the decision on when to lock out the compressors. All functions of the microprocessor shall be fully programmable and have the capability to be monitored and adjusted thru a laptop computer and/or remote LCD keypad. The UCM shall be Bacnet compatible.
- MM. Units shall be Trane, Carrier, Daikin or approved equal.

### 3.0 EXECUTION:

#### 3.1 INSTALLATION:

- A. Units shall be installed in accordance with manufacturer's recommendations.
- B. See details for mounting instructions and accessories.

END OF SECTION

1.0 - GENERAL

1.1 Scope

- A. Provisions of this Section shall apply to all HVAC work.

2.0 - PRODUCTS

2.1 Electric Wall Heaters:

- A. UL listed recessed convection heaters with finned sheathed heating elements, resiliently mounted direct driven propeller fan with motor heat shield, circuit breaker, concealed thermostat, concealed "On-Off" switch, high limit controls, and junction box for connecting power wiring.
- B. Cabinets: 16-gauge steel, with pencil proof welded steel bar grilles (bars 1/16" X 3/8" minimum). Equip cabinet with adjustable recessing frame. Finish: Baked enamel, over bonderizing. Architect will select the color from manufacturer's standard selections.
- C. Electric Wall Heaters: 2 KW and larger, Markel 3400 Series, less than 2 KW, Markel Series 3420, or approved equal.

2.2 Electric Unit Heaters:

- A. UL listed electric heater having capacity shown with resiliently mounted direct driven propeller fan with guard, finned-sheathed heating elements, and enameled steel enclosure not lighter than 20 gauge. Heater shall be equipped with automatic reset high limit controls, power contactors and control transformer for (120) (or) (24) volt control, factory wired to terminal strips.
- B. For horizontal heaters provide adjustable horizontal louvers. For vertical heaters provide radial diffusers.
- C. For each unit heater provide room thermostat to cycle contactor and fan.
- D. Electric Unit Heater shall be manufactured by Chromalox, Markel, Berko, or approved equal.

3.0 - EXECUTION

3.1 Installation

- A. Units shall be installed in accordance with manufacturer's recommendations.
- B. See Details for mounting instructions and accessories.

END OF SECTION

1.00 GENERAL:

1.01 SCOPE:

- A. Provisions of this Section shall apply to all HVAC work.

2.00 PRODUCTS:

2.01 DIRECT VENT CONDENSING FURNACE & DX COIL:

- A. Provide external 2" filter rack with hinges and thumb latches.
- B. Each unit shall be a heating and cooling unit bearing AGA approval for natural gas. All operating components shall be assembled together in a single casing.
- C. Casing shall be constructed of galvanized steel not lighter than 18 gauge with epoxy primer and baked enamel finish. Portion of casing in contact with return or supply air shall have 1" thick fiberglass insulation. Casing shall be mounted as shown on drawings.
- D. Cooling cycle components shall include direct expansion cooling coil with aluminum fins and seamless copper tubes and condensate drain pan with corrosion resistant coating.
- E. Motor shall be high efficiency, direct drive 4-speed. Provide slide out blower assembly, blower door safety switch and adjustable fan and limit control.
- F. Provide aluminized steel heat exchanger with 10 year prorated parts warranty. Provide multi-port in hot burners, shot surface ignitor and noncorrosive vent components. Provide power vent blower for discharge of gas fumes with differential proving switch.
- G. Provide alternate bottom/left/right return air connections.
- H. Filter section with 1" thick throwaway filters and latched access doors shall be provided.
- I. Provide left/right gas connection with gas cook, gas pressure regulator and solenoid.
- J. Furnaces shall be manufactured by Trane, Carrier, or approved equal.

3.00 EXECUTION:

3.01 INSTALLATION:

- A. Fans shall be installed in accordance with manufacturer's recommendations.
- B. See details for mounting instructions and accessories.

END OF SECTION

1.0 - GENERAL

1.1 Scope

- A. Provisions of this Section shall apply to all HVAC work.

2.0 - PRODUCTS

2.1 Fans, Centrifugal – General

- A. Fan Rating: Certified in accordance with AMCA Standard 210 for capacity and sound. Provide fans of class required for service based on static pressures 20% greater than those scheduled. All fans are to be rated for continuous duty.
- B. Provide forward curved blade, radial blade, backward curved blade or air foil blade fans statically and dynamically balanced with L (10) 80,000 hour rated self-aligning, grease lubricated ball or roller bearings rigidly supported by bearing stands.
- C. For all fans furnish adjustable motor bases or rails.
- D. Size V-belt drives for 50% overload, and provide adjustable pitch motor pulleys for drives of 15 BHP and smaller.
- E. For all fans outside casings provide belt and drive guards.
- F. Provide scroll access doors with quick-operating latches for all exhaust fans.
- G. Equip all fans with flanged outlets and casing drains.
- H. Sound power levels shall not exceed those shown.
- I. Size fan motors to provide at least 5% drive loss, with motor service factors not exceeding 1.0. Provide premium efficiency motors as specified under "MOTORS".
- J. Vibration isolators: See "MATERIALS AND METHODS" Section 15050.

2.2 FANS, CENTRIFUGAL CEILING EXHAUST:

- A. AMCA rated direct drive centrifugal fans for ceiling mounting, complete with removable ceiling grille, disconnect, fan mounted solid state speed control, flexible duct connection, integral backdraft damper and discharge outlet.
- B. Fans shall be manufactured by Greenheck, Cook, Acme, or approved equal.

3.0 - EXECUTION

3.1 Installation

- A. Fans shall be installed in accordance with manufacturer's recommendations.
- B. See details for mounting instructions and accessories.

END OF SECTION

1.0 - GENERAL

1.1 Scope

- A. Include Section 15010, "GENERAL PROVISIONS - HVAC", with this section.
- B. Provisions of this Section shall apply to all HVAC work.

1.2 Shop Drawings

- A. Ductwork shop drawings shall include details of duct constructions: seams, joints, gauges, reinforcing and hanger details for each pressure class and size range together with details of turning vanes, branch connections, dampers and access doors and elevations of all ductwork.

2.0 - PRODUCTS

2.1 Ductwork – General

- A. Unless otherwise shown or specified construct ducts of galvanized steel sheet metal using gauges and recommended details as contained in the current edition of the SMACNA HVAC Duct Construction Standards. Ductwork shall include supply air, exhaust air, return air, and outdoor air ducts, together with all necessary fittings, splitters, dampers, quadrants, flexible connections, sleeves, hangers, support, braces, etc. Hang and install ducts in a neat and workmanlike manner from structural members (not roof deck) with adequate bracing and cross bracing to prevent breathing, rattling, and vibration.
- B. No flexible ductwork on return, exhaust or outside air.
- C. Install Duro-Dyne locking quadrants and Duro-Dyne end bearings on all splitters and manual volume dampers located above accessible ceiling and Young #1 regulator, C.P., and Duro-Dyne end bearings elsewhere.
- D. Duct dimensions shown are net inside dimension and do not include insulation thickness.
- E. Duct Turns: Wherever possible, duct turns shall have a centerline radius equal to 1.5 times the duct width in the plane of the turn. Vane other duct turns to provide a dynamic loss coefficient ("C") not greater than 0.2. No reducing ells or tees to be used.
- F. Duct Sealing: Seal duct seams and joints as noted below. Seal entire circumference of all branch duct connections, tapping collars and spin-ins. Seal ducts using mastic sealant equal to United Duct Sealer.
  - 1. Class "A" Seal: Seal all joints and seams and leak test as specified.
  - 2. Class "B" Seal: Seal entire circumference of all transverse joints, seal all longitudinal joints.
  - 3. Class "C" Seal: Seal entire circumference of all transverse joints.
  - 4. Class "D" Seal: Seal corner of transverse joints.



## 2.2 Ductwork - Low Pressure

- A. Ductwork: Low Pressure, Pressure and Seal Class shall include: all supply, return, exhaust and outside air ductwork, 2" pressure class, "B" seal.
- B. Construct ducts in accordance with SMACNA Duct Construction Standards for pressure and seal classes noted.

## 2.3 Flexible Ducts

- A. Flexible duct connectors: A two (2) element spiral construction composed of galvanized steel supporting spiral and coated woven textile fabric with metal or mineral base, UL listed as Class I Air Duct and Connector (UL 181) minimum R=6.0.
- B. Flexible connectors shall not exceed 5 feet in length.
- C. Make connections between flexible ducts and other equipment using galvanized steel draw bands with plated screws and buckles and United Duct seal for high and medium pressure ducts and nylon draw bands for low pressure ducts.
- D. Factory insulate cold flexible ducts using insulation equivalent to that specified for cold ducts.
- E. Flexible ducts: Thermoflex M-KC, Wiremold 57K, Technaflex 57K, or Flexmaster Type 4M. Submit sample for approval of any other manufacturer.

## 3.0 - EXECUTION

### 3.1 Installation

- A. Ductwork shall be installed in accordance with manufacturer's recommendations.
- B. See details for mounting instructions and accessories.

END OF SECTION

1.0 - GENERAL

1.1 Scope

- A. Provisions of this Section shall apply to all HVAC work.

2.0 - PRODUCTS

2.1 Sheet Metal Specialties

- A. Make rectangular take-offs in low pressure supply, return and exhaust ducts using 45 degrees entry tap (SMACNA Duct Construction Standards Figure #2-8) with manual damper with end bearings and locking quadrant in branch. End bearings and quadrants shall have air tight duct connections and shaft seals: Ruskin, Duro-Dyne, or approved equal.
- B. Manual balancing dampers: Comply with SMACNA Duct Construction Standards, Figure 2-14 and 2-15. Equip all dampers with locking quadrants and end bearings. End bearings and quadrants shall have air tight duct connections and shaft seal, Ruskin, Duro-Dyne, or approved equal.
- C. When damper quadrants are located other than above lay-in ceilings.
1. Provide all necessary accessories for remote control of balancing dampers without requiring access doors. Substitute Young #1 regulators and an additional end bearing or Ventlock #688 regulators and an additional end bearing for the quadrant (regulators shall be chrome plated), or, Architect/Engineer option.
  2. Provide access door for access to the quadrant (See sub-section 2.04 "ACCESS DOORS", hereinafter).
- D. Provide "Stand-Offs" (hat sections) for damper quadrants, controls, etc., on externally insulated ducts.
- E. Branch duct connections for connecting round low pressure branches to rectangular low pressure trunks: spin-in fittings with integral dampers with end bearings, stand-off and beaded collars. Seal Class of components penetrating duct shall be consistent with duct pressure class. Spin-in shall be Flexmaster – FLD or equal. Submit sample for approval of other manufacturers for prior approval.

2.2 Fire Dampers

- A. Install UL labeled 1-1/2 hour fire dampers wherever sheet metal ducts pass through chase walls, floors, outside fire chases, and elsewhere as shown or required by local Code. Install dampers per SMACNA "Fire Damper Guide" and UL 555.
1. Fire dampers shall be Type "B" "Venation Blind" dampers. Unless otherwise shown folded blades shall not obstruct duct. Dampers in floors shall be spring loaded.

2. Provide factory fabricated steel integral wall sleeve 3" longer than wall thickness for each fire damper and install sleeve using bolts and angles as detailed in Figure #1 of SMACNA "Fire Damper Guide".
  3. Provide rectangular, round and/or flat-oval collars. See Drawings for sizes and locations.
  4. For aluminum ductwork provide stainless steel fire dampers.
- B. Install access door in low pressure ducts at each fire damper. Install wall or ceiling access door for access to fire dampers not accessible through lift-out ceilings. See sub-section 2.4 "ACCESS DOORS", below.
- C. Install three (3) hour fire dampers where sheet metal ducts pierce 4 hour fire walls. Three (3) hour fire damper shall consist of a three (3) hour UL labeled fire door pivoted in a 3" X 3" X 1/4" angle frame bolted through wall. Equip door frame with angle flange and latch. Install Fire Door as shown in Figure 25 and 26 of SMACNA "Fire Damper Guide".

### 2.3 Automatic Dampers

- A. Factory fabricated dampers with extruded aluminum airfoil blades and frame with full gasket stops for blades ends. Equip blades with air tight plastic or butyl rubber seals and bronze or nylon bearings. Provide jamb seals. Damper widths from 12" to 60" wide shall not leak any greater than 8 cfm sq. ft. at 4" w.g. and a maximum of 3 CFM sq. ft. at 1" w.g. Ruskin Model CD50 or approved equal.
- B. Automatic dampers located near fan outlets or in ducts having maximum velocities exceeding 1500 FPM shall have extruded aluminum air-foil blades and all linkages shall be located outside of airstream. Such dampers shall have leakage rates not exceeding 1% maximum design flow at 4" WG pressure differential.

### 2.4 Access Doors

- A. Access doors in plenum casings are specified under "DUCTWORK - PLENUM CASINGS".
- B. Access doors in low pressure ducts: Galvanized steel frame with gasket permanently secured to duct with a removable gasket access port held in place with screw driver or thumb operated latches. Door in insulated ducts: Double thickness with insulation. Doors in non-insulated ducts: A single thickness. Weld door frames to kitchen exhaust ducts. Size doors to permit removal of equipment or maintenance. Minimum size 12" X 12".
- C. Mark access points in lift-out ceilings with brass paper brads. Bend points of brads over top of ceiling.

### 2.5 Smoke Detectors

- A. Smoke detectors will be furnished and wired under Electrical Work but shall be installed in ducts under this Section.

- B. Install access door in duct at each smoke detector. (See sub-section 2.4 "Access Doors").

2.6 Flexible Duct Connections

- A. Install Neoprene coated glass cloth flexible connections at all duct connections to all fans and AC Units.
- B. Install flexible connections in all ducts at building expansion joints.

2.7 Electrical Grounding

- A. Ground all fans.
- B. Install braided copper jumpers around all flexible connections, taking care that jumpers do not bind flexes.

2.8 INTAKE AND RELIEF HOOD:

- A. Gravity roof ventilators shall be constructed of heavy gauge aluminum as specified.
- B. Hoods shall be constructed of precision formed, arched panels with interlocking seams.
- C. Bases shall be constructed so that the curb cap is 8" larger than the throat size. Provide 12" bases.
- D. Hood support members shall be constructed of galvanized steel and fastened so that the hood can be either removed completely from the base or hinged open.
- E. Birdscreens constructed of 1/2" galvanized steel mesh shall be mounted horizontally across the intake/discharge area of the hood.
- F. Intake units with throat widths through 42" shall ship assembled when throat lengths do not exceed 84". Relief units with throat widths through 48" shall ship assembled when throat lengths do not exceed 96".
- G. Units shall be factory painted to match roof.
- H. Gravity hoods shall be Fabra Hood Model FHI for intake or Model FHR for relief (as specified) as manufactured by Greenheck.

3.0 - EXECUTION

3.1 Installation

- A. Duct shall be installed in accordance with SMACNA Standards.
- B. Equipment shall be installed in accordance with manufacturers recommendations.
- C. See details for mounting instructions and accessories.

END OF SECTION

1.0 - GENERAL

1.1 Scope

- A. Include section 15010 "GENERAL PROVISIONS" with this section.
- B. Provisions of this Section shall apply to all HVAC work.

2.0 - PRODUCTS

2.1 Grilles, Registers and Diffusers

- A. General: Air devices may be Titus, Price, Nailor, Krueger or approved equal. Where fire dampers are required at grilles, provide steel grilles, not aluminum.
- B. Ceiling Return Grilles (R), Ceiling Exhaust Grilles (E) and Transfer Air Grilles (T): All aluminum, 1/2" X 1/2" X 1/2" cube core and plaster frames as needed. Off-white baked enamel finish. Provide 24 x 24 panel so grille will fit in 24 x 24 ceiling grid. Titus "50F".
- C. Architectural Supply Diffuser (S): The diffuser shall have a heavy gauge aluminum face panel, which shall be a one piece assembly, removable by means of four positive locking posts. The exposed surface of the face panel shall be smooth, flat, and free of visible fasteners. The face panel shall project 1/4" below the outside border of the diffuser back pan. The back of the face panel shall have an aerodynamically shaped, rolled edge to ensure a tight horizontal discharge pattern. The back pan shall be one piece precision die-stamped and shall include an integrally drawn inlet. The diffuser back pan shall be constructed of heavy gauge aluminum. The finish shall be #26 white. The pencil hardness must be HB to H. Directional blow clips shall be provided to restrict the discharge air in certain directions. The manufacturer shall provide published performance data for the square panel diffuser. The diffuser shall be tested in accordance with ANSI/ASHRAE Standard 70-1991. Diffuser shall be Titus "OMNI-AA".
- D. Wall Return Grilles (WRG): Horizontal bars fixed at about 15° angle, close spacing and plaster frames. Baked aluminum, enamel finish. Titus "1700".
- E. Concentric Supply / Return Grille (CG): Supply air from the center and return air around the perimeter of the grille. Plaster frames. Baked aluminum, enamel finish. Titus "CSR-P".

2.2 Weather Louvers

- A. Louvers shall be 6" thick extruded aluminum louvers with 12 gauge blades with drainable head frame, drainable blades, water stop, and with angled sill. 57% F.A. minimum. Equip with 1/2" mesh aluminum birdscreen on inside of louver. Finishes: Kynar. Submit color sample to Architect (20 year warranty on finish). Ruskin ELF6375DX, Louvers & Dampers, Greenheck, Airolite, or approved equal.

3.00 EXECUTION:

3.1 INSTALLATION:

- A. Equipment shall be installed in accordance with SMACNA Standards and manufacturer's recommendations.
- B. See details for mounting instructions and accessories.
- C. Secure louver to structure to comply with FEMA 361 and the following:
  - 1. Substrate: CMU, Grout filled. 1500 Min. PSI
    - a. Anchor Type: 3/4 inch (19 mm) diameter Hilti HIT HY 150 x 8 in (203) long threaded adhesive anchor.
    - b. Embedment: 6-3/4 inches (172 mm) minimum.
    - c. Factory Attachment Angle secured at factory.
    - d. Shipped Loose Attachment Angle: 4 in x 6 in x 20 in long (102 x 152 x 508) A36 HDG angle. 1/2 in (13) thick.
  - 2. Substrate: Concrete 2500 PSI Minimum Compression Strength.
    - a. Anchor Type: Hilti Kwik Bolt TZ CS III 1/2 (6) diameter x 3-3/4 in (95) long
    - b. Embedment: 3-1/2 inches (89 mm) minimum.
    - c. Factory Attachment Angle secured at factory.
  - 3. Substrate: Steel Framing.
    - a. Factory Attachment Angle secured at factory

END OF SECTION

1.0 - GENERAL

1.1 SCOPE:

- A. Provisions of this section apply to all HVAC work.

2.0 - PRODUCTS

2.1 FILTERS - AIR:

- A. 30% Filters, 1" or 2" Thick (Maximum allowed by MFR): Throwaway deep pleated filters, maximum face velocity 350 fpm. Maximum initial pressure drop 0.1" WG, UL Class 1, 30% efficiency per ASHRAE Test Standard 52-76, minimum ratio of media area to face area 4.4:1. Turn system over to Owner with clean filters and provide one (1) set of spare filters. Farr 30/30 or approved equal.

3.0 - EXECUTION

3.1 INSTALLATION:

- A. Filters shall be installed in accordance with manufacturer's recommendations.
- B. See details for mounting instructions and accessories.

END OF SECTION

1.00 GENERAL:

1.01 SCOPE:

- A. Include Section 15010 "GENERAL PROVISIONS", with this Section.
- B. Provisions of this Section shall apply to all HVAC work.

