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, metal, 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

A. 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

A. 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.

B. Product Data: For each paint system indicated. Include block fillers and primers.

1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
3. Coating Maintenance Manual: Upon conclusion of the project, the Contractor or paint manufacturer / supplier shall furnish a coating maintenance manual, such as Sherwin-Williams "Custodian Project Color and Product Information" report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product / color / finish was used, product data pages, Material Safety Data Sheet (MSDS), care and cleaning instructions, Touch-up procedures.

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

A. 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 Quality Assurance

A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats. An inspection is required by manufacture in between prime coat and finish. Per the request of the Architect.

C. Coordination of Work: Review other Sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings systems for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.

D. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5. Duplicate finish of approved sample Submittals.

1.9 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.**

1.10 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, or 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 only be 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.
Primer: S-W: Procryl B66 - 1310
Finish: Apply two coats
B66-600 Series

2. Non-primed metal shall be cleaned and etched with approved acid and washed with water.
Primer: S-W: Procryl B66 - 1310
Finish: Apply two coats
S-W: Pro Industrial DTM Acrylic Coating

3. Primed metals shall be inspected, scuffs, and abrasions sanded free of rust and receive full coat of primer. Concealed metal surfaces shall be spot primed.

Primer: S-W: Procryl B66 - 1310
Finish: Apply two coats
S-W: Pro Industrial DTM Acrylic Coating

B. Interior Metals

1. Non-primed metal shall be primed under this section.
Primer: S-W: Procryl B66 - 1310

Finish: Apply two coats
S-W: Pro Industrial DTM Acrylic Coating, Gloss

2. Primed metal shall have scratches and abrasions sanded free of rust and receive one full coat of primer.
Primer: S-W: Procryl B66 - 1310

Finish: Apply two coats
S-W: Pro Industrial DTM Acrylic Coating

C. Exterior Wood

Exposed wood of every description.

Primer: S-W: Exterior Latex Wood Primer, B42W8041
Finish: Apply Two Coats:
S-W: A-100 Exterior Latex Satin, A82 Series

D. Interior Woodwork and Trim

Apply two finish coats

Primer: S-W: Prep-rite Problock B51-620

Finish: Apply Two Coats:

S-W: ProMar 200 Zero VOC Interior Latex Semi-Gloss, B31-2600

E. Interior Gypsum Board and Plaster

1. Latex Finish system:

Primer: S-W: ProMar 200 Zero VOC Interior Latex Primer, B28-2600

Finish Apply Two Coats:

S-W: ProMar 200 Zero VOC Interior Latex

2. High Touch areas - Microbicidal Latex Finish System – passive system for controlling / killing E-COLI, STAPH and MRSA Infections. With topcoat EPA registered No. 64695-1.

Prime Coat: Primer, latex, interior: S-W ProMar 200 Zero VOC Latex Primer, B28W2600, at 4.0 mils (0.102 mm) wet, 1.0 mils (0.025 mm) dry.

a. First Coat: Microbicidal Latex, interior, matching topcoat.

b. Topcoat: Microbicidal Latex, interior, eggshell:
S-W Paint Shield Interior Latex Eg-Shel Microbicidal Paint, D12W51, at 4.0 mils (0.102 mm) wet, 1.8 mils (0.046 mm) dry, per coat. Brush and roll application only.

3. Ceiling Application:

**Note: Provide flat finish for gypsum board in ceiling applications.

S-W: Pro-Mar Ceiling Paint, P200 Flat - B30W2651

4. High Performance System: (All areas not ceiling) ***

Primer: S-W: ProMar 200 Zero VOC Interior Latex Primer, B28-2600

Finish Apply Two Coats:

S-W: Pro Industrial Pre-Catalyzed Waterbased Epoxy

Provide at all wet areas

S-W: Pro Industrial Waterbased Catalyzed Epoxy

F. Exterior Exposed Concrete and/or Clay Brick Masonry

Primer: Loxon Exterior / Interior Concrete & Masonry Primer / Sealer, A24W8300

Block Filler:S-W: Pro Industrial Heavy Duty Acrylic Block filler, B42-151

Finish:

S-W: A-100 Exterior Latex

Sheen indicated on Finish Schedule

G. Interior Concrete and Concrete Masonry

1. Concrete Masonry Surfaces shall be filled unless noted otherwise.

Prime: Pro Industrial Heavy Duty Acrylic Block Filler, B42W151

Finish Apply Two Coats:

S-W: Pro Industrial Pre-Catalyzed Waterbased Epoxy

Provide at all wet areas

S-W: Pro Industrial Waterbased Catalyzed Epoxy

a. Note: Block Filler should achieve a smooth pinhole free appearance.

b. This is necessary for proper protection before top coat is applied.

c. Apply at recommended film thickness and spread rate as indicated by manufacturer.
d. Architect requires manufacturer' inspection between block filler and top coat.

2. **Sealed Concrete (SC):** 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.

H. Interior Wood Doors and Natural Finish Wood
One (1) coat - Stain, of selected color, S-W: Wood Classics "250" Interior Wood Stain, A49-800
Or One (1) coat – S-W: Wood Classics Waterborne Polyurethane

I. Exterior Ground Mount and Roof Top Mechanical Units, Equipment and Accessories. Painting contractor shall examine the site and all drawings and provide one (1) heavy coat of paint for each unit. Provide also one (1) coat primer for galvanized and/or rust areas.

J. 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

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 Scope
The work required under this section consists of exterior Building Letters.

1.2 Submittals
A. Submit a sample drawing of letters, including size, style of lettering, materials, and finish and font.

1.3 Warranty
The letters shall have a lifetime warranty against fading, cracking, pitting or chipping as long as the letters are installed in their original location.

2.0 - PRODUCTS

2.1 Metal Building Letters
A. Each metal letter is precision cast in aluminum or bronze. Metal finishes and letter styles to be selected by the Architect.

B. See drawings for wording and location of letters. Font shall be subject to further selection by the Architect through the submittal process.

C. Size: Assume 12" high

D. The cast aluminum sign letters use virgin aluminum ingots Alloy 356 that are melted down in an all-electric, pollution free furnace. Aluminum Alloy 356 is a superior metal for outdoor signage because of its strength, hardness and corrosion resistance against weather extremes particularly in marine areas. This aluminum alloy has a tensile strength of 38,000 psi. finish to be selected by the Architect from the following two options:

1. Anodized in the colors of clear, gold, medium bronze, dark bronze or black. The anodized aluminum letter shall use virgin ingots Alloy 514. Anodizing is an electro-chemical process which embeds the colored dye into the microscopic pores in the aluminum surface of the letter.

2. Painted, select from 45 baked enamel colors.

3.0 - EXECUTION

3.1 Installation
Install per manufacturer's instructions and guidelines. Provide a mounting template for letter attachment.

3.2 Maintenance
Routine maintenance of rinsing with mild soap and water usually will restore the metal surface to its original appearance.

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, WHERE applicable)**

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)

I. Occupant Load Sign to be provided at every Auditorium, Gymnasium, and Cafeteria (**Assembly Areas**) as required by IBC Section 1004.3

J. Storm Shelter Signage (**See Life Safety Plan IF applicable**)

   1. Provide the following Storm Shelter Signage as required by ICC 500-2014 and as indicated on the storm shelter plan located within architectural drawings.
      a. Provide a 12" x 16" storm shelter plaque which shall be located within each storm shelter, as indicated.
      b. Provide 8" x 8" storm shelter sign, location as indicated.
      c. Provide 4" x 7" storm shelter instruction signs on each face of all storm doors as indicated.
      d. Provide an 8"x8" sign adjacent to all doors leading to electrical equipment rooms containing stationary battery systems indicating "APPLY NO WATER," along with the type of battery system and current maintenance contact information.

2.4 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.

B. Provide Traffic Control signs as indicated on drawings and in accordance with the State of Alabama Highway Department Manual on Uniform Traffic Control Devices.

2.5 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.

3.2 Install "Physically Handicapped Parking Only" sign at Handicapped Parking Spaces as indicated.

3.3 Install Traffic Control Signs in accordance with State of Alabama Highway Department Manual on Uniform Traffic Control Devices.

END OF SECTION

1.0 -GENERAL

1.1 Scope

The work required under this section consists of custom engraved Information Plaque(s) to indicate pertinent roofing or re-roofing information on the actual roof site for the Owner's future use.

1.2 Submittals

Submit a full scale graphic representation of the proposed Information Plaque(s) for the Architect's approval.

1.3 Related Sections

A. Division One

B. TPO Roofing System, Section 07420, Asphalt Shingles Section 07310

2.0 - PRODUCTS

2.1 Information Plaque

A. Provide one Information Plaque at each distinguishable area of new roofing being provided under this contract as follows:
   1. Size: 3 ½" x 7" (min.)
   2. Material: 1/8" thick aluminum or stainless steel
   3. Finish: Match roof edge metal
   4. Text: Deep Engraved and painted to contrast
   5. Font: ¼" (min.) Romans
   6. Minimum Information:
      a. Date - Substantial Completion / Start of Warranty
      b. Owner / Architect
      c. General Contractor
      d. Roofing Sub-Contractor
      e. Roof System Manufacturer
      f. Description of roofing system / type
      g. Warranty period / information

3.0 - EXECUTION

3.1 Mounting

A. Provide Information Plaque with 3/32" mounting holes at opposite ends.

B. Permanently attach to building features so as not to cause leaks at each distinguishable field area of new roof work. Preferably at the north or northeast perimeter edge; otherwise consult the Architect.

C. Locate to be visible from atop the roof only and close to new work so as to not mistake the area being identified; 8" minimum above the finish roof surface.

END OF SECTION

1.0 - GENERAL

1.1 Scope
The work of this section shall include all labor, material, and equipment necessary to furnish and install Walkway Cover and accessories hereafter specified and/or indicated on the Drawings.

1.2 Manufacturer
Walkway Cover 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.

1.3 Shop Drawings
Shop drawings shall be generated under the services of a structural engineer licensed in the State of Alabama, sealed and signed and submitted to the architect for approval before fabrication. These drawings to show: size, arrangement, foundation and type of material, connections and relationship to adjacent work and compliance with applicable codes.

1.4 Guarantee
The Walkway Cover Contractor shall guarantee all materials and workmanship covered by this section for a period of one (1) year from date of final acceptance of the Contract, or from occupancy of the building, whichever is earlier.

2.0 - PRODUCTS

2.1 General
A. Structural roof system for walkway shall be complete with all required components and accessories as shown on the Drawings and as required.

B. The system shall be designed to structurally withstand severe icing, heavy hail, and 110 mph wind loads. Minimal structural capacity for all components shall meet the latest edition of the IBC as adopted by the Authority having jurisdiction.

2.2 Concealed Drainage
Water shall drain internally from deck to beams and/or to columns, spouting out at ground level through columns.

2.3 Materials
A. Roof Panel: The self-supporting aluminum Roof Panel shall be an alloy accurately roll formed to the deep channel design shown on the Drawing. It shall have a depth required for span and be furnished with an interlocking design to provide a weathertight load-bearing deck. The gauge of the panels shall be as required to support the load in accordance with engineering prints and calculations provided by the manufacturer. Material to be baked enamel acrylic. Color as selected by Architect.

B. Roll-formed Fascia: The fascia shall be accurately roll formed from an aluminum alloy to the sculptured design shown on the drawing so that it will serve as a built-in gutter for roof drainage and as a structural frame member with a height of not less than 6-1/4" and a gutter width of not less than 2-3/8".

Gutter cross sectional area shall be 4 square inches. Fascia gauge shall be as required for the load to be supported in accordance with engineering prints and calculations provided by the manufacturer. Materials to be baked enamel acrylic. Color as selected by Architect.

C. Finish: The enameled finish on roof panels, roll-formed fascia and related enameled components shall be designed for optimum performance in exterior installations under all environmental conditions. The finish shall be applied in accordance with and conform to, or exceed the Painted Sheet "Quality Standards" and recommended ASTM, Military and/or Federal Test Methods specified by the Aluminum Association in their publication "Aluminum Standards & Data".

All exposed materials shall be pre-finished. Color choices shall include industry standard bronze, dark bronze, medium bronze, white, cream, etc.

Galvanized metal shall be solvent clean with VM&P Naphtha.
Primer: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310

Finish: Apply two coats
S-W Pro Industrial HP Acrylic Coating, S/G, B66-650
OR S-W Pro Industrial HP Acrylic Coating, Gloss, B66-600

Non-primed metal shall be cleaned and etched with approved acid and washed with water.
Primer: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310

Finish: Apply two coats
S-W Pro Industrial HP Acrylic Coating, S/G, B66-650
OR S-W Pro Industrial HP Acrylic Coating, Gloss, B66-600

Primed metals shall be inspected, scuffs, and abrasions sanded free of rust and receive full coat of primer. Concealed metal surfaces shall be spot primed.

Spot Primer Coat – S-W Pro Industrial Pro-Cryl Universal Primer, B66-310
Finish: Apply two coats
S-W Pro Industrial HP Acrylic Coating, S/G, B66-650
OR S-W Pro Industrial HP Acrylic Coating, Gloss, B66-600

D. Component Accessories: Roof Brackets, Post Brackets, Flashing, etc., shall be of same materials and finishes as specified for prime components. Each part and its use is described in the engineering prints and calculations provided by the manufacturer. Each part shall be used as specified in the aforementioned prints. Posts shall be used as specified. All components must match finish color as selected by Architect.

E. Hardware: All bolts, nuts, washers, and screws used in joining the members of the canopy together shall be stainless steel up to 1/4" diameter nominal size. Any hardware 1/4" diameter and larger shall be hot dip galvanized to withstand 200 hours' salt spray test of maximum resistance to rust and corrosion. Provide concealed fasteners where possible. All hardware must match finish color as selected by Architect.

3.0 - EXECUTION

3.1 Installation

A. Installed units shall have the following minimum pitch for water drainage of the roof.
Minimum pitch for all panels and fascia:
Up to 10'-1/8" ft.
Over 10'-1/4" ft.

B. Installed unit shall be properly caulked with a suitable, high quality material where needed and where specified.

C. Installed unit shall meet local building code requirements and conform to the engineering prints provided by the manufacturer.

3.2 Erection

A. Columns and beams shall be aligned with care before columns are grouted. Downspout columns shall be filled to the discharge level to prevent standing water, and downspout deflectors installed after grouting.

B. Grout shall be #2000 compressive strength. Mix by volume, 1 part Portland cement and 3 parts masonry sand. Add water to make pouring consistency and vibrate with a small rod to fill voids.

C. Extreme care shall be taken to prevent damage or scratching. All workmanship must be of the very best, with neat miters and fitted joints.

3.3 Flashing

At adjoining construction, as indicated or required.

3.4 Clean Up

Remove all debris from the site as it accumulates. Clean Protective Walkway Cover at completion of installation and leave in as new condition.

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. **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

1.0 - GENERAL

1.1 Intent

A. The intent of the specification is to provide the owner with a complete working curtain system. To have the design integrity of equipment and features meet the owners decided use, and provide equipment that has a proven long-term reliability record.

1.2 Scope

A. All materials, components and services necessary to provide a complete working system indicated in this section, as specified herein and shown on related drawings including, but not limited to:

1. Dimensional drawings and schedules for specified curtains, track and appropriate hardware.

2. Shipment of equipment and supplies to the job site.

3. Installation in accordance with these specifications, related drawings, the equipment manufactures' recommendations, established trade criteria, and all applicable code requirements.

4. Inspection and demonstration of completed installation with the general contractor's engineering personnel and any necessary adjustments needed to comply with these specifications, related drawings, equipment manufactures' recommendations, established trade criteria, applicable code requirements, or proper operation.

1.3 Work Included

A. Base Bid:

1. Theatre Curtains

2. Curtain Track, Electric Pipes and Hardware

B. The above list is for reference only and is not intended to define limits of the work for a complete installation. Carefully follow all written specifications and drawings and provide such work for a complete and operable system.

1.4 Work Not Included

A. Principal structural steel work, except as herein indicated.

1.5 Qualifications

A. All equipment and installation shall be the responsibility of a single contractor, or subcontractor, who shall own and operate his own full time shop for the installation and assembly of stage equipment. Preapproved contractors are: Mainstage Theatrical Supply, Milwaukee, WI (800)236-0878, Pensacola, FL (800) 851-3618 or Memphis, TN (800) 757-6884.

B. Bid submissions must identify any such subcontractors.

C. The contractor or subcontractor shall have at least 5 years experience in the installation of similar stage equipment and systems. If requested, the contractor or subcontractor shall submit a representative list of installations during the above period.

1.6 Submittals

A. Samples:

1. Within thirty (30) days of contract award, the contractor shall submit to the architect for approval, prior to fabrication:

a) Samples and color lines for all curtain fabrics.

b) Samples of any equipment component requested by the architect.

1.7 Standards

A. All equipment, where applicable standards have been established, shall be built to the standards of Underwriters Laboratories, Inc., the National Electric Code, and the United States Institute for Theatre Technology. Approved equipment shall be so labeled on delivery to the job site.

1.8 General Requirements

A. General Conditions of the project contract, work schedules, and site regulations apply to this work.

B. This work shall comply with all applicable local, state, and national codes.

C. All equipment shall be fully insured against loss or damage during shipment, installation and testing. Certification of such coverage shall be furnished to the architect.

D. The contractor shall warrant all equipment provided under this section to be free from defects in materials and workmanship for a period of at least twelve (12) months from the date of final acceptance of all work in this section.

E. All repairs and service during the warranty period shall be at the job site and include all necessary labor, materials and transportation of replacement materials and parts.

F. This warranty shall cover any manufacturer defects of equipment and unusual wear and tear caused by improper installation. Normal wear and tear and abuse of equipment are exempted.

1.9 Curtains

A. Fabrics:

1. Front Setting: Velour shall be 100% Polyester, 26 ounce 54" wide Charisma fabric manufactured by KM Fabrics. Fabric shall be Inherently Flame Retardant. Submit certificates showing dye lot and flame test. Architect to select color

2. Rear Setting: Velour shall be 100% Polyester; 22 ounce 64" wide Encore fabric manufactured by Milliken & Co. Fabric shall be Inherently Flame Retardant. Submit certificates showing dye lot and flame test. Architect to select color.

3. Cycloramas: Shall be Poly Muslin manufactured from 100% Avora polyester as provided by Rosebrand. Fabric shall be Inherently Flame Retardant. Submit certificates showing dye lot and flame test. Architect to select color.

B. Fabrication:

1. All pile fabrics shall be constructed with pile running down.

2. All seams shall be vertical with each width running the full height - no horizontal splices.

3. Thread colors shall match face of fabric.

4. A label shall be attached 6 feet from the bottom of every curtain showing height, width, and date of flame proofing.

5. Sizes and quantities per drawings and schedules.

6. Draw Curtains: Top hem shall be turned and reinforced with continuous 3 ½" heavy jute webbing. 50% fullness shall be sewn in with box pleats approximately 12" on center. A #3 brass anodized black grommet shall be inserted on every pleat and at ends. Bit snaps or ADC model CC-2 snaps shall be provided for attachment to carriers at each pleat and ends of curtain. Bottom hem shall be 5" and contain a continuous No. 8 jack chain held in a muslin pocket sewn securely to be held 1" above the bottom of the hem. Jack chain shall be secured to muslin pocket every 36". Side hems shall be a minimum of 8" on the leading edge and 3" on the offstage edge. Vertical seams with salvages shall be sniped every 36" for proper hanging.

10. Cycloramas: Top hem shall be turned and sewn flat with continuous 3 ½" heavy jute webbing reinforcement. A #3 brass anodized black grommet shall be inserted every 12"and at ends. For Track installation insert bit snaps or ADC model CC-2 snaps into each grommet. For Pipe installation insert a 30" piece of #4 black tie line into each grommet for tying curtain to pipe. Track mounted cycloramas shall have a 5" bottom hem and contain a continuous No. 8 jack chain held in a muslin pocket sewn securely to be held 1" above the bottom of the hem. Jack chain shall be secured to muslin pocket every 36". Pipe mounted cycloramas shall contain a 5" pipe pocket reinforced with muslin.

C. Fabricate and install as directed.

1.10 Curtain Track and Hardware

A. Draw Curtains

1. Curtains over 18' tall shall utilize H&H Specialties 400 series track and components or pre approved equal.

2. Curtains under 18' tall shall utilize H&H Specialties 200 series track and components or pre approved equal.

3. Lightweight curtains shall utilize H&H Specialties 116 series track and components or pre approved equal.

4. Curved curtains shall utilize H&H Specialties 300 series track and components or pre approved equal.

B. Hardware:

1. All pipes and track for curtains shall be suspended with 1/8" 7x19 Galvanized Aircraft Cable, Anodized Black, secure loop ends with copper oval sleeves. Attach to track clamp hanger or pipes clamp using rated gliders. Eye gliders connect with 3/16" domestic shackles, or direct connect with glider pin device. All pipes for lighting shall be suspended with 1/4 proof coil chain zinc plated or galvanized. Attach chain to pipe utilizing rated pipe clamps and ¼" domestic shackles.

2. Appropriate clamping devices or eyebolts shall be used to make connection to support steel or ceiling. Chain is not to be wrapped around support members.

3. ¾" I.D. Schedule 40 black iron pipe shall be used for dead hung borders and legs. 1 ½" I.D. Schedule 40 black iron pipe shall be used for electric pipes.

1.11 Execution

A. Field Quality Control

1. All equipment shall be installed under the direct supervision of an experienced representative of the rigging contractor.

2. All work shall be performed in strict accordance with approved shop and installation drawings.

1.12 BIDS

A. Base Bid

1. Provide curtains, track, pipe, hardware and installation of all items.

Schedule of Curtains

No.	Qty.	Name	Fabric	Color	Fullness	Height	Width	Pipe Length	Track	Notes
1		Valance	Velour		50%					
2		Front Drape	Velour		50%					
3		Cyc	Muslin		Flat					
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

END OF SECTION

1.0 - GENERAL

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

1.2 Summary
This Section includes front-projection screens.

1.3 Submittals
A. Product Data: For each type of screen specified.

B. Shop Drawings: Show layout and types of projection screens. Include the following:

1. Location of screen centerline relative to ends of screen case.

2. Location of wiring connections.

3. Connections to suspension systems for pendant and recess-mounted screens.

4. Anchorage details.

5. Details of juncture of exposed surfaces with adjacent finishes.

6. Frame details.

1.4 Delivery, Storage and Handling
Do not deliver projection screens until building is enclosed, other construction within spaces where screens will be installed is substantially complete and installation of screens is ready to begin.

2.0 PRODUCTS

2.1 Front-Projection Screens

A. Materials and Viewing Surface of Front-Projection Screens:
Provide screens manufactured from mildew and flame resistant fabric of type indicated for each type of screen specified and complying with the following requirements:

1. Matte-white viewing surface with gain characteristics complying with FS GG-S-00172D (1) for Type A screen surface.

2. Material: Vinyl coated glass fiber fabric.

3. Edge Treatment: Black masking borders.

4. Size of Viewing Surface: 99" H x 176" W; 202" Nominal Diagonal

B. Electrical Operated Screens, General:
Provide manufacturer's standard UL-labeled units consisting of case, screen, motor, controls, mounting accessories and other components necessary for a

complete installation. Remotely control operation of each screen to comply with the following:

1. Single-Station Control: 3-position control switch with metal device box and cover plate for flush wall mounting and for connection to 120-V, ac power supply. Provide key operated switch.

2. Motor: Provide either motor in roller or end mounted motor.

3. Motor in Roller: Instant-reversing motor of size and capacity recommended by screen manufacturer with permanently lubricated ball bearings, automatic thermal-overload protection, preset limit switches to automatically stop screen in up and down positions, and positive-stop action to prevent coasting. Mount motor inside roller with vibration isolators to reduce noise transmission.

4. End Mounted Motor: Instant-reversing, gear-drive motor of size and capacity recommended by screen manufacturer with permanently lubricated ball bearings, automatic thermal-overload protection, preset limit switches to automatically stop screen in up and down positions, and positive-stop action to prevent coasting.

5. Screen Mounting: Top edge securely anchored to rigid metal roller and bottom edge formed into a pocket holding a 3/8 inch diameter, metal rod with ends of rod protected by plastic caps.

C. Electrically Operated Screens without Ceiling Closure:

1. Units designed and fabricated for recessed, surface or suspended installation with bottom of case entirely or partially open under screen compartment, to allow lowering and raising of screen, but closed under motor compartment, and as follows:

2. Screen Case: Wood sides and top with metal lined motor compartment, factory primed and constructed with single or double top as standard with manufacturer.