2.00 PRODUCTS:

2.01 CONTROL SYSTEMS:

- A. Furnish and install complete and ready for operation a control system with control sequences specified below.
- B. Products of a manufacturer maintaining complete service and parts facilities in Alabama continuously for the last three (3) years: Trane, Carrier, or approved equal.
- C. Control equipment, except for items comprising an integral part of the water or refrigeration piping, shall be installed by trained mechanics employed by the Control Manufacturer.
- D. Include the services of a full time control technician for calibrating and adjusting controls for the first 3 working days after Owner has occupied building.
- E. Before installation, submit for approval five (5) copies of complete power and control wiring and piping diagrams. Hang a photostatic copy of the approved diagram, framed behind glass, in each equipment room. Provide one (1) set of reproducible sepias of "As-Built" control diagrams at completion of project for the Owner's use.
- F. Provide permanent nameplates for control switches and motor starters. Nameplates: engraved laminated plastic with letters legible under normal operating conditions. (White on black).
- G. Permanently identify control devices other than room thermostats, so they may be identified on control diagrams. Provide engraved plastic nameplates for items mounted outside of or on faces of panels. Mark other instruments with indelible ink.

2.02 CONTROL WIRING:

- A. Include control and interlock wiring and power wiring for control panel in this Section. Install in conduit in accordance with provisions of Electrical Work where exposed, concealed in walls or above ceilings other than lay-in type. Provide plenum rated cable above lay-in ceilings (for plenum or non-plenum).
- B. Waterproof and firestop all conduit floor penetrations. Firestop conduit penetrations of fire rated walls partitions.
- C. Wire all devices individually to terminal strips in control panels.
- D. Furnish necessary relays and auxiliary contactors and other accessories required. Provide interlock relays per NEC. Coordinate start-stop stations, auxiliary contacts, etc., with supplier of Starters, Variable Frequency Drive (VFD) and Motors Control Centers specified in Electrical Work.

2.03 CONTROL DEVICES:

- A. Room Thermostats: (Provide seven (7) day occupied/unoccupied, 24 hour, multi-stage programmable thermostats, with 3-hour override, and battery back-up. Thermostats to be provided with local control. Thermostat covers: lockable high impact plastic. Mount room thermostats with tops 4 feet above floors. Provide switches and Hand – Off – Auto switches (H-O-A) as required.
- B. Remote Bulb Thermostats (DDC) and Temperature Transmitters (DDC): Unless otherwise shown use averaging elements not less than 12 feet long for duct or casing cross sections for each 24



square feet of face area.

- C. Thermometers: Pipe line thermometers are specified in another Section. Install digital readout thermometers in ducts where shown on control diagrams, providing averaging bulbs where shown and/or required.
- D. Freezestats: Manual reset, pneumatic not permitted. Locate freezestat bulbs between preheat and chilled water coils in units with chilled water coils and downstream from DX coils in units with DX coils. Provide coverage for each 3' X 3' coil face area section.
- E. Firestats: Single pole double throw, electric, manual reset, pneumatic not permitted. Firestats shown to be connected to the fire alarm system: compatible with fire alarm system, furnished and installed under Controls, wired under Electrical Work. Firestats to be installed in all fans where smoke detectors are not furnished.
- F. Program Clocks / Timers:  
Provide digital time clock with 365 day holiday capabilities with 24 single dates, 99 setpoints, separate scheduling for each day of the week, AM/PM format, one minute programming resolution, portable memory module, optional programmer for integration into a Windows based PC for program duplication and modifications, LCD display, daylight savings or standard time, automatic leap year correction, permanent schedule retention, 100 hours of backup, manual override, Nema 3 indoor/outdoor enclosure. Clock/Timer to be Tork or approved equal.
- G. Valve and Damper Operators: Of sufficient power to close/open valves and dampers under operating conditions. Electric valve and damper motors shall have oil immersed gear trains and spring return to normal position. Valves and damper operators to have DDC Controls.
- H. Wells: Install pipe line mounted control and indicating devices in stainless steel or brass thermometer wells.
- I. Capillary Supports: Securely support all duct-mounted and casing- mounting thermostat capillaries using factory fabricated copper bulb supports.
- J. Provide stand-offs for control devices mounted on externally insulated ducts and equipment.
- K. Anchor all items mounted on gypsum board (dry-wall) using toggle bolts or moly bolts, not expansion shields.
- L. Air flow Measuring Station (AFMS): Provide AFMS with probe, transmitter and cable. Unit to average velocity profile thru multiple probes and provide average readout in CFM on transmitters LED screen. Provide 0-10VDC and 4-20MA output (field selectable) to BMCS. Sensor accuracy to be 2%, installed accuracy to be 3%. ARMS to be Ebronn model GTX116.
- M. Hand-Off-Auto switches (H-O-A): Provide 3 position dial switches (one for each exhaust/supply fan as scheduled). Switches for fans shall be grouped together in panels by building section. Locate panels in nearest Mechanical / Electrical room or where shown (coordinate location with G.C. & owner).

2.04 CONTROL POWER:

- A. All 120 Volt wiring shall be the responsibility of the Control Sub-Contractor from circuit furnished under Electrical Section. Coordinate circuit locations with General and Electrical Contractors.
- B. Power wiring to all automatic dampers shall be included under this section.
- C. Wiring and relays between light and fans for interlock shall be included under this section.

2.05 CONTROL PANELS:

- A. Local Control Panels: Construct of galvanized steel with baked enamel finish or aluminum-plywood-aluminum fronts and backs and extruded tops, bottoms, and ends. All panels

shall have piano hinges and key locking latches (key panels alike). Permanently label instruments located in panels consistent with labeling on control diagram. Cement photostat of approved diagram inside each panel cover. (Include Local-Remote switching for control point adjusters on face of each panel).

2.06 INTERFACES WITH BUILDING MANAGEMENT CONTROL SYSTEM (BMCS):

- A. Relays actuated by BMCS will be mounted in BMCS Panels located in Fan Rooms, Equipment Rooms, etc.
- B. Wiring from local panels (and Engineer panels) to BMCS panels is included in this Section.
- C. Control point adjusters actuated by BMCS system will be located in BMCS Panels.

2.07 CONTROL SEQUENCES:

- A. As shown on drawings.

3.00 EXECUTION:

3.01 INSTALLATION:

- A. Control diagrams on drawings and/or Control Sequences are intended to indicate, in general, control arrangements. Provide all instruments, relays, operators, switches, etc. required to accomplish control sequences whether or not such devices are actually shown.

END OF SECTION

PLUMBING AND FIRE PROTECTION - TABLE OF CONTENTS - SECTION 15400

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## PLUMBING IDENTIFICATION – SECTION 15405

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. This Section includes the following plumbing identification materials and their installation:
  - 1. Pipe markers.
  - 2. Valve tags.
  - 3. Valve schedules.
  - 4. Equipment labels.
  - 5. Warning signs and labels.

#### 1.02 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Valve numbering scheme.
- C. Valve Schedules: For each piping system. Furnish extra copies (in addition to mounted copies) to include in maintenance manuals.

#### 1.03 QUALITY ASSURANCE

- A. ASME Compliance: Comply with ASME A13.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.

#### 1.04 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with location of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

### PART 2 - PRODUCTS

#### 2.01 PIPING IDENTIFICATION DEVICES

- A. Manufactured Pipe Markers, General: Preprinted, color-coded, with lettering indicating service, and showing direction of flow.
  - 1. Colors: Comply with ASME A13.1, unless otherwise indicated.
  - 2. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.
  - 3. Pipes with OD, Including Insulation, Less Than 6 Inches: Full-band pipe markers extending 360 degrees around pipe at each location.
  - 4. Pipes with OD, Including Insulation, 6 Inches and Larger: Either full-band or strip-type pipe markers at least three times letter height and of length required for label.

- 5. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.
- B. Pre-tensioned Pipe Markers: Pre-coiled semi-rigid plastic formed to cover full circumference of pipe and to attach to pipe without adhesive.
- C. Self-Adhesive Pipe Markers: Are not allowed

2.02 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers, with numbering scheme approved by Architect. Provide 5/32-inch hole for fastener.
  - 1. Material: 3/32-inch thick laminated plastic with 2 black surfaces and white inner layer.
  - 2. Valve-Tag Fasteners: Brass wire-link chain, beaded chain or S-hook.

2.03 VALVE SCHEDULES

- A. Valve Schedules: For each piping system, on standard-size bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
  - 1. Valve-Schedule Frames: Glazed display frame for removable mounting on masonry walls for each page of valve schedule. Include mounting screws.
  - 2. Frame: Extruded aluminum.
  - 3. Glazing: ASTM C 1036, Type I, Class 1, Glazing Quality B, 2.5-mm, single-thickness glass.

2.04 EQUIPMENT LABELS

- A. Plastic Labels for Equipment:
  - 1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.
  - 2. Color Coding:
 

<u>System</u>	<u>Background Color</u>	<u>Letters</u>
Other equipment	Black	White
  - 3. Temperatures up to 160 deg F.
  - 4. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
  - 5. Letter shall be a minimum of 1/2" high. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
  - 6. Fasteners: Stainless-steel self-tapping screws.
  - 7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Label Content: Include equipment's Drawing designation or unique equipment number.

2.05 WARNING SIGNS AND LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.
- B. Letter Color: White.

- C. Background Color: Yellow.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- F. Minimum Letter Size: Minimum 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- G. Fasteners: Stainless-steel self-tapping screws.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Label Content: Include caution and warning information as indicated elsewhere in the specifications and on the Drawings.

### PART 3 - EXECUTION

#### 3.01 APPLICATIONS, GENERAL

- A. Products specified are for applications referenced in other Division 15 Sections. If more than single-type material, device, or label is specified for listed applications, selection is Installer's option.

#### 3.02 PIPING IDENTIFICATION

- A. Install manufactured pipe markers indicating service on each piping system. Install with flow indication arrows showing direction of flow.
  1. Pipes with OD, Including Insulation, Less Than 6 Inches: Pre-tensioned pipe markers. Use size to ensure a tight fit.
  2. Pipes with OD, Including Insulation, Less Than 6 Inches: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, [at least 3/4 inch] [1-1/2 inches] wide, lapped at least 1-1/2 inches at both ends of pipe marker, and covering full circumference of pipe.
  3. Pipes with OD, Including Insulation, 6 Inches and Larger: Shaped pipe markers. Use size to match pipe and secure with fasteners.
  4. Pipes with OD, Including Insulation, 6 Inches and Larger: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, at least 1-1/2 inches wide, lapped at least 3 inches at both ends of pipe marker, and covering full circumference of pipe.
- B. Locate pipe markers and color bands where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior non-concealed locations as follows:
  1. Near each valve and control device.
  2. Near each branch connection, excluding short takeoffs for fixtures. Where flow pattern is not obvious, mark each pipe at branch.
  3. Near penetrations through walls, floors, ceilings, and non-accessible enclosures.
  4. At access doors, manholes, and similar access points that permit view of concealed piping.
  5. Near major equipment items and other points of origination and termination.
  6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
  7. Label 2 psi gas piping at 6 foot intervals.

### 3.03 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; plumbing fixture supply stops; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
  
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following:
  - 1. Valve-Tag Size and Shape:
    - a. Cold Water: **2 inches square.**
    - b. Hot /HWR Water: **2 inches square.**
    - c. Gas: **1-1/2 inches round.**
  - 2. Valve-Tag Color:
    - a. Cold Water: **Natural.**
    - b. Hot Water: **Blue.**
    - c. Gas: **Yellow.**
  - 3. Letter Color:
    - a. Cold Water: **White**
    - b. Hot Water: **White.**
    - c. Gas: **White.**

### 3.04 VALVE-SCHEDULE INSTALLATION

- A. Mount valve schedule on wall in accessible location in each major equipment room.

END OF SECTION 15405

1.00 GENERAL:

1.01 SCOPE:

- A. Provisions of this Section apply to all Plumbing work.
- B. Include the provisions of General, Supplementary and Special Conditions and provisions of the Specifications shall apply to and form a part of this Section.
- C. Provide all labor, materials, equipment, and services necessary for the completion of all work shown or specified, except work specifically specified to be done or furnished under other sections of the Specifications. Include performing all operations in connection with the complete installation in strict accordance with the specification and applicable drawings subject to the terms and conditions of the Contract, for the following system:
  - 1. A system of sanitary waste and vent piping.
  - 2. A system of storm (rainwater) piping.
  - 3. A system of domestic water piping.
  - 4. A system of natural gas piping.
- D. Give required notices, file drawings obtain and pay for permits, deposits and fees necessary for the installation of the work. Obtain and pay for inspections required by laws, ordinances, rules, regulations or public authority having jurisdiction. Obtain and pay for certificates of such inspections, and file such certificates with Owner.
- E. "Provide" means to furnish and install, complete and ready for operation.

1.02 DRAWINGS:

- A. Drawings are diagrammatic and subject to requirements of Architectural Drawings. Drawings indicate generally the location of components and are not intended to show all fittings or all details of the work. Coordinate with Architectural, Structural, Electrical, HVAC and other Building Drawings.
- B. Follow the Drawings closely, check dimensions with Architectural Drawings and field conditions. DO NOT scale Drawings for location of system components.
- C. Make no changes without Architect's written permission. In case of doubt, obtain Architect's decision before proceeding with work. Failure to follow this instruction shall make the Contractor liable for damage to other work and responsible for removing and repairing defective or mis-located work.
- D. Do not scale Drawings to locate sprinkler heads. Coordinate with lighting, ceiling grids, ceiling diffusers and/or reflected ceiling plans. Install Sprinkler Heads in center of ceiling tiles.

1.03 APPLICABLE CODES AND STANDARDS:

- A. Comply with the current editions of the following Codes and Standards:
  - 1. ANSI/ASHRAE 15 - Code for Building Services Piping.
  - 2. NFPA 70 - National Electrical Code.
  - 3. NFPA 101 – National Life Safety Code.



4. Other Standards as referenced in other Sections of Division 15.
5. Local Building Code (International Building Code if no local Building Code in effect).
6. Local Plumbing Code (International Plumbing Code if no local Plumbing Code is in effect).
7. Local Gas Code (International Fuel Gas Code if no local Gas Code is in effect).
8. NFPA 110 - Emergency and standby power.

1.04 QUALIFICATIONS OF SUBCONTRACTOR:

A. The Plumbing Contractor shall meet the following qualifications:

1. The Plumbing Contractor must be approved by the Architect.
2. The Plumbing Contractor shall have been in business as a Plumbing Contractor for at least three (3) years prior to Bid Date. He shall have a current Master's Plumber's Certificate and Gas Certificate of competency issued by the State of Alabama and the city and county in which work occurs.
3. The Plumbing Contractor shall have a satisfactory experience record with Plumbing installations of character and scope comparable with this project, and for at least three (3) years prior to the Bid Date and shall have had an established service department capable of providing service inspection or full maintenance contracts.

1.05 CONFLICTS AND INTERFERENCES:

A. If systems interfere or conflicts, the Architect shall decide which equipment to relocate regardless of which was first installed.

1.06 WORKMANSHIP:

A. Do all work in a neat and first-class manner. Remove and replace work not done in such manner as directed by the Architect.

1.07 COOPERATION:

A. Cooperate with all other crafts. Perform work in a timely manner. Do not delay the execution of other work.

1.08 VISITING SITE:

A. Visit site and become familiar with location and various conditions affecting work. No additional allowance will be granted because of lack of knowledge of such conditions.

2.00 PRODUCTS:

2.01 MATERIALS, SUBSTITUTIONS AND SUBMITTALS:

- A. Unless otherwise noted, provide new, standard, first-grade materials throughout. Equipment and materials furnished shall be fabricated by manufacturers regularly engaged in their production and shall be the standard and current model for which replacement parts are available. Equipment shall be substantially the same equipment of a given manufacturer which has been in successful commercial use and operation for at least three (3) years.
- B. Where materials or products are specified by manufacturer's name, brand, trade name, or catalog reference, such named materials or products shall be the basis of the Bid, without substitution, and shall be furnished under the Contract unless requests for substitutions are approved as noted below. Where two or more brands are named the choice of these shall be optional with the

Contractor.

- C. Substitutions will be considered only if written request for approval has been received by the Architect TEN (10) DAYS prior to the date established for receipt of Proposals. Each request shall include the name of the material or equipment for which substitution is proposed and a complete description of the proposed substitute including drawings, cuts, performance and test data, samples and any other information necessary for evaluation. A statement setting forth any changes in other materials, equipment or other Work that incorporation of the substitute may require shall be included. The burden of proof of the merit of the proposed substitute is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution is final.
  - D. If the Architect approves any proposed substitution prior to receipt of Proposals, approval will be set forth in an Addendum. DO NOT rely upon approvals made in any other manner.
  - E. No substitutions will be considered after the Contract has been executed, except as described in the General Conditions.
  - F. Submittal data and shop drawings, shall be submitted at one time, partial submittals will not be considered. Within 30 days of execution of Contract and before ordering materials and equipment, submit to Architect and obtain his approval of a detailed list showing each item which is to be furnished by make, trade name, catalog number, or the like; together with manufacturer's specifications, certified prints, and other data sufficient for making comparisons with items specified. When approved, such schedule shall be of equal force with these specifications in that no variation there from shall be allowed except with Architect's written approval. Number of Shop Drawings and procedure shall be as directed by the Architect.
  - G. All pressure vessels shall be constructed and tested in accordance with applicable ASME Codes and shall bear ASME stamps. Certificates of inspection and approval shall be submitted to Architect.
  - H. Similar items of equipment shall be the product of the same Manufacturer.
  - I. See section, "ALTERNATES" in other sections of the Specifications and Bid accordingly.
- 2.02 SHOP DRAWINGS:
- A. Before starting work, submit and obtain approval of the following:
    - 1. Equipment piping.
    - 2. Plumbing Equipment, Products and Fixtures.
- 2.03 RECORD DRAWINGS:
- A. When work starts obtain from Architect two (2) complete sets of white prints of the **Plumbing**. All corrections, variations, and deviations, including those required by change orders, if any, must be recorded in colored ink or colored pencil at the end of each working day on these drawings. The marked prints shall be available at all times for the Architect's inspection.
  - B. Prior to examining the request for final payment or making any response thereto, the Architect shall receive from the Contractor one (1) complete set of the white prints, marked as stated above, indicating the actual completed installation of the work included under this Contract.
  - C. The Architect will forward the marked white prints to the Consulting Engineers for review. They will then be returned by the Architect to the Contractor for use in preparing record drawings.
  - D. When work is completed Contractor shall purchase from the Architect (At Architects' printing cost) one (1) set of reproducible electronic files and prints of Plumbing Drawings for use in preparing record drawings. Contractor shall transfer the information from the marked white prints to the dwg record drawings, removing all superseded data in order to show the actual completed conditions.

1. Accurately show location, size and elevation of new exterior piping work and its relationship to any existing piping and utilities, obstructions, etc., contiguous to the area of work.
2. Block out areas modified by change-order and identify them by change-order number.

2.04 ELECTRICAL EQUIPMENT:

- A. Provide electrical equipment compatible with the current shown on electrical drawings. Verify current characteristics before ordering equipment.
- B. Should the Contractor with the Architect's/Engineer's approval make changes in electrical equipment from those shown on the Electrical Drawings, he shall be responsible for the coordination and cost of required changes.
- C. Provide factory installed fuses in all equipment requiring fusing for branch circuit protection.
- D. Verify electrical characteristics of all equipment and voltages available with Electrical Section prior to ordering any electrical equipment.