D. Products

Provide one of the following, subject to compliance with requirements:

1. Matte-White Viewing Surfaces:

   a. Matte White: Bretford Manufacturing, Inc.
   b. Matte White: Da-Lite Screen Company, Inc.
   c. Fiberglass Matte White: Draper Shade & Screen Company, Inc.

2. Electrically Operated Screens without Ceiling Closure, End-Mounted Motor:

   a. Series 700/7500 Bretford Manufacturing, Inc.

3. Electrically Operated Screens without Ceiling Closure, Motor in Roller:

   a. Cosmopolitan Electrol: Da-Lite Screen Company, Inc.
   b. Targa: Draper Shade & Screen Company, Inc.

3.0 - EXECUTION

3.1 General:

A. Install projection screens at locations indicated to comply with screen manufacturer's written instructions.

B. Install front-projection screens with screen cases in position and relationship to adjoining construction indicated. Securely anchor to supporting substrate in a manner that produces a smoothly operating screen with vertical edges plumb and viewing surface flat when screen is lowered.

C. Test electrically operated units to verify that screen, controls, limit switches, closure and other operating components are in optimum functioning condition.

3.2 Protecting and Cleaning

Protect projection screens after installation from damage during construction. If damage occurs despite such protection, remove and replace damaged components or entire unit as required to provide unit(s) in their original, undamaged condition.

END OF SECTION.

PART 1 – GENERAL

1.01 SUMMARY

A. The Work required under this Section consists of providing gymnasium equipment complete with accessories, necessary mounting and installation hardware.

B. Related Sections

1. Section 05 00 00, Structural Metal Framing, Metal Joists.
2. Section 09 00 00, Maintenance of Finishes, Wood Flooring, Interior Painting.
3. Section 26 00 00, Electrical, Installing electrical power to operate gymnasium equipment.

1.02 REFERENCES

A. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1.03 SUBMITTALS

A. Comply with Section 01 33 00 – Submittal Procedures.

1. Design Data: Submit manufacturer's design data, including loads to be transmitted to building structural members with requirements of any additional structure needed.
2. Field Test Reporting: Submit manufacturer's certified destructive test reports completed by an accredited independent testing laboratory, indicating compliance with any specified factor or safety.
3. Shop Drawings: Submit manufacturer's shop drawings, including elevations, plans, sections, layouts, component locations, dimensions, tolerances, fabrication details, materials, finish, quantities, hardware, fittings, electrical wiring diagrams, additional structure needed details, and method of attachment.
4. Product Data: Submit manufacturer's product data, including proposed components, fabrication, finish, and materials.
5. Samples: Submit manufacturer's color samples.
    a. Basketball Backboard Edge Padding
    b. Basketball Backstop Powder Coat
6. Installation, Operation, and Maintenance Instructions: Submit installation, operation, and maintenance instructions including detailed step-by-step installation, troubleshooting, general operation instructions, and any recommended routine maintenance.

7. Manufacturer's Project References: Submit manufacturer's list of recently completed projects. To be included is project name, location, name of architect, and description of equipment installed.

8. Warranty: Submit manufacturer's guarantees and warranty information on a system and/or component.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualification: All components to be provided from a single source manufacturer.

B. Installer Qualification: All components to be installed by a trained and qualified installer approved by the manufacturer.

C. Welding Certification: All welding to be completed by a certified welder in accordance to the American Welding Society (AWS), D1.1, "Structural Welding Code – Steel."

D. Regulatory Requirements: Gymnasium equipment shall conform to the latest rules and regulations:

1. National Federation of State High School Associations (NFSHSA)
2. International Basketball Federation (FIBA)
3. National Collegiate Athletic Association (NCAA)
4. National Basketball Association (NBA)
5. Women's National Basketball Association (WNBA)

1.05 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver basketball system equipment in original manufacturer's containers, with all containers grouped together, with labels clearly labeling the manufacturer and contents. Upon delivery, immediately inspect delivery for any missing containers or damage. Any damage or defects shall be noted and reported to the Owner's Representative.

B. Storage: Store containers in a clean, dry indoor location.

C. Handling: Protect materials and finish during handling and installation.

D. Replacements: If necessary, replacements shall be immediately re-ordered, so as to minimize any conflict with the construction schedule.

1.06 WARRANTY

A. Wall mounted basketball structure shall be guaranteed against defects in material and workmanship for a period of ten (10) years. Other components may be covered by their own extended warranty.

B. Ceiling suspended basketball structure shall be guaranteed against defects in material and workmanship for a period of twenty-five (25) years. Other components may be covered by their own extended warranty.

PART 2 – PRODUCTS

2.01 MANUFACTURER

A. Jaypro Sports, LLC. 976 Hartford Turnpike, Waterford, Connecticut 06385. Toll Free 800-243-0533. Phone 860-447-3001. Fax 800-988-3363. Email info@jaypro.com. Web www.jaypro.com.

B. Manufactures of equivalent products will be considered in accordance with

Section 01 25 13, Product Substitution Procedures.

2.02 CEILING SUSPENDED BASKETBALL EQUIPMENT

A. J849-FFFB, Single Drop, Forward Folding, Front Braced.

1. Type: Singe drop, forward folding, front braced with attachment up to 32'.
2. Main Mast Stem: 6-5/8" O.D. 11-gauge structural steel tube.
3. Anti-Sway Braces: 2-3/8" O.D. 10-gauge structural steel tube with precision cut ends for maximum weld area. Sway braces shall attach to the mast no higher than 36" above the backboard for maximum stability.
4. Auxiliary Braces: 1.90" O.D. 13-gauge steel tube braces for increased stability for attachment elevation exceeding 28'.
5. Mast Header: 5" heavy duty structural c-channel.
6. Mast Construction: Fully welded construction in accordance with American Welding Society (AWS), D1.1 "Structural Welding Code - Steel." Bolt-together masts are not acceptable.
7. Front Brace: Operates with 2-3/8" O.D. 12-gauge structure steel tube with heavy duty folding knuckle joint.
8. Knuckle Joint: Locks unit into playing position.
9. Fittings and Support Structure: Backstop supported from existing structure with capped 3-1/2" O.D. 11-gauge structural steel tube with heavy duty precision formed and/or welded steel support fittings.
10. Swing Hinge Fittings: Backstop suspended from 3-1/2" O.D. support pipe by 7/8" forged eyebolts with press fit oil-impregnated bronze bearings. 2" of adjustability provided for precise plumbing of backstop during installation.
11. Weight Lock: Mast centerline offset 2" forward of swing hinge fittings to ensure backstop securely weight locks the unit into the playing position.
12. Hoist Cable: 1/4" Diameter galvanized aircraft cable with 7000 lbs ultimate break strength. Cable disengages knuckle joint, allowing brace to fold.
13. Goals: Mounted directly through the backboard to a direct goal mount which is secured to the 6-5/8" main mast stem. Direct goal mount eliminates any strain on backboard should any player hang on rim.
14. Finish: All metal parts, pipes, and fittings to be powder coated
15. Compliance: Backstop system meets all NCAA and NFSHSA regulations and requirements.

2.03 BASKETBALL BACKSTOP WINCHES

A. SBBW-4, Electric Positioning Winch

1. Type: Fully enclosed, direct drive winch designed to hold backstop at any position during raising or lowering. Winch is maintenance free with no oil, belts, or chains.
2. Motor: 3/4 HP, instantly reversing, 115 volt, single phase electric torque motor. The winch shall deliver at least 1250 lbs. / 566 Kg. of line pull. Motor shall incorporate built-in thermal overload protection. Motor is rated at an intermittent 10 minute duty cycle and operates at full load amperage rating of 9.2 full load amps.
3. Frame: Precision interlocking steel frame for high rigidity and precise

alignment.

4. Hoist Cable: 1/4" 7 x 19 galvanized aircraft cable with 7,000 pounds ultimate break strength.
5. Rope Pressure Roller: Torsion spring tensioning roller to ensure cable tracks properly in grooves even under slack cable conditions.
6. Cable Drum: Cast aluminum grooved for 1/4" aircraft cable to facilitate smooth take-up of cable and proper spooling. Supported in large diameter ball bearings.
7. Limit Switches: Integral adjustable upper and lower limit switches making the setting of stop positions easy and accurate.
8. Mounting: Universal type mounting bracket, mounted upside down or right side up, with cable pull from any one of three different directions.
9. Controls: Specify type of control in subsequent paragraph.
    a. Warranty: Limited 1 year warranty.

B. SBAL-30, Auto-loc Safety Strap

1. Application: For use with 1400 Fold-Up Wall Mounted Backstop and all Ceiling Suspended Folding Backstops.
2. Lock: Inertia sensitive to automatically lock basketball backstop in position at any time during raising, lowering, or being held in the storage position. Initiation of locking mechanism occurs when a sudden increase in either tension or speed shall occur.
3. Reset: Fully automatic reset mechanism requiring no poles, ropes, levers, or buttons.
4. Telltale Indicator: Breakaway loop sewn into strap containing bright colored warning label for notification when safety belt has been called into action.
5. Warranty: Limited 1 year warranty.

2.06 BASKETBALL BACKSTOP BACKBOARDS

A. GBRUB-42, 42" x 72" Unbreakable Rectangular Glass Backboard

1. Application: For use with goals with 4" (vertical) x 5" (horizontal) mounting centers. Meets all NBA, WNBA, NCAA, and NFSHSA regulations.
2. Construction: 1/2" tempered glass cushioned within shock absorbing vinyl gasket. Frame constructed of high strength aluminum channel with engineered lower reinforced steel member.
3. Frame Perimeter: Clear anodized anti-glare aluminum channel outer frame.
4. Goal Mount: Designed to transfer impact load on goal directly to support structure, without imparting any stress on the glass.
5. Border and Target: Official white color permanently fused into the face of the glass.
6. Warranty: Limited lifetime warranty against breakage.

2.07 BASKETBALL BACKSTOP EDGE PADDING

A. MBBP-6, Safe-Pro Bolt-On Edge Padding

1. Application: Recommended for all 72" wide glass backboards. Pads meet all NCAA and NFSHSA rules.
2. Type: Bolt-on, molded self-skinning urethane two-piece design.
3. Protection: Padding shall cover entire bottom edge and extend 17-3/8" up the sides. Padding shall not be less than 2" thick.
4. Construction: Steel reinforced plates facilitate attachment of padding with bolts. Interlocking steel pin connectors provided at match point between two halves to provide alignment and eliminate sagging underneath goal.
5. Color: [Royal Blue] [Navy Blue] [Columbia Blue] [Gray] [Black] [Purple] [Light Purple] [Maroon] [Scarlet] [Cardinal] [Burnt Orange] [Orange] [Old Gold] [Yellow] [Kelly Green] [Forest Green] [Pink]
6. Warranty: Safe-Pro Bolt-On Edge Padding covered by 8 year warranty.

2.08 BASKETBALL BACKSTOP GOALS

A. GBA-600, Competitor Pro Breakaway Goal

1. Application: Universal goal for use with backboards with 5" x 4" or 5" x 5" mounting pattern. Meets all NBA, WNBA, NCAA, and NFSHSA regulations.
2. Rim: 5/8" diameter steel rod braced by 3/16" die cut steel bracing welded to the underside of ring.
3. Net Attachment: 12 hideaway net attachments on underside of goal ring for maximum player safety
4. Pressure Release Mechanism: Automatically releases rim when static force exceeding the release setting is applied to the top of the goal at point most distant from the backboard. Spring loaded to instantaneously release back to playing position.
5. Settings: Factory pre-set to 180 lbs - 230 lbs with in-the-field adjustability to comply with NCAA recommendation rebound characteristics of non-moveable ring.
6. Net: White anti-whip nylon net.
7. Finish: Official durable orange powder coat.
8. Warranty: Limited 3 year warranty.

2.09 BASKETBALL BACKSTOP HEIGHT ADJUSTERS

A. SMHA-800, Steel Manual Height Adjuster, Required for all backstops

1. Type: Mechanism for manually adjusting height of backboard and goal.
2. Adjustment Range: Goal position from 8' to 10' above finished floor. Height indicators located on side of aluminum frame to visually determine height settings.
3. Construction: Lightweight, interlocking aluminum alloy extrusions with UHMW-polyethylene jib strips. 1/2" aluminum alloy mounting plates allow universal mounting to any drop and/or bank.
4. Operation: 3/4" acme thread rod secured within two bronze bushings driven by manual hand crank. Operation of height adjuster done from the floor with supplied crank.

5. Size and Weight: Height adjuster shall not exceed 14" in width or 55 pounds in weight. Slim profile has minimum impact on glass backboard clear view. Any height adjuster wider than 14" shall not be approved as equals.
6. Finish: Durable black powder coat.
7. Warranty: Limited 1 year warranty.

2.010 GYM EQUIPMENT GROUP CONTROL SYSTEMS

A. LRKS-23, Wall Mounted Key Switch

1. Wall Mounted Key Switch: Operate equipment with 3 position, momentary contact wall mounted key switch.
2. Momentary Switch: Spring loaded with automatic return to OFF position.
3. Cover Plate: Independently flush mounted stainless steel cover plate.
4. Equipment: Key switch identical for operation of basketball backstops, gymnasium curtains, mat hoist systems, electric height adjusters, batting cages.
5. Warranty: Limited one (1) year warranty.

2.011 VOLLEYBALL FLOOR PLATE/SLEEVES

A. PVB-75S, Brass 3-1/2 in. Floor Sleeves, 6 ea. Required

1. Lockable hinged cover
2. Heavy-duty cast brass finish design
3. 7-1/2" outside diameter cover plates, spring loaded latch.
4. 3 Year Limited Warranty

2.012 VOLLEYBALL SYSTEM AND ACCESSORIES

A. **PVB-7000, Powerlite System, 2 Complete Systems Required**

1. Uprights: Lower section of upright shall be constructed of a 3-1/2 in. O.D. x 0.300 in. wall aluminum tube and shall have a molded composite foot to protect the finished floor during transportation, storage, and installation of standards. Upper section of upright shall be constructed of a 2-7/8 in. O.D. x 0.203 in. wall aluminum tube with a 4-1/2 in. diameter pulley wheel to accommodate the net tensioning straps.
2. Winch: Tensioning winch shall have an internal worm gear construction with an effective 10:1 turn ratio to eliminate snap-back and shall be completely enclosed with a welded steel cover. The winch shall be furnished with folding handle. Winch will have a 1-1/2 in. wide, high tensile strength (7700 lb.) nylon strap with sewn snap buckle for completed cable-less design. Winch is located on outside of post for added player safety. Anchor strap shall be adjustable and winch strap shall be long enough to readily adapt to varying sleeve installation widths.
3. Net: Flex Net shall be 32 ft. long x 39 in. high with a top cable-less binding of 32 ft. 6 in.. A 2 in., 10,000 lbs. tensile strength, white binding shall surround entire perimeter of net body. High tensile strength hardened steel delta rings are attached to allow connection to upright leader straps or cables. This net shall be for use on any of the Jaypro volleyball units. Netting shall be manufactured from high quality, #21 black thread knotted nylon, 4 in. square mesh. Two net dowels at each end shall consist of 1/2 in. EMT steel tubing which are completely enclosed for safety in side pockets. Bottom of net shall have, on each end, a 2 in. Velcro tensioning

strap and metal buckle to allow a very tight bottom net binding. Each buckle shall be covered with an attached, yet removable, Velcro strap for player safety. Standard overall net length is designed for 36 ft. on-center standards, but will accommodate 35 ft. to 37 ft. spacing. Volleyball nets with cables for tensioning shall not be considered equal.

4. Upright Padding: Pad shall be manufactured of 2 in. thick virgin polyurethane foam covered by a heavy duty 14 oz. polyester reinforced vinyl sewn into place. A 1-1/2 in. wide vinyl and Velcro flap, sewn onto one pad, securely fastens to the edge of the other in attaching the pad snugly around standard. All sewing shall be of a lock stitch type, running stitch style of sewing shall not be considered equal. Pad shall be a full 72 in. in height. Velcro flap attachment shall be positioned to allow net cord or strap access to standards. Pad exceeds NFHS, NCAA and USVBA specifications for safety.
5. Antennae: Official 72 in., red and white antennae quickly clamps directly to the top and bottom of the net. Attachment adjustments are made easily from the floor. Fits both 36 in. and 39 in. nets.
6. Boundary Tape (Jaypro Model VA-22)
7. Folding Referee Stand (Jaypro Model VRS-6000), 2 required
8. Referee Stand Pad for VRS-8000 & VRS-6000 (Jaypro Model VRS-60P)
9. Equipment Carrier (6 uprights) (Jaypro Model EC-1000); Only 1 Equipment Carrier required

2.013 GYMNASIUM WALL PADDING

A. WallGuard Impact Wall Padding.

1. Type: Vinyl wrapped high impact wall padding for indoor use only. Bidder is responsible for quantity and dimensions of wall padding. Sections of padding shall meet architectural requirements, as specified by Architect and/or Drawing Elevations.
2. Impact Resistance: Meets or exceeds impact standards as defined in ASTM F2440-04. All pads without certification shall not be approved as equals.
3. Shape and Size:
    1. WallGuard Impact Flat Shaped Wall Pads: Typical 2' wide by 6' high, located 4" above finished floor.

4. Construction:
    1. Vinyl: 14 oz. per square yard with grip tensile strength 365 lbs x 348 lbs and tongue tear strength 92 lbs x 83 lbs. Vinyl shall have embossed leather-like pattern. Vinyl meets or exceeds NFPA 101 Life Safety Code for Class A rating (Flame Spread 0-25, Smoke Development 0-450) and California State (CSFM) test requirements.
    2. Foam: 2" thick ASTM F2440-04 high impact foam.
    3. Backing: 7/16" oriented strand board (OSB) backing. Column pads may be supplied without solid backing material.
    4. Wrapping: Pads with OSB backing shall have vinyl completely wrapped around back side of pad and secured with steel staples.
5. Attachment: WallGuard Impact Wall Padding can be mounted to wood, drywall, concrete, brick, etc using the appropriate fasteners supplied by others. Pads without solid backing material may require custom attachment method.

1. 1" Nailing Margins Top & Bottom: Pad construction with 1" nailing margin on top and bottom of pad assembly. (STANDARD)

6. Treatments: Vinyl shall be washable and resistant to fade, rot, mildew, and fungus.

7. Color: [Royal Blue] [Navy Blue] [Light Blue] [Purple] [Red] [Maroon] [Black] [White] [Gray] [Forest Green] [Kelly Green] [Tan] [Yellow] [Orange]

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine areas of installation for any conditions that would affect the installation of the gymnasium equipment. If conditions exist that prohibits or hinders installation, notify the Architect and do not proceed with the installation until conditions have been resolved.

3.02 INSTALLATION

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

B. Install equipment level, straight, accurate in accordance with the supplied drawings and at the correct locations specified.

C. Install equipment with supplied hardware, fittings, and components.

D. For electrically operated equipment, install electrical power in accordance with Section 26, Electrical.

E. For electrically operated equipment, install control system such that the operation of the equipment can been seen in clear sight.

3.03 ADJUSTING

A. Adjust gymnasium equipment as needed to function properly and to ensure accurate position in both stored and in-use positions.

B. For electric powered gymnasium equipment, adjust upper and lower limit switches as need to achieve desired heights.

3.04 CLEANING

A. Clean gymnasium equipment in accordance with manufacturer's instructions.

B. Do not use harsh cleaning methods or supplies that may alter the finish of the gymnasium equipment.

C. Remove temporary labels and protective coverings.

3.05 DEMONSTRATION

A. Demonstrate complete operation of the gymnasium equipment to the Owner Representative.

B. Furnish Owner Representative of operation procedure and required maintenance.

C. Furnish Owner Representative with means necessary to operate gymnasium equipment.

3.06 PROTECTION

A. For installations of gymnasium equipment with finished floor already installed, provide means of protecting the floor to prevent damage.

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.

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

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
A. 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.

2.3 KnoxBox
Provide one Standard Capacity Model 3274 KnoxBox 3200 - Location as directed by the Architect
Color: Black
Mount Type: Standard Mount
Tamper Switch Type: None - Fire Alarm

2.4 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. Locks master keyed to room doors: Division 8.

D. Glass: Division 8.

E. Base molding: Division 9.

F. Sinks and service fixtures, service waste lines, connections, and vents: Division 15.

G. 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: 6 sets indicating 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 Case Systems, Stevens 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.
2. 3mm PVC banding, machine applied and machine profiled to 1/8 inch radius.

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.

B. Tote Trays:
1. Heavy-duty vacuum-formed polypropylene plastic with full top rim and pull. Trays are ivory color, equipped with label holder.

2. Tote tray/supply cabinets equipped with injection molded polycarbonate; continuous side rail support glide. Each side rail support glide is adjustable with integral support pins to interface 32mm pre-drilled holes.

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. Elbow catch or chain bolt used to secure inactive door on all locked cabinets.

F. Sliding Door Track: Anodized aluminum double channel.

G. File Suspension System: Extruded molding integral with top of drawer box sides to accept standard hanging file folders.

2.5 Fabrication:

A. Fabricate casework, countertops and related products to dimensions, profiles, and details shown.

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.

2. Cabinet backs: Minimum 1/4 inch thick particle board core (maximum of 1/2 inch thick particle board)

   a. Exposed back on fixed or movable cabinets: 3/4 inch thick particleboard with the exterior surface finished in VGS laminate as selected.

   b. Exposed back on fixed or movable sink base cabinets: 3/4 inch thick moisture resistant particleboard with the exterior surface finished in VGS laminate as selected.

   c. Flexible rail mounted cabinet backs: 3/4 inch thick particleboard structurally doweled into cabinet sides and top panels.

3. Fixed base and tall units have an individual factory-applied base, constructed of 3/4 inch thick plywood. 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. Melamine - Color indicated by architect/drawing.

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. Melamine 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.

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

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Telescopic Gym Seating includes manually operated multiple-tiered seating rows comprising of seat, deck components, understructure that permits closing without requiring dismantling, into a nested configuration for storing or for moving purposes.

1. Wall-attached telescoping stands

B. Related Sections:

1. Retain those sections below which cross reference information related to this section in project manual.
2. Section 012100 "Allowances" for allowances in the contract for telescoping stands.
3. Section 012300 "Alternates" for alternate products.
4. Section <Insert Number> "<Insert Section Title>" for floor finishes adjacent to telescoping stands.
5. Section <Insert Number> "<Insert Section Title>" for wall finishes adjacent to telescoping stands.
6. Division 26 Electrical sections for electrical wiring and connections for electrically operated telescoping stands.

1.2 REFERENCES

A. Aluminum Association (AA):

1. ADM 1- Aluminum Design Manual

B. American Institute of Steel Construction (AISC):

1. AISC 360- Steel Construction Manual.

C. American Iron & Steel Institute (AISI):

1. AISI S100 – Design of Cold Formed Steel Structural Members.

D. American Society for Testing Materials (ASTM):

1. ASTM - Standard Specifications for Properties of Materials.

E. American Wood Council (AWC):

1. ANSI/AWC NDS (National Design Specification for Wood Construction).

F. American Welding Society (AWS):

1. AWS D1.1 Structural Welding Code – Steel
2. AWS D1.3 Structural Welding Code - Sheet Steel

G. Canadian Welding Bureau: CWB Division 3 W47.1

H. U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

I. Forest Stewardship Council:

1. Chain of Custody Certification (FSC-STD-40-004)

J. International Building Code (IBC): 2021

K. International Code Council (ICC): <Insert Year>

1. ICC 300: Standard for Bleachers, Folding and Telescopic Seating and Grandstands.

L. National Fire Protection Association (NFPA):

1. NFPA 101 <Insert Year>:
2. NFPA 5000 <Insert Year>: Building Construction and Safety Code
3. NFPA 70: National Electrical Code.

M. National Institute of Standards and Technology (NIST)

1. PS 1: Structural Plywood.

N. Southern Pine Inspection Bureau (SPIB):

1. SPIB: Standard Grading Rules for Southern Pine.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Engineer, fabricate and install telescopic gym seating systems to the following structural loads without exceeding allowable design working stresses of materials involved, including anchors and connections. Apply each load to produce maximum stress in each respective component of each telescoping stand unit according to ICC 300 <Insert year>.

B. Manufacturer's System Design Criteria:

1. Gymnasium seat assembly; Design to support and resist, in addition to its own weight, the following forces:
    a.) Live load of 120 lbs. per linear foot (1.75 kN/m) on seats and decking
    b.) Uniformly distributed live load of not less than 100 psf (4.79 kN/m^2) of gross horizontal projection.
    c.) Parallel sway load of 24 lbs. per linear foot (0.35 kN/m) of row combined with (b.) above
    d.) Perpendicular sway load of 10 lbs. per linear foot (0.15 kN/m) of row combined with uniformly distributed live load above.
    e.) Parallel and Perpendicular sway loads are not applied concurrently.
2. Hand Railings, Posts and Supports: Engineered to withstand the following forces applied separately:
    a.) Concentrated load of 200 lbs. (0.89 kN) applied at any point and in any direction.
    b.) Uniform load of 50 lbs. per foot (0.73 kN/m) applied in any direction.
3. Guard Railings, Post and Supports: Engineered to withstand the following forces applied separately:
    a.) Concentrated load of 200 lbs. (0.89 kN) applied at any point and in any direction along top rail.
    b.) Uniform load of 50 lbs. per foot (0.73 kN/m) applied in any direction at top rail
    c.) Uniform load of 50 lbs. (0.22 kN) applied on an area equal to 1 ft^2 (0.09 m^2) applied on all guardrail infill panels.

1.4 ACTION SUBMITTALS

A. Product to be supplied shall have a current evaluation report issued by ICC Evaluation Services (ICC-ES) certifying that it meets all structural design requirements of the current ICC 300 Standard for Bleachers, Folding and Telescopic Seating, and Grandstands, including all specified load combinations.

B. Provide Current Welding Certification[s] AWS or CSA.

C. Provide Manufacturers Certification of Insurance coverage of not less than $5,000,000
and Errors and Omission Insurance of not less than $2,000,000

D. Provide Installer Name, Current Certification Number and Product Qualifications

E. Provide Manufacturers' standard warranty documents.

F. Shop Drawings: For telescoping stands in both stacked and extended positions. Show seat heights, row spacing and rise, aisle widths and locations, assembly dimensions, anchorage to supporting structure, material types and finishes.

G. Samples: For units with factory-applied finishes.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For telescopic bleacher to include video operations manual.

1.6 QUALITY ASSURANCE

A. Manufacturer shall be a current Certified Welding Fabricator as defined by either AWS or CWB, or both. The manufacturer shall comply with structural welding codes that are applicable to their products or materials. These welding codes shall be produced by AWS or CSA

B. Product to be supplied shall have a current evaluation report issued by ICC Evaluation Services (ICC-ES) certifying that it meets all structural design requirements of the current ICC 300 Standard for Bleachers, Folding and Telescopic Seating, and Grandstands, including all specified load combinations.

C. Electrical components, devices, and Accessories shall be listed and labeled as defined in NFPA 70, by a qualified testing agency and marked for intended location and application.

D. Installer Qualifications: Factory trained and certified by the manufacturer.

E. Seating Layout: Provide telescoping stands to comply with ICC 300 <Insert year> Standard for Bleachers, Folding and Telescopic Seating, and Grandstands, except where additional requirements are indicated or imposed by authorities having jurisdiction.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver telescoping stands in manufacturers packaging clearly labeled with manufacturer name and content.

B. Handle bleacher equipment in a manner to prevent damage.

C. Deliver the telescoping stands at a scheduled time for installation that will not interfere with other trades operating in the building when at all possible.

1.8 PROJECT CONDITIONS

A. Field Measurements: Coordinate actual dimensions of construction affecting telescoping stands installation by accurate field measurements before fabrication. Show recorded measurements on final shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid delay of Work.

1.9 WARRANTY

A. Manufacturer's Warranty: Includes the repair or replacement of the defective product; or defective component thereof, with a comparable product; or component thereof, or a refund of the purchase price prorated over the warranty period.

1. Includes: Labor, materials, and freight for replacement or repairs.
2. Structural Component parts of Understructure Warranty Period: [10 years] from Date of Acceptance
3. Decking systems, seating collections, electrical, portable and integral dolly systems, end closure curtains, surface material finishes Warranty Period [5 years] from Date of Acceptance.

PART 2 PRODUCTS

2.1 PRODUCTS

A. Wood:

1. Lumber: NIST PS 20, southern pine complying with SPIB's "Standard Grading Rules for Southern Pine Lumber" for B&B Finish (B and better) grade-of-finish requirements.
2. Plywood: NIST PS 1, APA-grade trademarked, A-C grade.

B. Steel:

1. Structural-Steel Shapes, Plates, and Bars: ASTM A36.
2. Galvanized-Steel Sheet: ASTM A653, Grade 40 (276 MPa) coating designation G60.
3. Uncoated Steel Strip; Non-Structural Components: ASTM A1011, Commercial Quality, Type B, Hot-Rolled Strip.
4. Uncoated Steel Strip; Structural Components: ASTM A1011 Grade 33 (228 MPa), Grade 36 (249 MPa), Grade 40 (276 MPa), Grade 45 (311 MPa), or Grade 50 (345 MPa), Structural Quality, Hot-Rolled.
5. Galvanized Steel Strip: ASTM A653 Grade 40 (276 MPa) or Grade 64 (441 MPa), structural quality, coating designation G60.
6. Tubing: ASTM A500, cold formed; Grade B, or ASTM A513, 46 ksi min yield.

C. Polyethylene Plastic: High-density polyethylene; injection molded, color-pigmented, textured, impact-resistant, and dimensionally stable.

2.2 MANUFACTURERS

A. Manufacturer: Hussey Seating Company, U.S.A.

1. Address: North Berwick, Maine, 03906.
2. Telephone: (207) 676-2271; Fax: (207) 676-9690.
3. Product: MAXAM Telescopic Gym Seat System.

B. Substitutions: Permitted with prior approval.

2.3 TELESCOPING STANDS

A. Wall-Attached Telescoping Stands: Forward-folding system with the rear of the understructure permanently attached to the floor and to the rear wall. Rear wall provides structural support and must support loads imposed by the bleacher.

2.4 DIMENSIONAL AND OPERATIONAL CRITERIA

A. Dimensions:

1. Bank Length: 74'-3"
2. Aisle Width: 4'-6"
3. Number of Tiers: 3
4. Row Spacing: 26 inches (660 mm)
5. Row Rise: 9-5/8 inches (244 mm)
6. Open Dimension: 7'-0 3/8"
7. Closed Dimension: 5'-1"
8. Overall Unit Height: 3'-0 3/8"
9. Maximum Net Capacity with Flex Row Fully Recovered: 252

B. Operation: Manual

1. Manual: User operates system by manually pulling/pushing each section with operating handles

2.5 SEATING

A. Polymer Seat System: Courtside Collection [XC10]

1. Material: Gas assist injection-molded, 100 percent recyclable HDPE, high density polyethylene.
2. Module Size: 18 inches (457 mm) long by 10 inches (254 mm) deep.
3. Module Load: Tested to 600 lbs. (2.67 kN).
4. Seat height range from deck to top of seat: 16-1/8 inches (410 mm)
5. Integrally molded end caps at aisle end locations.
6. Integrally molded recess pockets to accept seat number and row letters.

7. Integrally molded rear closure panel at back of seat to allow for "continuous clean sweep" of debris at deck level and minimized visibility of structural ribbing.
8. Color: As selected by Architect from manufacturers 15 standard colors

B. ADA Accessible Seating:

1. Locate first tier modular units to provide wheelchair-accessible seating at locations indicated on Drawings.
    a.) Flex-Row™: Provide first row modular recoverable seating units that can be closed to accommodate persons requiring ADA spaces (or any other temporary space needs) or opened for standard usage. Each Flex-Row unit shall have a handle for easy operation.
    1.) Provide a black full-surround steel skirting with no more than ¾" floor clearance for safety and improved aesthetics.
    2.) Provide a black injection molded end cap for the nose beam for safety and improved aesthetics.
    3.) Provide a mechanical positive lock when the Flex-Row system is in both the open and closed position. Handle shall unlock the modular recoverable seating unit for operation.
    4.) Flex-Row can be utilized with the full system in the open or closed position.
    5.) Flex-Row modular units are designed to achieve multi-use front row seating to accommodate team seating, ADA requirements and facility specific requirements. Flex-Row units are available in modular units from 2 to 7 seats wide as well as full section widths.

2.6 RAILS, PANELS AND STEPS

A. End Rails:

1. Self-storing
    a.) Provide steel self-storing starting no higher than tier 2 [42 inches (1066mm)] high above seat, end rail with tubular supports and intermediate members designed with [4 inch (102mm)] sphere passage requirements.
2. Material and Finish: Gloss powder coated steel.
3. Color: Black

B. Center Aisle Rails:

1. Manual Rotating
    a.) Provide single pedestal mount handrails [34 inches (864mm)] high with terminating mid rail. Permanently attached handrail shall rotate in a permanently mounted socket for rail storage. Rail shall deploy easily, lock in the use position, and require intent and effort to unlock, and return to the stowed position. Ends of the handrail shall return to the post, and not extend away from it. Rails having

openings to avoid interference with closed decks are not acceptable.

2. Material and Finish: Gloss powder coated steel.
3. Color: Black

C. Skirt Panel: On 1st Row, provide galvanized steel front skirt panel to prevent players/objects from sliding underneath the first row.

D. Steps

1. Removeable Front Aisle Steps: At each vertical aisle location front aisle step. Front steps shall engage with front row to prevent accidental separation or movement. Provide four non-skid rubber feet each [1 inch (25 mm)] in diameter. Full radius end caps on all four edges.
2. Intermediate Aisle Steps: Fully enclosed, at each vertical aisle. Full radius end caps on all four edges. Adhesive-backed abrasive non-slip tread surface.

2.7 COMPONENTS

A. Decking

1. Plywood
   a.) 5/8 inch (16 mm) thick AC grade tongue and groove Southern Yellow Pine with clear urethane, high gloss finish.

B. Understructure:

1. Finish: Rust-inhibiting black finish
2. Hardware finish: Zinc-plated, Rust inhibiting black finish
3. Posi-locks and other surfaces: Powder coated black, Rust inhibiting black finish
4. Nose beam and Rear Riser beam: Nose beam shall be continuously roll-formed closed tubular shape of ASTM A653 grade 40 (276 MPa). Riser beam shall be continuously roll-formed of ASTM A653 Grade 64 (441 MPa). Nose and Riser beam shall be designed with no steel edges exposed to spectator after product assembly. Nose beam and riser beams are through-bolted fore/aft to deck stabilizers and frame cantilevers to create the deck structure.
5. Frame: The frames are welded assemblies (one left hand, one right hand per tier) comprised of the following components:
   a.) Lower Track subassembly: ASTM A1011 Grade 50: Continuous Positive Interglide System (casterhorn) interlocks each adjacent frame casterhorn using an integral, continuous, anti-drift feature and captive interlock with adjustable row spacing at front to prevent separation and misalignment.
   b.) Lower Track Wheels: 3 per frame Not less than [5 inches (127 mm)] diameter by [1-1/4 inches (32 mm)] with non-marring soft rubber face to protect wood and synthetic floor surfaces, with molded-in sintered iron oil-impregnated bushings to fit [3/8 inch (10 mm)] diameter axles secured with E-type snap rings.

1.) Option: up to 6 wheels per frame for load distribution

c.) Slant Columns: A500 Grade B, tubular shape.

d.) Cantilever Subassembly: Consists of ASTM A1011 Grade 50 nose connection plate, cantilever, and riser attachment plate welded together into a subassembly.

6. Lock system: Casterhorns at the end sections of powered banks (minimally), and manual sections, contain a Low Profile Posi-Lock LX to lock each row in open position and allow unlocking automatically. Provide adjustable stops to allow field adjustment of row spacings.
7. Sway Bracing: ASTM A653 grade 40 (276 MPa), tension members bolted to columns.
8. Deck Stabilizer: A1011 Grade 45, member through-bolted to nose and riser at three locations per section. Securely captures front and rear edge of decking at rear edge of nose beam and lower edge of riser beam for entire length of section. Interlocks with adjacent stabilizer on upper tier using low-friction nylon roller to prevent separation and misalignment.

C. Fasteners: Vibration proof, in manufacturer's standard size and material.

2.8 FABRICATION

A. Fabricate understructure from structural-steel members in size, spacing, and form required to support design loads specified in referenced safety standard.

B. Weld understructure to comply with applicable AWS standards.

C. Round corners and edges of components and exposed fasteners to reduce snagging and pinching hazards.

D. Form exposed sheet metal with flat, flush surfaces, level and true in line, and without cracking and grain separation.

2.9 ACCESSORIES

A. Operating Handles: Manual operating handles; 3/4 inch (19 mm) OD steel tubing. Handles to engage at the first tier.

B. Rear Deck Filler: Provide at rear deck level an extended rear deck filler, 10". Available for wall attached and free standing applications. Available in 4 inch increments with a minimum of 6 inches (152mm) and a maximum of 50 inches (1270mm).

C. Rear Wall Column Cutouts: Provide custom bleacher cutouts at rear wall building columns. Top row(s) to be cut out and fitted to meet wall column conditions.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas where telescoping stands are to be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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

3.2 INSTALLATION

A. Tolerances:

1. Flooring [and rear wall]: Level [and plumb] within [1/8 inch (3 mm)] in [8 feet (2438mm)].
2. Maximum bleacher force on the floor of a 27 foot (8230 mm) section: Static point load of less than 300 psi (2068 kN/m^2).

B. Install telescoping stands to comply with referenced safety standard and manufacturer's written instructions.

3.3 ADJUSTING AND CLEANING

A. On completion of installation, lubricate, test, and adjust each telescoping stand unit so that it operates according to manufacturer's written operating instructions.

B. Clean installed telescoping stands on exposed surfaces. Touch up shop-applied finishes or replace components as required to restore damaged or soiled areas.

3.4 MAINTENANCE SERVICE

A. Service Capability: Show proof of full-time service capability by factory certified technicians directly employed by the installer.

1. A four to eight-hour maximum on-site repair response is required during normal working hours, 8 a.m. to 5 p.m. weekdays (excluding holidays).
2. All Full Time Service Personnel shall be Factory Authorized and Trained.
3. Provide proof of Service Capability and a list of service parts regularly maintained in inventory.

3.5 DEMONSTRATION

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

END OF SECTION.

1.0 - GENERAL

1.1 Scope

The pre-engineered steel building package shall consist of primary and secondary structure, metal roof panel or deck, exterior wall cover, fascia panel, trim and flashing, closures, caulking, fasteners and other miscellaneous metal building components or accessory items as shown or called for in the drawings or specifications and as required.

1.2 Related Sections

A. Section 07610 – Standing Seam Roof and Sheet Metal System

1.3 Qualifications

A. A complete structural analysis of the design by a structural engineer is to be made to demonstrate that requirement of design and load criteria are met.

B. A copy of manufacturer's stamped and signed engineer's calculations and analysis shall be furnished to the Architect.

C. Metal building manufacturer shall be accredited by the International Accreditation Services' IAS Accreditation for Inspection Programs for Manufacturers of Metal Building Systems (AC472). Metal Building Manufacturer shall be currently enrolled in an IAS accreditation program and shall maintain such throughout the course of the project.

D. Metal building shall be designed in accordance with "The Metal Building Manufacturers Association's Design Practice Manual."

E. The metal building design engineer is responsible for the complete design of the metal building system.

1.4 Submittals

A. Shop Drawings for approval. Drawings and design analysis shall bear the seal of a registered professional engineer registered in the State of Alabama. Submittal shall include layout of all members, connections, and accessories and associated details for erection. All calculations must be provided.

B. Documentation of manufacturer's current (up-to-date) IAS certification shall be submitted to the Architect. If accreditation expires during the course of the project renewed certificate shall be submitted as well.

C. Record or certificate of erector training for metal building system being erected.

D. Building exterior components samples.

E. Color samples for approval.

1.5 Warranties

All materials and workmanship covered by this section shall be guaranteed from date of final acceptance of the Contract, or from occupancy of the building whichever is earlier.

A. Wall Paint Warranty

All wall panels shall be guaranteed for a period of ten (10) years against chalk, fade, crack, check, blister or peel.

1.6 General

A. All components including, but not limited to the following will be furnished and installed for the complete steel structural framework: anchor bolts, wall and roof panels, downspouts, gutters, fascias, insulation, all necessary closures, trims, flashing and fasteners to provide a weather proof building, and miscellaneous accessories as specified.

B. All steel shall be new, clean and straight. Welding shall be done by qualified operators and the specifications of the American Welding Society adhered to. Workmanship on all parts will be equal to that of best modern shop practices.

2.0 - PRODUCT

2.1 General

A. All structural mill sections or welded up plate sections shall be designed in accordance with the AISC "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings", latest edition.

B. All Cold-formed steel structural members shall be designed in accordance with the AISI "Specification for the Design of Cold-formed Steel Structural Members", latest edition.

2.2 Design Loads

A. The design loads for the building shall be, in addition to their own dead load, the live, wind, snow and seismic loads required of the following as specified:
   1. 2015 International Building Code.
   2. Low Rise Building Systems Manual, by the Metal Building Manufacturers Association.

B. The building components shall be designed to meet the most severe conditions of load combinations set by the specified building code, but in no case be less than that produced by the following load combinations:
   1. Building dead load plus roof live load (or snow).
   2. Building dead load plus wind load.
   3. Building dead load plus wind load plus one-half roof snow load.
   4. Building dead load plus roof snow load plus one-half wind load.

C. Roof live and snow loads shall be applied on the horizontal roof projection. Wind loads shall be assumed to act horizontally and shall be applied as pressure and suction perpendicular to the building surface.

D. Design load requirements shall be determined by local conditions, applicable codes, building end use, etc. Application of design loads shall be in accordance with the Design Practices sections of the Metal Building Manufacturers Association (MBMA) Building Systems Manual, unless specified otherwise. NOTE: See all

drawings for additional point loading on the roof structure (including but not limited to roof top mechanical units, hanging equipment loads, continuous heavy piping loads, etc.).

E. Minimum design collateral loads supported on or hung from the roof structure shall be as follows:

Minimum Design Collateral Load (MDCL)..... 10 psf

These collateral loads shall be applied in addition to self-weight of building frame, roof decking and roof covering weights.

F. Deflection Limits:
- Roof Purlins and Rafters: DL Span/360, LL Span/360, TL Span/240.
- Girts Supporting Metal Panels: Horizontal deflection Span/120.
- Overall Building Drift: H/200 where "H" is the building eave height.
- Note specific deflection requirements and expansion joints noted on drawings.

2.3 Primary Framing Steel

A. Steel for hot-rolled structural sections shall conform to the requirements of ASTM specification A 36.

B. Steel for all built-up sections shall meet as applicable the physical and chemical properties of ASTM A 572 modified to 55,000 psi minimum yield and 70,000 psi minimum tensile strength, or ASTM A 607-85, Grade 55, or ASTM A 570-88, Grade 55.

C. Steel for all endwall "C" sections shall meet the physical and chemical properties of ASTM A 570-88, Grade 55.

D. Rigid Frame: All rigid frames shall be welded, built-up "I" sections. The columns shall be straight or sloped with a minimum depth of 12" for primary frame members. Bases of frames are to be pinned.

E. Endwall Frames: All endwall roof beams and endwall columns shall be cold-formed "C" sections, mill-rolled sections, or built-up "I" sections as required for future bay addition.

F. Plates, Stiffeners, etc.: All base plates, splice plates, cap plates, and stiffeners shall be factory welded into place on the structural members.

G. Bolt Holes, etc: All base plates, splice plates and flanges shall be shop fabricated to include bolt connection holes. Webs shall be shop fabricated to include cable brace or rod brace holes and flange brace holes.

2.4 Secondary Framing Steel

A. Steel used to form purlins, girts, eave struts and "C" sections shall meet the physical and chemical properties of ASTM A 570-88, Grade 55.

B. Steel used to form zinc-coated (galvanized) rolling service door frames shall meet the physical and chemical properties of ASTM A 446-87, Grade D and G 90 Coating designation as described in ASTM A 525-87.

C. Purlins and Girts: Purlins and girts shall be cold-formed "Z" or "C" sections with stiffened flanges. They shall be prepunched at the factory to provide for field

bolting to the primary framing. They shall be simple or continuous span as required by design.

D. Bracing Struts: Provide bracing struts of round HSS or pipe sections sized as required to transfer lateral forces into primary structural frame system.

E. Eave Struts: Eave Struts shall be unequal flange, cold-formed "C" sections.

F. Base Angle: A base member will be supplied by which the base of the wall covering may be attached to the perimeter of the slab. This member shall be secured to the concrete slab with concrete anchors.

G. Provide attachment and support framing for wall mounted gymnasium equipment.

2.5 Bracing

A. Diagonal Bracing: Diagonal bracing in the roof shall be used to resolve horizontal loads (wind, seismic, crane, etc.) from the roof structure into the longitudinal bracing frames or transverse rigid frames. This bracing will be furnished to length and equipped with bevel washers and nuts at each end. It may consist of rods threaded each end or galvanized cable with suitable threaded end anchors.

B. Flange Braces: The compression flange of all primary framing shall be braced laterally with angles connecting to the webs of purlins or girts so that the flange compressive stress is within allowable limits for any combination of loadings.

C. Longitudinal and Special Bracing: **Diagonal bracing is not permitted in the sidewall**, a rigid frame type portal with pinned bases must be used. Coordinate load path of sidewall bracing frames with load path of wind/seismic bracing in the roof. Provide additional bracing as required to transfer all horizontal loads into the primary structural system.

D. Coordinate trades with locations of bracing. Bracing shall not be removed or cut to facilitate installation of other trades unless approved in writing by the metal building design engineer.

2.6 Wall Panel Material

Panel material as specified shall be 24-gauge zinc-coated (galvanized) steel, coating designation G 90, conforming to the requirements of ASTM A 446 Grade D. Minimum yield stress shall be 50,000 psi.

2.7 Connections

A. All field connections shall be bolted (unless otherwise noted).

B. All shop connections shall be welded using either submerged or shielded arc process, and welding shall be in accordance with the applicable sections, relating to design requirements and allowable stresses, of the latest editions of the American Welding Society "Structural Welding Code."

C. Metal building designer shall size anchor rods and provide details for required anchorage to the foundations.

2.8 Roof Covering

A. The roof system shall be provided under Section 07610.

B. The roof system shall carry a UL wind uplift rating. Comply with FM I-90 and the

2021 International Building Code.

C. Purlins shall be insulated so as to eliminate "thermal short circuits" between purlins and roof panels, with continuous thermal spacer blocks.

2.9 Wall Covering

The Exterior wall covering shall be first quality 24 gauge galvanized steel architectural type panels (A.S.T.M. Galvanized Specifications). Panels will be precision roll-formed 36" panels with ribs at 12" o.c. The interior liner panels shall be minimum 3/4" thick 24 gauge - panel profile to be approved by architect.

2.10 Panel Fasteners

Panel fasteners will be galvanized self-tapping hex head screws. A self sealing washer will be used under the head of all panel fasteners. Galvanized screws will be used on the sidewalls of all colored buildings. Fasteners shall be pre-finished to match wall panel color.

2.11 Weather Sealing

A. Sealant

Sealant to be used in all end panel laps on roofs and all other locations recommended by the manufacturer or required for weathertightness.

B. Weather Seal Strips

Sealer strips to be moulded from first grade high quality polyurethane to ensure long life.

2.12 Paint

A. Exterior Paint and Interior Paint (For Exterior Wall Panels and , Interior Liner Panels)

A 70% minimum Kynar 500 finish shall be applied over galvanized steel and shall be given a chemical conversion treatment prior to painting. See paragraph 1.4 for Warranty requirements. Color shall be approved by the Architect to match existing.

B. Structural Paint

1. All fabricated structural steel to be shot blast cleaned to remove loose rust, mill scale, etc. After inspection for accuracy of fabrication, it shall receive one shop coat of manufacturer's standard gray finish.

2. Any field touch-up necessary shall be the responsibility of the erector.

2.13 Gutters, Downspouts, and Flashings

A. Gutters and Downspouts: Gutters and downspouts to be furnished by Metal Building Manufacturer. Members to be fabricated from galvanized steel with supporting brackets properly spaced. Gutters shall be 24 gauge and downspouts 28 gauge. Finish shall match roof/wall panels.

B. Flashings: Roof, gables and eaves will be flashed with 26 gauge galvanized fascia trim. Corners of the building will be provided with 26 gauge galvanized steel corner trim. Door, window and sill trim will be provided in 26 gauge galvanized steel. Painted galvanized steel flashings will be fabricated from prefinished steel using the same paint specifications as wall and roof sheets.