2.05 SLEEVES:

- A. Refer to the Architectural Life Safety Drawings for wall ratings and close all openings to match rating of wall.
- B. Submit details of all pipe penetrations thru rated walls indicating wall construction, penetrating material and method of closing penetration including materials and listing of detail.
- C. All Penetrations thru walls are to be closed. If the wall is not rated, sheet rock joint compound may be used to close space around piping. For walls with ratings opening shall be closed with a U.L. Listed rating system compatible with wall rating. Insulation is to be continuous thru all openings.
- D. For pipe through floors inside rated chases or through non-fire-rated walls: 20 gauge galvanized steel sleeve 1/2" larger than pipe or pipe covering. Pipe insulation to be continuous thru sleeve. Seal opening between sleeve and pipe or pipe covering
- E. For uninsulated pipe through 2 hour fire rated walls, partitions or floors outside chases: Hilti FS605 with sleeve, U.L. Listing #WL1056.
- F. For insulated pipe passing through fire rated partitions or walls or floors outside chases: Hilti #FS611A with no sleeve, U.L. Listing #WL5029. Insulation: 1" thick fiberglass continuous thru wall.
- G. For pipe passing thru concrete floor, concrete walls, and concrete block walls:
  1. Uninsulated Schedule 40 steel and copper: Hilti #FS605 with sleeve, U.L. #CAT1155.
  2. Insulated Schedule 40 steel and copper: Hilti #FS611A, U.L. #CAT5045.
- H. For 4" and smaller PVC pipe passing thru 3 hour concrete floor, wall or concrete block wall - Hilti #FS611A with collar, UL System #CAJ095.
- I. For 2" and smaller Schedule 40 PVC pipe penetrating a 1H12 concrete floor or wall - Hilti #FS611A sealant, UL #CAT2062 or UL #CAJ2066.
- J. Under this Section, the Contractor shall be responsible for closing and making fire safe all openings exposed during construction (both new and existing) in the floor and deck above. Closing of opening shall be compatible with rating and shall not compromise the rating of the wall or floor being sealed.
- K. Set sleeves before concrete is poured or masonry is erected. In existing construction, grout sleeves firmly in place.

- L. In Mechanical Rooms extend sleeves 1-1/2" above finish floor and waterproof.
  - M. Where exposed pipes pass through walls and partitions in finished or exposed spaces, provide chrome plated F & C plates or escutcheons. Seal wall penetration and case work penetration with silicone prior to installing escutcheon.
  - N. All wall floor penetrations shall be closed in a neat manner. The method used to the close penetrations shall be compatible with the rating of the wall and shall in no way compromise the integrity of the partition or floor.
- 2.06 ACCESS DOORS:
- A. Provide access doors for valves, and other items requiring maintenance located above hard ceilings or behind partitions or walls. Doors in fire rated walls and ceilings: UL labeled with fire rating equal to fire rating of wall or ceiling. Provide door styles, sizes and colors as specified under the Architectural section.
  - B. Mark lay-in ceilings with paper brads at valve locations and maintenance access points. Bend ends of brads over above ceiling tile.
- 3.00 EXECUTION:
- 3.01 PROTECTION OF EQUIPMENT:
- A. During construction all fixtures and equipment shall be protected from damage caused by weather, masonry, plaster, paint and job accidents.
  - B. When installation is complete, clean equipment and make ready for painting. Adjust all flush valves.
- 3.02 INSTALLATION OF FIXTURES AND EQUIPMENT:
- A. Install fixtures and equipment to provide normal service access to all components.
  - B. Provide sufficient space for removing components, install fixtures and equipment to provide such clearance.
  - C. Install fixtures and equipment in accordance with manufacturer's instructions. If manufacturer's instructions conflict with contract documents, obtain Architect's decision before proceeding.
  - D. All fixtures and equipment shall be firmly fastened in place:
    - 1. All wall hung fixtures shall be installed on a floor mounted fixture support with anchoring bolts in all holes of each leg. Bolts shall be sized as per manufacturer's recommendation.
- 3.03 CUTTING AND PATCHING:
- A. Set sleeves and inserts and lay-out and form openings in walls, beams, girders and structural floors in this Section.
  - B. Cut, patch and repair as required to accomplish work and finish to match adjacent work. Architect's approval required before cutting any part where strength or appearance of finished work is involved.
  - C. Cutting, patching and repairing of walls, floors, etc., where noted in paragraph "A" above, have been located or sized incorrectly are included in this Section.
- 3.04 INCIDENTAL WORK:
- A. All power wiring is included in Electrical Section.

- B. Permanent drain and relief connections for **Plumbing Equipment** to nearest floor drain or to grade are included in this Section whether shown or not.
  - C. Items obviously omitted from drawings and/or specifications shall be called to attention of the Architect prior to submitting Bid, after award of Contract any changes or rearrangements necessary to complete Contract shall be at no additional cost to Owner.
- 3.05 FLASHING:
- A. Vent Pipe and Roof Drain Flashing: Specified in "Architectural Roofing Section".
  - B. Coordinate all roofing penetrations with Roofing Section.
- 3.06 EXCAVATION AND BACKFILLING:
- A. Include all excavation and backfilling required to bring the work to line and grade shown, including excavation of rock and all other materials which may be encountered.
  - B. Excavate trenches wide enough for proper installation of work. Grade trench bottoms evenly. Provide bell holes as necessary to insure uniform bearing for pipes. Excavate minimum 6" below pipe. Refill cuts below required pipe grade with sand or compacted gravel. Support pipe continuously along its entire length. Do not use piers to support piping.
  - C. Backfill after inspection by Architect and authorities having jurisdiction. Backfill compacted areas with "Engineered Fill", sand or fine gravel in accordance with requirements of "Sitework". Backfill paved areas with sand or fine gravel compacted to meet requirements of Paving Section. Backfill shall be free of rock, wood, steel, brick, etc. Do not disturb pipe. Restore or repair pavements and the like after backfilling, to meet the requirements of the authority having jurisdiction.
- 3.07 PAINTING:
- A. Refinish equipment damaged during construction to new condition.
  - B. Paint all non-potable water pipe and insulation with two (2) coats of bright yellow paint in compliance with the Local Plumbing Code and these specifications. Paint piping prior to installing insulation. Paint type to be equal to Paint Specified in Painting Section of the Specifications.
  - C. Other painting is specified in "PAINTING SECTION, Finishes Division".
- 3.08 PIPE IDENTIFICATIONS:
- A. Identify all piping exposed to view or accessible through removable ceilings or access panels with plastic snap-on pipe line markers. Color code markers in accordance with ANSI A13.1. Show pipe contents and direction of flow. Markers on lines 8" OD and smaller shall be taped in place; on lines over 8" OD secure with spring clips.
  - B. Submit samples of all nameplates, tags, chains and etc., for approval.
  - C. Protect all factory identification tags, nameplates, model and serial numbers, stenciling, etc., during construction and replace if damaged.
  - D. Label Spacing and Extent:
    - 1. On straight run of pipes; Above suspended ceilings space labels approximately 10 feet on center; elsewhere, 20 feet on center.
    - 2. Wherever a pipe enters or leaves a room or building.
    - 3. At change of direction.
    - 4. At main valves and control valves (not equipment valves).

5. On risers, just above and below floors.

3.09 VALVE TAGS:

- A. 2" X 3" laminated plastic with 1/2" numbers engraved at top, leaving space for further engraving by others. Secure tags with chains to valve yoke or stem, not handles.
- B. Valve tags colors:
  - 1. Plumbing: Red tags with white numbers.
- C. Valve tag locations: At all valves on mains, risers and branches.
- D. Valve tag numbers: Starting with Number 1, number tags in sequence from the lowest point to the highest point in the building. In existing building extend existing sequences.
- E. Starting with Number 1, number valve tags on this floor extending existing sequence. If there are no valve tags on existing valve, provide tags for all existing valves and new valves beginning floor sequence with Number 1.

3.10 VALVE CHARTS:

- A. In all mechanical rooms, provide charts showing number and locations of all valves, type of service, etc. Frame with aluminum, under glass.
- B. In existing buildings include existing valves in the charts of new valves.

3.11 WARRANTY AND INSTRUCTIONS:

- A. See General Conditions - One-Year Warranty.
- B. Contractor shall and hereby does warrant all materials, workmanship and equipment furnished and installed by him to be free from defects for a period of one (1) year after date of substantial completion of the Contract. Should any defects in materials, workmanship, or equipment be made know to Contractor within the one (1) year warranty period, Contractor shall replace such materials, workmanship, or equipment without charge.
- C. After completion of the work, Contractor shall operate the equipment which he installs for a period of ten (10) working days, as a test of satisfactory operating conditions. During this time, Contractor shall instruct the Owner's operating personnel in the correct operation of the equipment. Furnish necessary oral and written operating instructions to the Owner's representative.
- D. Provide three (3) sets of manufacturer's operating and maintenance manuals and parts lists including nearest manufacturer's sales and service representative by name, address and phone for all equipment and materials furnished. Provide a maintenance schedule listing routine maintenance operations and suggested frequency there of. Include all warranty dates on equipment and guarantees. Include names, address and phone of any subcontractor and work performed. Bind above items in loose leaf three (3) ring binders with tab for each class of equipment.
- E. During the period of tests, adjust all controls, regulators, etc., to comply with these Specifications.
- F. Make available to the Owner, without additional cost, service and adjustment of the equipment for the guarantee period.

3.12 PROJECT CLOSE-OUT DOCUMENTS:

- A. Prior to the issuance of a certificate for final payment, submit to Architect and obtain his approval of the following:
  - 1. Record drawings – Plumbing (reproducible). Electronic drawings dwg format and pdf format.

2. Equipment and Fixture Submittal Data: List of manufacturers representative including name, address and telephone number that supplied requirement (3).
3. Equipment operating and maintenance manuals including: Spare parts required (3).
4. Maintenance schedule (3).
5. Equipment warranty dates and guarantees (3).
6. List of Owner's Personnel who have received maintenance instructions.
7. Record of inspections indicating what system was tested, type of tests, date of tests and those parties witnessing tests.
8. Valve Tag Chart.

TESTING, CLEANING AND ADJUSTING (TCA) - SECTION 15420

1.00 GENERAL:

1.01 SCOPE:

- A. Provisions of this section apply to all Plumbing work.
- B. Include Section 15410, "GENERAL PROVISIONS - PLUMBING", with this Section.
- C. All tests shall be witnessed by the Architect in addition to authorities having jurisdiction. A minimum of 48 hour notice is required prior to performance of test.

2.00 PRODUCTS:

2.01 NOT APPLICABLE

3.00 EXECUTION:

3.01 GENERAL REQUIREMENTS:

- A. After system have been installed, Test, Balance and Adjust System for proper operation, flow rates, pressures and temperatures. Correct any noise and/or vibration conditions.
- B. Perform all tests as required by local codes. Contractor shall furnish testing equipment. Keep a record of all tests indicating dates of tests, those persons witnessing tests and results of tests.
- C. Provide with the Close-Out Documents a Testing Record.
- D. If local Codes are more stringent, local Codes shall govern.

3.02 SANITARY AND STORM (RAINWATER) SYSTEMS:

- A. Test piping by stopping lower outlets and filling with water to 10' hydrostatic head. Stop leaks and repeat test until watertight. All joints shall be exposed throughout test.
- B. Provide "Ball Test" on all piping 3" and larger with ball 1/2" smaller than pipe diameter.
- C. Provide visual inspection of all building drain piping below grade. Visual inspection shall be by means of a video camera routed through the drain system. Where the drain piping is connected to existing drain piping, the visual inspection shall include the existing drain piping from the point of connection, downstream to the point of connection to the public utility. A video tape and written report, noting any defects, on the findings of the visual inspection shall be provided to the owner with the close-out documents. The Plumbing Contractor shall provide personnel and equipment required for the visual inspection.

3.03 DOMESTIC WATER PIPING:

- A. On completion of roughing-in, cap all outlets, make connections with house supply line, and put under full water pressure. Test by applying additional pressure (by temporary pump or compressed air connection) to total hydrostatic pressure 1-1/2 times street pressure but not less than 150 psig for not less than 4 hours.
- B. Immediately and completely stop all leaks and retest until system is watertight. After testing, leave general pressure on until ready to install fixture (except when necessary to drain to avoid freezing during construction). After completion of all tests, repairs and installation of fixtures, flush all domestic hot and cold water piping with water to remove all sediment scale and until water runs clear, then disinfect.



- C. Disinfect piping with hypochlorite solution of chlorine or compressed chlorine gas applied through on approved chlorinator. Operate all valves and faucets several times to insure the chlorine reaches all parts of the system. Feed water and chlorination agent into the system at rates that will provide a residual chlorine content of not less than 50 ppm after a retention period of 6 hours and 10 ppm after a retention period of 24 hours. Upon completion of treatment, flush treated water from each system until the water supply is satisfactory to the public health authority having jurisdiction. Provide Architect a certificate of compliance from the local Health Department.
  - D. Clean air aerators, hose sprays, flush valves, etc. and adjust to proper flow rates.
- 3.04 NATURAL GAS PIPING TESTS:
- A. After all piping is roughed-in but before connection to main or to appliances or equipment, test piping for tightness as required by local gas company. In the absence of such requirements, apply in Architect's presence an air pressure test equal to 25 psig. Piping shall maintain pressure without drop for at least four (4) hours. Stop all leaks shown up by such test and repeat test until piping is air tight.
- 3.05 COMPLETION OF TEST:
- A. Upon completion of all testing, Contractor shall provide to the Architect copies of test results and include a listing of all personnel witness to the tests.

1.00 GENERAL:

1.01 SCOPE:

- A. Include Section 15410, "GENERAL PROVISIONS - PLUMBING", with this Section.

2.00 PRODUCTS:

2.01 MATERIALS:

- A. Pipe and fittings to be the same manufacturer.

2.02 SANITARY - WASTE AND VENT PIPING:

- A. PVC plastic pipe: PVC-DWV, ASTM D-2665. All piping located in a return air plenum shall be insulated to meet ASTM E84.
- B. Joints for PVC plastic pipe: Solvent welded, ASTM B-2564.
- C. Install vent stacks through roof. Terminate 12" above finish roof. Flashing is specified under Roofing Section.
- D. Connect to site sanitary 5'-0" from Building. Verify with Civil Site Drawings exact size, location and invert of site sewer prior to beginning work.

2.03 STORM (RAIN WATER) PIPING:

- A. Storm piping to be cast iron.
- B. Cast iron pipe: Cast iron no-hub pipe and fitting. CISPI Standard 301 may be used above slab on grade.
- C. Joints for hubless cast iron pipe and fittings: Hubless pipe and fittings shall be jointed by a heavy-duty coupling. Approved manufacturers: Husky SD 4000, Clamp All 125 or MG Couplings.
- D. Install roof drains where shown. Flashing is specified under Roofing Section.
- E. Connect to site storm sewer as required by local authority. Verify exact location and invert prior to installing any pipe.

2.04 DOMESTIC WATER PIPING:

- A. Domestic Water Piping: Copper tube.
- B. Copper Tube: ASTM C-88, copper water tube, Type "L" hard temper inside building, Type "K" outside building and below slab on grade. Fittings, cast brass or wrought copper water tube fittings, ANSI B-16.18 or B-16.22.
- C. Joints on copper tube:
  - 1. Inside Building: Properly cleaned fluxed and soldered as recommended by manufacturer, using 95-5 solder and 100% lead free flux.
  - 2. Outside Building and below slab on grade: "Sil-Fos".
- D. Provide temporary construction water at site as required.

- E. Connect to water service 5'-0" from building, provided and installed under Civil Section. Verify exact location with Civil Drawings.
  - F. All water piping installed below slab on grade to be type "K" soft copper bent up on both ends with no joints below slab.
- 2.06 NATURAL GAS PIPING:
- A. All gas piping: Black steel. All gas piping below grade, mill-wrapped with fittings field-wrapped with PVC tape, same thickness as millwrapping. Mill wrapping shall be X-TRU coat.
  - B. Black steel pipe, Schedule 40, ASTM A-53. Fittings on pipe 2" and smaller, black malleable iron screwed fittings, ASTM A-197. Fittings on pipe 2-1/2" and larger, welded, using butt welding fittings.
  - C. Joints on screwed pipe made up with Teflon tape applied to male threads only.
  - D. Joints on welded pipe made up with butt welding fittings. Mitering and notching for tees, etc., not permitted. Weldolets are permitted.
  - E. Unions 2" and smaller, black malleable iron screwed, unions 2-1/2" and larger flanged.
  - F. Arrange for tapping of utilities main, service from main to meter and installation as required by local utility. Pay all charges, fees, temporary deposits, etc.
  - G. All gas piping in the 2 psig system, labeled at the beginning, at all gas cocks, at ends and at 4' intervals with labels reading "2 psig". See piping identification for materials.
  - H. Install appliance type regulators as shown on drawings. Regulators shall have vent limiting device as required by local code and local utility, or shall be vented to the exterior as approved by Architect.
  - I. Sleeved gas piping below slab shall be type "K" copper tubing, ASTM B88, with lead free soldered fittings.
  - J. All exposed exterior piping shall be painted with two coats of paint equal to "Tar-Guard" by Sherwin Williams. Coordinate colors with architect.
- 2.07 VALVES:
- A. Domestic Water Piping Valves:
    1. Ball Valves: All bronze, 150 psig WP, chrome plated bar stock ball, full port Teflon seats, stem packing seal and thrust washer, Watts B-6080 or B-6081, Apollo 20-100, Red White 5044F or 5094F, Kitz 56 or 57. Provide valve handle extension to (minimum 1") clear insulation.
    2. Check valves 2" and smaller: All bronze, 125 psig WP, bronze disc, swing check, Stockham B-309, Crane 1342, Nibco S-413-B, Milwaukee 1509, Red White 237, Kitz 14.
    3. Check valves 2-1/2" and larger: Iron body, bronze trim, switch check, 125 psig WP, Stockham G-931, Crane 373, Nibco F-918-B, Milwaukee F2974, Red White 435, Kitz 78.
  - B. Water pressure reducing valves: Watts, Wilkins, or Cash Acme, complete with inlet strainer, unions, inlet and outlet pressure gages and shut-off valve up stream of strainer.
  - C. Natural gas valves: Plug cocks 2-1/2" and larger, Rockwell 143; 2" and smaller, Rockwell 142, A.F.C. or Walworth, lubricated, 175 psi.
  - D. Gas pressure regulator:

1. System Regulator: Equal to Reliance Model 1893 with built-in under and over pressure shut off size and capacity as shown on drawings.
2. Appliance Regulator: Equal to Maxitrol 325-5 on 325-5M complete with vent limiting device. Valve shall be full line size and capacity as shown on Drawings.

## 2.08 PIPE HANGERS:

- A. General: Pipe hangers, Grinnell, PHD, Michigan Hanger, or Elcen. Grinnell figure numbers are given for reference. Provide copper clad hangers on bare copper lines.
- B. Pipe hangers for lines 3" and smaller, adjustable wrought ring hangers, Grinnell Fig. 97 or wrought clevis hangers, Grinnell Fig. 260.
- C. Pipe hangers for lines 4" and larger, adjustable wrought clevis hangers, Grinnell Fig. 260.
- D. Parallel piping graded in same direction may be grouped on trapezes. Trapezes for line 4" and smaller, Unistrut P2000 channel, or equal, with rods sized as specified below for largest pipe on trapeze. Guide lines on (but not anchor to) trapezes using Unistrut Series P1100 clamps. Trapezes shall not exceed 3' in length. Space lines to allow at least 3" clear between adjacent pipe or pipe covering and between pipes or pipe covering and rods. Space trapezes as specified for pipe hangers based upon smallest size of pipe on trapeze.
- E. Provide riser clamps on pipe risers on each floor. Clamps in contact with copper or plastic pipe, plastic coated.
- F. Beam Clamps: Grinnell Fig. 229.
- G. Inserts for hangers in concrete structures: Underwriter's listed cast iron inserts. Grinnell Fig. 282.
- H. For fasteners in existing concrete structures use drilled in expansion anchors with load rating at least 150% of pipe hanger rating (power driven anchors are not acceptable).
- I. Size rods for pipe hangers not smaller than the following: 3/8" rods for pipe up to 2", 1/2" for 2-1/2" and 3" pipe, 5/8" rods for 4" and 5" pipe, 3/4" rods for 6" pipe, and 7/8" rods for 8" and 10" and 12" pipe, 1" rods for 14" and 16" pipe and 1-1/8" rods for 18" pipe.
- J. Space pipe hangers at maximum: 5' intervals for cast iron pipe with additional hanger at each fittings. Pipe hanger spacing for screwed, solder joint and welded piping: 1/2", 6 ft.; 3/4" to 1-1/4", 8 ft.; 1-1/2" to 2-1/2", 10 ft.; 3", 12 ft.; 4" to 6", 14 ft.; 8" and over, 16 ft. Polypropylene and PVC plastic pipe 4 ft. horizontally maximum or as directed by manufacturer if closer, and 10 ft. vertically. Install additional hangers at change of direction and valve clusters.
- K. Install pipe hangers on insulated pipe over pipe covering. Provide sheet metal saddle under hanger length to be 1-1/2 times the pipe diameter, minimum 12" long.