2.14 Glass Fiber Insulation

Glass Fiber Insulation to be fabricated from first grade high quality glass fiber blanket and faced with white vinyl reinforced polyester film. Insulation shall have Underwriter's Label. Glass fiber insulation shall be .60 density - 6" thick - 25 flame spread - "R" value of R19. All insulation shall be protected and maintained dry. Wet Insulation shall be rejected.

2.15 Framed Openings This contractor to provide framed openings with pre-finished flashing to accommodate mechanical equipment such as louvers, grilles, piping, conduit furnished by other trades.

2.16 Roof and Wall Penetrations
All roof penetrations shall be flashed by building manufacturer/installer. All circular roof penetrations shall be made of a one piece construction from an EPDM membrane with aluminum base. Roof curbs shall be provided by building manufacturer/installer.

3.0 - EXECUTION

3.1 Erection
All components herein specified and indicated shall be furnished and erected in accordance with details and manufacturer's instructions. Erection shall be performed by a qualified erector who has attended training by the building manufacturer of the system being installed using proper tools and equipment. It shall be the responsibility of the erector to comply with all applicable legal and safety requirements. It shall further be the responsibility of the erector to determine and provide any and all temporary bracing, bridging, blocking, shoring, and/or securing of components, etc. as required for stability during the entire erection process.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Unenclosed, self-contained vertical platform wheelchair lift.

1.2 RELATED SECTIONS

A. Section 03300 - Cast-In-Place Concrete: Concrete shaftway and anchor placement.

B. Section 04800 - Masonry Assemblies: Masonry shaftway and anchor placement.

C. Section 06100 - Rough Carpentry: Blocking in framed construction for lift attachment.

D. Section 09260 - Gypsum Board Assemblies: Gypsum board shaftway.

E. Division 16 - Electrical: Dedicated telephone service and wiring connections.

F. Division 16 - Electrical: Lighting and wiring connections at top of shaft.

G. Division 16 - Electrical: Electrical power service and wiring connections.

1.3 REFERENCES

A. ASME A17.1 - Safety Code for Elevators and Escalators.

B. ASME A17.5 - Elevator and Escalator Electrical Equipment.

C. ASME A18.1 - Safety Standard for Platform Lifts and Stairway Chairlifts.

D. CSA B44 - Safety Code for Elevators and Escalators.

E. CSA B355 - Lifts for Persons with Physical Disabilities.

F. ICC/ANSI A117.1 - Accessible and Usable Buildings and Facilities.

G. NFPA 70 - National Electric Code.

H. CSA - National Electric Code.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Submit manufacturer's installation instructions, including preparation, storage and handling requirements.
   2. Include complete description of performance and operating characteristics.

C. Shop Drawings:

1. Show typical details of assembly, erection and anchorage.
2. Include wiring diagrams for power, control, and signal systems.
3. Show complete layout and location of equipment, including required clearances and coordination with shaftway.

D. Selection Samples: For each finished product specified, provide two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finished product specified, two samples, minimum size 1-3/4" x 2-1/4", representing actual product, color, and patterns.

F. Manufacturer Qualifications: Firm with minimum 20 year's experience in manufacturing of vertical platform wheelchair lifts, with evidence of experience with similar installations of type specified.

G. Installer Qualifications: Licensed to install equipment of this scope, with evidence of experience with specified equipment. Installer shall maintain an adequate stock of replacement parts, have qualified people available to ensure fulfillment of maintenance and callback service without unreasonable loss of time in reaching project site.

1.5 REGULATORY REQUIREMENTS

A. Provide platform lifts in compliance with:
1. ASME A18.1 - Safety Standard for Platform Lifts and Stairway Chairlifts.
2. ASME A17.1 - Safety Code for Elevators and Escalators.
3. ASME A17.5 - Elevator and Escalator Electrical Equipment.
4. NFPA 70 - National Electric Code.

B. Provide platform lifts in compliance with:
1. CSA B355 - Lifts for Persons with Physical Disabilities.
2. CSA B44.1/ASME A17.5 - Elevator and Escalator Electrical Equipment.
3. CSA - National Electric Code.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store components off the ground in a dry covered area, protected from adverse weather conditions.

1.7 PROJECT CONDITIONS

A. Do not use wheelchair lift for hoisting materials or personnel during construction period.

1.8 WARRANTY

A. Warranty: Manufacturer shall warrant the wheelchair lift materials and factory workmanship for two years following completion of installation.

B. Extended Warranty: Provide an extended manufacturer's warranty for the entire warranty period covering the wheelchair lift materials and factory workmanship for the following additional extended period beyond the initial one-year warranty. Preventive Maintenance agreement required.
   1. One additional year.
   2. Five additional years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Garaventa Lift;
United States - P.O. Box 1769, Blaine, WA 98231-1769.
Canada – 18920 – 36th Ave., Surrey, BC V3Z 0P6. ASD.
Toll Free: 800-663-6556. Tel: (604) 594-0422. Fax: (604) 594-9915.
Email: productinfo@garaventalift.com Web www.garaventalift.com

B. Substitutions: Not permitted.

C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 UNENCLOSED VERTICAL WHEELCHAIR LIFT

A. Capacity: 750 lbs (340 kg) rated capacity.

B. Mast Height:
   1. Model GVL-OP-42; 45 inches (1143 mm) maximum lifting height.
   2. Model GVL-OP-60; 63 inches (1600 mm) maximum lifting height.

C. Platform Size and Nominal Clear Platform Dimensions:
   1. Standard: 36 inches (914 mm) by 48-7/8 inches (1242 mm) clear platform dimensions.
   2. Mid-Size: 36 inches (914 mm) by 54-7/8 inches (1394 mm) clear platform dimensions.
   3. Large: 43-1/4 inches (1100 mm) by 60-7/8 inches (1546 mm) clear platform dimensions.
   4. Large 90 degree: 42 inches (1067 mm) by 60 inches (1524 mm) with 90-degree entry/exit configuration.

D. Platform Configuration:
   1. Straight Through: Front and rear openings.
   2. 90 Degree: Front and side openings.

E. Power Gate Operators:
   1. Location:
      a. Platform Gate: Travels with platform and opens lower landing.
      b. Upper Landing Gate.

2. Automatically opens the gate when platform arrives at a landing. Will also open at landing by pressing call button.
3. ADA Compliant and obstruction sensitive.
4. Low voltage, 24 VDC with all wiring concealed.

F. Lift Components:
1. Machine Tower: Aluminum extrusion.
2. Base Frame: Structural steel.
3. Platform Side Wall Panels: 16 gauge (1.5 mm) galvanized steel sheet.
4. Platform Access Ramp: 12 gauge (2.5 mm) galvanized steel plates; slip resistant surfaces.
   a. Ramp: Stationary type.
   b. Ramp: Automatic folding type.
5. Side Guard Panels: 42-1/8 inches (1070 mm) high mounted on platform.
6. Outdoor Protection: Lift shall include modifications recommended by manufacturer for reliable performance in outdoor climate of project site.

G. Base Mounting at Lower Landing:
1. Floor Mount: Base of lift shall be mounted on the floor surface of the lower landing. For access onto the platform provide a ramp of 16 gauge (1.5 mm) galvanized steel sheet with a slip resistant surface.
2. Pit Mount: Lift to be mounted in pit with dimensions to meet manufacturer's requirements for the platform size specified. Pit construction shall be in accordance to Section 03300.

H. Leadscrew Drive:
1. Drive Type: Self-lubricating acme screw drive.
2. Emergency Operation: Manual handwheel device to raise or lower platform.
3. Battery Powered Emergency Lowering: Battery powered platform lowering device that automatically activates in the event of power failure. Allows passenger to drive platform downward to lower landing. Does not operate lift in up direction.
4. Safety Devices:
   a. Integral safety nut assembly with safety switch.
1. Travel Speed: 10 fpm (3.0 m/minute).
2. Motor: 2.0 hp (560 W).
3. Power Supply:
   a. 120 VAC single phase; 60 Hz on a dedicated 20-amp circuit.
   b. 208/240 VAC, single phase; 50 Hz on a dedicated 16 amp circuit.

I. Hydraulic Drive:
1. Drive Type: Chain hydraulic.
2. Emergency Operation: Manual device to lower platform and battery auxiliary power to raise or lower platform.
3. Safety Devices:
   a. Slack chain safety device.
   b. Shoring device.
4. Travel Speed: 17 fpm (5.2 m/minute).
5. Motor: 3.0 hp (2.2 kW); 24 volts DC.
6. Power Supply:
   a. 120 VAC single phase; 60 Hz on a dedicated 15-amp circuit.
   b. 208/240 VAC, single phase; 50 Hz on a dedicated 16-amp circuit.

c. Powered by continuous building mains converted to 24 VDC, equipped with auxiliary power system capable of running lift up and down for a minimum of 5 trips with rated load.
d. Powered by continuously charged battery system.

J. Platform Controls: 24 VDC control circuit with the following features.
1. Direction Control: Continuous pressure rocker switch.
2. Direction Control: Illuminated tactile and continuous pressure elevator-style buttons with dual platform courtesy lights and safety light.
3. Illuminated and audible emergency stop switch shuts off power to lift and activates audio alarm with battery backup.
4. Keyless operation.
5. Keyed operation.
6. Emergency Telephone: Platform shall be equipped with ADA compliant integrated telephone with a stainless-steel faceplate. Telephone shall operate in the event of power failure. A telephone line shall be supplied to the lift site as specified under Division 16.

K. Call Station Controls: 24 VDC control circuit with the following features.
1. Direction Control:
c. Continuous pressure rocker switch.
d. Illuminated tactile and continuous pressure elevator-style buttons with dual platform courtesy lights and safety light.
1. Keyless operation.
2. Keyed operation.
3. Call Station Mounting:
e. Lower:
1) Wall mounted surface.
f. Upper:
2) Frame mounted.
3) Wall mounted surface.

L. Safety Devices and Features:
1. Grounded electrical system with upper, lower, and final limit switches.
2. Tamper resistant interlock to electrically monitor that the gate is in the closed position and the lock is engaged before lift can move from landing.
3. Pit stop switch mounted on mast wall.
4. Electrical disconnect shall shut off power to the lift.
5. Under platform safety pan with five waterproof safety switches to detect obstruction under platform.

M. Finishes
1. Extruded aluminum electrostatically applied baked powder finish, semi matte Silver Moon.
2. Ferrous Components: Electrostatically applied baked powder finish, semi matte.
g. Color: Silver Moon.
3. Lift Finish: Baked powder coat finish as selected by the Architect from manufacturer's optional RAL color chart.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Verify shaft and machine space are of correct size and within tolerances.

C. Verify required landings and openings are of correct size and within tolerances.

D. Verify electrical rough-in is at correct location.

E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install platform lifts in accordance with applicable regulatory requirements including ASME A17.1, ASME A18.1 and the manufacturer's instructions.

B. Install platform lifts in accordance with applicable regulatory requirements including CSA B355, and manufacturer's instructions.

C. Install system components and connect to building utilities.

D. Accommodate equipment in space indicated.

E. Startup equipment in accordance with manufacturer's instructions.

F. Adjust for smooth operation.

3.4 FIELD QUALITY CONTROL

A. Perform tests in compliance with ASME A17.1 or A18.1 and as required by authorities having jurisdiction.

B. Perform tests in compliance with CSA B355 and required by authorities having jurisdiction.

C. Schedule tests with agencies and Architect, Owner, and Contractor present.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

GARAVENTA LIFT

Genesis Opal

Unenclosed Vertical Platform Lift

Technical Information

Specifications

Rated Load	Rated Load of 340 kg (750 lbs)
Platform size	Standard: 914mm x 1242mm (36" x 48 7/8"). Optional: Mid-Size Platform: 914mm x 1394mm (36" x 54 7/8") Large Platform: 1100mm x 1546mm (43 1/4" x 60 7/8")
Configuration	Standard: Straight through entry/exit Optional: 90° entry/exit
Controls	Up/Down continuous pressure directional controls
Warranty	Standard: 2 years Optional: Warranty extension of 1 year (3 years total) or 5 years (7 years total)
Accessories	Standard: Keyless operation. Grabrail on platform side wall. Audible Illuminated Emergency Stop/ Alarm Switch Optional: Autodialer phone. Emergency battery lowering (Leadscrew drive only). Illuminated and tactile directional buttons. Power gate operator. Keyed call station and platform controls. Stationary loading ramp or platform mounted automatic folding ramp for installations without a pit. Electrical disconnect
Drive System	Standard: Leadscrew: 2 HP motor, travel speed at 3 meters (10 ft) per minute. Hydraulic: 3 HP motor Continuous Mains Powered with an auxiliary power system. Lift travels at 5.2 meters (17 ft) per minute. Optional: Hydraulic (full time battery operation): 3 HP 24VDC hydraulic motor lifts the platform at 5.2 meters (17 ft) per minute.

Power Requirements

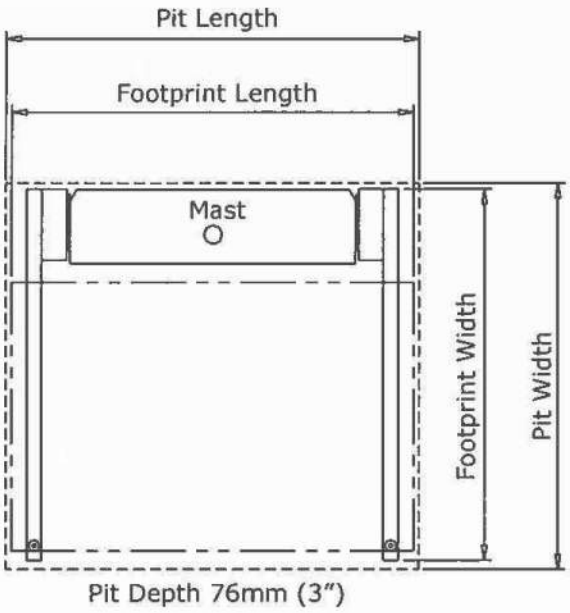
Leadscrew	(Limited to residential use in Canada) North America: 120 VAC single phase on a dedicated 20 amp circuit International: 208-240 VAC single phase on a dedicated 16 amp circuit
Hydraulic	North America: 120 VAC single phase on a dedicated 15 amp circuit International: 208-240 VAC single phase on a dedicated 15 amp circuit

Finishes

Steel panels and framework are finished with electrostatically applied baked Silver Moon paint. The panels, gates and mast are framed with Silver Moon aluminum extrusions (optional colours available)

Dimensions

Footprint / Clearance



If a pit is used, recommended depth is 76mm (3").
Pit width and length include running clearances.

NO PIT - USE VERSION
W/ RAMP INSTEAD

Straight Through Entry / Exit

Platform Size	Footprint Width		Footprint Length		Pit Width		Pit Length	
	mm	in	mm	in	mm	in	mm	in
Standard	1258	49 1/2	1296	51	1319	52	1334	52 1/2
Mid -Size	1258	49 1/2	1448	57	1319	52	~~1493~~	~~58 1/2~~
Large *	1445	56 7/8	1600	63	1508	59 3/8		64 1/2
90° Entry / Exit								
42 x 60 - 90° Entry / Exit	1386	54 5/8	1606	63 1/4	1405	55 3/8	1689	66 1/2
Large	1445	56 7/8	1600	63	1464	57 5/8	1683	66 1/4

*** Large platforms exceed maximum allowable platform size permitted by ASME A18.1**

GARAVENTA LIFT

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Authorized Garaventa Lift Representative

15806-U-PB-EN

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.

G. Door louvers are not included in this Section.

H. 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.

I. 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 DEMOLITION:

A. Certain existing HVAC equipment to be removed and/or relocated as shown or noted. Equipment removed will remain the property of the Owner unless designated otherwise. Remove from the premises all items not retained by the Owner.

3.9 CONNECTIONS TO EXISTING SYSTEMS:

A. Make connections to existing systems only at time authorized, in writing, by Owner.

B. Do not take heating system out of service during occupied working, office or school hours during heating season.

C. Drain existing systems and fill, vent, test, balance and put existing systems into operation after connections have been made.

D. Repair existing insulation at points of connection to existing work.

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

A. Duct Mounted Smoke Detectors: Install in duct.

3.11 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".

3.12 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.

3.14 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.

3.15 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.

3.16 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.

3.17 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.

3.18 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.

3.19 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.

3.20 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).

3.21 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

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

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 <u>VIBRATION ISOLATION:</u>

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 oxactylene welding. Provide full perimeter wells 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 ran 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 factory 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@ 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@. Flame spread classification, 25 or less, smoke developed rating not exceeding 50. Minimum density, 3/4 lb./cu. ft., 2.3" thickness (3" in attic), installed R=6.0 minimum (R=8.3 minimum in attic).

2.5 DUCT INSULATION, EXTERNAL FOR EXPOSED OUTDOOR DUCTS:

A. 6 lb/cu. ft. fiberglass board with FSK facing and thermal conductivity not exceeding 0.22 BTU/(hr) (sq. ft.) (□F/in.) at 75□F mean temperature. Finish with glass cloth embedded in vinyl acrylic mastic.

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 (3" in attic).

B. Fire Dampers for Internally Lined Ducts and Externally Insulated Ducts: 2" thick duct insulation on all sides, external for concealed (3" in attic).

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 joints 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 (UNLESS SHOWN ON PLANS).**

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. Exposed round spiral supply duct serving the Gym to be double wall duct: 1" thick between shells.

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. Supply duct located in Attic: 3" thick.

2. Exhaust duct connected to exhaust fans: 2" thick..

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 DUCT INSULATION, EXTERNAL, FOR OUTSIDE DUCTS:

A. Insulate all exposed supply and return ducts with 2" thick 6 #/cu. ft. fiberglass board with FSK jacket in addition to the insulation specified above. Secure board with weld pins and speed clips 12" on centers. Seal clip indentations with mastic. Seal all joints and seams with mastic. Finish with aluminum jacket, 26 gauge, slope so rain will not stand on duct.

B. Cover all angles, seams and joint reinforcing with insulation and seal vapor tight.

3.6 INSULATION WETTED DURING CONSTRUCTION:

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

END OF SECTION

1.00 GENERAL:

1.01 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.

1.02 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

1.03 RELATED WORK:

1. Testing, Adjusting and Balancing
2. Facility Access and Protection
3. Ductwork
4. Filters
5. Water and Refrigerant Piping
6. Electrical Wiring
7. Control Wiring

1.04 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.

1.05 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.

1.06 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.

1.07 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.

2.00 PRODUCTS

2.01 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.

2.02 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^3 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:

1. 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.

F. Air Handler Mounted Units:

1. 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.

G. 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.

H. 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:

A. MRSA - >96% in 30 minutes or less
B. E.coli - > 99% in 15 minutes or less
C. TB - > 69% in 60 minutes or less
D. 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.

I. 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.

J. 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 or 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.

3.00 EXECUTION:

3.01 GENERAL:

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

3.02 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.

3.03 TESTING:

A. Provide the manufacturers recommended electrical tests.

3.04 COMMISSIONING & TRAINING:

A. A manufacturer's authorized representative shall provide start-up supervision and training of owner's personnel in the proper operation and maintenance of all equipment.

END OF SECTION

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:

System	Background Color	Letters
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 ¾ 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. Fire Protection: **2 inches square.**
      d. Gas: **1-1/2 inches round.**
   2. Valve-Tag Color:
      a. Cold Water: **Natural.**
      b. Hot Water: **Blue.**
      c. Fire Protection: **Red.**
      d. Gas: **Yellow.**
   3. Letter Color:
      a. Cold Water: White
      b. Hot Water: **White.**
      c. Fire Protection: **White.**
      d. 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 and Fire Protection 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 domestic water piping.

3. A system of natural gas piping.

4. A system of fire protection 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 Plumbing Code is in effect).

7. NFPA 24 – Installation of Private Fire Service Mains.

8. NFPA 13 – Installation of Sprinkler Systems.

9. 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.

B. The Fire Protection Sub-Contractor shall meet the following qualifications:

1. The Fire Protection Contractor shall be approved by the Architect,

2. The Fire Protection Contractor shall have been in business as a Fire Protection Contractor for at least three (3) years prior to the Bid date and shall be licensed by the State, County and City in which the work will be performed.

3. The Fire Protection Contractor shall have a satisfactory experience record with Fire Protection installations of character and scope comparable with this project and shall have completed three (3) such installations in the past three (3) years.

4. The Fire Protection Contractor shall be a Registered Engineer in the State in which the work occurs or be a Nicet Level 3.

5. The Fire Protection Contractor shall be the employer of the NICET Level 3 Designer. The NICET Level 3 designer will oversee installation and provide in closeout documentation.

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.

B. Thirty (30) days before starting work, submit Fire Protection Shop Drawings bearing the Seals of the Owner's underwriters and all governmental agencies having jurisdiction. Shop Drawings will not be considered without these seals. Complete shop drawings are required to be submitted at one (1) time.

1. Piping routing showing sizes, dimensions, elevations, and head locations (coordinate with reflected ceiling plan). Provide minimum six (6) sets of blue line drawings.

2. Provide a sprinkler head layout on a reflected ceiling plan. Indicate on plan all lights, HVAC ceiling air devices, smoke detectors, exit lights and any other ceiling attachments. Adjust locations of heads after Architectural review.

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 manufacture'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.

B. Other painting is specified in "PAINTING SECTION, Finishes Division".

3.08 DEMOLITION:

A. Refer to the Architectural Demolition Plans for areas to be demolished and remove all fixtures noted to be removed.

B. All fixtures and equipment noted "To Be Removed" on the drawings shall remain the property of the Owner. If Owner decides against retention of any or all items this Contractor shall remove from the site.

C. Where fixtures are removed, remove all abandoned or unused piping back to main or nearest active connection and cap or plug.

D. When vent stack(s) thru roof(s) are abandoned leave existing vent stack thru roof in place, cut pipe and cap as close as possible to underside of roof deck.

E. Coordinate all system shut down with Owner. Request shut down minimum 72 hours prior to scheduled shut down period. Do no shut down any system without approval of Owner. Perform shut down at premium time if required.

F. Refer to Architectural Demolition Plans for fixtures to be removed.

3.09 CONNECTIONS TO EXISTING SYSTEMS:

A. Make connections to existing systems only at time authorized, in writing, by Owner.

B. Do not take system out of service during occupied working, office or school hours.

C. Drain existing systems and fill, vent, test, balance and put existing systems into operation after connections have been made.

D. Repair existing insulation at points of connection to existing work.

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 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.

3.11 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.

3.12 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.

B. In existing buildings include existing valves in the charts of new valves.

3.13 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.

3.14 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 & Fire Protection (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.

9. Current flow test.

1.00 GENERAL:

1.01 SCOPE:

A. Provisions of this section apply to all Plumbing and Fire Protection work.

B. Include Section 15410, "GENERAL PROVISIONS - PLUMBING AND FIRE PROTECTION", 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 SYSTEM:

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 200 ppm after a retention period of 3 hours and 50 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 FIRE PROTECTION PIPING TEST:

A. Test in accordance with NFPA Pamphlets 13 and 20. Architects, Owner's, Underwriters and local Fire Marshall shall witness test. Provide certificate of inspection to the Architect/Engineer including the name of those witnessing the test.

B. On completion of roughing-in and before connection to existing piping, 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 200 psig for a period of not less than four (4) hours. Immediately and completely stop all leaks. Retest when system is watertight.

C. After testing, leave general pressure on until ready to install sprinkler heads and fire department valves, etc. except when necessary to drain to avoid freezing during construction.

3.06 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 AND FIRE PROTECTION", 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.

E. Connect to existing piping where shown on drawings. Contractor shall confirm exact size, location, invert, and direction of flow of existing piping prior to installing any new piping.

2.03 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.

G. Connect to existing piping where shown on drawings. Contractor shall confirm exact size and location of existing piping prior to installing any new piping. Patch insulation at point of new connection.

2.04 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.

2.05 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.

2.07 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.

L. On sanitary 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 oxactylene welding. Provide full perimeter wells 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.

SECTION 15451 - GENERAL FIRE PROTECTION REQUIREMENTS

1.00 GENERAL:

1.01 RELATED DOCUMENTS

A. Division 1 – Section "ALTERNATES": Coordinate related Division 15 work and modify surrounding work to integrate the Work of each Alternate.

1.02 SUMMARY

A. Description of General Fire Protection Requirements. Applies to all Division 15, Section 15450's (Fire Protection).

1.03 DEFINITIONS

A. "Provide" means to furnish and install, complete and ready for operation.

1.04 REFERENCES

A. ASME: American Society for Mechanical Engineers.

B. ASTM: American Society of Testing and Materials.

C. AWWA: American Water Work Association.

D. FM: Factory Mutual.

E. NEMA: National Electrical Manufacturer's Association.

F. NFPA: National Fire Protection Association.

G. MSS: Manufacturer's Standardization Society of the Valve and Fitting Industry.

H. UL: Underwriters Laboratories, Inc.

1.05 REGULATORY REQUIREMENTS

A. Comply with current edition, unless otherwise noted, of the following codes and standards.
   1. ANSI B31.9 - Building Services Piping.
   2. ADA - American's with Disabilities Act.
   3. NFPA 13 – Installation of Sprinkler System.
   4. NFPA 24 – Installation of Private Fire Service Mains.
   5. NFPA 30 – Flammable and Combustible Liquids Code.
   6. NFPA 31 – Installation of Oil-Burning Equipment.
   7. NFPA 45 – Fire Protection for Laboratories Code.
   8. NFPA 54 – National Fuel Gas Code.
   9. NFPA 70 - National Electrical Code.

10. NFPA 101 - Life Safety Code.
11. IBC - International Building Code with Fire, Mechanical, Plumbing and Gas Codes.

B. Permits, Licenses, Inspections and Fees.
1. Obtain and pay for all permits, licenses, inspections and fees, and comply with all rules, laws and ordinances pertaining to the Contractor's portion of the Work.
2. Obtain and pay for certificates of required inspections, and file certificates with Owner.

1.06 PRODUCT REQUIREMENTS

A. Provide new standard, materials throughout.

B. Multiple items of similar equipment shall be the product of the same manufacturer.

C. Substitutions:
1. Comply with the provisions of Division 1, Section "Product Requirements" and the following:
2. When several manufacturers are named in the specifications, the corresponding products and models made by the specified manufacturers will be accepted and Contractor may base his bid on any one of those products. However, if the Contractor's bid is based on products other than the scheduled or specified **basis of design**, it shall be understood that there will be no extra cost involved whatsoever, and the effect on other trades has been included in the Contractor's proposal. Coordination with other trades for substituted equipment or use of products other than the named basis of design shall be the responsibility of the Contractor furnishing the equipment.
3. The basis of design manufacturer's equipment has been used to determine space requirements. Should another approved manufacturer's equipment be used in preparing proposals, Contractor shall be responsible for determining that said equipment will fit space allocated. Submission of shop drawings or product data on such equipment shall be considered as indicating that the Contractor has reviewed the space requirements and the submitted equipment will fit the space allocated with due consideration given to access required for maintenance and code purposes.
4. The basis of design manufacturer's equipment and scheduled Fire Protection equipment electrical requirements have been used to coordinate the electrical requirements of the plumbing equipment with the electrical systems serving that equipment.
   a. Contractor shall coordinate the electrical requirements of the equipment actually furnished on this project and provide the electrical systems required by that equipment at no additional cost to the Owner.
   b. Equipment of higher or lower electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified at no additional cost to the Owner.
   c. Prior to approval of submittals of Fire Protection equipment with electrical requirements that are greater or lower than those shown on the Drawings, Contractor shall submit letter verifying that required changes to the electrical system, serving the specific piece of equipment in question, have been coordinated with the electrical contractor. Letter to be included with the associated equipment submittal, addressed to the Architect with a copy to the electrical engineer.
5. Each bidder may submit to the Architect a list of any substitutes which he proposes to use in lieu of the equipment or material named in the specifications

with a request for the approval of proposed substitutes. To be considered, such requests must be delivered to the office of the Architect not later than 10 days prior to bid due date. The submittal shall include the following:

a. Specific equipment or material proposed for substitution giving manufacturer, catalog and model number.
b. All performance and dimensional data necessary for comparison of the proposed substitute with the equipment or material specified.
c. A statement setting forth any changes in other materials, equipment or other Work that incorporation of the substitute may require.

6. 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.

1.07 SUBMITTALS

A. Submit under provisions of Division 1, Section "Submittal Procedures" and the following:

B. Product Data: Submit to the Architect and obtain his approval of a complete list of materials and equipment which are to be provided under the 15450 Sections of Division 15.

1. List shall be complete with manufacturer's names, catalog number, dimensions, specifications, rating data and options utilized. Capacities shall be in the terms specified.
2. Call attention to deviations from specified items as to operation and physical dimensions.
3. Performance curves for pumps shall be included.
4. Final equipment orders shall not be placed until submittals have been returned marked "No Exceptions Noted" or "Make Corrections Noted".
5. Bind all equipment submittals and provide index tab for each type of equipment. Submit all at one time. Reserve two sets for project close-out documents.

C. Shop Drawings: Before starting work, submit and obtain approval from Architect of detailed drawings of the following, fully dimensioned and drawn to 1/8" to 1'-0" scale. Submit six (6) prints of each drawing. Engineer will return five (5) of the prints with comments noted. Failure to submit shop drawings will make the Contractor responsible for changes required to facilitate installation.

1. Fire Protection Systems. See Division 15, Section "Fire Protection System."
2. For multi-story buildings, submit detailed floor penetration sleeve layout drawings. See Division 15, Section "Plumbing Basic Materials and Methods," Article "Informational Submittals."

1.08 COORDINATION DRAWINGS

A. General:

1. Within 60 days of Notice to Proceed provide Coordination Drawings for the following areas of the building:
   a. Auditorium (Include all Rigging)
2. Do not base Coordination Drawings on reproduction of Contract Documents or standard printed data.
3. Submitted Coordination Drawings are for information only and typically will not be returned to the Contractor. Architect will not take any action, but may define coordination conflicts or problems and inform the Contractor of such conflicts or problems.

B. Content:

1. Project specific information, drawn accurately to scale.

2. Show sequencing and spatial relationship of separate units of work that must function in a restricted manner to fit in the space provided, or function as indicated.
3. Indicate dimensions shown on Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

C. Format:
1. Coordination shop drawings shall be drawn to a scale of not smaller than ¼" = 1'-0".
2. Provide drawings on electronic media in AutoCad .dwg format.
3. Provide layering system separate from wall outline and unique to each discipline.
4. In addition to plan view, provide sections as required to clarify congested situations and verify vertical clearances.
5. Base drawings and building sections in .dwg format will be provided by Architect.

D. Fire Protection Shop Drawings: Fire Protection subcontractor shall add all fire protection equipment, piping, sprinkler heads and other elements to database.
1. Upon completion of Fire Protection shop drawings, transmit electronic database to Electrical subcontractor.

E. General Contractor's Final Coordination: General Contractor shall thoroughly review shop drawings, adding additional building elements where appropriate, and shall resolve conflicts, coordinating with the Architect, and the various subcontractors.

F. Submit Coordination Shop Drawings: Upon completion of final coordination, General Contractor shall approve coordination shop drawings and transmit 3 sets of hard copies and electronic files on CD's to Architect.

1.09 QUALITY ASSURANCE

A. Installer's Qualifications: Firm experienced in installation of systems similar in size and complexity to those required for this project, plus the following:
1. Acceptable to, or licensed by, manufacturer.
2. Not less than 3 years experience with systems.
3. Successfully completed not less than 5 comparable scale projects using systems similar to those for this project.
4. Professional Engineer licensed in the State in which the work occurs; or NICET Level 3 and licensed by the State Fire Marshall in the State in which the work occurs. NICET Level 3 designer must be an employee of the Fire Protection Contractor. NICET Level 3 designer must oversee installation of shop drawings.

1.10 SUMMARY OF WORK

A. Scope: Provide all labor, materials, equipment and services necessary for the completion of all fire protection work shown or specified, except work specified to be done or furnished by others, complete and ready for operation.

1.11 DRAWING INTERPRETATION AND COORDINATION

A. Drawings are intended to show size, capacity, approximate location, direction and general relationship of one phase to another, but not exact detail or arrangement.

B. Do not scale drawings for location of system components. Check all measurements, location of pipe, ducts, and equipment with the detail architectural, structural, and electrical drawings and conditions existing in the field and lay out work so as to fit in with ceiling grids, lighting and other parts.

C. Make minor adjustments in the field as required to provide the optimum result to facilitate ease of service, efficient operation and best appearance.

D. Where doubt arises as to the meaning of the Drawings and Specifications, obtain the Architect's written decision before proceeding with parts affected; otherwise assume liability for damage to other work and for making necessary corrections to work in question.

E. Refer to Architectural Drawings for all dimensions and location of lights, ceiling diffusers and sprinkler heads.

1.12 PROJECT/SITE CONDITIONS

A. Visiting Site: 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.

B. Determine sizes and locations, and inverts of existing and new utilities near site.

C. Cause as little interference or interruption of existing utilities and services as possible. Schedule work which will cause interference or interruption in advance with Owner, authorities having jurisdiction, and all affected trades.

1.13 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit under provisions of Division 1 Sections - "Closeout Procedures" and "Project Record Documents" and the following.

B. Record Drawings:
1. Keep accurate record of corrections, variations, and deviations, including those required by change orders to the Fire Protection drawings.
2. Accurately show location, size and elevation of new exterior work dimensioned from permanent structure.
3. Record changes daily on a set of prints kept at the job site.
4. Submit prints marked as noted above to Architect for review prior to request for final payment.
5. Marked prints will be returned to Contractor for use in preparing Record Drawings.
6. The Fire Protection Contractor shall use marked up drawing showing as-built conditions provided by Contractor to prepare Record Drawings. Asbuilt drawings shall be incorporated on electronic files.

C. Prior to the issuance of a certificate for final payment, submit to Architect and obtain his approval of the following:
1. Record drawings – fire protection piping/shop drawings, bond and electronic files in AutoCAD *.dwg & PDF format.
2. Equipment Submittal Data (2).
3. Equipment operating and maintenance manuals (2).
4. Equipment warranty dates and guarantees (2).
5. List of Owner's Personnel who have received operating and maintenance

instructions.

6. Install valve charts and valve location plans in main mechanical room. (See Division 15, Section "Plumbing Identification.")

7. Submit factory start-up/field reports for:
   a. Pressure Reducing Valve

D. Contractor's Material and Test Certificate for above ground piping.

E. Contractor's Material and Test Certificate for underground piping.

END OF SECTION 15451

SECTION 15453 - BASIC FIRE PROTECTION MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SUMMARY

A. Description of common piping, equipment, materials and installation for Fire Protection systems.

B. This Section includes the following:
1. Piping materials and installation instructions common to most Fire Protection piping systems.
2. Sleeves.
3. Concrete.
4. Grout.
5. Escutcheons.
6. Access doors - Building.
7. Flashing
8. Workmanship.
9. Cutting and patching.
10. Excavation, trenching and backfilling.
11. Piping systems installation - Common Requirements.
12. Equipment installation - Common Requirements.
13. Painting and finishing.
14. Concrete bases.
15. Supports and anchorages.
16. Protection and cleaning of equipment and materials.

1.02 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.03 SUBMITTALS

A. Product Data: For the following:
1. Transition fittings.
2. Escutcheons.
3. Access doors - building.

1.04 INFORMATIONAL SUBMITTALS

A. Shop Drawings: For multi-story buildings, submit detailed drawings of the floor penetration sleeve sizes and locations, including the following information:
   1. Fully dimensioned off column lines with location respective to adjacent walls shown.
   2. Sleeve size.
   3. Pipe size.
   4. Pipe service.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture. If pipes do not ship with end caps, cover ends of pipe stored on site with 6 mil plastic.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.06 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for Plumbing installations.

B. Coordinate installation of required supporting devices and set sleeves and inserts in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate installation of building access doors for fire protection items requiring access that are concealed behind finished surfaces.

D. Electrical Characteristics for Fire Protection Equipment:
   1. Coordinate electrical system installation to match requirements of equipment actually furnished on this project.
   2. Include a letter with the respective equipment submittal from the electrical contractor and approved by electrical design consultant, detailing changes to the electrical system required to accommodate changes in the power distribution system to accommodate Fire Protection equipment that has different electrical power requirements from that equipment used as basis of design, or power provisions, as shown on the electrical drawings.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
   1. Manufacturers: Subject to compliance with requirements. Provide products by one of the following:

2.02 PIPE, TUBE AND FITTINGS

A. Refer to individual Division 15 Fire Protection Piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

C. All piping and fittings prior to PRV shall be rated for 250psi.

2.03 JOINING MATERIALS

A. Refer to individual Division 15 Fire Protection Piping Sections for special joining materials not listed below.

B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

D. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated.

2.04 SLEEVES

A. Galvanized-Steel Sheet: 20 gauge minimum thickness; round tube closed with longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Firestopping Sealant: See Division 7 Sections "Through-Penetration Firestop Systems" and "Fire Resistive Joint Systems" for firestopping sealant requirements.

D. Stuffing Insulation: Glass fiber type, non-combustible.

2.05 CONCRETE

A. Nominal weight concrete (145 PCF) using Type I Portland Cement, 1-inch maximum size coarse aggregate to provide a minimum 28 day compressive strength of 3000 psi.

2.06 GROUT

A. Description: ASTM C 1107, Grade B, non-shrink and nonmetallic, dry hydraulic-cement grout.
   1. Characteristics: Post-hardening, volume-adjusting, non-staining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
   2. Design Mix: 5000-psi 28-day compressive strength.
   3. Packaging: Premixed and factory packaged.

2.07 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
   1. Finish: Polished chrome-plated.

2.08 ACCESS DOORS – BUILDING

A. Manufacturers:
   1. Bilco.
   2. Milcor.
   3. Nystrom.

B. Construction:
   1. Door: 14-gauge, cold rolled steel.
   2. Frame: 16-gauge, cold rolled steel of configuration to suit material application.
   3. Hinge: Concealed spring hinge.
   4. Latch: Screwdriver cam latch.
   5. Finish: Phosphate dipped and prime coated.
   6. UL labeled when in fire-rated construction with rating to match construction.
   7. Stainless steel (Type 304) shall be used in ceramic tile or glazed structural tile.

C. Size: 18 inch x 18 inch minimum, as indicated on drawings, or as required to allow inspection, service, and removal of concealed items.

2.09 FLASHING

A. Flexible Flashing: 47 mil thick sheet butyl compatible with roofing.

B. Lead Flashing: Waterproofing, 5 lb/SF sheet lead.

C. Pitch Cups: 20 gauge galvanized steel, minimum 8 inches deep, bases mitered and soldered and extending at least 4 inches horizontally.

PART 3 - EXECUTION

3.01 WORKMANSHIP

A. First class and in accordance with best practice. Work to be orderly, neat, workman-like in appearance and performed by skilled craftsman.

B. Poor or improper workmanship shall be removed and replaced as directed by the Architect without additional cost to the Owner or design professionals.

3.02 CUTTING AND PATCHING

A. Comply with the requirements of other Divisions for the cutting and patching required to accommodate the installation of Fire Protection work. Repair and finish to match surrounding.

B. Architect's approval required before cutting any part where strength, or appearance of finished work is involved.

C. Openings are to be laid out and built-in, set sleeves and inserts and furnish detailed layout drawings to other trades in advance of their work.

D. Core drill or saw cut openings in existing masonry construction.

3.03 EXCAVATION, TRENCHING AND BACKFILLING

A. Provide trenching, excavation, backfilling necessary for performance of work, including excavation of rock and all other materials which may be encountered.

B. Grade bottom of trenches evenly and excavate bell holes to insure uniform bearing for the full pipe length. Excavate minimum 6 inches below pipe. Refill cuts below grade with sand.

C. Backfill after inspection by Architect and authorities having jurisdiction. Backfill compacted areas (engineered fill) with sand or fine gravel in accordance with requirements in Division 2. Section "Earthwork" no less than 95% compactancy. 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.

D. Refer to Division 15, Fire Protection Piping Sections for specific bedding and backfill requirements.

E. Restore existing pavement, curbs, sidewalks, sodding, bushes, etc., matching surroundings.

F. Restore all pavement cuts to meet the requirements of the cuts of the local authority.

3.04 PIPING SYSTEMS INSTALLATION - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 15 Fire Protection Piping Sections specifying piping systems.

B. Drawings, schematics, and diagrams indicate general location and arrangement of piping systems. Install piping as indicated unless deviations to layout are approved on Shop Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas and stairwells.

D. Install piping indicated to be exposed and in service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections. No mitering or notching for fittings permitted.

J. Select system components with pressure rating equal to or greater than system operating pressure.

K. Install escutcheons where exposed piping penetrates walls, ceilings, and floors in finished spaces.

3.05 SLEEVES

A. Sleeves are not required for core-drilled holes.
   1. In mechanical room floors and other potentially wet areas, provide 1-1/2 inch angle ring or square set in silicone adhesive around penetration.

B. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
   1. Cut sleeves to length so that sleeve extends out ½ inch from both surfaces.
      a. Exception: Extend sleeves installed in floors of mechanical equipment areas, or other potentially wet areas, 1-1/2 inches above finished floor level. Caulk space outside of sleeves water tight.
   2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
   3. Use the following sleeve materials:

a. Sleeves for Piping Through Concrete Beams, Concrete Walls, Footings, and Potentially Wet Floors: Steel pipe.
b. Sleeves for Piping through Masonry Walls and Gypsum Board Partitions: Steel sheet sleeves 1/2 inch larger than pipe or pipe covering.

4. Where piping penetrates non-rated equipment room wall, floors or roofs outside of a shaft, close off space between pipe or duct and adjacent work with stuffing insulation and caulk air tight.
5. Above ground, non-rated, exterior wall penetrations: Seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 7 Section "Joint Sealants" for materials and installation.
6. Provide for continuous insulation wrapping thru sleeve.
7. Seal space around the outside of sleeves with grout at masonry walls and floors and dry wall mud at gypsum board partitions.

C. Fire-Rated Penetrations: Where pipes pass through fire-rated and fire-resistive floors, walls, and partitions, install appropriately rated sleeves and firestopping sealant. Firestopping materials and installation methods are specified in Division 7 Sections "Through Penetration Firestop Systems" and "Fire Resistive Joint Systems".

3.06 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 15 Fire Protection Piping Sections specifying piping systems.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

D. Flanged Joints:
1. 125 Pound Cast Iron Flange (Plain Face): Mating flange shall have raised face, if any, removed to avoid overstressing the cast iron flange.
2. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.07 PIPE CLEANING

A. Keep pipe clean and free of dirt. Keep caps on ends of pipe when it is stored on site and reinstall caps on ends of installed piping at the end of each day.

3.08 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations.

D. Install equipment in accordance with manufacturer's instructions. If manufacturer's instructions conflict with Contract Documents, obtain Architect's decision before proceeding.

E. Install equipment to allow right of way for piping installed at a required slope.

F. All equipment shall be firmly fastened in place:
   1. Pad mounted equipment shall be secured to pads using poured in place anchor bolts or cinch anchors.
   2. Vibration isolators shall be secured to floors or pads and equipment shall be bolted to the isolators.

3.09 PAINTING AND FINISHING

A. Except as specified below or noted on the Drawing, requirements for painting of Fire Protection systems, equipment, and components are specified in Division 9 Sections "Interior Painting" and "Exterior Painting."

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

C. Painting of fire piping:
   1. The following piping within boiler and chiller room shall be painted in its entirety under Division 9: Painting. Color codes are listed here for information only.
      a. Fire Protection Piping: Red Metaltex B47R3.
   2. Should there be a conflict of colors in existing installations, contact the Architect.

3.10 CONCRETE BASES

A. Provide concrete foundations with nominal dimensions conforming to the following schedule for floor-mounted equipment:

Equipment	Foundation
Equipment and piping stands and supports	4" high pad
Equipment located in equipment rooms, not listed above	4" high pad or as indicated on the Drawings

B. Concrete bases shall be continuous and shall have beveled edges and smooth float finish. Concrete bases shall be reinforced with No. 3 bars a maximum of 12" on center each way, and held in place with dowel rods at each corner anchored in the slab. Dowel rods shall not penetrate through the slab.

C. Roughen and clean exposed slabs before pouring foundations. Apply bonding agent to surfaces in contact.

D. Concrete pads shall extend a minimum of 4" beyond the equipment footprint in all directions, including appurtenances, vibration isolators, base elbow supports, and motors.

E. Equipment attached directly to foundations or inertia bases; bases provided with grout holes; and bases consisting of a structural frame shall have voids filled with grout after attachment to foundation.

F. Fill voids between baseplates and foundations, and level equipment, with grout.

3.11 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 5 Section "Metal Fabrications" requirements.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing and fire protection materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.12 GROUTING

A. Mix and install grout for Fire Protection equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

3.13 ACCESS DOORS – BUILDING

A. Provide access doors in wall and inaccessible ceilings to allow access to service and maintain concealed Plumbing equipment, valves, etc.

B. Coordinate installation of access doors with Divisions responsible for Building System in which panels are being installed.

3.14 PROTECTION AND CLEANING OF EQUIPMENT, FIXTURES, AND MATERIALS

A. Equipment and materials shall be carefully handled, properly stored, and protected from weather, dust-producing procedures, or damage during construction.

B. At completion of all work, thoroughly clean exposed materials (pipe, etc.) and equipment and make ready for painting.

END SECTION 15453

SECTION 15455 - FIRE PROTECTION SYSTEM

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Pipe, Fittings, Valves for:
   1. Wet sprinkler system.

B. System design and installation. Base system design hydraulic calculations using the area/density method on the following criteria and in accordance with NFPA 13 latest edition.
   1. Sprinkler Protection:
      a. Offices, auditoriums, classrooms, lobbies, waiting areas, and corridors: Light hazard, 0.10 gpm/sq. ft. over the hydraulically most remote 1500 sq. ft.
      b. Mechanical Equipment Rooms, Transformer Rooms, Electrical Switchgear Rooms, Electric Closets, and storage between 100 and 250 sq. ft.: Ordinary Hazard, Group 1, 0.15 gpm/sq. ft. over the hydraulically most remote 1500 sq. ft.
      c. Utility and Maintenance rooms, laundry, laboratory and storage rooms, storage rooms over 250 sq. ft., loading docks, energy centers areas: Ordinary Group 2, 0.20 gpm/sq. ft. over the hydraulically most remote 1500 sq. ft.
      d. Provide sprinklers in accessible shafts per NFPA 13 latest edition.
   2. Add water allowance of 250 gpm for inside and outside hose streams to the sprinkler requirements at the connection to the distribution main.
   3. Hydraulic Calculations: The calculated demand including hose stream requirements shall fall no less than 10 percent below the available supply curve.
   4. Comply with IBC (2015 Edition), NFPA 13 (2013 Edition), NFPA 30, Flammable and Combustible Liquid Code, NFPA 45, Standard on Fire Protection for Laboratory Using Chemicals, NFPA 54, National Fuel Gas Code, NFPA 58, Liquefied Petroleum Gas Code, NFPA 70, National Electric Code, NFPA 72, National Alarm and Signaling Code, and NFPA 101, Life Safety Code (2015 Edition).

1.02 RELATED SECTIONS

A. Section 15405 – Plumbing Identification.

B. Section 15451 – General Fire Protection Requirements.

C. Section 15453 – Basic Fire Protection Materials and Methods.

1.03 SYSTEM

A. A wet pipe sprinkler system providing coverage for the entire building.

B. Fire service from approximately 5ft outside the building to inside the building.

C. Existing building is presently sprinkled. Contractor shall modify/extend existing sprinkler system to provide 100% coverage of renovation area per NFPA 13 and local authority having jurisdiction.

1.04 SUBMITTALS FOR REVIEW

A. Submit under provisions of Division 1, Section "Submittal Procedures" and the following:

B. Product Data: Submit to the Architect and obtain his approval of a complete list of materials and equipment which are to be furnished under Division 15.
   1. List shall be complete with manufacturer's names, catalog number, dimensions, specifications, rating data and options utilized. Capacities shall be in the terms specified.
   2. Call attention to deviations from specified items as to operation and physical dimensions.
   3. Performance curves for equipment such as pumps shall be included.
   4. Final equipment orders shall not be placed until submittals have been returned marked "No Exceptions Noted" or "Make Corrections Noted".
   5. Bind all equipment submittals and provide index tab for each type of equipment. Submit all at one time. Reserve two sets for project close-out documents.