On sanitary and storm piping requiring insulation, hanger may be installed directly on pipe and insulation installed over hanger.

## 3.00 EXECUTION:

### 3.01 PIPE INSTALLATION:

- A. All piping shall be securely anchored in place to the Building Structure.
- B. Cut pipe square and ream full size after cutting. Clean pipe. Make threaded joints with Teflon tape. Do not spring pipe into place.
- C. Provide welding material and labor in accordance with the welding procedures of the Heating,

Piping, and Air Conditioning Contractor's National Association or other approved procedure conforming to the requirements of ANSI B-31.9 "Building Service Piping". Employ only welders fully qualified in the above specified procedure and currently certified by recognized testing authority. Use either electric arc or oxyacetylene welding. Provide full perimeter welds at both face end and collar end of each slip-on flange.

- D. Install piping to allow for expansion. Make connections to all equipment to eliminate undue strains in piping and equipment. Furnish necessary fittings and bends to avoid spring of pipes during assembly.
- E. Install chrome plated floor and ceiling plates on pipe passing through finished surfaces in finished spaces.
- F. Make pipe size reductions using reducing fittings. Bushings are prohibited.
- G. Install 3/4" ball or gate valve drains with hose adapters at low points of water piping and at bases of all risers or where shown provide large drains.
- H. Make connections to equipment using screwed unions in sizes 2" and smaller and flanged unions in sizes 2-1/2" and larger. Install unions in all piping connections to each piece of equipment.
- I. Wherever ferrous pipes or tanks and copper tubing connect, provide dielectric insulation unions or couplings, equal to EPCO.
- J. Run piping concealed, except where specifically shown or specified exposed. Plumb all vertical lines and run mains parallel to building walls unless specifically shown otherwise.
- K. Lay underground pressure piping so top of pipe is at least 18" below finished grade. Provide deeper bury if required by local regulations. Support all underground piping solidly along body of pipe. Strongly suspend other piping from building construction.
- L. Run no piping or tubing in direct contact with slag fill. Where necessary to pass through slag, protect piping with not less than two (2) wrappings of polyvinyl chloride tape or equivalent protection approved by Architect.
- M. Install shock arrestors as manufactured by J. R. Smith, Josam, Zurn or Wade as required by the IPC Plumbing Code and where indicated on drawings. Size in accordance with manufacturer requirements.

### 3.02 INSTALLATION OF VALVES:

- A. Provide shut-off valves where shown and detailed on Drawings. Locate valves to isolate each item to facilitate maintenance and/or removal.
- B. Locate valves in piping connections to water heaters, etc., so heads and tube bundles can be removed without disconnecting equipment or piping other than union or flange connections immediately adjacent to heat exchangers.
- C. Provide sweat to screw adapters where required.
- D. In Buildings with water pressure exceeding 80 psig, provide and install a water pressure reducing valve(s) immediately upon entering building or as shown on Drawings. The P.R.V. shall be line size and have an integral strainer or separate WYE strainer up stream of P.R.V. Provide a ball or gate valve immediately upstream of P.R.V. and strainer.

1.00 GENERAL:

1.01 SCOPE:

- A. Include Section 15410 "GENERAL PROVISIONS - PLUMBING", with this Section.
- B. Repair existing insulation at points of connection to existing work.
- C. "Exposed" is defined as: Exposed to view when construction is complete. Items which are not "exposed" are "concealed".
- D. Insulate all items subject to sweating or loss of heat.
- E. All insulation shall be installed by licensed applicator and applied in accordance with the Manufacturer's Recommendations.

1.02 INSULATION REQUIREMENTS:

- A. Comply with NFPA 90A.
- B. Pipe hanger saddles are specified in Section 15450 "MATERIALS AND METHODS - PLUMBING"
- C. Use insulation and adhesives with Underwriter's Laboratories flame spread rating not over 25 without evidence of continued progressive combustion, and smoke developed rating not exceeding:
  - 1. 50 for pipe covering located in air ducts, plenum or casing.
  - 2. 150 for all other pipe, and equipment insulation.

2.00 PRODUCTS:

2.01 FIBERGLASS PIPE COVERING:

- A. Snap-on glass fiber insulation minimum density 5#/cu. ft. maximum thermal conductivity at 75°F mean temperature 0.25 BTU/(hr) (sq. ft.) (°F/in.) with UL rated vinyl coated and embossed vapor barrier laminate of aluminum foil and kraft reinforced with glass fiber yarns (ASJ).
- B. For all lines seal jacket with self sealing lap and staple with outward clinching staples 3" o.c. Butt adjoining sections of insulation tightly and seal with self-adhering butt joint strips.
- C. Cover fittings to thickness of adjacent covering with factory pre-molded fitting covers. Cover flanged valve bodies with flanged unions. Do not cover screwed unions on hot lines. Finish fittings with a skim-coat of insulating cement and when cement is dry fitting shall be covered with glass fab and vinyl acrylic mastic. Finish fittings exposed in equipment rooms, boiler room, and in finished spaces with vinyl acrylic mastic over glass fab.
- D. At Contractor's option, concealed tees may be insulated with field fabricated tee covers consisting of straight pipe covering on run of tee with notch at branch together with pipe covering on branch contoured to fit notch. Glass fab shall be applied around main, lapping contoured joint at branch by 1" minimum for the full circumference of joint. Cover entire fitting covering with vinyl- acrylic mastic over glass fab, 1/8" thick (dry) coat. Submit sample of fabricated tee covering to Architect for approval before work is begun.

2.02 ALUMINUM JACKET PIPING COVER:

- A. 0.010" thick corrugated aluminum jacket with laminated polyethylene and draft paper adhered liner.

- B. Securely rivet jacket in place and band with flat aluminum bands 18" o.c.
- C. Finish fittings on aluminum jacketed lines with 1/8" thick (dry) coat of vinyl acrylic mastic reinforced with glass cloth.

## 2.03 MANUFACTURERS

- A. Acceptable Manufactures for Fiberglass Insulation Materials:
  - 1. Owens-Corning.
  - 2. Certaniteed.
  - 3. Knauf.
  - 4. Manville Corporation
- B. Acceptable Manufacturers for Foamed Plastic Closed Cell Elastometric Insulation Materials:
  - 1. Armstrong AP.
  - 2. Rubatex.
- C. Acceptable Manufacturers for Adhesives, Mastics and Coatings:
  - 1. Armstrong.
  - 2. Benjamin Foster.
  - 3. Childers.
  - 4. Marathon.
- D. Acceptable Manufacturers for Metal Jackets:
  - 1. Childers.
  - 2. Manville Metal-Loc.

## 2.04 SCHEDULES - PIPING

- A. Plumbing Piping:
  - 1. Domestic Cold Water Interior, Above Grade:
    - a. Glass Fiber Pipe Insulation
      - 1) All pipe sizes: 1 inch thick.
      - 2) Pipes located in walls: ½ inch thick.
    - b. Foamed Plastic Pipe Insulation
      - 1) All pipe sizes: 1 inch thick.
      - 2) Pipes located in walls: ½ inch thick.
  - 2. Domestic Hot and Recirculating Water Interior, Above Grade:
    - a. Glass Fiber Pipe Insulation
      - 1) All pipe sizes: 1-1/2 inch thick.
      - 2) Pipe located in walls: 1 inch thick.
    - b. Foamed Plastic Pipe Insulation
      - 1) All pipe sizes: 1 inch thick.
      - 2) Pipes located in walls: ½ inch thick.
  - 3. Floor Drain Bodies, Traps and Waste Piping Between Floor Drain and Waste Stack for Floor Drains Serving Refrigeration Equipment, Ice Machine and AC Units; Interior, Above Grade:
    - a. Glass Fiber Pipe Insulation
      - 1) All pipe sizes: 1 inch thick.

## 2.05 INSTALLATION – EQUIPMENT INSULATION GENERAL

- A. Install in accordance with NAIMA Insulation Standards.
- B. Factory Insulated Equipment: Do not insulate.
- C. Exposed Equipment: Locate insulation and cover seams in least visible locations.

- D. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires or bands.
  - E. Fill joints, cracks, seams and depressions with bedding compound to form smooth surface. On cold equipment, use vapor barrier cement.
  - F. Insulated equipment containing fluids below ambient temperature: Insulate entire system.
  - G. Finish insulation at supports, protrusions, and interruptions.
  - H. Equipment in Mechanical Rooms or Finished Spaces: Finish with canvas jacket or as scheduled.
  - I. Nameplates and ASME Stamps: Bevel and seal insulation around; do not insulate over.
  - J. Equipment Requiring Access for Maintenance, Repair, or Cleaning: Install insulation so it can be easily removed and replaced without damage.
  - K. Install in accordance with NAIMA National Insulation Standards.
  - L. Exposed Piping: Locate insulation and cover seams in least visible locations.
  - M. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
  - N. Fit pipe hangers over insulation.
  - O. Inserts and Shields:
    1. Application: Protect insulated piping at hangers and supports with insulation shield. On pipe sizes over 2 inches, provide insert.
    2. Insulation Protection Shield: Galvanized steel formed in half circle to fit insulation. Length and gauge as follows:
      - a. Up to NPS 4: 12 inches long and 22 gauge.
      - b. NPS 6: 18 inches long and 22 gauge.
      - c. NPS 8 through 12: 24 inches long and 18 gauge.
      - d. NPS 14 and Large: 24 inches long and 16 gauge.
    3. Insulation-Insert Material: Water repellent treated, ASTM C533, Type I calcium silicate; or ASTM C552, Type II cellular glass of same thickness and vapor barrier jacket specified for surrounding insulation. Insert shall be a minimum of 2 inches longer than the shield.
    4. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
    5. For Clevis Hangers: Insert shall cover lower 180 degrees of pipe.
    6. Option: At Contractor's option, insert may be factory fabricated Thermal Hanger Shield (insulation insert encased in sheet metal shield) equal to Pipe Shield, Inc. "Insulated Pipe Supports."
  - P. Continue insulation through metal studs, walls, sleeves, pipe hangers, and other pipe penetrations. Finish firestopping at supports, protrusions, and interruptions. At fire separations, refer to Division 7 and Section 15410: Sleeves.
  - Q. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.
- 3.00 EXECUTION:
- 3.01 PLUMBING PIPING INSULATION:
- A. Bodies of floor drains serving refrigeration equipment, AC units and ice machines and traps and waste piping between such drains and waste stack: "Fiberglass Pipe Covering". 1" thick.
  - B. Cold water piping, interior, above grade: "Fiberglass Pipe Covering", 1" thick. Pipe insulation in



partitions and chases may be 1/2" thick "Arma-cell" or approved equal.

- C. Hot and Hot Water Return water piping, interior, above grade: "Fiberglass Pipe Covering", 1-1/2" thickness. Pipe insulation in partitions and chases may be 1" thick "Arma-cell" or approved equal.
- D. All horizontal storm piping and roof/overflow drain bodies: "Fiberglass Pipe Covering", 1" thick.
- E. Exposed P-Traps, stops and supplies on handicapped lavatories, and sinks. Equal to "PRO-WRAP" by McGuire.

FIXTURES AND EQUIPMENT - SECTION 15490

1.00 PRODUCTS:

1.01 SCOPE:

- A. Include Section 15410, "GENERAL PROVISIONS - PLUMBING ", with this Section.
- B. Pay particular attention to requirements in the General Provisions for substitution of products not named or listed as substitutions.

2.00 PRODUCTS:

2.01 CLEANOUTS:

- A. Furnish and install cleanouts where indicated on drawings and at all 90-degree bends, angle, upper terminals and not over 50 feet apart on straight runs. All cleanouts to have bronze countersunk tapered slotted plugs, except acid waste piping cleanouts, which shall be standard of piping system used. Flush-with-floor cleanout access covers shall have non-skid covers. All wall cleanout access covers shall have polished satin finish. All cleanouts shall be full size of pipe, piping larger than 6" shall have minimum 6" cleanout covers.
- B. Exposed Cleanouts: Cast brass plug type, J.R. Smith #4470.
- C. Wall type cleanout plug and access covers, J.R. Smith #4472. Cleanout plug must be within 1" of finish wall and must be tapped for access cover.
- D. Install wall cleanouts on stacks at flush valve fixtures 12" above top of flush valve, 12" above finish floor on sinks, lavatories and water coolers and 12" above grab bars at fixtures with grab bars. Locate cleanouts to clear baseboard at floor.
- E. Floor type cleanout access covers: J.R. Smith #4248-NB. Plug must be within 3" of finished floor. Grout cleanout below access cover to seal watertight.
- F. Outside Cleanouts: J.R. Smith #4258 cleanout access encased in a 18" X 18" X 6" deep concrete pad. See Detail on Drawings.

2.02 REDUCED PRESSURE ZONE BACKFLOW PREVENTER AND DOUBLE CHECK VALVE ASSEMBLIES:

- A. One (1) inch and larger: Equal to Watts #909 with gate valves and inlet strainer. Provide additional valve upstream of strainer. Clayton, Beeco, Febco, Conbraco, Wilkins or equal. Provide same size as piping.
- B. One-half (1/2) inch and three-fourth (3/4) inch: Watts #9D, Wilkins #750, same size as pipe.
- C. Pipe relief from backflow preventer full size to nearest floor drain. Provide factory made air gap for relief connection.
- D. Double check valve assemblies: Watts, Clayton or Beeco.

2.03 PLUMBING FIXTURES AND EQUIPMENT:

- A. All "wetted" domestic potable fixtures, piping materials, valves shall meet the Federal Lead Free Guidelines. All materials shall be clearly marked and submitted with complete data during submittal review.
- B. Unless otherwise specified, all fixtures complete as catalogued, commercial grade, white color, exposed metal trim chromium plated.

- C. Fixtures and brass shall be securely anchored. Carriers shall be securely anchored to floor with lug bolts in all holes as recommended by the manufacturer.
- D. Flush valve "YJ" supports shall be installed 1" below vacuum breaker on all water closet flush valves and around vacuum breaker on urinals.
- E. Seal all fixtures at wall and floor with white silicone sealant. Seal countertop fixtures with clear silicone sealant.
- F. Mount all fixtures at standard mounting height unless otherwise noted.
- G. Furnish sinks and lavatories with correct number of drilling required by the faucet and accessories. Cock hole covers are not acceptable.
- H. All items complete as catalogued as shown on drawings:

2.04 SUBSTITUTE MANUFACTURERS:

- A. Where Kohler is listed above, Crane, Eljer, American Standard or Zurn may be substituted.
- B. Where J.R. Smith is listed above, Josam, Zurn or Wade may be substituted.
- C. Where Elkay water coolers are mentioned above, Halsey Taylor, or Oasis may be substituted, only if water ways are constructed of totally lead free materials.
- D. Where McGuire is listed above for traps, outlets and stops, EBC, Kohler, Crane, Eljer or American Standard may be substituted.
- E. Where Symmons is listed above, Chicago Faucet or Powers, Zurn may substituted.
- F. Where Chicago Faucet is listed, T&S Brass may be substituted.
- G. Where Elkay sink (s) are listed above, Just may be substituted.
- H. Where Church is listed above, Bemis, Beneke or Centoco may be substituted.
- I. Where Lochinvar tank type water heaters are listed, A.O. Smith or Rheem may be substituted.
- J. Where Stern Williams is listed above, Fiat may be substituted.
- K. Where Sloan is listed, Toto and Zurn may be substituted.
- L. Where Symmons is listed above for shower control valves, Speakman, Leonard, Powers, T&S or Zurn may be substituted.
- M. Where Armstrong is listed above, the equal of B & G, Taco, Grundfos or Thrush may be substituted.

3.00 EXECUTION:

3.01 INSTALLATION:

- A. Equipment shall be installed in accordance with manufacturer's recommendation.
- B. See details for mounting instruction and accessories.
- C. Install electric water heaters so elements can be removed without disconnecting and/or removing heater.

- D. Cleanouts on water closet stacks shall be installed minimum 12" above top of the flush valve on standard water closets, minimum 12" above top of grab bar on handicapped water closets and minimum 12" above top of tanks on non-handicapped tank type water closets. On urinal locate cleanouts minimum 12" above top of flush valve on handicapped urinals and 12" above finish floor on standard units. On lavatories and sinks - 12" above finish floor and all other fixtures 12" above floor or above top of fixture.
- E. Stops and supplies are to be installed with chrome plated brass nipples penetrating wall with deep escutcheon at wall. Compression type stops are not acceptable.
- F. All floor mounted fixtures supports are to be securely attached to the floor using anchors in all mounting hole of size as recommended by manufacturer.
- G. Provide wood backing in wall at all flush valve brackets and faucet supports and anchor brackets and supports to wood backing with anchors of sufficient length to penetrate backing.
- H. Handicapped flush valve shall be installed with the pull handle on the open side or side opposite the adjacent wall.

**NEW SOFTBALL COMPLEX FOR  
TRUSSVILLE CITY SCHOOLS  
(#23-72)**

**PROJECT NO. 23129**

**MARCH 2024**

**STEWART ENGINEERING, INC.  
ELECTRICAL CONSULTANTS**

**PHONE (256) 237-0891**

**ANNISTON, ALABAMA 36202**



## ELECTRICAL - SECTION 16000

### 1.0 GENERAL

#### 1.1 Related Documents

The general provisions of the contract, including General Conditions and General Requirements, apply to the work specified in this section.

#### 1.2 Description of Work

Furnish all labor and materials required to complete the electrical work indicated on drawings or herein specified. Major work included in this section shall be:

- A. Arrange with local utility companies for providing such electrical and electronic services as indicated or herein specified. Pay to utility companies any charges associated with providing these services.
- B. Remove or relocate all electrical or electronic services located on or crossing through the project property, either above or below grade, which would obstruct the construction of the project or conflict in any manner with the completed project or any code pertaining thereto.
- C. Furnish and install complete electrical light and power system.
- D. Connect all meters, switchboards, panelboards, circuit breakers, power outlets, convenience outlets, switches and/or other equipment forming part of the system.
- E. Connect all electrical equipment mentioned in this section or noted on drawings, whether furnished by Electrical Contractor or by others.
- F. Furnish and install all disconnect switches not included as integral part of equipment.
- G. Furnish and install complete sports field lighting system.
- H. Furnish and install outlet boxes, faceplates, conduit raceways, cable, data outlet faceplates and jacks, patch panels, IDF Racks, termination connectors and all other equipment needed for complete Computer Cabling System.
- I. Procure and pay for permits and certificates as required by Local and State Ordinances and Fire Underwriters Certificate of Inspection.
- J. Visit the Site and determine conditions which affect this contract. Failure to do so will in no way relieve contractor of his responsibility under this contract.
- K. Submit to Architect a Certificate of Final Inspection from local Inspection Department along with assurance of completion of any items on this list.

#### 1.3 Qualifications of Electrical Subcontractor

The Electrical Subcontractor shall meet the following qualifications:

- A. In business as an Electrical Contractor for two (2) years prior to the date of opening bids. Employees of a General Contractor will not be acceptable for work for this Section.
- B. Have completed at least five (5) projects with Electrical installations of character and scope

comparable with this project. Contractor must supply list of projects, with the project shop drawings, for approval. If Contractor uses subcontractor for any portion of project, the name of this subcontractor must be submitted, along with similar project list, for approval.

- C. If Electrical Subcontractor proposes to use any other Subcontractor for any part of the work, these Subcontractors shall also meet the above qualifications before bid is acceptable.
- D. If Subcontractor's office is located more than 75 miles from jobsite, he shall submit the name of a service company with a 20-mile radius of the jobsite, for approval, who will be responsible through him for service required during the warranty period.

#### 1.4 Drawings

- A. Drawings indicate diagrammatically extent, general character and approximate location of work. Where work is indicated but with minor details omitted, furnish and install it complete so as to perform its intended function. For Building Details and Mechanical Equipment follow Architectural, Structural and Mechanical Drawings and fit electrical work thereto.
- B. Take finish dimensions at Job in preference to scale dimension.
- C. Except as above noted, make no changes in or deviations from work as shown or specified except on written order of Architect.

#### 1.5 Manufacturers Drawings and Data

- A. Within twenty (20) days after award of contract submit six (6) copies of Manufacturer's drawings to Architect for review of the following items. Partial submittals will be acceptable. Shop drawings of a specified item or system to be in one submittal:
  - 1. Sports Field Lighting Fixtures
  - 2. Sports Field Light Poles
  - 3. Disconnects
  - 4. Lighting Control Panels and Equipment
  - 5. Computer Cabling
  - 6. Panelboards
  - 7. Light Fixtures
  - 8. Sports Field Sound System
  - 9. List of five (5) projects that Contractor (and any sub-contractor) has completed similar in size and capacity to this project
- B. Drawings of power equipment to contain exact details of device placement, phasing and numbering in elevation form. They shall also contain elevation view of front panelboard/switchboard outside cover.
- C. See Section 01350 – Administrative Requirements, for submittal procedures.

#### 1.6 Progress of Work

- A. Cooperate with other crafts and schedule work as needed. Do not delay other trades. Maintain necessary competent mechanics and supervision to provide an orderly progression of the work.
- B. Be informed as to equipment furnished by other trades but not liable for added cost incurred by equipment substitutions made by others above wiring indicated on drawings.

1.7 Insurance

- A. This Contractor to carry Workman's Compensation Insurance and Public Liability Insurance and save Owner free from damage from suits arising out of the performance of this contract.

1.8 Protection of Persons and Property During Construction

- A. Take all precautions to provide safety and protection to persons and protection of materials and property as necessary, including protection from injury from rotating or moving equipment, tools, hot surfaces, holes, shafts, falling objects, electrical energy and all other potential hazards. Erect signs, barricades, warning lights, instruct workmen and others who may be subject to construction hazards.
- B. Protect items of equipment from stains, corrosion, scratches and any other damage or dirt, whether in storage at job site or installed. No damaged or dirty equipment, lenses or reflectors will be accepted.

1.9 Service Entrance

- A. Main service shall be as shown on drawings. Verify with the local utility company that the location, arrangement, voltage, phase and connections to utility service as well as required metering equipment are coordinated with and in accordance with requirements of the local utility company. If their requirements are at variance with these drawings or specifications, the contract price shall include any additional cost necessary to meet those requirements without extra cost to the Owner after contract is entered into. Notify Architect of any changes required before proceeding with work.

1.10 Cleaning Up

- A. During the progress of the work keep the Owner's premises in a neat and orderly condition, free from accumulation of debris resulting from this work and at completion of the work, remove all material, scrap, etc., not a part of this contract.

1.11 Operating and Maintenance Instructions

- A. Turn over to Architect one set of marked "as built" drawings, one set of all equipment catalogs and maintenance data and one set of shop drawings on all equipment requiring same. Explain and demonstrate electrical systems to Owner's representative.

1.12 Guarantee

- A. Guarantee that all work executed under this section will be free from defects of workmanship and materials for a period of one year from date of final acceptance of this work. Promptly repair, replace or otherwise make good, any defect becoming apparent during this period, upon notification and at no charge to Owner.
- B. See Section 01910 – Closeout Submittals, for additional warranty requirements.

1.13 Temporary Systems

- A. The Electrical Contractor shall be responsible for the furnishing and installation of all equipment and materials necessary for providing temporary power required by all trades during construction. All temporary wiring shall be installed so as not to interfere with the



new construction and shall be made in a safe and approved manner.

- B. It shall be the responsibility of the Electrical Contractor to visit the site prior to submitting bid and thoroughly review all existing conditions affecting the temporary system requirements.

## 2.0 PRODUCTS

### 2.1 Standard of Materials

- A. All materials shall be new and listed by the Underwriters' Laboratories as conforming to these standards.
- B. Material substitutions will be considered only when evidence of equality and suitability, satisfactory to the Architect, has been presented in writing, with samples, if requested by the Architect. All proposed substitutions shall be approved in writing at least five days prior to bid date.
- C. It shall be understood that the Architect has the authority and may reject any material or equipment not specified or approved, or showing defects of manufacturer or workmanship, before or after installation.

### 2.2 Conduits

- A. Rigid: To be mild steel piping, galvanized inside and outside, and conform to ASA Specification C80.180.1 and Underwriters' Laboratories Specifications. By Sprang, Republic, Wheatland, Triangle or Pittsburg.
- B. Intermediate Metal Conduit: Shall be hot dipped galvanized inside and outside, and manufactured in accordance with U.L. Standard #6 or #1242. By Allied or approved equal.
- C. E.M.T.: To be of high-grade steel electro-galvanized outside and lacquer or enamel coating inside and conform to ASA Specification C80.1 and Underwriters' Laboratories Specifications. By Sprang, Republic, Wheatland, Triangle or Pittsburg.
- D. PVC: To be of high impact PVC Schedule 40 and conform to Underwriters' Laboratories Standard UL-651. PVC to be used only where indicated on drawings. By Pittsburg, R. G. Sloane or Carlon.

### 2.3 Couplings and Connectors

- A. Rigid & IMC: By Raco, Efcor, Republic or Appleton.
- B. E.M.T.: All steel raintight type. Pressure indented type or cast metal will not be approved. All connectors to be insulated. By Appleton, Raco or Efcor.
- C. PVC: To be of high impact PVC Schedule 40. Joints to be made with PVC solvent cement as recommended by manufacturer. By Pittsburg, R.G. Sloane or Carlon.

### 2.4 Bushings

- A. All rigid bushings 1 1/4" and larger shall be the insulated grounding type. All other bushings shall be OZ. Mfg. Co., Type B or Efcor Type 55 insulated metallic type or by Sylvania.

2.5 Conduit Seals

- A. All conduit seals for wall, floor or ceiling penetrations shall be by 3M Company or approved equal.

2.6 Conduit Accessories

- A. Conduit clamps and supports by Efcor, Steel City or G. A. Tinnerman. Conduit fittings by Pyle-National, Crouse-Hinds and Appleton.

2.7 Building Wire

- A. Conductors shall have current carrying capacities as per N.E.C. and with 600-volt insulation THW #12 minimum. Conductors #3 and smaller to be copper. Conductors #2 and larger to be copper unless specifically indicated aluminum on drawings. Insulation for conductors to be N.E.C. Type THW for #3 and smaller. Insulation for conductors #2 and larger shown in cable specifications. By Phelps-Dodge, Rome, Simplex, General Cable, Okonite or Anaconda.

2.8 Cable

- A. Conductors for 0-600 volts shall have copper, current carrying capacities as per N.E.C. with cross-linked polyethylene insulation and thickness to IPCEA standards, and U.L. Standard #44. Rated for wet and dry locations. Type THW or THWN. By Phelps-Dodge, Rome, Simplex, General Cable, Okonite or Anaconda.

2.9 Fixture Wire

- A. Conductors for fixtures of 300 watts or less shall be #16 type TFN, for fixtures of more than 300 watts #14 type TFN shall be used. Conductors in channel of fluorescent fixtures shall be type THHN or RHH. Conductors shall be either Phelps-Dodge, Anaconda, Rome or General Cable.

2.10 Control and Signal System Wire

- A. Type TFF minimum size #16 copper and fully color coded. Conductors by Phelps-Dodge, Anaconda, Rome or General Cable.

2.11 Junction Boxes (thru 4-11/16")

- A. Sheet Metal: To be standard type with knockouts made of hot dipped galvanized steel by Steel City, Raco, Appleton or approved equal.
- B. Cast: To be type FS, FD, JB, GS or SEH as required for application.
- C. Junction and Pull Boxes (larger than 4-11/16"): To be cast aluminum for all below grade exterior use and where shown all other shall be oil tight, JIC boxes not less than 16 gauge. Hoffman type "CH" Boxes.

2.12 Gutters

- A. Up to and including 8" x 8" shall be a standard manufacturer's item as manufactured by Square D, ITE or B & C Company. Special gutters shall be made of code grade galvanized sheet steel with hinged covers having approved fastening devices. At each location shown

for gutters, install a wood backboard not less than 3/4" thick, paint 2 coats of gray enamel, mount all equipment thereon. Conductors serving a gutter shall be extended without reduction in size for the entire length of the gutter. Tap-offs to the switches and other items serviced by the gutter shall be made with Penn-Union and Anderson compression connectors for aluminum conductors. Properly tape and insulate.

#### 2.13 Outlet Boxes

- A. Standard type with knockouts made of hot dipped galvanized steel. Ceiling outlet boxes shall be 4" octagon 1-1/2" deep or larger if required due to number of wires.
- B. Boxes shall be provided with approved 3/8" fixture studs where required. Except when located in exposed concrete block switch and receptacles boxes shall be 4" square for single gang installation. Appropriate gang boxes shall be used for mounting ganged switches. Use Raco square block boxes for exposed block walls. By Steel City, Raco, National or Appleton.

#### 2.14 Safety Switches

- A. Furnish and install safety switches as indicated on the drawings. Switch to be NEMA Heavy Duty type HD and Underwriters' Laboratories listed. Safety switches to be G.E., Cutler Hammer, Sylvania or Square D Heavy Duty type.
- B. Appropriately identify each safety switch by engraving micarta name plate.

#### 2.15 Fuses

- A. Branch feeder fuses to be Bussman Manufacturing Company dual element and fusetron. Main switch fuses to be Bussman Manufacturing Company dual Hi-Cap. Fuses to be used only where indicated on drawings. Equals by Littell Fuse accepted.

#### 2.16 Manual Motor Switches

- A. Thermal overload protection to be provided for single phase motors by manual switches with overload units rated as required by specific motor to be served. Manufactured by Cutler Hammer or Square D with NEMA Type 1 enclosure.

#### 2.17 Wiring Devices

- A. Switches shall be A.C. type as made by Hubbell, P & S, Sierra, Bryant, Slater or Arrow Hart as shown on the drawings.
- B. Receptacles shall be Hubbell, Bryant, P & S, Sierra, Slater or Arrow Hart as shown on the drawings.
- C. Wiring devices shall be gray with stainless steel plates, beige with brass, ivory with ivory bakelite, brown and brown bakelite.

#### 2.18 Special Purpose Receptacles

- A. Special purpose receptacles (other than 120V, 20A) shall be complete with a matching cord grip cap of the same manufacturer. See plans for special receptacles required in various locations.

## 2.19 Floor Outlets

- A. Floor outlets shall be an adjustable, galvanized floor box finished with accessories as required for a complete installation for power or communications. Except as identified otherwise on the plans, use Type "A" outlets as follows:
1. Type "A" Outlet: Power outlets shall be Hubbell #2429 floor box finished with #S-2425 brass plate, #SC-3091 service fitting, receptacle and required accessories. Signal outlets shall be the same except #SC-3090 service fitting.
  2. Type "B" Outlet: Power outlets shall be Hubbell #2429 floor box finished with #S-3825 brass plate and complete with duplex receptacle and required accessories. Signal outlets shall be the same, less receptacle and with #S-2425 plate and #S-3086 nozzle furnished to the Owner.
  3. Type "C" Outlet: Power outlets shall be Hubbell #B-2529 floor box furnished with #S-3042 carpet flange and #S-3040 service fitting with duplex receptacle. Signal outlets shall be the same, except with #S-3041 service fitting.
- B. Where equipment is to be connected above floor level, delete service fitting and nipple or flex to connection from threaded brass floor plate.

## 2.20 Finishes

- A. All electrical items (device and telephone plates, junction, floor outlets, under-floor duct junctions, outlets, and other miscellaneous items) to match finish of building hardware in area installed. Unfinished areas with exposed conduit, shall have surface mounted boxes, gray switches and outlets, galvanized metal plates with beveled edges. All outlets to be gray with stainless steel plates.

## 2.21 Fixtures

- A. Fixtures shall be furnished as shown in fixture schedule on drawings. It shall be specifically the responsibility of this Contractor to verify exact type ceiling and recessing depth of all recessed fixtures, prior to any purchasing of fixtures. Stems shall be approved ball aligner type swivel 30 degrees from vertical and swivel below canopy. Paint stems same color as fixture trim. Stems in unfinished areas to be unpainted conduit.

## 2.22 Ballasts

- A. Ballasts shall be (General Electric Maxi Miser II or approved equal by Jefferson, Universal or Advance) (electronic, rapid start, parallel wired with total harmonic distortion of less than 20%. Ballast must be approved by E.T.L. and have a noise level rating in accordance with I.E.S. recommendations. Use ballasts approved for the use in fire-rated ceilings. Provide fuse for each individual ballast. (Ballasts shall be by Advance, Motorola or Magnetek).

## 2.23 Lamps

- A. Furnish and install 125 volts inside frosted incandescent lamps of proper wattage for all outlets so designated on the drawings. Lamps to be G.E. Company, Sylvania, or Phillips.
- B. Furnish and install fluorescent, mercury vapor and quartz lamps of proper size and type as shown on drawings. Lamps to be G.E. Company, Sylvania or Phillips. (Fluorescent lamps shall be F32T8/SP35 with a minimum CRI of 75.)

- C. All lamps shall be installed new, immediately prior to final inspection, and shall not be used for construction purposes.

#### 2.24 Guarantee and Warranty - Lamps

- A. The guarantee and warranty shall apply to lamps as follows:
  - 1. LED Fixtures: Per manufacturer's warranty period for LED driver.
- B. Guarantees shall begin from date of final acceptance.

#### 2.25 Panelboards

- A. Furnish and install circuit breaker lighting panelboards as indicated in the panelboard schedule and where shown on the plans. Panelboards shall be equipped with thermal-magnetic molded case circuit breakers with frame and trip ratings as shown on the schedule.
- B. Circuit breakers shall be Square D type QOB (bolt-on) thermal-magnetic, molded case circuit breakers. Breakers shall be 1, 2 or 3-pole with an integral crossbar to assure simultaneous opening of all poles in multipole circuit breakers. Breakers shall have an overcenter, trip-free, toggle-type operating mechanism with quick-make, quick-break action and positive handle indication. Handles shall have "ON", "OFF" and "TRIPPED" positions. In addition, trip indication shall include a VISI-TRIP indicator appearing in the window of the breaker case. Bolt-on (NQOB) circuit breakers shall be able to be installed in the panelboard without requiring additional mounting hardware. Circuit breakers shall be UL listed in accordance with UL Standard 489 and shall be rated 240 volts ac maximum with continuous current ratings as noted on the plans. Interrupting ratings shall be 65,000 rms symmetrical amperes maximum at 240 volts ac maximum. Single pole, 15 and 20 ampere circuit breakers intended to switch fluorescent lighting loads on a regular basis shall carry the SWD marking.
- C. Panelboard bus structure and main lugs or main circuit breaker shall have current ratings as shown on the panelboard schedule. Such ratings shall be established by heat rise tests, conducted in accordance with UL Standard 67. Bus structure shall be insulated. Bus bar connections to the branch circuit breakers shall be the "distributed phase" or phase sequence type and shall accept bolt-on (NQOB) circuit breakers. All current carrying parts of the bus structure shall be plated.
- D. The panelboard bus assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel to be as specified in UL Standard 50 for cabinets. Wiring gutter space shall be in accordance with UL Standard 67 for panelboards. The box shall be fabricated from galvanized steel or equivalent rust resistant steel. Each front shall include a door and have a flush, cylinder tumbler-type lock with catch and spring-loaded stainless steel door pull. All panelboard locks shall be keyed alike. Fronts shall have adjustable indicating trim clamps which shall be completely concealed when the doors are closed. Doors shall be mounted with completely concealed steel hinges. Fronts shall not be removable with door in the locked position. Each front shall be furnished with a "hinged trim" accessory. Column width fronts shall have exposed hinges and be screw cover type. A circuit directory frame and card with a clear plastic covering shall be provided on the inside of the door.

- E. Each panelboard, as a complete unit, shall have a short circuit current rating equal to or greater than the integrated equipment rating shown on the panelboard schedule or on the plans. This rating shall be established by testing with the overcurrent devices mounted in the panelboard. The short circuit tests on the overcurrent devices and on the panelboard structure shall be made simultaneously by connecting the fault to each overcurrent device with the panelboard connected to its rated voltage source. Method of testing shall be per Underwriters Laboratories Standard UL 67. The source shall be capable of supplying specified panelboard short circuit current or greater. Testing of panelboard overcurrent devices for short circuit rating only while individually mounted is not acceptable. Also, testing of the bus structure by applying a fixed fault to the bus structure alone is not acceptable. Panelboards shall be marked with their maximum short circuit current rating at the supply voltage and shall be UL listed.
- F. Panelboards shall be listed by Underwriters Laboratories and bear the UL label. When required, panelboards shall be suitable for use as service equipment. Panelboards shall be by Square D, General Electric, Siemens, or Eaton (Cutler Hammer).

#### 2.26 Distribution And Power Panels

- A. Furnish and install distribution and power panelboards as indicated in the panelboard schedule and where shown on the plans. Panelboards shall be deadfront, safety type equipped with thermal-magnetic, molded case circuit breakers with trip ratings as indicated on the schedule.
- B. Panelboard bus structure and main lugs or main breaker shall have current rating as indicated on the panelboard schedule. Ratings to be established by heat rise tests conducted according to UL Standard UL67.
- C. Circuit breakers shall be equipped with individually insulated, braced and protected connectors. The front faces of all circuit breakers shall be flush with each other. Permanent circuit identification to be on each breaker. Tripped indication shall be clearly shown by breaker handle taking a position between ON and OFF. Provisions for additional breakers shall be such that no additional connectors will be required to add breakers.
- D. Panelboard assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel to be as specified in UL Standards. The size of wiring gutters to be in accordance with UL Standards. Cabinets to be equipped with spring latch and tumbler-lock on door trim. Doors over 48" long shall be equipped with three point latch and vault lock. All locks to be keyed alike. End walls shall be removable. Front locks shall be code gauge, full finished steel with rust-inhibiting primer and baked enamel finish. Each front shall be furnished with a "hinged trim" accessory. A circuit directory frame and card with clear plastic covering shall be provided on the inside of the door. The directory shall be typed to identify the load fed by each circuit. Furnish an engraved micarta plate on front of panel with panel name and rating.
- E. The panelboard interior assembly to be deadfront with panelboard front removed. Main lugs or main breaker shall be barriered on five sides. The barrier in front of the main lugs to be hinged to fixed part of the interior. The end of the bus structure opposite the mains shall be barriered.

- F. Panelboards to be listed by Underwriters' Laboratory and bear UL label. When required, panelboards to be suitable for use as Service Equipment. Panelboards to be by Square D, General Electric, Siemens, or Eaton (Cutler Hammer).
- G. When utilized as Service Entrance Equipment, this panelboard shall be equipped with built-in surge protection.

## 2.27 Sports Field Lighting

### A. General

#### 1. Summary

- a. Work covered by this section of the specifications shall conform to the contract documents, engineering plans as well as state and local codes.
- b. The purpose of these specifications is to define the lighting system performance and design standards for Trussville City Schools Softball Field using an LED Lighting source. The manufacturer / contractor shall supply lighting equipment to meet or exceed the standards set forth in these specifications.
- c. The sports lighting will be for the following venues:
  - 1) Softball – 200'/200'/200'
- d. Manufacturer to provide a list of 5 projects where the technology and specific fixture proposed for this project has been installed in the state of AL. Reference list will include project name, project city, installation date, and if requested, contact name and contact phone number.
- e. The primary goals of this sports lighting project are:
  - 1) Guaranteed Light Levels: Selection of appropriate light levels impact the safety of the players and the enjoyment of spectators. Therefore, light levels are guaranteed to not drop below specified target values for a period of 25 years.
  - 2) Environmental Light Control: It is the primary goal of this project to minimize spill light to adjoining properties and glare to the players, spectators and neighbors.
  - 3) Cost of Ownership: In order to reduce the operating budget, the preferred lighting system shall be energy efficient and cost effective to operate. All maintenance costs shall be eliminated for the duration of the warranty.
  - 4) Control and Monitoring: To allow for optimized use of labor resources and avoid unneeded operation of the facility, customer requires a remote on/off control system for the lighting system. Fields should be proactively monitored to detect luminaire outages over a 25-year life cycle. All communication and monitoring costs for 25-year period shall be included in the bid.