C. Shop Drawings:
   1. A reflected ceiling plan indicating locations of sprinkler heads, lights, HVAC devices, smoke detectors, exit lights and any additional items attached to ceiling. In lift out ceilings, sprinkler heads are to be centered in ceiling tiles. In hard ceilings, sprinkler heads to follow the general arrangement of the ceiling. After review by the Architect, revise layout as required.
   2. Prepare a working pipe shop drawing based on hydraulic calculations. The piping shop drawing shall indicate routing and configuration of piping, size of pipe, piping support, elevation of piping and coordination of piping with ductwork. Shop drawings shall include low point drain downs.
   3. Hydraulic calculations are to be prepared utilizing a current water flow test (maximum 90 days old). If current flow test is not available, obtain a current flow test and pay for all fees required.
   4. If water flow information is not available due to new main extension or other construction which prohibits the availability of flow information at the start of construction, the contractor shall estimate probable flow information based on information available. Once permanent water is available at the site, the Contractor shall perform a flow test, incorporate the information into the calculation and make any modifications to the system as may be required.
   5. When drawings and hydraulic calculations are submitted to the Engineer for review, they shall bear the seals of review and approval of the Architect, General Contractor, the Owners Insurance Underwriter, and the Nicet Level 3 Designer. The Nicet registered designer shall be an employee of the Fire Protection Installing Contractor and shall oversee installation of Project. Nicet registration seal shall be included on shop drawings.
   6. Contractor to provide to the State reviewing Agency a set of shop drawings reviewed and approved by Engineer of Record as required by the State of Alabama.
   7. The Contractor shall incorporate all comments for approval by local Fire Marshall's Office and any State of Alabama Reviewing Agency. Contractor shall provide signed, and approved set of plans to Engineer upon approval by state and local authorities.
   8. Each system calculations, components and alarming to be on shop drawings.

1.05 SYSTEM INSTALLATION AND INSPECTION

A. Required Inspections:
   1. All underground and above ground fire line piping must be inspected by owner's representative prior to being covered or concealed.

B. Fire Stopping:
   1. All fire stopping of any and all fire rated assemblies must be inspected and approved by a State Inspector prior to the work being concealed.

C. Hydrostatic Testing Requirements:
   1. The required hydrostatic testing of the underground and above ground fire line piping must be witnessed and approved by City Inspector prior to being covered or concealed.

D. Underground Fire Line Pipe Flush Test Requirements:
   1. The required flush test of the underground fire line piping must be witnessed by an Owners representative prior to being connected to the above ground piping or riser.

E. Acceptance Inspections & Testing:
   1. Allow fire protection and life safety systems installation and acceptance test must be inspected, test, witnessed and approved by an AHJ and Owner's representative.

F. Plans Review & Approval:
   1. All fire protection and life safety system drawings and specifications must be reviewed by this office to ensure code compliance prior to start of any work.

1.06 REGULATORY REQUIREMENTS

A. Materials: Conform to UL and FM Global Requirements and Standards.

B. Sprinkler System: Conform to NFPA 13, State of Alabama Fire Marshall Requirements, City Fire Requirements and Alabama State Building Commission Requirements.

C. NFPA 14, Installation of Standpipes and Hose Systems.

D. Private Service Mains: Conform to NFPA 24.

E. NFPA 25, Inspections, Testing and Maintenance of Water-Based Fire Protection Systems.

F. NFPA 72, Standard for the Installation, Maintenance and Use of Protective Signaling Systems.

G. NFPA 72E, Standard on Automatic Fire Detectors.

H. Applicable Building Codes.

I. Welding Materials and Procedures: Conform to ASME Code.

J. Valves: Bear UL, FM label or marking. Provide manufacturer's name and pressure rating marked on valve body.

K. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.

1.07 EXTRA MATERIALS

A. Provide extra sprinklers under provisions of NFPA 13, State and Local requirements.

B. Provide suitable wrenches for each sprinkler type.

C. Provide metal storage cabinet in location designated. (Designate location).

PART 2 - PRODUCTS

2.01 PIPING BELOW GRADE AND BELOW SLAB ON GRADE

A. Ductile Iron: Cement lined ANSI A-21.50.

B. Joints on Ductile Iron: Standard mechanical joint ANSI A-21.11. Provide with retainer glands at all fittings and thrust blocks minimum 1 cubic yard of concrete at all changes of direction.

2.02 ABOVE GROUND PIPING

A. Black Steel Pipe:
1. All piping 1-1/2" and smaller, all piping larger than 1-1/2" with cut grooves or threaded and all welded piping, Schedule 40 black steel ASTM A53, ASTM A795, ASTM A135.
2. Piping larger than 1-1/2" for roll grooving only, Schedule 10 ASTM A795, ASTM B36.10. Schedule 10 pipe may not be used for threading or cut grooving.
3. Cast iron threaded fittings ANSI B16.4 cast iron flanges and flanged fittings ANSI B16.1.
4. Malleable iron threaded fittings, ANSI B16.3.
5. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts and washers; galvanized for galvanized pipe.
6. Mechanical Formed Fittings: Carbon steel housing with integral pipe stop and O-ring pocked and O-ring, uniformly compressed into permanent mechanical engagement into pipe.

B. Malleable Iron Fittings 175 lb. (250 lb.); ASME B16.3, threaded fittings.

C. Copper Tubing: ASTM B75; ASTM B88; Type K, hard drawn.
1. Fittings: ASME B16.22, wrought copper and bronze, solder joint, pressure type.
2. Joints: AWS A5.8 Classification BCuP-3 or BCuP-4 silver braze.

2.03 WET SPRINKLER SYSTEM

A. Sprinklers:

1. Sprinklers to be UL approved glass bulb quick response type.

2. Ceiling Areas:

a. Manufacturer's:

1) Viking, Tyco, Reliable.

b. Type: Quick response concealed pendent type with factory painted cover plate. Coordinate color with architect.

3. Exposed areas:

a. Sprinklers to be UL approved glass bulb quick response type.

b. Manufacturer's:

1) Viking, Tyco, Reliable.

c. Type: Quick response upright type guard.

d. Finish: Brass or Chrome plated.

e. Fusible link: Glass bulb type temperature rated for specific area hazard.

f. Guards: finish to match sprinkler finish.

B. Pipe Hangers and Supports:
1. Conform to NFPA 13.
2. Hangers for Pipe Sizes ½ to 1-1/2 inch: Carbon steel, adjustable swivel, split ring.
3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
7. Vertical Support: Steel riser clamp.
8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
9. Copper Plate Support: Carbon steel ring, adjustable, copper plated.
10. All hangers to be a maximum of 12 inches from the end of a branch line or an arm-over for drop.

Pipe hangers and supports shall be of one manufacturer. Grinnell, Anvil or Tolco are approved manufacturers. Substitutions require prior approval.

C. Gate Valves:
1. Up to and including 2 Inches:
   a. Manufacturers:
      1) Nibco Model T-104-O.
      2) Where Nibco is listed, Victaulic, Stockham, Watts, Tyco and Milwaukee are equal.
   b. Bronze body, bronze trim 175 psi WP, UL Listed, rising stem, handwheel, solid wedge or disc, threaded ends.
2. Over 2 Inches:
   a. Manufacturers:
      1) Nibco Model F-607-OTS.
      2) Where Nibco is listed, Victaulic, Watts, Tyco and Milwaukee are equal.
   b. Iron body, bronze trim 175 psi WP, UL Listed, rising stem pre-grooved for mounting tamper switch, handwheel, OS&Y, solid bronze or cast iron wedge, flanged or grooved ends.

D. Butterfly Valves:
1. Cast or Ductile Iron Body
   a. Manufacturers:
      1) Nibco Model GD-4765-4/8.
      2) Where Nibco is listed, Victaulic, Watts, Tyco and Milwaukee are equal.
2. Cast or ductile iron, chrome or nickel plated ductile iron or aluminum bronze disc, resilient replaceable EPDM seat, lug, or grooved ends, extended neck, handwheel and gear drive and integral indicating device, and internal tamper switch rated, UL / FM approved.

E. Check Valves:
1. Up to and including 2-1/2 inches to 6 inches:
   a. Manufacturers:
      1) Nibco Model G-917-W.

2) Where Nibco is listed, Victaulic, Watts, Tyco and Milwaukee are equal.

b. Iron body and swing disc, bronze seat, stainless steel spring, grooved ends, 175 psi WP.

F. Water Flow Switch:
1. System sensor WFD water flow detector. Poetter Reomer, Viking, and Tyco are acceptable manufacturers.

G. Supervisory Switches:
System sensor OSY2 Model tamper detector. Poetter Roemer, Viking, and Tyco are acceptable manufacturers.

H. Test and Drain Assembly:
1. Viking Model A-1 complete with sight glass and ½" orifice for test purpose. Pipe discharge to drain riser on to exterior and spill on splash block.

Tyco, Victaulic, and Reliable are acceptable manufacturers.

2.04 FIRE STOP SYSTEMS

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

B. Non-rated walls – sheet rock joint compound may be used to seal opening.

C. For piping passing through listed sheet rock walls or partitions:
1. Uninsulated pipe passing through 2 hour walls or partitions – minimum 5/8" depth of Hilti FS 605 filling annular space between wall and pipe on both sides of wall. U.L. Listing #WL1056.
2. Uninsulated pipe passing through 2 hour walls or partitions – minimum 1-1/4" depth of Hilti FS 601 filling annular space between pipe and wall on both sides of wall, U.L. Listing #WL1054.

D. For piping passing through concrete floors, concrete walls or concrete block walls.
1. Uninsulated Schedule 40 steel pipe; fill annular space between pipe and opening with Hilti #FS 605. U.L. Listing #CJ1184.

PART 3 - EXECUTION

3.01 PREPARATION

A. Install piping in accordance with NFPA 13 for sprinkler systems, NFPA 14 for standpipe and hose systems, and NFPA 24 for service mains.

B. Connect to site fire service installed under another section. Verify the site with civil drawings for the exact size and location of the service prior to beginning work.

C. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

D. Install piping to conserve building space, to not interfere with use of space and other work.

E. Group piping whenever practical at common elevations.

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

G. Inserts:
   1. Provide inserts for placement in concrete formwork.
   2. Provide inserts for suspending hangers form reinforcement concrete slabs and sides of reinforced concrete beams.
   3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
   4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

H. Pipe Hanger and Supports:
   1. Install in accordance with NFPA 13 and NFPA 14.
   2. Hangers on branch lines to comply with NFPA 13, 9.2.3.
   3. Hangers on mains to comply with NFPA 13, 9.2.4.
   4. All hangers to be a maximum of 12 inches from the end of a branch line or an arm-over for a drop.
   5. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
   6. Where several pipes can be installed in parallel and at same elevation, provide multiple trapeze hangers may be used.
   7. Provide copper plated hangers and supports for copper piping.
   8. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

I. Slope piping and arrange systems to drain at low points.

J. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coast of zinc rich primer to welding.

K. Do not penetrate building structural members unless indicated.

L. Provide sleeves when penetrating floors and wall. Seal pipe and sleeve penetrations to achieve fire resistance equivalent to fire separation required.

M. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, unions, and couplings for servicing are consistently provided.

N. Die cut threaded joints with full cut standard taper pipe threads and connect with Teflon tape or Teflon pipe compound applied to male threads.

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

P. Provide valves for shut-off or isolating service and where shown on plans.

Q. Provide drain valves at main shut-off valves, low points of piping and apparatus.

R. Install piping in attic directly on top of joists. Install plastic sheeting over top of pipe and secure joists. Insulation to be installed over pipe and plastic sheeting.

S. Provide automatic sprinkler coverage at the bottom of hydraulic elevator shafts and elevator machine room in Accordance with NFPA 13 and local requirements.

T. Exterior exposed equipment shall be chrome plated.

U. All fire department or maintenance connections shall be coordinated with the Fire Department.

V. The fire protection contractor is responsible for coordination and labelling of fire devices supplied under this specification.

W. Where pipes penetrate exterior or finished surfaces escutcheons shall be used. Escutcheons shall be chrome finished and single piece design.

X. All devices and equipment shall be labelled as required by NFPA 13, 24.

1.00 GENERAL:

1.01 SCOPE:

A. Include Section 15410 "GENERAL PROVISIONS - PLUMBING AND FIRE PROTECTION", 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.

2.03 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: 1½ inch thick.
      2) Pipe 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.
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.

2.03 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. 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.

B. 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 1/2" thick "Arma-cell" or approved equal.

C. Exposed P-Traps, stops and supplies on handicapped lavatories, and sinks. Equal to "PRO-WRAP" by McGuire.

1.00 PRODUCTS:

1.01 SCOPE:

A. Include Section 15410, "GENERAL PROVISIONS – PLUMBING AND FIRE PROTECTION ", 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 value, 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, American Standard, or Zurn may be substituted.

B. Where J.R. Smith is listed, Josam, Zurn, or Wade may be substituted.

C. Where McGuire is listed for traps, outlets and stops, EBC, Kohler, Crane, Eljer or American Standard may be substituted.

D. Where Symmons is listed, Chicago Faucet or Powers, Zurn may substituted.

E. Where Chicago Faucet is listed, T&S Brass may be substituted.

F. Where Willoughby is listed, Acorn may be substituted.

G. Where Church is listed above, Bemis, Beneke or Centoco may be substituted.

H. Where Lochinvar water heaters are listed, A.O. Smith, PVI, or Rheem may be substituted.

I. Where Stern Williams is listed above, Fiat may be substituted.

J. Where Sloan is listed, Toto and Zurn may be substituted.

K. Where Symmons is listed above for shower control valves, Speakman, Leonard, Powers, T&S or Zurn may be substituted.

L. 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 tope 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.

F. 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.

G. 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.

H. 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.

I. Handicapped flush valve shall be installed with the pull handle on the open side or side opposite the adjacent wall.

1.0 - GENERAL

1.1 Scope

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

2.0 - PRODUCTS

2.1 Coils

A. ARI Standard 410-89 rated with capacities and dimensions shown.

B. Provide coils with aluminum fins and seamless copper tubes.

C. Headers may be iron castings or steel or copper tubing. Braze return bends.

D. Space fins not closer than 10 per inch, maximum coil depth of 8 rows.

E. Prove coils tight with 200 psig under water air test.

F. Coil casings: Stainless steel and flanges drilled for mounting.

3.0 - EXECUTION

3.1 Installation

A. Coils 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 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 shall apply to all HVAC work.

2.0 PRODUCTS:

2.1 HOT GAS REHEAT PACKAGED ROOF TOP AIR CONDITIONING UNITS (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-454B.

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, dedicated horizontal airflow or mixed horizontal / vertical as shown on plans. Provide roof curb as required. Provide horizontal discharge curbs as required.

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.

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. 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. Provide a thermal expansion valve for each refrigeration circuit. Factory pressure test at 450 psig and leak tested at 200 psig.

Y. Provide drain pan for base of evaporator coil constructed of PVC or galvanized steel with external connections.

Z. 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.

AA. 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.

BB. 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.

CC. Provide internally finned 3/8 " seamless copper tube mechanically bonded to aluminum fins. Factory pressure tested to 450 psig.

DD. 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.

EE. 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.

FF. Compressor(s) shall be manufactured by the HVAC unit manufacturer.

GG. Units shall have cooling capabilities down to 60° F.

HH. Provide with thermostatic temperature control in the compressor windings, to protect against excessive temperatures, high and low pressure conditions.

II. Provide 100% outside air hood with birdscreen and multi position osa damper where required with economizer.

JJ. Provide Differential Enthalpy controlled economizer and barometric relief damper.

KK. 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.

LL. 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 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 unit mounted thermostat to cycle contactor and fan. For each unit heater provide unit mounted disconnect.

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

1.0 - GENERAL

1.1 Scope

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

2.0 - PRODUCTS

2.1 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, Twin City, 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 breaking 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 co-efficient ("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.

C. Provide paint grip finish (color by Arch) for all exposed ductwork (PU-1 and 2).

D. All round duct for PU-1 and 2 shall be double wall with 1" internal insulation.

2.3 Ductwork Located Outdoors:

A. Construct ducts served by exhaust fans as specified for respective exhaust ducts, above. Seal all seams weather tight using glass cloth tape and carbolastic or United Duct Sealer.

2.4 Ductwork, Plenum Casing:

A. Include all plenum chambers and enclosures for air passage between air intakes, filters, heating and cooling coils and fans. Unless otherwise shown the floors under casings shall serve as the bottom and sides and tops shall be constructed of sheet metal. Provide concrete pads (4" min. height) under all casings. Any passage definitely shown above and clear of floor shall not be classed as a casing and shall be constructed as specified for ducts.

B. Construct all exterior walls of casings, partitions between decks and fan discharge partitions of 4" thick factory furnished insulated panels having 20 gauge galvanized steel outer skin, 20 gauge perforated galvanized steel inner skin, fiberglass insulation (flame spread 10 20, fuel contributed 10 15, smoke developed 0 20) (and 0.002" thick mylar film between insulation and perforations). Assemble casing panels with joining members to provide structural rigidity to 10" WG pressure differential. Reinforce and support panels as recommended by panel manufacturer. Minimum "U" value (still air both sides) 0.06 Btu/hr sq. ft. F. Minimum NRC 0.95, minimum STC 37. Casing joints and seams shall be air tight under 8" WG pressure and casing joints will be fully insulated to prevent sweating.

C. Construct portions of casings other than the panels specified above of 18 gauge galvanized steel with standing seams 42" on center. Locate 2" standing seams on casing perpendicular to direction of air flow. Seal seams with United Duct Sealer and fastened with bolts or tinnier's rivets 6" O.C., reinforce casings with members sized and spaced as follows: I = 3 X SP X C X L/1000 X L/1000 X L/1000. Where I = moment of inertia of section, inches fourth, SP= static pressure, ins. WG, C = member spacing inches, L = member length, inches.

D. Brace casings diagonally with 2 X 2 X 3/16 angles and stay as required.

E. Calk casing floor angles to pads and secure with expansion bolts 12" O.C.

F. Construct drain pans inside with double construction with insulation between pans and 16 gauge type 304 stainless steel inner pan with welded joints.

G. Install coil racks of galvanized angle iron inside casings to permit removing coils

without dismantling casings. Equip cooling coils with intermediate drip troughs and eliminators as shown. Pipe drip troughs to main drain pans.

H. Provide access doors where shown and/or required for access to equipment and/or controls. Construct doors with 1" insulation between two (2) sheets 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.

2.5 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. Kitchen hood exhaust duct access doors: 16 gage black iron with high temperature ceramic fiber rope gasket for services up to 2000°F. Provide thumb screw access. Equal to Ruskin ADR-KE & ADF-KE.

D. 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 Air Flow Measuring Stations (Afms):

A. Thermal dispersion airflow measurement station. Shall be provided with insertion type mounting style, 304 stainless steel mounting bracket, aluminum alloy tube with individual sensors and BMS connectivity. Using recommended placement guidelines for the specified probe sensor density, measurement accuracy of 3% shall be provided.

B. Air flow measurement stations shall be Ebtron Advantage series or approved equal.

C. Install an access door in duct immediately upstream from each airflow measuring station.

2.9 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 in 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, Cook or equal.

2.10 GRAVITY ROOF VENTILATORS:

A. Factory fabricated spun aluminum ventilator with integral curb cap and birdscreen. Equip hood with galvanized steel curb with wood nailer. Minimum material gauges, hood 20 gauge, base 18 gauge, curb 18 gauge.

B. Gravity Roof Ventilators shall be manufactured by Greenheck, Cook, or approved equal.

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. Supply Registers (SR): Adjustable vertical deflection, adjustable horizontal deflection, removable core, opposed blade damper and multi-blade scoop and baked aluminum enamel finish. Titus "1700".

C. Wall Return Grilles (WRG): Horizontal bars fixed at about 15° angle, close spacing and plaster frames. Baked aluminum, enamel finish. Titus "1700".

D. Bar Return Grille (BRG): All steel, heavy duty, 16 gauge border, 14 gauge blades, 1/2" spacing, 38° deflection. Provide all frames. Titus "33R". All BRG's are to appear as a one piece grille. BRG's are to be painted as selected by architect. Submit color chart to architect.

E. 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".

F. 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".

G. Drum Louver (DL): Outer borders shall be 1 1/4" wide and shall be constructed of heavy gauge extruded aluminum. Corners shall be assembled with full penetration resistance welds with a reinforcing steel patch for extra strength. Screw holes shall be countersunk for a neat appearance. Drum shall be constructed of heavy gauge extruded aluminum and shall rotate a minimum of 25° up and down from center line of the diffuser. Heavy extruded aluminum blades shall be individually adjustable. Optional opposed blade volume damper shall be constructed of heavy gauge steel. Damper must be operable from the face of the register. The grille

finish shall be #26 white. The finish shall be an anodic acrylic paint, baked at 315°F for 30 minutes. The pencil hardness must be HB or H. The paint must pass a 100 hour ASTM D117 Corrosive Environments Salt Spray Test without creepage, blistering, or deterioration of film. The paint must pass a 250 hour ASTM-870 Water Immersion Test. The paint must also pass the D-2794 Reverse Impact Cracking Test with a 50 inch pound force applied. Supply grilles shall be TITUS "DL".

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:

END OF SECTION

1.00 GENERAL:

1.01 SCOPE:

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

2.00 PRODUCTS:

2.01 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.

3.00 EXECUTION:

3.01 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.

C. This project shall include an expansion of the existing Trane Building Automation System to cover all work in the existing building. All new HVAC controls in the new Gymnasium building shall be stand-alone controls.

D. Refer to Section 15910 "BUILDING MONITORING AND CONTROL SYSTEM (BMCS)".

2.00 PRODUCTS:

2.01 CONTROL SYSTEMS:

A. Equipment manufacturer shall provide and install all controls for a complete working system. Provide control points and sequences as shown on drawings.

B. All new HVAC controls products, programming, and installation for all work in the existing building shall be performed by Trane. Provide control points and sequences as shown on drawings. All new HVAC controls in the new Gymnasium building shall be stand-alone controls. Trane, Carrier, Daikin 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 Unless otherwise shown provide proportional action relay thermostats with key operated adjustments. Thermostats to be provided with local control, limited range of local control. Thermostat covers: high impact plastic. Mount room thermostats with tops 4 feet above floors. Thermostats located in Gymnasiums shall have metal impact resistant ventilated covers, painted to match the wall.

B. Remote Bulb Thermostats and Temperature Transmitters: 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 O-10VDC and 4-20MA output (field selectable) to BMCS. Sensor accuracy to be 2%, installed accuracy to be 3%. ARMS to be Ebrron 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 (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 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 15900

BUILDING MANAGEMENT CONTROL SYSTEM (BMCS) – HVAC - SECTION 15910

1.00 GENERAL:

1.01 SCOPE:

A. The General, Supplementary and Special Conditions and provisions of the Specifications shall apply to and form a part of this section.

B. Provisions of this Section shall apply to all HVAC work.

C. Refer to Section 15900 "CONTROLS".

D. Give all requisite notices, file plans if required, obtain and pay for all permits and pay all deposits and fees necessary for the installation of the BMCS. Obtain and pay for all inspections required by all laws, ordinances, rules, regulations or public authority having jurisdiction. Obtain and pay for certificates of such inspection, and file such certificates with Owner.

E. BMCS work shall be furnished and installed by the temperature control system manufacturer complete with all required conduit and wire. Installation of conduit, wiring and wiring devices shall be done in accordance with the provisions of Division 26, Electrical Work. BMCS work shall be performed by skilled mechanics under the direction of experienced engineers, all of whom shall be properly trained and qualified for BMCS work.

F. Control system and components shall be web-based, TCP-IP protocol requiring only an internet browser to access and control or modify the system

G. Network and all controllers to be native BACNET and/or LON basis.

H. The existing Trane Summit BMCS shall be extended as required for work in the existing building only.

1.02 WORK REQUIRED:

A. All engineering design, labor, materials, equipment and services necessary for and reasonably incidental to proper completion of BMCS work as shown or herein specified (excepting only work or materials specified or noted as being done or furnished by others), consisting in general of the following, complete and ready for operation.

1. Central Control.

2. Input/Output Panel (IOP's).

3. Software Packages.

4. Interface with Power Company electric meter.

5. Remote Control, alarm and sensing devices.

6. Fire Alarm System Interconnects.

7. Complete wiring network interconnecting all parts of the system.

8. Instruction of Owner's operating personnel.

1.03 DRAWINGS:

A. The drawings are diagrammatic in general: Drawings indicate generally the locations of component parts of the system, but are not intended to show all fittings or all details of the work.

B. However, follow the drawings as closely as possible, checking all dimensions against conditions existing at the building.

1.04 APPLICABLE CODES AND STANDARDS:

A. Systems and equipment installed under this Section shall comply with the current editions of the following codes and standards:

1. Local Building Code.

2. NFPA 70: National Electrical Code.

1.05 WORKMANSHIP:

A. Do all work in a neat and first-class manner. If so directed by Architect, remove and replace any item of work not done so as to present an orderly, neat, and workmanlike appearance,provided that such item can be correctly installed by usual methods of the trade.

1.06 VISITING SITE:

A. Visit site of proposed work and become familiar with locations and various local conditions affecting proposed work. No additional allowance will be granted because of lack of knowledge of such conditions. The Birmingham Control Engineers shall visit site to insure complete and automatic system installation.

1.07 PROTECTION OF EQUIPMENT:

A. During construction all mechanical equipment shall be protected from damage caused by water, masonry, plaster, paint and job accidents.

1.08 EQUIPMENT SUPPORTS:

A. Provide all necessary grillage, angle iron, etc., required to support equipment.

1.09 INCIDENTAL WORK:

A. Setting sleeves and inserts and laying out and forming openings in walls and structural floors are included in this Section.

B. Cutting and patching and repairing of walls, floors, etc., are included in this Section. Architect's approval required before cutting any parts where strength or appearance of finished work is involved. Finish up in a neat and workmanlike manner to match existing work.

C. Repair pipe covering and duct insulation at points of connection to system.

1.10 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 NEC when exposed, concealed above in accessible ceilings or concealed in walls. Plenum rated cable may be used above accessible ceilings only (for plenum or non-plenum).

B. Waterproof and firestop all conduit floor penetrations. Firestop conduit penetrations of fire rated walls and 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 starters.

1.11 PAINTING:

A. Finished equipment which has had finish damaged during construction shall be refinished to new condition.

1.12 MATERIALS, GENERAL:

A. Use standard components, regularly manufactured and not custom designed for project. Use systems and components proven in use.

B. System shall be modular, permitting expansion by adding hardware and software without changes in communication or processing equipment.

C. Provide all necessary relays and contactors, auxiliary contacts and other items required to perform the functions specified herein.

1.13 SUBMITTALS:

A. Submittal contents shall include the following:

1. Trunk cable schematic showing Input/Output Panel (IOP) locations, and all trunk data and intercom conductors.

2. List of connected data points, including IOP's to which they are connected, and input device (sensor, etc.).

3. Sketches of system showing all monitored systems, point addresses, and operator notations.

4. BMCS central system configuration complete with all peripheral devices, batteries, power supplies, diagrams, etc., with interconnection diagrams.

5. Technical specification data sheets for each system component and device.

6. Descriptive data and sequence of operation of all operating, user, and application software including complete Operator's Manual and Programmer's Manual tailored to the job.

1.14 OPERATOR INSTRUCTION:

A. Conduct operator training on the system installed in building. Training shall include a minimum of Two (2) 4 hour dedicated courses. Classes are to be provided in segments taken at the owners discretion, either consecutively or intermittently.

B. Schedule training at Owner's request. Coordinate with Engineer.

C. All Commissioning Functional Performance Testing must be completed and all deficiencies corrected prior to Owner training.

1.15 DOCUMENTATION:

A. Provide six (6) sets of complete system documentation at acceptance time as specified. Include the following:

1. Data specified in the SUBMITTALS Section in its final as-built approved form.

2. As-Built interconnection wiring diagrams, or wire lists, of the complete field installed system with complete, properly identified ordering number of each system component and device.

3. Operator's Manual.

1.16 ACCEPTANCE PROCEDURE:

A. Submittal data relevant to point index, function, limits, sequences, interlocks, power fail-restart, logs, software routines and associates parameters, and other pertinent information for the operating system and data base shall be forwarded to the Owner's authorized representative. Approved software packages shall be entered into the central computer and debugged. Prior to full operation, a complete demonstration and readout of the computer real-time responsibilities of surveillance, and command shall be performed in the presence of the Owner's authorized representative, and the Engineers.

This demonstration may also involve temporary alteration of data values to determine software response to certain conditions, and changes to system clock to test time dependent functions. This demonstration shall, with the Owner's authorized representatives' written acceptance, allow commissioning of the computer for on-line operation.

B. Warranties (See General Conditions) shall apply to software as well as to hardware and workmanship.

1.17 SERVICE:

A. Include complete service for Three years beginning when system is accepted. Support shall be applied to all materials and equipment furnished under this section and and includes:

1. Parts and Labor Warranty.

2. Semi Annual Building/Systems Status Report (to be determined by owner).

3. Semi Annual Training Session (conducted offsite).

4. Twenty-four (24) hour-on-call breakdown service as required, within four (4) hour

response time, during normal business hours.

5. Replacement of software if loss of such software is not fault of Owner.

6. On-call questions and answer service.

2.00 PRODUCTS

2.01 GENERAL:

A. Furnish and install an expansion to the existing Building Management and Temperature Control System (BMCS) at the high school. The Facilities management system shall consist of a network of various independent Stand-Alone Digital Controllers (SDC), together with a Centralized Host Station (CHS) (PC), as specified to provide centralized access and facility wide control functions. The SDC's shall be interconnected in a communicating network to provide facility wide access and sharing of information. A Local Area Network (LAN) shall be provided to interconnect SDC's for high-speed data transmission. Provide web server and native BACNET and/or LON devices and protocols.

B. Provide two copies of all software required for system operation/control.

2.02 LOCAL AREA NETWORK (BACNET AND/OR LON):

A. The LAN shall be a peer-to-peer, token passing network, using packetized transmissions, CRC 16 error checking and distribution error recovery. Single or multiple SCD failures shall not cause loss of communications. Communications shall be sustained as long as there are at least two (2) operational SDC's on any segment of the LAN.

B. LAN connected SDC's shall be provided with a communications watchdog to assure that an individual SDC cannot permanently occupy the LAN. If an SDC is determined to be monopolizing communications, it shall be automatically shutdown and an exception reported to annunciate this fact.

C. Network shall be BACNET or LON based protocol.

2.03 BUILDING MANAGEMENT AND CONTROL SYSTEM (BMCS) PERFORMANCE REQUIREMENTS:

A. This section shall describe the minimum hardware requirements for the Stand-Along Digital Controllers (SDC's) and the Centralized Host Station (CHS), as well as the overall performance requirement for BMCS.

B. The BMCS shall support CHS as specified. Each CHS shall provide operator access to the entire network of SDC's.

2.04 WEB SERVER OPERATOR INTERFACE:

Furnish a Web Server to allow daily operations functions to be accomplished from any network connected web browser.

A. Operators shall be able to utilize any commercially available browser such as Microsoft Internet Explorer or Netscape Navigator. No additional software shall have to be installed on the client PC for normal operation of the system.

B. All communications between the web browser and web server shall be encrypted using 128 bit SSL encryption.

C. Web server shall be able to be located on the owners Intranet or on the Internet.

D. Web server shall have the ability to automatically obtain an IP (Internet Protocol) address using DHCP. Use of static IP addressing shall also be supported.

E. Any unlimited number of users shall be able to access the web server.

F. BACnet. The Web Server shall support the BACnet Interoperable Building Blocks (BIBBS) for Read (Initiate) and Write (Execute) Services.

G. The Web browser client shall support Sun Microsystems Java 2 (JRE 1.4.0 or higher) plug-in.

H. Functionality:

1 Operators shall be required to enter in a valid user name and password to access the system. The view of the system provided for the user will be customized based on user identity.

2 Operator security. Each operator shall be able to be assigned a unique user name and password. Users shall be assigned to view, view and edit or administrative capability.

3 The web server shall display the same graphics that have been created for the Operators Workstation. Graphics shall be able to contain both static information such as floorplans, equipment schematics, etc. as well as dynamic information including space temperatures, setpoints, equipment status etc.

4 All dynamic values shall be automatically refreshed every 10 seconds. The refresh of dynamic data shall not require a refresh of the static information on the graphic.

5 Operators with proper security shall be able to override setpoints and equipment operation.

6 System schedules shall be easily selected for display. Operators with valid security shall be allowed to make changes to schedules including modifications to start and stop times and creating exception days. These changes shall be made graphically within the web browser.

7 A log of system alarms and events shall be able to be viewed from the web browser. Operators with proper security shall be able to acknowledge alarms.

8 System trends shall be able to be selected and viewed. Trends shall be shown graphically with the proper axis scaling automatically selected.

9 Operators with proper access shall be able to configure the web server using their web browser.

10 All user entered information (web pages, security, etc.) shall be stored in non-volatile memory. System operational information and clock functions shall be backed up by battery or other device for a minimum of 72 hours.

2.05 SDC HARDWARE REQUIREMENTS:

A. Stand-alone Digital Controllers shall be 16-bit microcomputer based, providing a multi-tasking operating system for control functions simultaneous with all other facility management, operator interface, and system communications functions.

B. SDC's shall provide true floating point arithmetic calculations. To accommodate accumulation of large totalized values, the SDC shall support calculation and accumulation of values up to 10 to the thirty-eight power.

C. Application Program Protection:

1. All programming defining the functions to be performed by the SDC, including but not limited to application programs and point database, shall be protected from loss due to power failure for a minimum of 10 months. Provide EE Prom nonvolatile memory for these functions.

2. Uninterruptible Power Source (U.P.S.): All ASDC@ panels shall be protected from power surge and power outage. Provide 5 minute full load runtime, 2 year warranty and $25,000 lifetime equipment protection. Provide protection for data and telecom lines. U.P.S. shall be equal to APC, ASmart-UPS 700.@

D. Multi-tasking: SDC's shall provide the capability to simultaneously perform at least, but not limited to, the following functions.

1. Downloading of application program changes to the SDC without affecting the simultaneous operation of existing operating application programming.

2. Printing of scheduled or on-demand reports without preempting operator functions.

2.06 CENTRALIZED HOST STATION (CHS):

A. The BMCS shall include a web based server P.C. (CHS). CHS' shall, in conjunction with the network of SDC's, UDC's and VAVDC's provide the performance requirements within this specification. One (1) CHS to be included under this project. Each CHS shall include all hardware and software components to serve as a centralized facility operator station providing color graphics, facility wide access and operator initiation of global control strategies, and centralized documentation. Provide modem, web address, telephone number, access code(s), control software, graphics, etc., as required.

B. Uninterruptible Power Source (U.P.S.): All C.H.S. shall be protected from power surge and power outage. Provide 5 minute full load runtime, 2 year warranty and $25,000 lifetime equipment protection. Provide protection for data and telecom lines. U.P.S. shall be equal to APC.

C. The CHS shall be capable of simultaneously interfacing with the following:

< 2 parallel printers
< High resolution VGA color graphics monitor
< 2 auto answer auto dial modems
< Color inkjet printer
< 2 serial printers
< Color pen plotter
< Integration of BMCS and /Fire Alarm System/other BAS systems/Access control

and security system.

- < Alarm FAX dial out service interface
- < Mass storage tape system
- < Digital scanners (black and white and color)

As a minimum, temperature control contractor shall provide the types and quantities of CHS, SDC, UDC and VAVDC controllers specified.

2.07 COMPUTER:

A. The one (1) computer serving the CHS at the site shall be the fastest available Intel Pentium based microcomputer (3 GHZ or faster) with a truly multi-tasking operating system, performing multiple tasks simultaneously, CHS shall be provided with multi-tasking operating system software Windows XP Pro.

B. The CHS computer shall include and utilize at least 1 GB of RAM.

C. The CHS computer shall include as a minimum, 1-40X CD Read/Write Rom drive, sound card, and shall operate as a standard with 80 GB hard disk drive.

D. Each CHS computer shall include an optical mouse system in conjunction with each color graphic terminal as the primary operator interface method. Each color graphic terminal shall also have a 101 key enhanced keyboard. Either mouse or keyboard shall be able to be utilized interchangeably for operator interface.

E. The CHS computer monitor shall be 17" flat panel.

F. The CHS computer shall simultaneously support all peripherals as specified. Peripherals shall be defined to include, serial printers, plotters, and auto answer/auto dial modems, streamer tape back-up systems, facsimile machine interface, color inkjet printers, computer video image capture boards and color or black and white digital scanners.

G. The CHS system shall be listed by Underwriters Laboratories under the Data Terminal Equipment.

H. Uninterruptible Power Source (U.P.S.): All computers shall be protected from power surge and power outage. Provide 5 minute full load runtime, 2 year warranty and $25,000 lifetime equipment protection. Provide protection for data and telecom lines. U.P.S. shall be equal to APC, ASmart-UPS 700.@

2.08 CHS PERFORMANCE REQUIREMENTS:

A. Color graphic Operator Interface: Color graphics shall be submitted for approval by the Engineer. Each color graphic terminal shall be driven by software allowing the operator to access any system information via a "system penetration" method. System penetration shall allow the operator to begin at an entire site plan color graphic display and progressively select portions of the site plan to be chosen for closer inspection or selection of a more detailed Color graphic display of a desired portion of the facility. The operator shall be able in this manner to "penetrate" to any desired system information without being required to enter any commands via the keyboard.

1. Provide overall graphic view of the entire facility's floor plan. Color code each space to indicate whether space setpoints (temperature and humidity) are satisfied or not. Use the following color scheme:

Red: High limit
Green: Satisfied
Blue: Low limit

B. Accessible System Information: Available for display or modulation in any specific Color graphic display shall include, but not limited to:

< the real-time value display of any connected point in the network of SDC's.
< the alarm status condition of any desired system alarm point.
< any software parameter such as setpoints for control sequences, minimum position adjustments, or throttling ranges.
< Provide air and water systems flow diagrams for all AC units, ERU, Terminal Boxes, Exhaust Fans, Chiller, Towers, Boilers, Pumps and piping.

C. Centralized Scheduling and Modification: Each CHS Color graphic terminal shall support operator access to the Global Scheduling Screens which allow the operator to review and modify any or all BMCS schedules as desired. The Centralized Scheduling function shall allow modification of equipment and lighting operating schedules, modification of facility holiday schedules, and when desired allow assignment of temporary schedules for designated portions of the facility or specific equipment. Scheduling functions shall be either global or individual by equipment, as selected by the operator. Any scheduled event shall bring on all necessary equipment for proper operation.

D. Global Electrical Demand Limiting Control: CHS shall allow operator to review and modify the parameters affecting global demand controls strategies. Demand control shall utilize sliding window control algorithm with provisions for multiple load shed tables facility wide as appropriate to Owner's requirements. Time of Day demand limits shall be assignable to appropriate billing period time slots.

E. Energy Management Reporting:

1. CHS shall provide daily, weekly, monthly, yearly formatted reports of facility metered electrical consumption. Reports shall provide information as detailed as hourly KWH consumption, daily peak hour of consumption, daily time of peak demand, demand setpoint in use at time of peak, daily degree days, and outside air temperature and relative humidity at time of peak. Reports shall be created to provide individual reporting as desired by the Owner for multiple facility meters, multiple sites, or aggregate facility metering combining multiple meters.

2. CHS shall retain daily summary energy data for up to five (5) years. Reports can be designated as automatically printed, or called-up for report print out on demand.

3. CHS shall support auto dial polling of remote sites for individual energy reporting and histories of multiple sites. CHS provided shall have sufficient capacity to accommodate auto polling and report accumulation of at least 100 sites.

F. Optimum Start Control: CHS shall provide operator access to Optimum Start parameters for any designated items or equipment or commonly scheduled systems of equipment. Optimum Start programs shall be self-learning and shall adapt the algorithm parameters to the optimum values for each applied zone. Optimum start/stop shall, at a minimum, provide separate control outputs for heating, cooling, fan and ventilation control sub-systems to maximize energy efficiency.

G. Trend Reports:

1. CHS shall supports logging and historical accumulation of treated data from the entire facility, or multiple sites as required. CHS shall include the capacity for acquiring trend data from at least 100 sites.

2. CHS supplied with dedicated logging printers shall provide the capacity to document printed trend data accumulated from any or all of the SDC's in the connected on-site network, or from any number of remote sites which connect to the CHS dedicated logging printer via dial-up modem.

3. CHS shall provide capacity to store to disk a directory of at least 150 trend logs. Such trend logs can be accessed from the directory by the operator at any time for analysis of selected sets of the trended data, display onto the screen, or hard copy documentation.

4. All points listed in BMCS points list shall be trended in a rolling (2) two week log, accessible by the user upon command. Trends shall automatically graph specified points for the (2) two week period. Provide (30) thirty minute samples of each point.

H. Third Party Software Packaged: CHS shall provide the capacity to run specific third party software packages for word processing, spreadsheet, or database management programs. Use of third party software shall not suspend operation of background tasks of multi-tasking operating system, such as alarm logging, and report generation.

I. Graphic Chart Plotting and Bar Graph Software: Provide software to be integrated with CHS BMCS software which will enable the operator to command X-Y graphic plots of specific BMCS energy history data, or accumulated real-time system information. Software shall in addition provide bar charts of energy usage information, such as charts of daily peak demand, etc. All graphic plots and bar charts shall be screen printable onto CHS dot-matrix printer, or onto multi-pen plotter where available.

J. SDC Data Base Archiving: CHS shall provide capability to upload global control functions being performed by the network of SDC's, and the individual database and application programming resident in each SDC in the facility, or on remote sites. Unloaded programs shall be retained on
CHS hard disk for system backup. Programs may be modified using CHS Editor functions, and downloaded to individual SDC's as desired. Downloading of SDC databases shall not interrupt alarm reporting functions, or other multi-tasked functions which are ongoing.

1. All individual sites/school must be programmed such that each site and panel can be individually archived and any uploading or downloading can be done per site and panel such that one site or panel will not prohibit another from being updated or archived.

K. BMCS Data Base Maintenance Reports: CHS shall provide a daily report of all modifications made to any software function in the BMCS. Report shall include the face that specific setpoints, schedules, sequence parameters, or limits were modified and the time and location of the modification, and the identification of the operator making the modification.

L. BMCS Overrides Report: CHS shall provide a daily report of all overrides issued, and all overrides in force on the BMCS. Overrides report shall allow tracking of operator functions and maintenance of desired operation conditions.

1. Provide a history of equipment/system schedules being changed by user. The history shall include date and time that schedule was changed and who changed it (login name). The intent is to provide the user proof of schedule changes implemented, that have been requested by end user at site.

M. BMCS Maintenance Reports: CHS shall provide a weekly report of maintenance items on an automatic printout basis. The maintenance report shall segregate maintenance items into four categories minimum. A "Fire Occurrence" report shall be generated for those items which have passed their maintenance limits within the past week. A "Pending" report shall be generated for those items which have been previously annunciated. An "Overdue" report shall be generated for those items which have exceeded their critical past due maintenance settings. A "Work Completed" report shall be generated for those items which have been entered as complete. Maintenance events shall be satiable by the user based on event, elapsed run time, number of cycles or calendar day/date.

2.09 BMCS PERFORMANCE REQUIREMENTS:

A. Automatic Temperature Control: The SDC's shall interface to additional panels of equipment as required to provide the performance specified for Control Panels.

B. Control Panel: Each control panel shall be a fully electronic analog control or digital control system, providing all control functions for the equipment specified to be controlled from that panel. Control functions to be performed by control panels are as described in this specification in the sequences of operation, in the point charts, and other relevant sections of these specifications. Every control panel shall be constructed and provided to perform the facilities management requirements of this specification.

C. Control Panel BMCS Functions:

1. It is the intent of this specification to provide the Owner with the ability to read out temperatures and other values, and to adjust specific items from localized, as well as centralized locations. In order to provide this capability, control panels are specified to be placed in specific locations with readout gauges and adjustments to be mounted directly in the control panel.

2. Every control panel shall provide readouts for the temperatures, or other information, specified. Every control panel shall provide adjustments for the setpoints, parameters, and other adjustment functions specified.

D. Read Out of Items:

1. Items specified for read out shall be under continuous display on the face of the panel with either a digital display or analog electronic meter. Read out of sensed variables used in control sequences shall be from the same sensors used for control. As an alternative, provide either a duplicate sensor for the read out, or provide a transducer for each sensed signal which can provide both a read out signal and a signal compatible with the controller.

2. Each read out items shall be individually named and labeled. Name label shall be directly adjacent to the actual display value of that item. Label shall be a part of the digital display of that value, or a Bakelite label mounted directly above the value display. Display readout requirements are in addition to capabilities provided by plug-in operator devices which are provided as part of digital controller-based systems.

E. Adjustments: Every control panel shall provide adjustments for the functions specified. In general, adjustments shall be provided for all setpoints used by controllers within each control panel. In addition, adjustments shall be provided for throttling ranges, mixed air damper minimum positions, or other items as specified. Adjustments shall be integral to each control panel. For systems providing digital controllers, it shall not be necessary to carry or plug-in portable operators device to make these adjustments. The preferred method for adjustments is a dedicated adjustment pad, or individual adjustment potentiometer providing direct input to the affected loop controller or sequence controller.

F. Spare Point Capacity: Digital controller based control panel bids shall include in every panel, additional capacity for future installation of desired equipment at the Owners discretion. Provide expansion capacity of at least 10% for every panel. Expansion capacity shall include equal quantities of every point type; Analog input, Digital input, Digital output, and Analog output. Systems providing modulating outputs via pulse width modulation techniques, shall provide within each panel all the components required to implement the functions equivalent to an analog output.

G. Provide BMCS override of all points/equipment/systems upon loss of temperature or humidity sensor or other controlling setpoint. It is the intent ot give the user the ability to override any control input to force a temporary unit/equipment override from a remote location until they can dispatch service personnel to the site.

2.10 SENSING AND CONTROL OUTPUT REQUIREMENTS:

A. Sensing:

1. All sensing inputs shall be provided via industry standard signals. Temperatures, humidities, differential pressure signals and all other signal inputs shall be one (1) of the following types:

   0-20 mA
   4-20 mA
   0-5 VDC
   0-12 VDC
   Resistance Signals

2. All signal inputs shall be compatible with the controllers used, and with the requirement for readout of variables as specified.

2.11 CONTROL OUTPUTS:

A. On/Off Outputs: Control panel shall internally provide test points for the circuit driving the equipment contactor, for the purpose of troubleshooting whether the 120 VAC circuit to the contactor is active. All such relays or digital output modules shall provide a pilot light or LED display of this same status.

B. Modulating Output:

1. Modulating outputs shall be industry standard 0-5 VDC, or 0-12 VDC. Milliamp outputs of 0-20 mA or 4-20 mA are also acceptable. Drive open/Drive closed type modulating outputs are acceptable provided that they also comply with the following requirements.

2. All modulating outputs shall provide within the control panel, a metric gauge, or display indication of the commanded position signal to the actuating device. This meter, gauge or display must provide either a 0-100 percent position indication,

or read out directly in the engineering units of the signal being used. Drive open/Drive closed type controllers shall include sufficient components and control algorithms to comply with this requirement.

C. Pneumatic Actuation Pressure Feedback Controller:

1. Where pneumatic actuators are used as actuating devices, the overall circuit must include a feedback circuit to verify that the pneumatic pressure signal matches the commanded position output. This feedback circuit shall be provided via output signal pressure sensing directly within the transducer generating the pneumatic signal. Alternately, this feedback may be provided by sensing the pneumatic line pressure output, and supplying this as an additional analog input point to the SDC controller. This input will be used to reset the modulating output to maintain the commanded position output.

2. The above requirements for modulating outputs shall be complied with by all systems bid.

D. Standard Software Function Libraries: All SDC's shall have a standard feature of their system software, complete libraries of control algorithms for DDC, Energy Management, and Building Management functions. These resident libraries of algorithms shall be drawn from for the creation of the application programming of each individual SDC.

E. Application Software Documentation: Control shall provide a blueprint documentation of the software application program for each SDC. Documentation provided shall include block software flowchart showing the interconnection between each of the control algorithms and sequences. For systems utilizing program listings. A program listing shall be printed onto the same blueprint shall be stored and maintained in each SDC panel. System acceptance shall not be completed until this documentation is provided and located in each panel.

F. Energy Management Control:

1. The network of SDC's shall individually perform Time of Day Scheduling, Optimum start/stop, Enthalpy optimization, and all control optimization strategies, such as Supply Air Reset and Soft Start Ramp-up, for their connected systems of equipment.

2. Coordination of strategies involving multiple systems of equipment shall be performed by sharing of necessary data between the SDC's on the communicating network.

2.12 FACILITY DIAGNOSTICS:

A. The BMCS shall provide diagnostic reports of the following types, for specific systems of equipment as specified:

B. Alarm Occurrence Status: When specified alarm conditions occur, provide a report printout listing the status of specific items associated with the equipment generating the alarm. Report shall be routed to a specific printer or combination of printers at the CHS' or CCS'. Report shall record the time the status information was taken, and shall allow operational personnel to use this information to diagnose the alarm situation.

C. Alarm Occurrence Development Report: For specific systems of equipment the BMCS shall record a continuous log of the values of selected variables. Upon occurrence of an

alarm, or some specific combination of performance conditions, the report will be printed, showing the status of each of these variables for each of the 15 minutes immediately prior to the occurrence of the "triggering" condition.