#### 2. Lighting Performance

- a. **Illumination Levels and Design Factors:** Playing surfaces shall be lit to an average target illumination level and uniformity as specified in the chart below. Lighting calculations shall be developed and field measurements taken on the grid spacing with the minimum number of grid points specified below. Appropriate light loss factors shall be applied and submitted for the basis of design. Average illumination level shall be measured in accordance with the IESNA LM-5-04 (IESNA Guide for Photometric Measurements of Area and Sports Lighting Installations). Illumination levels shall not to drop below desired target values in accordance to IES RP-6-15, Page 2, Maintained Average Illuminance and shall be guaranteed for the full warranty period.

Area of Lighting	Average Target Illumination Levels	Maximum to Minimum Uniformity Ratio	Grid Points	Grid Spacing
Softball Infield	50 foot-candles	2:1.0	25	20' x 20'
Softball Outfield	30 foot-candles	2.5:1.0	71	20' x 20'
T				

- b. **Color:** The lighting system shall have a minimum color temperature of 5700K and a CRI of 75+.
- c. **Mounting Heights:** To ensure proper aiming angles for reduced glare and to provide better playability, minimum mounting heights shall be as described below. Higher mounting heights may be required based on photometric report and ability to ensure the top of the field angle is a minimum of 10 degrees below horizontal.

# of Poles	Pole Designation	Pole Height
Softball	A1, A2, B1 B2	70'

3. Environmental Light Control

- a. **Light Control Luminaires:** All luminaires shall utilize spill light and glare control devices including, but not limited to, internal shields, louvers and external shields. No symmetrical beam patterns are accepted.

4. Cost of Ownership

- c. **Manufacturer** shall submit a 25-year Cost of Ownership summary that includes energy consumption, anticipated maintenance costs, and control costs. All costs associated with faulty luminaire replacement - equipment rentals, removal and installation labor, and shipping - are to be included in the maintenance costs.

B. Product

1. Sports Lighting System Construction



- a. Manufacturing Requirements: All components shall be designed and manufactured as a system. All luminaires, wire harnesses, drivers and other enclosures shall be factory assembled, aimed, wired and tested.
- b. Manufacturer shall provide certificate of manufacturing stating that the lighting system as a whole contains at least 55% domestic USA content. Manufacturer will be rejected if supporting documentation is not provided.
- c. Durability: All exposed components shall be constructed of corrosion resistant material and/or coated to help prevent corrosion. All exposed carbon steel shall be hot dip galvanized per ASTM A123. All exposed aluminum shall be powder coated with high performance polyester or anodized. All exterior reflective inserts shall be anodized, coated, and protected from direct environmental exposure to prevent reflective degradation or corrosion. All exposed hardware and fasteners shall be stainless steel, passivated and coated with aluminum-based thermosetting epoxy resin for protection against corrosion and stress corrosion cracking. Structural fasteners may be carbon steel and galvanized meeting ASTM A153 and ISO/EN 1461 (for hot dipped galvanizing), or ASTM B695 (for mechanical galvanizing). All wiring shall be enclosed within the cross-arms, pole, or electrical components enclosure.
- d. System Description: Lighting system shall consist of the following:
  - 1) Galvanized steel poles and cross-arm assembly. Alternate: Concrete pole with a minimum of 8,000 psi and installed with concrete backfill will be an acceptable alternative provided building code, wind speed and foundation designs per specifications are adhered to.
  - 2) Non-approved pole technology:
    - a) Square static cast concrete poles will not be accepted.
    - b) Direct bury steel poles which utilize the extended portion of the steel shaft for their foundation will not be accepted due to potential for internal and external corrosive reaction to the soils and long-term performance concerns.
  - 3) Lighting systems shall use concrete foundations. See Section 2.4 for details.
    - a) For a foundation using a pre-stressed concrete base embedded in concrete backfill the concrete shall be air-entrained and have a minimum compressive design strength at 28 days of 3,000 PSI. 3,000 PSI concrete specified for early pole erection, actual required minimum allowable concrete strength is 1,000 PSI. All piers and concrete backfill must bear on and against firm undisturbed soil.
    - b) For anchor bolt foundations or foundations using a pre-stressed concrete base in a suspended pier or re-enforced pier design pole erection may occur after 7 days. Or after a concrete sample from the same batch achieves a certain strength.
  - 4) Manufacturer will supply all drivers and supporting electrical equipment
    - a) Remote drivers and supporting electrical equipment shall be mounted approximately 10 feet above grade in aluminum enclosures. The enclosures shall be touch-safe and include drivers and fusing with indicator lights on fuses to notify when a fuse is to be replaced for

each luminaire. Disconnect per circuit for each pole structure will be located in the enclosure. Integral drivers are not allowed. Manufacturer must show 10 projects in the state of AL where remote drivers have been installed.

- b. Manufacturer shall provide surge protection at the pole equal to or greater than 40 kA for each line to ground (Common Mode) as recommended by IEEE C62.41.2\_2002.
- 5) Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation.
  - 6) All luminaires, visors, and cross-arm assemblies shall withstand 150 mi/h winds and maintain luminaire aiming alignment.
  - 7) All manufacturers submitting for approval to bid this project must manufacture the fixture they are submitting for approval. No third-party manufacturers will be approved.
  - 8) Control cabinet to provide remote on-off control and monitoring features of the lighting system will be provided with electronically held contactors to allow for complete turn off of the lighting system. Digital contactors will not be allowed. See Section 2.3 for further details.
  - 9) Manufacturer shall provide lightning grounding as defined by NFPA 780 and be UL Listed per UL 96 and UL 96A.
    - a) Integrated grounding via concrete encased electrode grounding system.
    - b) If grounding is not integrated into the structure, the manufacturer shall supply grounding electrodes, copper down conductors, and exothermic weld kits. Electrodes and conductors shall be sized as required by NFPA 780. The grounding electrode shall be minimum size of 5/8 inch diameter and 8 feet long, with a minimum of 10 feet embedment. Grounding electrode shall be connected to the structure by a grounding electrode conductor with a minimum size of 2 AWG for poles with 75 feet mounting height or less, and 2/0 AWG for poles with more than 75 feet mounting height.
- e. Safety: All system components shall be UL listed for the appropriate application.
2. Electrical
    - a. Electric Power Requirements for the Sports Lighting Equipment:
      - 1) Electric power: 208 Volt, 1 Phase (Softball Field)
      - 2) Maximum total voltage drop: Voltage drop to the disconnect switch located on the poles shall not exceed three (3) percent of the rated voltage.
    - b. Energy Consumption: The kW consumption for the field lighting system shall be 24.01W.
  3. Control

- a. Instant On/Off Capabilities: System shall provide for instant on/off of luminaires.
- b. Lighting contactor cabinet(s) constructed of NEMA Type 4 aluminum, designed for easy installation with contactors, labeled to match field diagrams and electrical design. Manual off-on-auto selector switches shall be provided.
- c. Dimming: System shall provide for 3-stage dimming (high-medium-low). Dimming will be set via scheduling options (Website, app, phone, fax, email) or via an onsite user interface tablet or device. Any systems that cannot dim are not allowed.
- d. Remote Lighting Control System: System shall allow owner and users with a security code to schedule on/off system operation via a web site, phone, fax or email up to ten years in advance. Manufacturer shall provide and maintain a two-way TCP/IP communication link. Trained staff shall be available 24/7 to provide scheduling support and assist with reporting needs.

The owner may assign various security levels to schedulers by function and/or fields. This function must be flexible to allow a range of privileges such as full scheduling capabilities for all fields to only having permission to execute "early off" commands by phone. Scheduling tool shall be capable of setting curfew limits.

Controller shall accept and store 7-day schedules, be protected against memory loss during power outages, and shall reboot once power is regained and execute any commands that would have occurred during outage.

- e. Remote Monitoring System: System shall monitor lighting performance and notify manufacturer if individual luminaire outage is detected so that appropriate maintenance can be scheduled. The controller shall determine switch position (manual or auto) and contactor status (open or closed).
- f. Management Tools: Manufacturer shall provide a web-based database and dashboard tool of actual field usage and provide reports by facility and user group. Dashboard shall also show current status of luminaire outages, control operation and service. Mobile application will be provided suitable for IOS, Android and Blackberry devices.

Hours of Usage: Manufacturer shall provide a means of tracking actual hours of usage for the field lighting system that is readily accessible to the owner.

- 1) Cumulative hours: shall be tracked to show the total hours used by the facility
- 2) Report hours saved by using early off and push buttons by users.

- g. Communication Costs: Manufacturer shall include communication costs for operating the control and monitoring system for a period of 25 years.
- h. Communication with luminaire drivers: Control system shall interface with drivers in electrical components enclosures by means of powerline communication. Wireless Control system is not allowed.

4. Structural Parameters

- a. Wind Loads: Wind loads shall be based on the 2015 International Building Code. Wind loads to be calculated using ASCE 7-10, an ultimate design wind speed of 115mph and exposure category C.
- b. Pole Structural Design: The stress analysis and safety factor of the poles shall conform to 2013 AASHTO Standard Specification for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (LTS-6).
- c. If no geotechnical report is available, the foundation design shall be based on soils that meet or exceed those of a Class 5 material as defined by 2015 IBC Table 1806.2.
- d. Foundation Drawings: Project specific foundation drawings stamped by a registered engineer in the state where the project is located are required. The foundation drawings must list the moment, shear (horizontal) force, and axial (vertical) force at ground level for each pole. These drawings must be submitted at time of bid to allow for accurate pricing.

C. Execution

1. Soil Quality Control

- a. It shall be the Contractor's responsibility to notify the Owner if soil conditions exist other than those on which the foundation design is based, or if the soil cannot be readily excavated. Contractor may issue a change order request / estimate for the Owner's approval / payment for additional costs associated with:
  - 1) Providing engineered foundation embedment design by a registered engineer in the State of Alabama for soils other than specified soil conditions;
  - 2) Additional materials required to achieve alternate foundation;
  - 3) Excavation and removal of materials other than normal soils, such as rock, caliche, etc.

2. Delivery Timing

- a. Delivery Timing Equipment On-Site: The equipment must be on-site 30 days from receipt of approved submittals and receipt of complete order information. Delivery timing will need to be provided on bid form.

3. Field Quality Control

- a. Illumination Measurements: Upon substantial completion of the project and in the presence of the Contractor, Project Engineer, Owner's Representative, and Manufacturer's Representative, illumination measurements shall be taken and verified. The illumination measurements shall be conducted in accordance with IESNA LM-5-04.
- b. Field Light Level Accountability
  - 1) Light levels are guaranteed not to fall below the target maintained light

levels for the entire warranty period of 25 years. These levels will be specifically stated as "guaranteed" on the illumination summary provided by the manufacturer.

- 2) The manufacturer shall be responsible for conducting initial light level testing and an additional inspection of the system, in the presence of the owner, one year from the date of commissioning of the lighting.
  - 3) The manufacturer will be held responsible for any and all changes needed to bring these fields back to compliance for light levels and uniformities. Contractor/Manufacturer will be held responsible for any damage to the fields during these repairs.
- c. Correcting Non-Conformance: If, in the opinion of the Owner or his appointed Representative, the actual performance levels including footcandles and uniformity ratios are not in conformance with the requirements of the performance specifications and submitted information, the Manufacturer shall be required to make adjustments to meet specifications and satisfy Owner.

#### 4. Warranty And Guarantee

- a. 25-Year Warranty: Each manufacturer shall supply a signed warranty covering the entire system for 25 years from the date of shipment. Warranty shall guarantee specified light levels. Manufacturer shall maintain specifically-funded financial reserves to assure fulfillment of the warranty for the full term. Warranty does not cover weather conditions events such as lightning or hail damage, improper installation, vandalism or abuse, unauthorized repairs or alterations, or product made by other manufacturers. Warranty will be provided by the manufacturer of the fixture, not a third-party provider. Documents will be provided to show proof of fixture and component manufacturing.
- b. Maintenance: Manufacturer shall monitor the performance of the lighting system, including on/off status, hours of usage and luminaire outage for 25 years from the date of equipment shipment. Parts and labor shall be covered such that individual luminaire outages will be repaired when the usage of any field is materially impacted. Manufacturer is responsible for removal and replacement of failed luminaires, including all parts, labor, shipping, and equipment rental associated with maintenance. Owner agrees to check fuses in the event of a luminaire outage.
- c. Manufacturer shall supply certification of manufacturer which will provide in detail that 55% of the system is manufactured in the USA. Inability to provide such documentation will result in disqualification of bid.

#### D. Design Approval

##### 1. Pre-Bid Submittal Requirements (Non-Musco)

- a. Design Approval: The owner / engineer will review pre-bid submittals per section 4.0.B from all the manufacturers to ensure compliance to the specification 10 days prior to bid. If the design meets the design requirements of the specifications, a letter and/or addendum will be issued to the manufacturer indicating approval for the specific design submitted.
- b. Approved Product: Musco's Light-Structure System™ with TLC for LED™ is

the approved product. All substitutions must provide a complete submittal package for approval as outlined in Submittal Information at the end of this section at least 10 days prior to bid. Special manufacturing to meet the standards of this specification may be required. An addendum will be issued prior to bid listing any other approved lighting manufacturers and designs.

- c. All listed manufacturers not pre-approved shall submit the information at the end of this section at least 10 days prior to bid. An addendum will be issued prior to bid; listing approved lighting manufacturers and the design method to be used.
- d. Bidders are required to bid only products that have been approved by this specification or addendum by the owner or owner's representative. Bids received that do not utilize an approved system/design, will be rejected.

## 2.28 Stadium Sound System

### A. General

#### 1. Description

- a. The stadium sound systems shall consist of microphone, amplifier, speaker systems, and accessories required to provide a complete operating system. Same system (different speaker quantities) shall be installed at football field, baseball field, and softball field.

#### 2. Substitutions

- a. Any proposed substitution of equipment or materials from that specified must be approved by the Engineer within ten (10) days prior to the bid date.
- b. All proposed substitutions shall clearly identify the item submitted. Standard catalog sheets shall be marked, in ink, so as to identify which item is to be considered.

### B. Products

#### 1. Microphones

- a. The announcer microphone shall be ASTATIC Model 920B with Model 40-112 desk stand.
- b. Provide two (2) TOA Model WM5270 wireless microphones with WT-5800 receivers for field use.

#### 2. Mixer-Preamplifier

- a. The mixer-preamplifier shall provide eight (8) individually controller inputs, master volume control, bass and treble controls, and color coded calibrated LED level display. The mixer-preamplifier shall be TOA M900MK2 with input modules required.

#### 3. Digital Signal Processor

- a. The digital signal processor panel shall include 31-band digital graphic equalizer, feedback controller, and compressor/limiter. The digital signal processor panel shall be SABINE Model GRQ-3101S.

4. Power Amplifiers

- a. The power amplifier shall provide 500 watts (RMS) power output at less than 5% distortion, 45 Hz to 20 KHz. The power amplifier shall be digital type TOA DA-500F-HL.
- b. The power amplifier for use with field monitor speaker shall be TOA DA-250F.

5. CD Playback Deck

- a. The CD deck shall be 19 inch rack mounted and shall be DENON DN-C615.

6. IPOD Docking Panel

- a. The iPod docking station shall be rack mounted and shall be RAXXESS model PAX1RDS1.

7. Master Power Panel

- a. Provide master power control panel which shall control AC power to all amplifier equipment from a single on-off switch. The master AC power panel shall be MIDDLE ATLANTIC PD915R.

8. Equipment Rack

- a. The equipment rack shall be equipped with rear locking door and shall be SOUNDOLIER Model 235-18.

9. Speaker Systems

- a. The speaker system shall consist of eight (8) COMMUNITY Model R1-94Z speaker systems with TRC400-70V line matching transformer with enclosure. All speakers shall be pole mounted with BAND-IT S.S. Hardware.
- b. The portable field monitor speaker system shall be COMMUNITY Model XLT48E-94B.

10. Cables

- a. Microphone cable shall be WEST PENN No. 452. Speaker shall be WEST PENN No. 226.

C. Guaranty

- 1. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance.
- 2. The full cost of maintenance, labor and materials required to correct any defect during this one year period shall be included in the submittal bid.

2.29 Data Cabling System

A. General

- 1. All fiber optic and level 6 cable, data outlet faceplates and jacks, patch panels, MDF frame and IDF cabinets, outlet boxes, conduit, cable support hardware, and all other

hardware as required to complete the installation described in these specifications shall be supplied and installed by this contractor.

2. All terminations are to be made by the contractor.
3. To be qualified to bid on this project, the contractor shall have successfully completed a minimum of five (5) projects for installation of fiber optic cable and a minimum of ten (10) projects for installation of Category 6 unshielded twisted pair cable.

B. Data Cabling System

1. The cabling system shall allow the owner to transmit up to speeds of 100 Mbps plus.
2. One 6-strand fiber optic cable shall be routed from the Main Distribution Frame (MDF) to each Intermediate Distribution Frame (IDF) and terminated on each end (all 6 strands).
3. Category 6 cable shall be routed from each IDF to the outlets and terminated on each end. Two (2) Category 6 cables shall also be routed from the MDF to each IDF and terminated on each end.

C. Data Outlet and Cabling System (Category 6 UTP)

1. Cable Installation

- a. All cables shall be independently supported throughout the entire project by J-hooks installed on 4'-0" centers.
- b. Cables shall be routed in groups of similar types. (i.e. data outlet cables grouped together, fiber optic cables grouped together, etc.)
- c. Cables shall be routed in accordance with EIA TIA 568A standard.
- d. The BICSI Methods Manual is to also be used as a guide for cable installations.
- e. Horizontal cabling routed above ceilings shall be supported using the following methods.
  - (1) Cables supported on J-hooks designed specifically for this purpose. Support J-hooks from structure with threaded rod. Hang J-hooks approximately two feet above the lay-in ceiling.
  - (2) Cables independently supported using cabling clips attached to the ceiling structure or slab.
- f. All cable shall be neatly routed above the lay-in ceiling along one side of the corridor. Branch out across the corridors as necessary to serve the classrooms and offices. Cabling shall be routed in a manner which will allow the owner to maintain access to the cables, electrical systems and HVAC equipment above the ceiling. Maintainability of all systems above the ceiling is critical.
- g. All cables shall be bundled and tie wrapped together. Tie wrapping shall occur on four foot intervals throughout the space. Tie wraps should not bite into the cable, but should form loosely around the cables as not to depress the cable.



- h. Cables above the corridor ceiling shall be supported using wall mounted J-hooks equal to Caddy CAT32 with any necessary attachment hardware.
- i. Cables shall be routed into conduits stubbed up above the ceiling from each outlet (bushing on end of conduit). Cabling shall be routed in conduit above non-accessible ceilings.
- j. All cables being pulled shall not exceed the manufacturers recommendations for pulling tensions.
- k. All cables shall not exceed the manufacturers recommendations for minimum bending radius upon pulling and completed installation.
- l. All cables shall pass acceptable test requirements and levels as detailed in Section 2.35(F) of these specifications. Contractor to remedy any cabling problems or defects in order to pass or comply with testing. This includes terminations and the re-pull of new cable as required at no additional cost to the owner.
- m. Cables shall not be spliced.
- n. Ends of cables shall be terminated by the contractor on both ends unless otherwise noted.
- o. Do not damage the outside jacket sheath of any cable.
- p. Provide proper temporary protection of cable after pulling is complete before final dressing and terminations are complete. Do not leave cable lying on floor. Bundle and tie wrap up off of the floor.
- q. Provide labeling for all cables.
- r. Provide 12" wide ladder style tray with 1-2" side rails and 9" rung spacing in the MDF and IDF rooms.
- s. Contractor shall insure that cabling is a minimum of 5" away from all light fixtures.
- t. Contractor shall install three (3) 1" sleeves with bushings in walls for routing cables to classrooms and offices. Install sleeves above the ceiling, directly above the door to the classroom or office. Install two (2) 4" sleeves with bushings for each IDF and MDF. Firestop all firewall penetrations.
- u. When cables turn down below ceiling at each IDF and MDF, contractor shall install sleeves through the lay-in ceiling (bushing on each end). Hole(s) through ceiling tile for sleeve(s) shall be cut to the exact size of the sleeve.
- v. Install a J-hook directly above the drop to every outlet. Bundle and tie wrap up 5' of slack cable prior to entering the wall.

## 2. Cable Terminations

- a. Terminations shall be made in accordance with EIA TIA 568B standard.

- b. Terminations shall be RJ45 type.
- c. Route individual four pair category 6 cable to the backside of each patch panel and punch down onto a port. Label each port on the front and rear of each panel.
- d. Maintain twists of each pair to the punch down point. Do not strip more than one-half inch of insulation from the cable at termination points.

3. Outlets

- a. Install outlets per manufacturer's instructions and recommendations.
- b. Install and terminate all UTP cabling at each outlet as per manufacturer's instructions and recommendations.
- c. Provide an outlet label on each cover plate and inside each wall box.
- d. Leave at least 12" of slack cable at each outlet.

D. Fiber Optic Cabling System

1. Cable Installation

- a. Fiber optic cable shall be installed inside buildings using the same methods as twisted pair; however, the following guidelines should be observed:
  - (1) Do not exceed maximum recommended pulling tension.
  - (2) Do not exceed minimum installed and long term bend radius.
  - (3) Avoid sharp bends and corners.
  - (4) Provide additional crush/mechanical protection in high risk environments.
  - (5) Do not exceed maximum vertical rise specification unless intermediate tension relief is used.
  - (6) Observe all governing building and fire codes (either by using a properly listed cable or suitable raceway).
  - (7) Do not deform the cable jacket, specifically when using cable fasteners or ties.
  - (8) All fiber optic cabling shall be routed in innerduct. Innerduct shall be orange and shall be 2" diameter equal to Endot Industries #1050. Install an extra pull string in all innerduct.
- b. When installing fiber optic cable in vertical runs, the following special guidelines should be observed:
  - (1) Work from the top down, when possible.
  - (2) Install intermediate split wire mesh grip(s) wherever the maximum vertical

rise is exceeded.

- (3) Secure the cable in the riser wiring closets with cable ties or straps as needed to prevent accidental damage to cable.
- c. When installing fiber optic cable, the following guidelines should be observed at termination and splice points:
- (1) The amount of cable slack at termination points should allow the cable to be routed to the termination location with enough additional cable to reach a convenient location for the polishing, plus an additional ten feet.
  - (2) Fiber optic warning signs should be placed on all innerduct and conduits containing fiber optic cable. Warning signs can help prevent damage resulting from the cable being mistaken for something else. Install signs at each end of the cable and every 20 feet in between.
- d. When pulling fiber optic cable, the following guidelines should be observed:
- (1) Yellow pulling compound shall be used if making long/difficult pulls to reduce cable drag.
  - (2) When pulling fiber optic cable by any mechanical device (winch etc.), a dynamometer must be used to ensure the maximum tensile strength is not exceeded.
  - (3) The mechanical pulling device will be equipped with clutches or shear pins to ensure this.
  - (4) The fiber cable will be attached to the pull line via the strength member or mesh grip.
- e. Provide labeling of each cable indicating >TO= and >FROM= information.
- f. Bring fiber optic cables into patch panels or cabinets at one location. Innerduct around cables shall extend to patch panel or cabinet entrance. Secure cables inside patch panel or cabinet at entrance point by tying the fiber jacket and/or strength members. Break out individual fiber cables inside of panel or cabinet. Coil up approximately 6 feet of spare cable before applying SC connector.
- g. Cable Terminations
- (1) Terminations shall be SC type and shall be installed per the manufacturer=s instructions.
  - (2) Terminate the fiber optic cable onto the backside of the fiber optic patch panel using SC connectors.
  - (3) An SC connector shall be installed on each individual strand of fiber optic cable.

## E. Labeling

### 1. General

- a. All labels shall be vinyl.
  - b. All labels shall have an adhesive backing for permanent attachment.
  - c. All labels shall be of sufficient size. Minimum size shall be 12" W x 3/16" H for outlets, outlet cables and patch panels.
2. Installation
- a. Install labels straight.
  - b. Install labels every 20' along cable, at locations previously specified and as follows:
    - (1) Outlet faceplates.
    - (2) Inside of outlet box.
    - (3) Outlet cable inside box.
    - (4) Outlet cable in ceiling above outlet.
    - (5) Outlet cable at rear of patch panel.
    - (6) Fiber optic cable at patch panels.
3. Text Size and Information
- a. Text shall be as large and bold as possible.
  - b. All outlets and outlet cables shall contain the outlet number, final room number, IDF number and patch panel number.

F. System Testing and Certification

1. General
- a. The following cabling systems shall be tested after installation is fully completed.
    - (1) Data outlet cabling from each outlet to the patch panel port, including patch cables.
    - (2) Fiber optic cabling from each IDF to the MDF. All six strands shall be tested.
  - b. Testing shall follow EIA TIA 568, TSB 36 and TSB 40 standards.
2. Category 6 Cable Testing
- a. Cable testing shall be performed with a Micro-Test Pentascanner Plus or equivalent test unit. Test unit shall be capable of providing a Level 2 accuracy test and have a category 6 printout.
  - b. Each outlet/cable shall be tested and certified. Each pair of the end to end

system shall be tested. End to end is from the outlet RJ 45 port through the RJ45 port at the Category 6 data patch panel. A 10' patch cable shall be used at the patch panel end and a 3' patch cable shall be used at the outlet end so that the outlet, outlet termination, cable, patch panel termination, patch cables and patch panel port can be seen in the test.

- c. Test results shall be positive and favorable. End to end attenuation loss and near end cross talk shall meet or exceed category 6, EIA/TIA 568, TSB 36 requirements. Those requirements are:

Frequency MHZ	Next Loss Worst Pair dB @ m (1000 ft)	Maximum Attenuation Loss Worst Pair dB/m (1000 ft)
	Category 6	Category 6
1.0	62	63
4.0	53	13
8.0	48	18
10.0	47	20
16.0	44	25
20.0	42	28
25	41	32
31.25	40	36
62.5	35	52
100	32	67

- d. If a problem or failed test occurs, the contractor shall evaluate and remedy the problem. After a problem has been remedied, the contractor shall re-test the circuit and analyze test results. The contractor shall continue this process until the cable passes all tests.

- e. Each outlet/cable test shall include:

- (1) Overall cable length
- (2) System continuity
- (3) Proper connectivity
- (4) Open pairs
- (5) Short circuits
- (6) Reversed pairs
- (7) EMI noise induction
- (8) Damaged cable
- (9) Stretched, chinked or crimped cable
- (10) Attenuation loss in dB
- (11) Near end cross talk in dB

- f. Provide the owner with three (3) copies of the test results and certification for all cables.

### 3. Fiber Optic Cable Testing

- a. The fiber cables shall be tested in both directions at 850 nanometers and 1300 nanometers.

- b. All test results shall be in writing giving all readings, date, tested by, and totals.
- c. All testing shall be performed by using an Optical Power Meter (Wilcom Model T339 or approved equivalent).
- d. Each strand shall be tested and the following information be turned over to the owner in chart form:
  - (1) From Point to Point
  - (2) Fiber I.D. Label No.
  - (3) RX Level
  - (4) Attenuation Total
  - (5) Wave Length
  - (6) Reference Level
- e. Each strand shall not exceed a level of 3.0db of attenuation.
- f. Provide the owner with three (3) copies of the test results and certification for all cables.

G. Products

1. Category 6 Cable

Category 6 cable shall be 4 pair, 24 AWG, UTP, with an orange jacket as manufactured by 3 Com.

2. Fiber Optic Cable

Fiber optic cable shall be 62.5/125 multimode indoor and FDDI rated with 6 strands as manufactured by 3 Com.

3. IDF Racks

IDF racks shall be 7' high, 19" wide, aluminum and floor mounted as manufactured by Chatsworth.

4. Category 6 Patch Panels

Patch panels shall be 24 or 48 ports, as necessary, wired 7568B as manufactured by 3 Com. Provide and install quantity necessary to terminate all cables.

5. Fiber Optic Distribution Unit

Fiber optic distribution units shall be 24 port as manufactured by 3 Com.

6. Fiber Optic Cable Connectors

Fiber optic cable connectors shall be "SC" type as manufactured by 3 Com.

7. RJ45 Jacks

RJ45 jacks (568B) shall be as manufactured by 3 Com.

8. Data Outlet Faceplates

Data outlet faceplates shall be gray in color as manufactured by 3 Com.

9. Ladder Tray

Ladder tray shall be 12" wide, 1-1/2" side rails, 9" rung spacing and gray in color as manufactured by 3 Com.

10. Vertical Cable Management Rails

Cable management rails shall be 6' high, 6" wide with rungs on front and rear and shall be as manufactured by 3 Com.

11. Rack Mounted Plugmold

Plugmold shall be 6' long with 12 outlets, each on 5.25" centers, and a 15" cord. Plugmold shall be as manufactured by Wiremold (Part No. UL2062BD).

### 3.0 EXECUTION

#### 3.1 Workmanship

- A. All work shall be executed in workmanlike manner and present a neat and mechanical appearance upon completion.
- B. Balance load as equally as practical on services and all feeders, circuits, and panel busses. All wiring in panelboards shall be laced and looped in a workmanlike manner.
- C. Upon completion of work, test entire wiring system and show to be perfect working order in accordance with intent of specifications and drawings. This Contractor to have all systems ready for operation and electrician available to assist in removal of panel fronts, etc., to permit inspection as required.
- D. All work shall be in accordance with the National Electrical Code and the rules and regulations of the local bodies having jurisdiction.

#### 3.2 Excavation Cutting and Patching

- A. Provide cutting and patching required for this section of work under supervision of the General Contractor. Coordinate with other trades as work progresses so cutting and patching will be minimal.

#### 3.3 Sleeves, Inserts, and Supports

- A. Provide and install No. 16 gauge galvanized steel or iron sleeves in all walls, floors,

ceilings, and partitions. Sleeves shall have not more than 1/2" clearance around pipes and insulation.

- B. Contractor shall furnish to other trades all sleeves, insert, anchors and other required items which are to be built in by trades for the securing of all hangers or other supports by the Contractor.
- C. Contractor shall assume all responsibility for the placing and size of all sleeves, inserts, etc., and either directly supervise or give explicit instructions for installation.
- D. Seal all conduits through floor, smoke or fire walls and sound barrier walls. All such penetrations shall be made with an Underwriters' Laboratories firestop assembly. Through floor conduit shall be sealed water tight.
- E. Furnish and install steel angles and channels as required for mounting and bracing heavy equipment, and conduits. Steel shall be securely bolted or welded to structure and equipment bolted to steel framework. Obtain approval of Architect prior to welding.

#### 3.4 Roof Penetrations

- A. Furnish roof flashing for all equipment installed under this section that penetrates through the roof. Galvanized sheet, 24 gauge with base extending 6" beyond pipe.
- B. All equipment shall be grounded and bonded in accordance with local regulations and National Electrical Code. Ground main service to code size cold water pipe and driven ground rod, maximum of 2 driven rods. All conduits entering a free-standing switchboard or motor control center shall be bonded together with approved grounding lugs and bare copper wire.
- C. Interior metal water piping shall be bonded to the system ground as outlined in NEC Section 250-80.
- D. This Contractor shall bond all metal air ducts to the respective unit grounding conductor. Install additional bonding jumpers at joints, flexible sections, etc., to ensure that entire duct system is bonded.

#### 3.5 Conduit Installation

- A. Where rigid conduits enter boxes secure in place by approved lock nuts and bushings. Where E.M.T. enters boxes secure in place with approved insulated fittings. Conduit ends shall be carefully plugged during construction.
- B. Use of running threads is absolutely prohibited. Conduits shall be joined with approved conduit couplings.
- C. Install conduit runs to avoid proximity to steam or hot water pipes. In no place shall a conduit be run within 3" of such pipes except where crossings are unavoidable, then conduit shall be kept at least 1" from the covering of the pipe crossed.
- D. Before installing raceways for motors and fixed appliances, check locations of motors and appliance connections. Locate and arrange raceways appropriately.
- E. Provide flexible conduit connections to all motors and/or any equipment which has moving or vibrating parts. Sealtite flexible conduit shall be used in all cases where exposed to



moisture and in mechanical equipment rooms.

- F. Exposed conduit runs shall be parallel and/or at right angles to building walls and/or partitions.
- G. Where conduit crosses a structural expansion joint, an approved conduit expansion fitting will be installed.
- H. Leave aluminum pull wire in all empty conduit.
- I. Conduit shall be cut square and the ends reamed after threading.
- J. Fasten conduit securely in place by means of approved conduit clamps, hangers, supports, and fastening. Arrangement and method of fastening all conduits subject to Architect's direction and approval.
- K. Apply two (2) coats of asphaltum paints to all underground rigid conduit. Carefully retouch any breaks in paint and allow to dry before covering. Leave exposed until after Architect's inspection.
- L. Conduits shall be sized in accordance with National Electrical Code as amended to date, except when the size is shown larger on the drawings.
- M. Conduit with an external diameter larger than  $\frac{1}{3}$  the thickness of the slab shall not be placed in the slab. Conduit in the slab shall not be spaced closer than 3 diameters on center. No conduit in porous fill.
- N. E.M.T. may be used where concealed in ceiling or walls where there is no danger of mechanical injury. Rigid conduit shall be used in floor slabs, where embedded in concrete, areas exposed to moisture and danger of mechanical injury, in hazardous areas, and for feeders and motor circuits.

### 3.6 Wire and Cable Installation

- A. No conductor shall be smaller than #12 except where so designated on the drawings or hereinafter specified.
- B. Joints and splices on wire shall be made with solderless connectors, and covered so that insulation is equal to conductor insulation. Wire nuts not permitted.
- C. Multi-wire lighting branches shall be used as indicated.
- D. No splices shall be pulled into conduit.
- E. Both conductors and conduits shall be continuous from outlet to outlet.
- F. No conductor shall be pulled until conduit is cleaned of all foreign matter.
- G. In installing parallel conductors, it is mandatory that all conductors making up the feeder be exactly the same length, the same size and type of conductor with the same insulation. Each group of conductors making up a phase or neutral must be bonded together at both ends in an approved manner.

### 3.7 Feeder Designation

- A. Non-ferrous identifying tags or pressure sensitive labels shall be fastened securely to all cables, feeders and power circuits in vaults, pull boxes, manholes, switchgear and at termination of cables. Tags or labels shall be stamped or printed to correspond with markings on drawings so that feeder or cable number or phase can be readily identified.

3.8 Circuits and Branch Circuits

- A. Outlets shall be connected to branch circuits as indicated on drawings by circuit number adjacent to outlet symbols, and no more outlets than are indicated shall be connected to a circuit.

3.9 Wire Joints

- A. On copper wire larger than #12 joints shall be made with solderless connectors and covered with Scotch #33 Electrical Tape so that insulation is equal to conductor insulation. Connectors by Penn-Union or Anderson.
- B. #12 and smaller wire joints shall be made with T & B Sta-Kon wire joints, complete with insulating caps, Ideal Wing nuts, or Buchanan Electrical Products Series 2000 pressure connectors complete with nylon snap-on insulators.
- C. Joints on aluminum cable #0 and larger shall be made with compression lugs and bolted to terminals using stainless steel bolts and Belleville washers. Torque to 50-to-60-foot pound or torque with torque wrench. Aluminum cable and joints shall be used only where indicated on drawings. Connectors by Penn-Union or Anderson. Connection to panelboard by Burndy Connector and stud.

3.10 Outlet Boxes Installation

- A. Outlet boxes shall be securely fastened.
- B. Surface Fixture outlet boxes shall be set so edge of cover comes flush with finished surface.
- C. There shall be no more knockouts opened in any outlet box than are actually required.
- D. Boxes shall be sealed during construction. Protect interiors (including panel cans) from paint and mortar.
- E. Unless otherwise shown, outlets shall be located as follows: centerline of boxes shall be following distance above the finished floor:

Receptacles General -----	1'4" - Centerline
Receptacles Over Counters -----	3'8" - Centerline
Telephone Outlets General -----	1'4" - Centerline
Wall Telephone Outlets -----	4'0" - Centerline
General Clock Outlets -----	7'6" - Centerline
Switches General -----	4'0" - Top
Fire Alarm Pulls -----	4'0" - Top
Fire Alarm Signals -----	6'8" - Bottom
Bells -----	6'8" - Centerline
T V & Computer Outlets -----	1'4" - Centerline

- F. Symbols on drawings and mounting heights as indicated on drawings and in specifications are approximate only. The exact locations and mounting heights must be determined on the job and it shall be the Contractor's responsibility to coordinate with all trades to secure correct installation, i.e., over counter in or above back splashes, in stud walls, and other specific construction features. Mount all receptacles vertical. In block walls (exposed), use nearest joint as approved by Architect.
- G. All outlets installed back-tback in fire rated walls shall be offset a minimum of 24".

### 3.11 Fixture Installation

- A. Support of all fixture shall be responsibility of this Contractor. Fixtures shall be supported independent of ceiling from structure members of building. Contractor shall submit typical hanging detail to Architect/Engineer before installing any fixtures. All grid fixtures shall be wired by flex individually to junction and not wired fixture to fixture.
- B. Fixture conductors shall be connected by soldering and tying or by approved connectors.
- C. All stems on fluorescent fixtures shall be installed as follows: except fixtures with slide grip hangers first and last stem in row in first knockout from end of fixture. One stem shall be installed between each two fixtures, stem shall center joint where fixtures join, and attach by use of "joining plates". All fixtures in continuous rows other than recessed grid type shall be connected by nipples with lock nuts and bushings.
- D. Thoroughly clean all fixture lens and reflectors immediately prior to the final inspection.

### 3.12 Installation of Motors, Electric Heaters, and Controls

- A. Provide feeders and make connections for motors, electric heating units and controls.
- B. An approved H.P. rated safety switch shall be provided within sight of each motor and each heating unit. Provide fused switches where branch circuit fuses are not sized for overload protection. Weatherproof switches are to be used where switches are located outdoors. Safety switches shall be as manufactured by G.E., Square D, or Cutler Hammer.
- C. Manual motor starters with thermal overload protection may be used in lieu of safety switches for motors under 1/2 H.P. Manufacturers shall be same as above.
- D. The heating and air conditioning contractor shall furnish all motor starters.
- E. The temperature control contractor shall furnish and install all low and line voltage wiring necessary for the temperature control systems and interlocking with air handling units, cabinet unit heaters.
- F. The electrical contractor shall install all motor starters, except for factory mounted. He will furnish wire and disconnect switches. He will furnish and install all power wiring from the power panels on packaged equipment. He will not furnish nor install any low and line voltage wiring necessary for the temperature control system and interlocking with air handling units, or cabinet unit heaters.

END OF SECTION 16000

**PRE-CONSTRUCTION CONFERENCE CHECK-LIST**

**Project:** New Softball Complex for Trussville City Schools

**Funding:** Local

**Location:** TBD

**Date/Time:** TBD

**DCM Insp:**

**Please note that all items listed below may not be applicable to this project.**

1. **Introductions / Sign In**
2. **Owner's Comments**
3. **Preface / Pass Along To Others**
4. **General Contractor's Team Members (contact information)**

**Project Manager:** \_\_\_\_\_

**Superintendent:** \_\_\_\_\_

**Verify all alternates accepted.**

5. **E-Verify. Alabama Immigration Law. Be sure that all subcontractors comply with E-Verify requirements.**
6. **List of Sub-Contractors, submit for approval.**  
A Complete list of sub-contractors must be submitted and approved by the Architect and Owner prior to any work commencing. Contractor cannot replace subs unless approved by the Architect and Owner (GCS 41)
7. **Cost Breakdown and Progress schedule.**  
Cost breakdown and progress schedule must be submitted and approved on proper state forms prior to first pay request. **GC is required to provide an updated progress schedule at each OAC.**  
  
Start: \_\_\_\_\_ Completion Date: \_\_\_\_\_ Days: \_\_\_\_\_
8. **Method of approving monthly pay request.**  
Due by the 25th of each month. Architect will verify, sign and forward to Owner, who will forward to DCM, if applicable.
9. **Allowances.**
  - A. With the exception of quantity allowances, all allowances indicated are contingency allowances and therefore the Owner may transfer balances for other discretionary uses. Overhead and profit margins **SHALL NOT BE ADDED** to any amount drawn from original Allowance(s) regardless of the indicated use.

- B. Each contingency allowance shall be a "line item" on the Schedule of Values.
- C. The following allowance(s) are a part of this project:
  - 
  -
- D. If applicable, note special material/equipment delivery dates associated with allowances.
  -

**10. Change Orders Requests. No work prior to final approval; Architect can approve in writing if emergency.**

- A. All changes in work are to be submitted via Change Order Request, regardless of monetary value.
- B. COR's must be submitted in sequential order on GC letterhead.
- C. All COR's must be broken down to the fullest degree, including breakdown of GC's cost by GC's labor, materials, subcontractor, sub-subcontractor cost and OH&P. Subcontractor and sub-subcontractor cost must be documented with copies of quotes detailing OH&P included.
- D. COR's applied to allowances cannot include OH&P.
- E. Credit COR's must include a minimum of 5% OH&P.
- F. Upon Owner and/or Architects' approval of COR's, a revised Change Order and Allowance Usage log will be sent to GC via email.
- G. GC is to maintain a COR Log and present updated copy at each OAC meeting.
- H. **NOTE: The following information is required for ALL Change Order Requests submitted:**
  - a. Each material number shall include an invoice / quote listing unit quantities, unit price, and extended total.
  - b. Each labor number shall include a breakdown showing number of laborers, hours of labor worked, hourly wage, and extended total.
  - c. Each equipment number shall have an invoice / quote listing the hours of use, hourly rate, and extended total.
- I. An official Change Order to the State **CANNOT** be prepared if all backup paperwork is not provided and accounted for.
- J. This information is required for all contractors, subcontractors, and sub-subcontractors.

**11. Shop Drawings.**

- A. Submittal Schedule must be submitted to Architect at or before Pre-Construction Conference. Correlate this submittal schedule with the listing of subcontractors and with list of materials as specified in contract documents. The submittal schedule should be in chronological order following the critical timing of the approval of submittals in accordance with the Work Progress Schedule.
- B. Submit all items proposed for use in work. Do not combine submittals with requests for substitutions
- C. Must bear GC's action stamp as APPROVED OR APPROVED AS NOTED. Contractor shall review and stamp approval and submit shop drawings, product data and samples far enough in advance to allow ample time for Architect review. Color selections may take

longer than actual submittal approval, but in any case will not be given via phone calls. If submittals are not marked as approved by the GC, they will be returned without action.

D. Digital Copies: Provide via email to submittals@lathanassociates.com. Do not send directly to Architect. **See attached Sample.**

E. Submittal Preparation:

- **Include the following information on transmittal / email.**
  - Date
  - Project Name and Architect's Project Number.
  - Name of the General Contractor and Contact within company.
  - Subcontractor/Supplier.
- Clearly state **Number** and title of appropriate Specification Section and **Description** of Item and if applicable
  - Name of the Manufacturer.
  - Model / Style of Item
  -

General Contractor must review and approve shop drawings and submittals prior to submitting to Architect. Allow the Architect no less than three (3) weeks for initial review. Allow more time if the Architect must delay processing to permit coordination with the sequence of construction, related specification divisions, engineers, consultants and owner's representatives. Allow no less than two (2) weeks for reprocessing.

NOTE: No extension of Contract Time and/or additional costs will be authorized because of failure to transmit submittals sufficiently in advance of the Work to permit processing.

F. Material shall not be fabricated or work performed without approval of respective submittal.

G. GC is to maintain copies of all approved shop drawings at the site and have available for architect and/or engineers at all times.

H. **GC is to maintain a Submittal Log and present updated copy log at each OAC meeting.**

I. **Important:** Contractor shall perform no portion of the work for which the contract documents require submittal and review of Shop Drawings, Data, Installer Qualifications, etc. until respective submittal has been approved by the Architect.

J. **Important:** Submittals are not Contract Documents and are not used to make changes in scope of project or intent of Contract Documents, and not used to request or IMPLY substitutions or to otherwise make changes in project requirements.

K. **Important:** The only changes that can be made to the project once it is bid, is through Change Order Requests and Approvals.

L. **Important:** After receiving approved digital submittals, General Contractor is responsible for printing and delivering 2 hard copies of the approved shop drawings to the Architect within 10 days. Submittals are not considered complete until 2 copies have been received by the Architect. This may have a direct effect on pay requests or final payment.

## 12. CAD Files / PDF

A. This project was bid under the assumption that electronic CAD files would not be available.

B. Electronic CAD files are owned individually by each design professional according to discipline. If electronic CAD files or portions thereof are made available, be reminded that electronic CAD files can be manipulated and do not constitute the Contract Documents. The business of acquiring such files shall be between the contractor and the individual design professional. Fees may or may not be applicable. It shall be the Contractor's responsibility to investigate and procure at no added expense to the Owner.

C. PDF files shall be made available to the General Contractor for use during construction.

**13. Advanced notice of required inspections.**

The contractor will contact the architect by e-mail at [inspections@lathanassociates.com](mailto:inspections@lathanassociates.com) of the date the project will be ready for an inspection by the DCM Inspector: Pre-Roofing, Fire Above Ceiling, Final, and Year End. Special Inspections shall be required for all work of the Storm Shelters and the Fire Water Lines. Schedule well in advance to prevent delays.

- Inspections must be requested 14 days in advance.
- When the DCM Inspector confirms the inspection time, the Architect will send an e-mail confirming the inspection time and date.
- Cancellations of any scheduled inspection must be received in writing by e-mail no less than 48 hours prior to the scheduled inspection. If an inspection is cancelled, it will be rescheduled subject to the DCM Inspector's availability.
- If an inspection is cancelled less than 48 hours prior to the scheduled inspection, the re-inspection fee of \$1,500 will be charged.

**14. Inspection Minimum Requirements.**

The following minimum requirements listed below are provided to aid the contractors and architect in determining if a project is ready for a required inspection.

- Pre-Construction Conference
  - Required Attendees: Contractor, Owner, Architect, Major Subcontractors
  - Inspection Requirements:
    - ✓ Signed construction contract
    - ✓ Verification of payment of permit fee
    - ✓ Fire Alarm Contractor's Certification (from State Fire Marshal)
    - ✓ ADEM permit, if more than 1 acre of land is disturbed
- Pre-Roofing Conference
  - Required Attendees: Contractor, Owner, Architect, Roofing Subcontractor, Roofing Manufacturer's Representative
  - Inspection Requirements:
    - ✓ Roofing submittals must be approved by the architect prior to pre-roofing conference
    - ✓ Roofing manufacturer must provide documentation that roof design and roofing materials meet code requirements for wind uplift and impact resistance
    - ✓ Copy of sample roofing warranty
- Above-Ceiling Inspections
  - Required Attendees: Contractor, Owner, Architect, MEP Engineers, Major Subcontractors, DCM Inspector
  - Inspection Requirements:
    - ✓ All work must be completed except for installation of ceiling tiles and/or hard ceilings
    - ✓ Space must be conditioned
    - ✓ Permanent power must be connected unless otherwise arranged with the DCM Inspector
    - ✓ Grease duct must be inspected and approved by the DCM Inspector prior to fire wrapping and Above-Ceiling Inspection

- Life Safety Inspections and Final Inspections
  - Required Attendees: Contractor, Owner, Architect, Engineers, Major Subcontractors, Local Fire Marshal, DCM Inspector
  - Inspection Requirements:
    - ✓ Fire alarm certification
    - ✓ General Contractor's 5-Year Roofing Warranty (ABC Form C-9)
    - ✓ General Contractor's Five Year Building Envelope
    - ✓ Above ground and below ground sprinkler certifications
    - ✓ Completed Certificate of Structural Engineer 's Observations for storm shelters
    - ✓ Emergency and exit lighting tests
    - ✓ Fire alarm must be monitored
    - ✓ Elevator Inspection completed and Certificate of Operation provided by the State of Alabama Department of Labor
    - ✓ Boiler/Vessels Inspection completed and Certificate of Operation provided by the State of Alabama Department of Labor
    - ✓ Flush test for underground sprinkler lines (witnessed by local fire marshal, fire chief and/or DCM Inspector)
    - ✓ Flush/pressure test for new and/or existing fire hydrants
    - ✓ Must have clear egress/access and emergency (for first responders) access to building
    - ✓ Must have ADA access completed
- Year-End Inspections
  - Required Attendees: Contractor, Owner, Architect, Engineers and /or Major subcontractors may also be required to attend
  - Inspection Requirements:
    - ✓ Owner 's list of documented warranty items

**15. Above Ceiling Inspection by the Architect, Engineers and DCM Inspector.**

No above ceiling work is to be done after the Above Ceiling Inspection other than correction of deficiencies noted during the inspection. (Pre-Above Ceiling Inspection)

Fire Caulking              Tented fixtures      Wire at Light Fixtures      Debris  
Temporary Lighting      Penetrations          Pipe Saddles

**Insulation - No Kraft - Exposed Fire-Rated FSK or FRK - Type III, Class A.**

**16. Other inspections required before work is covered.**

- A. Local inspectors may require a full range of inspections on this project, footings, under-slab, etc. A wall inspection will be held before any finish paints are applied.
- B. Material Testing.

**17. Observation report distribution.**

Architect will submit field reports promptly to the Owner, GC, DCM Inspector. Architect will fill in all blanks on the field report form.  
(GCS 16 & MP 8D)

**18. Record drawings, definitions of procedures.**

G.C. is to keep all changes made in the field red lined daily. Cut and paste all addendums onto the plans at their respected locations. One clean set of plans is to be secured at the job trailer at all times for review by all interested parties. This set with changes could be used as the record drawings. Final pay approval is subject to receipt of these as-built drawings.

**19. Project sign and other job signs.**

State required sign is the only sign allowed on project.  
Job trailers with contractor and/or sub-contractor names are allowed.



- 20. Overall phasing of project.**  
 Superintendent is responsible to plan ahead in order to avoid delays and conflicts. GC is to advise Architect on delays of critical path items. Superintendent is to be on site at all times when any work is in progress; no exceptions (GCS 6A & B)
- 21. Contractor's duty to coordinate work of separate contractor.**  
 Contractors employed by others for installation of data, computer and etc. (GCS 40D)
- 22. Use of existing site, building and access drive.**
- A. Use of existing building site for lay down is to be determined by local owner and Architect. Local owner will advise contractor on proper route to site. Material delivery times are to be made as to not interfere with the school bus schedule. Area is to be reviewed after this meeting, if necessary. Maintain traffic flow.
  - B. No workmen are allowed in existing building, unless prior approval is granted by the Owner and arranged by the General Contractor. There is to be no communication between workers and faculty/staff or students; through vocal, looks, stares or body language.
  - C. Since most projects are hard hat areas, the worker's name will be on his/her hat for identification purposes.
  - D. If a faculty/staff member or student is causing a problem with a worker, the worker is to report the incident to the Project Superintendent. The Superintendent should then report the incident to the Owner. Under no circumstances should the Worker try and handle the problem by him/herself.
  - E. There is to be no profanity on the job site.
  - F. School Lunchroom is off limits to workers.
  - G. Use of existing site, building and access drive.
  - H. Workmen are expected to dress appropriately. Tee-shirts are expected to be non-offensive to all parties.
  - I. State school properties are tobacco free areas. No smoking, chewing, or dipping of tobacco products are allowed.
  - J. State school properties are drug free areas. Vehicles are subject to search and seizure by law enforcement authorities.
  - K. Firearms are not allowed on school property. Cased, uncased, loaded, or unloaded.
- 23. Use of existing toilets.**  
 There will be no use of existing toilets. G.C. is to provide proper number of toilets for all workers. School telephone is off limits.
- 24. Coordinate any utilities supplied by the Owner / New equipment.**
- A. Existing sites, normally water only.
  - B. Coordination - OAC /Sub Meetings
  - C. New equipment utilities may be different than those existing utilities that the design is based upon. Coordinate with actual equipment cut sheets submitted and approved.
- 25. Coordinate outages with Owner.**  
 Provide as much notice as possible. Superintendent is to verify that coolers and freezers are back on line. Coordinate with key testing date, do not disrupt on-going school operations. *Roofing fumes must be minimized with afterburner.*
- 26. Keeping existing exit paths open.**

- Required exits are to be maintained at all times.
27. **Routine job clean up.**  
Debris is to be removed daily/weekly from building and site. Do not allow dumpster to spill over. Burning of trash on site is not allowed. (GCS 48, A & C)
  28. **Safety is General Contractor's responsibility.**  
As a courtesy, advise the Architect if there has been a problem.
  29. **Project limits.**  
Defined on drawings.
  30. **Building location relative to critical property line. Easements, Setbacks, etc.**  
Review with Architect before starting work.
  31. **Location of property lines, corners, etc.**  
Review with Architect before starting work.
  32. **Verify sanitary outfall before committing to floor level.**  
Plumber is to advise Superintendent ASAP and Superintendent is to notify Architect if there is a problem.
  33. **Procedure if bad soil is encountered.**  
Contact Architect immediately.
  34. **Stockpiling top soil.**  
On existing sites, location is to be approved by the Architect and Owner.
  35. **Protect existing trees, shrubbery, landscaping, sidewalks, curbs and etc. if intended to remain.**  
GC is to leave existing site in same condition as when project started.  
*\*\*If disturbing more than 1 acre, discuss ADEM requirements.*
  36. **Soil compaction, type soil, lab test, etc.**  
Testing Engineer is to approve compaction. Soil type is listed in the specs. For lab tests, refer to the specs. Testing disclosure.
  37. **Soil Treatment.**  
Soil treatment provider is to come to the site with empty tank. Use on site water. Superintendent is to witness the treatment container seals broken and mix prepared. No pre-mixed material is to be brought to the site.
  38. **Surveyor to check foundation wall. Location is critical.**
  39. **Ready mix plant, file delivery tickets, slump and cylinder test.**  
Protect cylinders until tested. Superintendent is to have on file, at all times, the delivery tickets, slump and cylinder test results.
  40. **Quality of concrete work. Concrete testing.**  
Concrete is to be free of hollows and humps. Finish floor areas are to be no more than 1/8" in 10'. Review specs for slump requirements. Do not add water to concrete without approval of Geotechnical personnel.
  41. **Materials Testing / Re-testing**

**Retesting shall be the at the contractor's expense.**

**42. Inspection before pouring concrete.**

**Two (2) day notice is required before you pour footings.** Architect must approve all concrete placement. Pictures are not acceptable. Prior to footing inspection, all footings will be cleaned of loose soil, debris, and water. Steel is to be properly tied and supported.

**43. What is expected of masonry work, mortar additive.**

All masonry work shall be as stated in the specs. Full head and bed bull-nose outside corners. Joints are expected on both sides of the units. Pre-formed corner tees, durowall and flashing are required. Mortar mix shall be made with same proportions everyday throughout entire project, using appropriate measuring devices. For tooling of brick or block, refer to specs. No brick or block less than a half unit is allowed at any opening. Full head weeps at 32" on center. All substandard masonry will be removed. Cull blocks; do not lay chipped blocks. Cut holes for electrical outlet boxes the proper size; caulking and oversized plates are not allowed.

**44. Problems with hollow metal (install proper fire labels).**

Do not paint fire labels. Labels will be attached; rating is to be embossed in minutes and/or hours. Specs require coating the interior of the frames. Grout frames solid.

**45. Pre-roofing conference. No roofing materials installed prior to conference.**

Contractor, manufacturer and applicable suppliers are required to be present. Verify with DCM inspector if underlayment installation is acceptable prior to pre-roofing conference.

**46. G.C. is to have copies of all required roofing warranties in hand at the final inspection. i.e.**

Manufacturers' and DCM Five Year warranty issued by the General Contractor and the Roofing Subcontractor, (which is to be dated the date of the substantial completion), or final cannot be held.

**47. Potential conflict of mechanical and electrical equipment.**

It is the responsibility of the GC to coordinate the installation of all equipment where a conflict may occur. G.C., HVAC, Plumbing and Electrical subs are to read their sections of specs. Each foreman is to sign their section on the master copy, which is kept in the job trailer.

**48. Problems with fire damper installations.**

Installation of the dampers will be as shown on the plans. All other installation procedures will be unacceptable.

A. Fire stop material; workmen must be certified to install firestop material. Firestop system must be a UL approved assembly. (See manufactures' manual).

B. Stencil all fire walls, both sides every 20ft.

**49. Certificate of Substantial Completion.**

Architect will provide at the final inspection, provided contractor has copies of all roof warranties and the fire alarm certification.

**50. Project Closeout Procedures / Final payment.**

A. Warranties must be effective the Date of Substantial Completion. All warranties must identify the product covered.

B. Operating and maintenance manuals. All training required for the MPE fields will be completed prior to the final request being released.

C. As-built drawings.

D. Other requirements. G.C. is to make a list of all over-stocks that are required by specs and have at final for B.O.E. signature and acceptance.

- E. Final Payment. Punch list items must be completed to the Architect and DCM Inspector's satisfaction, all close out documents must be received by the Architect, all change orders must be fully executed and Certificate of Substantial Completion must be fully executed before final payment is made. (GCS, 34A & B, MP 7 G4)
- 51. Advertisement of Completion. Start ad after substantial completion.**
- A. 1 week for projects valued less than \$50,000.00.
  - B. 4 consecutive weeks for projects exceeding \$50,000.00.
  - C. General Contractor is responsible for placement and payment of advertisement.
- 52. Time Extensions.**  
The GC can submit time extension request to the Architect on a weekly basis, with reasons for extension. Delays caused by rain, must exceed the five year average. (GCS 23).
- 53. Quality Control.**  
Urinals 17" A.F.F. Flush valves at wide side. Rigid conduit under slab. Fire strobes 80" to bottom, within 15' of exits.
- 55. Requests For Information (RFI'S)**
- A. All RFI's must be numbered and made in writing to the Architect's email [rfi@lathanassociates.com](mailto:rfi@lathanassociates.com) by the General Contractor. Please include your name, company name, telephone number, and fax number so that we may respond appropriately. Verbal RFI's will not be answered. All RFI's must be in writing.
  - B. The Architect will not accept RFI's directly from subcontractors or vendors.
  - C. The Team List provided within the Specification Manual is for informational purposes only and should not be used to contact Engineers and/or Consultants directly with questions regarding the project.
  - D. All questions that need to be directed to an Engineer / Consultant must be routed through the Architect's office. If applicable, the Architect will contact the appropriate Engineer / Consultant for information.
  - E. Bids shall be based upon the official Contract Documents consisting of Plans, Specifications and Addenda. Architect assumes no responsibility for information used by Contractors outside the official Contract Documents.
  - F. **A RFI Log shall be kept by the Contractor and reviewed at each OAC Meeting.**  
It will be the contractor's responsibility to inform Architect of any outstanding RFI's in a timely manner.
- 56. Liquidated Damages**  
Liquidated damages will be strictly enforced for not reaching substantial completion by the scheduled completion date. Liquidated damages will be deducted from the General Contractors final payment.
- 57. Miscellaneous:**