D. BMCS Telecommunications Support: The entire BMCS network shall be able to share one or multiple auto dial auto answer modems for automatic dial out reporting of alarms, exceptions, and report information to any CHS or CCS via the dial up telephone network. Such CHS or CCS may be on remote sites, or on the same multiple building site connected by a private branch exchange system.

E. Off Hours Exception Reporting: The Owner shall specify up to five (5) sites to which off hours exceptions shall be auto-dialed and reported. This shall allow the Owner to assign off hours exception responses to various facility personnel as necessary. Selection of the site to be dialed can be programmed by the Owner, and set to change automatically per time of day and day of week.

F. Segregation of Information Reporting: The Owner shall be able to identify up to five (5) locations to which various BMCS reports are auto-dialed and reported.

G. System Support Inventory: Provide for purposes of system support, a complete set of Input/Output circuit boards sufficient to replace any failed input output point card in any configuration of control panel. These shall be kept on-site, and shall be available for immediately recovering from the loss of point processing capability in any control panel.

H. Diagnostic/Notification Modem: Provide an implement and auto-dial/auto-answer modem in the system of control panels for purposes of remote diagnostics and notification of desired exceptions and alarms. Dial up telephone line shall be provided by the Owner. Modem shall provide for the following functions:

1. Access to the entire facility control system by the Contractor to provide service and diagnostic support.

2. Access by the Owner from off-site for similar purposes, and for remote operation, monitoring, and adjustment of facility functions.

3. Auto-dial out of desired exceptions to a remote site, or to an Owner specified set of phone numbers for business-hours, or off-hours reporting.

2.13 DISTRIBUTED ACCESS:

A. It is the intent of this specification to provide the Owner with BMCS information at distributed locations through the facility.

B. Multi-user:

1. Distributed Access-at every panel.

2. Distributed Documentation.

3. Historical Documentation logging-printer of disk for exceptions.

4. Facility-wide access - LAN connected SDC=s.

5. Facility Operation Documentation.

a. Overrides logging-CRT in specific locations.

b. System log-on documentation.

c. System database modification documentation.

d. Local historical alarm documentation.

C. Distributed Access: SDC's shall include integral operator devices with full alphanumeric display and a keypad for password controlled access to various levels of operational capability, from simple information access, to full programmability of SDC functions.

D. Facility Wide Access: LAN connected SDC's shall provide facility wide access to locally connected operators. Access shall be supported both via the integral operator device and through locally connected VT-100 compatible CRT's.

3.00 EXECUTUION

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.

B. Installation shall be in accordance with manufacturers recommendations.

C. Coordinate the required dedicated telephone line provided by the Owner for BMCS use.

END OF SECTION

NEW GYMNASIUM FOR
BARKLEY BRIDGE ELEMENTARY SCHOOL
(#24-107)

PROJECT NO. 2547

MARCH 2025

STEWART ENGINEERING, INC.
ELECTRICAL CONSULTANTS

PHONE (256) 237-0891 **ANNISTON, ALABAMA 36202**

03-21-2025

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. Procure and pay for permits and certificates as required by Local and State Ordinances and Fire Underwriters Certificate of Inspection.

G. Furnish and install complete Fire Alarm System.

H. Complete alterations and additions to Intercom Sound System.

H. Furnish and install complete Gymnasium Sound System.

I. Furnish and install outlet boxes, faceplates, conduit raceways, cable, data outlet faceplates and jacks, patch panels, IDF cabinets and termination connectors and all other equipment needed for complete Telephone and Computer Cabling System.

K. 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.

L. 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. Lighting Fixtures
2. Panelboards
3. Disconnect Switches
4. Dry Type Transformers
5. Intercom Sound System
6. Gymnasium Sound System
7. Fire Alarm System
8. Computer Cabling System
9. Lighting Control Relay Panels
10. Occupancy Sensors and Switches
11. 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 Littel 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 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.

2.23 Lighting Panelboards

A. Furnish and install circuit breaker panelboards as indicated in the panelboard schedule and where shown on the plans. Panelboards shall be of dead front construction equipped with thermal-magnetic molded case circuit breakers of frame size and trip ratings as shown on the schedule.

B. Circuit breakers shall be Square D type EDB (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.

C. Circuit breakers shall be UL listed in accordance with UL Standard 489 and shall be rated with continuous current ratings as noted on the plans. Single pole, 15 and 20 ampere circuit breakers intended to switch fluorescent lighting loads on a regular basis shall carry the SWD marking.

D. 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 insulated. Bus bar connections to the branch circuit breakers shall be the "distributed phase" or phase sequence type and shall only bolt-on circuit breakers. All current carrying parts of the bus structure shall be plated.

E. 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. 600A panelboard fronts shall have exposed trim clamps. Column width fronts shall be provided on the inside of the door.

F. 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 be 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 the 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.

G. Panelboards shall be listed by Underwriters Laboratories and shall 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).

2.24 Receptacle 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).

2.25 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.

2.26 Dry Type Transformers

A. The transformers shall be manufactured, tested and rated in accordance with ANSI C89.1-1961 and NEMA STI-4-1961 Standards, and these specifications.

B. The transformers shall be two winding, dry-type, air-cooled, 60Hz with indoor enclosures, except as otherwise noted on the drawings.

C. The minimum KVA rating shall be as shown on the drawings and shall be equipped with standard full capacity high voltage taps, 2-2-1/2% above and 4-2-1/2% below normal high voltage.

D. Overload capacities shall be:

160% - 2 hour
140% - 1 hour
125% - 2 hours
110% - 4 hours
105% - 8 hours

E. The transformers shall have core material of non-aging, high permeability, grain oriented, cold reduced silicon steel.

F. The transformers shall be 480 Volt, 3 Phase, 3 Wire to 120/208 volts, 3 Phase, 4 Wire grounded secondary neutral.

G. The maximum continuous full rated load temperature rise shall be 150 degrees C.

H. The transformers shall successfully withstand the maximum short circuit current at rated top voltage, in conformance with NEMA Standards: STI-4 and ANSI C.89.1.

I. The maximum percent voltage regulation at unity power factor load shall be 2%.

J. Noise levels shall conform to NEMA Standards: STI-4 and ANSI C.89.1.

K. Maximum impedance at 75 degrees C. shall be 3%.

L. Minimum load efficiency shall be 97%.

M. A floor mounted transformer enclosure and supports shall make no contact with wall surfaces.

N. All conduit directly connected to transformer enclosures shall be flexible steel conduit, and shall extend for a minimum of one foot from transformer enclosures, measured along the conduit center lines.

O. Manufacturers shall be Square D, General Electric, or Eaton (Cutler Hammer).

2.27 Fire Alarm System

A. General

1. The contractor shall furnish and install a complete low voltage, automatic and manual addressable fire alarm system, as specified herein and indicated on the drawings. The system shall include a central control panel, power supply, signal initiating devices, annunciator, remote station equipment, audible and visual alarm devices, provisions for connections to municipal fire circuits, a conduit and wiring system, all necessary devices required to provide a complete operating system.

2. The system shall comply with the applicable provisions of the current National Fire Protection Association Standard Number 72, and meet all requirements of the local authorities having jurisdiction. All equipment and devices shall be listed by the Underwriters' Laboratories, Incorporated or approved by the Factory Mutual Laboratories.

3. To establish the type and quality of system desired, the equipment specified is that of FIRELITE Company. No deviation will be considered unless submittals are received and approved, in writing, not less than ten (10) days prior to bid date. All companies wanting to request to bid must submit equal request as stated above.

B. Control Panel

1. FIRELITE Model ES-1000X addressable panel with ECC-50/100(E) Emergency Command Center with receiving and alarm zones per plans and battery standby power, shall provide for the connection of alarm circuits as indicated and shall include functions as follows:

   a. Detect the operation of any signal initiating device.

   b. Indicate on LCD display the device(s) alarming.

   c. Operate all alarm and auxiliary devices.

2. The Control Panel shall include the following features:

   a. A green pilot lamp shall normally be on, indicating that the system is receiving power from the building service supply. A failure of the building service supply shall cause the lamp to go out.

   b. A trouble lamp and trouble buzzer, operating together, shall signal any trouble condition. Failure of the building service supply, disarrangement in system wiring, or alarm condition shall cause that trouble lamp to come on and trouble buzzer to sound. A self-restoring silencing switch shall be provided to silence the trouble buzzer, which shall be so arranged that the trouble lamp will remain on until the system is restored to normal.

   c. All alarm signals shall be automatically locked in at the Control Panel until the operated device is returned to it's normal condition, and the Panel is manually reset. A switch shall be provided on the Control Panel for silencing the alarm devices. The manual reset switch and the alarm silencing switch shall be of the self-restoring type, which cannot be left in an abnormal position.

d. Each signal initiating circuit and each alarm circuit shall be represented on the Control Panel by an amber trouble lamp and a red alarm lamp. The lamps for each circuit shall be identified by a lettered name plate showing the circuit number and/or zone designation. Circuit trouble shall be indicated by the amber trouble lamp lighting. An alarm shall be indicated by both the amber trouble lamp and the red alarm lamp lighting. Audible trouble and alarm devices shall function as herein before specified.

e. Each circuit shall include individual supervisory and alarm relays, and shall be so arranged that a fault condition in any circuit, or group of circuits, will not affect the proper operation of any other circuit.

Provide Transient Voltage Surge Suppression at FACP, for both the incoming power supply and the outgoing connection to the remote station receiving unit.

C. Power Supply

1. Shall be 24 volt D.C., filtered and regulated, and shall provide sufficient power for all system functions.

2. The fire alarm system main power supply shall operate from 120 volt A.C. This connection shall be made in conduit or cable in accordance with local and national codes. Separate over-current protection shall be provided, marked "FIRE ALARM".

3. The 120 volt A.C. main power shall be converted to low-voltage direct current for system operation. The system shall operate on 24 volts D.C. with trickle charged batteries provided as an emergency source of supply for operating the system in the event of the interruption of main power. A changeover relay in the Control Panel shall transfer to standby power automatically upon main power failure and automatically reconnect to main power upon restoration.

D. Fire Alarm Pull Stations

Shall be FIRELITE flush mounted with monitor module. Stations with two sets of contacts will not be acceptable.

E. Smoke Detectors

FIRELITE Model photoelectric smoke detector, dual chamber design shall be installed where shown on plans.

Duct Housing with photoelectric detector, sampling tubes and shutdown relay shall be installed in air-handling system duct work where shown on plans. Optional feature for actuation of contact closure for fan shut-down and/or damper closure on alarm shall be provided in Control Panel.

F. Heat Detectors

FIRELITE model heat detectors, combination fixed temperature and rate of rise, 135 degree F or 190 degree F shall be installed where shown on the plans.

G. Signaling Devices

FIRELITE Model Strobe Unit shall be installed where shown on plans. FIRELITE Model combination Speaker-Stobe shall be installed where indicated on the plan. All Strobe units shall meet ADA requirements. Make separate connections to speakers and to strobes to permit strobes to operate after system is silenced.

H. Remote Station Receiving Panel

1. Terminals and other necessary facilities shall be provided in the Control Panel to permit automatic transmission of trouble and alarm signals over leased or private owned telephone cable to a Remote Station Receiving Panel located in the fire, police, or other continuously manned facility, so designated for response to fire emergency.

2. Receiving equipment shall be UNIVERSAL FIRE CELL COMMUNICATOR DUALCOMNF-V, and shall be installed under this contract. Install all hardware as needed for Digital Communicator.

3. The contractor shall coordinate requirements with telephone company and cognizant municipal fire officials to assure a complete operating system performing all functions specified and shall so attest by written certification to the architect prior to acceptance of building for occupancy.

I. Wiring

1. All wiring shall be in accordance with the NATIONAL ELECTRICAL CODE and the local code having jurisdiction. Unless otherwise specified, minimum wire size shall be 12 gauge for A.C. and power supply connections, 14 gauge for audible alarm and auxiliary circuits, and 14 gauge for signal initiating circuits. Typical diagrams shall be provide for devices and power wiring.

2. Wiring shall be run in conduit. In general the wiring shall consist of:

   From the Control Panel.

   a. West Penn No. 995 shielded twisted pair common to all Fire Alarm Stations or Detectors.

   b. 4#14 wires common to each circuit of Fire Alarm Signals.

J. Certified Fire Alarm Contractor

1. The Certified Fire Alarm Act requires that the company installing the fire alarm system must be licensed as a Certified Fire Alarm Contractor. The contractor must have a NICET Level III Technician in a position of responsibility, and the license must be issued in the name of the certificate holder and the contractor. The Certified Fire Alarm Act also requires that technicians working for the Certified Contractor must hold a current NICET Level II, or equivalent, certification. Contractors wishing to bid this project will be required to show evidence at the pre-bid conference that he/she meets the certification requirements of the Certified Fire Alarm Act and holds a permit/license issued by the State Fire Marshall.

K. Testing, Guarantee And Service

1. A Factory trained representative of the manufacturer shall supervise final testing of the system and it shall be subject to the approval and acceptance of the responsible engineer. On completion of the acceptance tests, the Owner or his representative shall be instructed in the operation and testing of the system. The Owner shall be provided with a written verification of this inspection and certification.

2. The Fire Alarm system shall be free from defects in workmanship and materials, under normal use and service, for a period of one year from date of acceptance or beneficial occupancy; whichever earlier. Any equipment shown to be defective in workmanship or material shall be repaired, replaced, or adjusted free of charge.

3. The equipment manufacturer shall be represented by a service organization, and the name of this organization shall be furnished to the Architect and Owner. The service organization shall furnish, gratis to the Owner, a one year maintenance and inspection Contract, effective from the date of final acceptance. The contract shall provide for four inspections during the contract year.

2.28 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 Mbs 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 should be used if making long or difficult pulls to reduce cable drag.

(2) When pulling fiber optic cable by any mechanical device (winch etc.), a dynameter 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) Category 6	Maximum Attenuation Loss Worst Pair dB/m (1000 ft) 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. MDF and IDF Racks

MDF and IDF racks shall be 7' high, 19" wide, aluminum and floor mounted as manufactured by Chatsworth. Install two (2) racks for the MDF and one (1) for the IDF.

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).

2.29 Intercom Sound System

A. General

The contractor shall complete alterations and additions to the existing Sound System as specified herein as shown on the plans together with all equipment and accessories required to provide a complete operating System. The System shall be installed by a factory trained sound system contractor for the equipment manufacturer.

The entire System shall be guaranteed for a period of one (1) year from the date of final acceptance of the installation and any defective equipment or parts shall be replaced or repaired, during the guarantee period, at no cost to the Owner.

The manufacturer and model numbers are provided to establish quality of equipment and operating requirements for the system. Any proposed substitution of equipment must be approved by the Architect within ten days prior to bid date. No substitution will be permitted after the project bid date.

B. Console

The contractor shall replace the existing Dukane Console with a new CAREHAWK CH1000 central controller and (3) CAREHAWK AP1 admin consoles. Contractor shall connect all existing zones and all new zones to new console for a complete operating system. All existing call-in switches, digital clocks, speakers, etc. are to remain.

C. Ceiling Speakers

a. Furnish speakers in classrooms, common areas, etc. as indicated on drawings.

b. Ceiling speaker assembly shall consist of Atlas SD72 speaker, Atlas CS95-8 enclosure, Atlas 62-8 baffle, and Atlas 180-2 supports.

c. Horn speakers shall be Atlas AP15T.

D. Call-In Switch

a. The INTERCOM SYSTEM shall allow for the use of normally open, normally closed, wireless and virtual call buttons. INTERCOM SYSTEMS not capable of using all the above call button types shall not be considered.

b. The INTERCOM SYSTEM shall allow for the use of virtual call buttons installed on local PC computers. INTERCOM SYSTEMS that do not support virtual call buttons shall not be considered.

c. Call buttons shall be Dukane D-CS25.

E. Administrative Telephones

a. The INTERCOM SYSTEM Administrative telephone shall have the following features. INTERCOM SYSTEM Administrative telephones not containing the features below shall not be considered.

1) Desk & Wall Mountable
2) Minimum 8 line by 20 character back lit display
3) Wizard driven menu system for ease of use
4) 200 speed dials
5) Head set compatible
6) Integrated speaker phone for hands free use

b. Administrative telephone handset shall be Dukane D-AP1.

F. Sound System Installation

1. All wiring shall be in accordance with the local national codes.

2. Wiring shall be run in conduit except where accessible above lay-in ceilings. The wiring shall consist of the following:

a. West Penn 357 cable from amplifier to speakers.

2.32 Gymnasium Sound System

A. General

1. Description

a. The gymnasium sound system shall consist of microphone, amplifier, speaker systems, and accessories required to provide a complete operating system.

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 substitution shall clearly identify the item submitted. Standard catalog sheets shall be marked, in ink, so as to identify which item is to be considered. All drawings submitted must be by factory as field drawings will not be accepted.

B. Products

1. Microphones

a. The microphones shall be dynamic cardioid type and shall be SHURE SM58-S with 25 ft. cables. Provide two (2) microphones, one (1) ATLAS MS10C floor stands, and two (2) SHURE C25J microphone extension cable.

b. Wireless microphone system shall consist of two (2) TOA WM5270 handheld microphones with two (2) WT5800 receivers. Wireless microphone antennas shall be TOA YW-4500.

2. Mixer-Preamplifier

a. The digital mixer-preamplifier shall provide eight (8) individually controller inputs, master volume control, bass and treble controls, and color coded calibrated LED level display. The digital mixer-preamplifier shall be TOA M900MK2.

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-3121-S-U.

4. Power Amplifier

a. The power amplifier shall be multi-channel unit and have power output of 550 watts per channel. The power amplifier shall be TOA Model DA-550F-HL.

5. CD Player

a. The CD player 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 NA1D1BA.

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. Main Equipment Rack

a. The equipment rack shall be ATLAS 235-18.

9. Speaker Systems

a. Speaker systems shall consist of three (3) SOUNDSPHERE Q12A speaker units with HKL mounting kit and TX250 70V transformer.

10. Cables

a. Microphone cable shall be WEST PENN No. 452. Speaker shall be WEST PENN No. 226.

11. Guaranty

    a. 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.

    b. 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.

12. Certification

    a. Upon completion of the system(s), the contractor shall provide written certification of the following:

        1) That each aspect of the system(s) is complete and is working properly.
        2) That each aspect of the system(s) meets the specification outlined in this document.
        3) Installation was completed by factory trained technicians.
        4) That the system was operated for thirty (30) days without failures or unsatisfactory performance.
        5) Warranty statement, including start and termination dates and contact information for service and emergency response.

13. Test Equipment

    a. The contractor shall perform a test, equalization and balance of the sound reinforcement system using the listed test equipment. At the end of the test, the contractor will demonstrate the performance of the system to the satisfaction of the owner's designated representative. The demonstration of the system performance shall be conducted by a qualified systems engineer. The system must be fully operational and with all components properly labeled and identified with engraved nameplates prior to requesting system checkout.

    b. The contractor shall furnish the following minimum list of test equipment for use during system testing, checkout and equalization:

        1) One Third Octave Real-Time Analyzer and Reference Microphone: Preamp interface and M30 reference microphone. Alternate products are as manufactured by Goldline, Crown, Ivie or approved equal.
        2) Sound Pressure Level Meter: Bruel and Kjaer, General Radio, or included with RTA.
        3) Random (Pink) Noise Generator: Goldline, Crown, Ivie or approved equal. Digital RMS Volt-Ohm Meter: Fluke Impedance Meter: Sennheiser ZP-2, ZP-3 or Gold Line ZM1.

    c. All test equipment shall be provided with evidence of factory calibration and verification within one year of use. All batteries, connectors, etc. shall be in good repair and charge state.

14. Cleaning

    a. Clean all equipment of construction dust and debris prior to final acceptance.

    b. After completing installation of exposed, factory-finished components, inspect

exposed finishes and repair damaged finishes.

15. Demonstration

    a. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain all equipment. This shall consist of at least one (2) hour training session scheduled at the owner's convenience and shall cover operation of all components and the control systems including a basic seminar on systems operation.

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.

3.5 Grounding

A. 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.

B. Interior metal water piping shall be bonded to the system ground as outlined in NEC Section 250-80.

C. This Contractor shall bond all metal air ducts to the respective unit grounding conductor. Install additional bonding jumpers at joints, flexible sections, etc., to insure that entire duct system is bonded.

3.6 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 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 , where embedded in concrete, areas exposed to moisture and danger of mechanical injury, in hazardous areas, and for feeders and motor circuits. PVC shall be allowed for branch circuit conduits installed in floor slab (rigid steel 90's).

3.7 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.

3.8 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.

3.9 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.

3.10 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 Buchannan 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.

3.11 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.

3.12 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.

3.13 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.

3.14 Fire Alarm Installation

A. All wiring shall be in accordance with Local and National Codes and Article 210 of the National Board of Fire Underwriters Standard Number 72. Unless otherwise specified, minimum wire size shall be 12 gauge for A.C. and power supply connections, 14 gauge for audible alarm circuits and 14 gauge for signal initiating circuits, or wire size as indicated on drawings.

B. Wiring shall be run in conduit. In general, the wiring from the Control Panel shall consist of:

1. West Penn No. 995 shielded twisted pair common to all Fire Alarm stations or Detectors.

2. 4#14 wires common to each circuit of Fire Alarm Signals.

C. A factory trained representative for the manufacturer shall supervise the final testing of the system and it shall be subject to the approval and acceptance of the responsible engineer. On completing of the acceptance tests, the Owner or his representative shall be instructed in the operation and testing of the system.

3.15 Sound System Installation

A. All wiring shall be in accordance with local and national codes.

B. Wiring shall be run in conduit except where accessible above lay-in ceilings.

3.16 Alterations & Additions to Electrical System in Existing Building

Work in existing building shall be performed as indicated or requested to perform its intended function on Electrical and Architectural plans. This contract shall include removing, relocating, extending, etc., any items of electrical nature required to facilitate work as indicated. All circuits interrupted by rework shall be extended and left energized. Contractor shall include night and weekend work in bid as required to keep all outages to a minimum four (4) hours, during non-school hours only.

END OF SECTION 16000

PRE-CONSTRUCTION CONFERENCE CHECK-LIST

Project: **New Gymnasium for Barkley Bridge Elementary School**

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: _____

5. **Verify all alternates accepted.**

6. **E-Verify. Alabama Immigration Law. Be sure that all subcontractors comply with E-Verify requirements.**

7. **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)

8. **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:

9. **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.

10. **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.

-

11. 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 <u>ALL</u> 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 <u>CANNOT</u> be prepared if all backup paperwork is not provided and accounted for.

J. This information is required for all contractors, subcontractors, and sub-subcontractors.

12. 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.

13. 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.

14. Advanced notice of required inspections.

The contractor will contact the architect by e-mail at 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 schedule 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 schedule inspection, the re-inspection fee of$1,500 will be charged.

15. 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
- ✓ Provide Smoke Machine for testing of Duct Detectors
- ✓ 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
- ✓ Emergency and exit lighting tests
- ✓ Fire alarm must be monitored
- ✓ 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

16. 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.

17. 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.

18. 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)

19. 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.

20. 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.

21. 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)

22. Contractor's duty to coordinate work of separate contractor.
Contractors employed by others for installation of data, computer and etc. (GCS 40D)

23. 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.

24. 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.

25. 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.

26. 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.*

27. Keeping existing exit paths open.
Required exits are to be maintained at all times.

28. 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)

29. **Safety is General Contractor's responsibility.**
As a courtesy, advise the Architect if there has been a problem.

30. **Project limits.**
Defined on drawings.

31. **Building location relative to critical property line. Easements, Setbacks, etc.**
Review with Architect before starting work.

32. **Location of property lines, corners, etc.**
Review with Architect before starting work.

33. **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.

34. **Procedure if bad soil is encountered.**
Contact Architect immediately.

35. **Stockpiling top soil.**
On existing sites, location is to be approved by the Architect and Owner.

36. **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.*

37. **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.

38. **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.

39. **Surveyor to check foundation wall. Location is critical.**

40. **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.

41. **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.

42. **Materials Testing / Re-testing**
Retesting shall be the at the contractor's expense.

43. **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.

44. **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.

45. **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.

46. **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.

47. **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.

48. **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.

49. **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.

50. **Certificate of Substantial Completion.**
Architect will provide at the final inspection, provided contractor has copies of all roof warranties and the fire alarm certification.

51. **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)

52. **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.

53. 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).

54. 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** 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: