THE SALVATION ARMY ADULT REHABILITATION CENTER

DINING HALL ADDITION AND APARTMENT RENOVATION

Project Manual – VOLUME II

CONSTRUCTION DOCUMENTS

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SECTION 071113 - BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cold-applied, emulsified-asphalt dampproofing.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sketch showing grade line and extent of installation as it relates to grade.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction unless otherwise required.

2.2 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. 220AF Fibered Emulsion Dampproofing by Karnak or approved equal.

B. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.

C. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.

2.3 AUXILIARY MATERIALS

A. General: Furnish auxiliary materials recommended in writing by dampproofing manufacturer for intended use and compatible with bituminous dampproofing.

B. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended in writing by manufacturer.

C. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.

D. Protection Course: Extruded-polystyrene board insulation, unfaced, ASTM C 578, Type X, 1/2 inch thick.

PART 3 - EXECUTION

3.1 APPLICATION, GENERAL

A. Comply with manufacturer's written instructions for substrate preparation, dampproofing application, cure time between coats, and drying time before backfilling unless more stringent requirements are indicated.

1. Apply dampproofing to provide continuous plane of protection.
2. Apply additional coats if recommended in writing by manufacturer or to achieve a smooth surface and uninterrupted coverage.

B. Where dampproofing footings and foundation walls, apply from finished-grade line to top of footing; extend over top of footing and down a minimum of 6 inches over outside face of footing.

1. Extend dampproofing 12 inches onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
2. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where shown as "reinforced," by embedding an 8-inch- wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat for embedding fabric is in addition to other coats required.

C. Where dampproofing exterior face of inner wythe of exterior masonry cavity walls, lap dampproofing at least 1/4 inch onto flashing, masonry reinforcement, veneer ties, and other items that penetrate inner wythe.

1. Extend dampproofing over outer face of structural members and concrete slabs that interrupt inner wythe.
2. Lap dampproofing at least 1/4 inch onto shelf angles supporting veneer.

D. Where dampproofing interior face of above-grade, exterior concrete walls, continue dampproofing through intersecting walls by keeping vertical mortar joints at intersection temporarily open or by dampproofing wall before constructing intersecting walls.

3.2 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. Concrete Foundations: Apply two brush or spray coats at not less than 1.5 gal./100 sq. ft. for first coat and 1 gal./100 sq. ft. for second coat, one fibered brush or spray coat at not less than 3 gal./100 sq. ft., or one trowel coat at not less than 4 gal./100 sq. ft..

B. Unexposed Face of Concrete Retaining Walls: Apply one brush or spray coat at not less than 1.25 gal./100 sq. ft..

C. Unexposed Face of Masonry Retaining Walls: Apply primer and one brush or spray coat at not less than 1.25 gal./100 sq. ft..

D. Interior Face of Exterior Concrete Walls: Where above grade and indicated to be furred and finished, apply one brush or spray coat at not less than 1 gal./100 sq. ft..

3.3 INSTALLATION OF PROTECTION COURSE

A. Where indicated, install protection course over completed-and-cured dampproofing. Comply with dampproofing-material and protection-course manufacturers' written instructions for attaching protection course.

END OF SECTION 071113

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Molded polystyrene foam-plastic board.
2. Glass-fiber blanket.
3. Insulation for miscellaneous voids.

1.2 RELATED SECTIONS

A. For roofing insulation, refer to “SECTION 075323 - Ethylene-Propylene-Diene-Monomer (EPDM) Roofing”

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Low-emitting product certification.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Research reports.

PART 2 - PRODUCTS

2.1 MOLDED POLYSTYRENE FOAM-PLASTIC BOARD

A. Extruded Polystyrene Board, Type VI: ASTM C 578, Type VI, 40-psi minimum compressive strength; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.

1. Foamular 400 by Ownes Corning; Toledo, OH; 1-800-GET PINK; https://www.owenscorning.com/.

2. Architect approved equal.

2.2 GLASS-FIBER BLANKET

A. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:

1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
2. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.

B. Glass-Fiber Blanket, Unfaced: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

1. EcoTouch Pink Fiberglass Insulation by Owens Corning; Toledo, OH; 1-800-GET PINK; https://www.owenscorning.com/.

a. Thickness: 5-1/2 inches.
b. R-Value: 21.

2. Architect approved equal.

2.3 ACCESSORIES

A. Insulation for Miscellaneous Voids:

1. Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

B. Insulation Anchors, Spindles, and Standoffs: As recommended by manufacturer.

C. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.2 INSTALLATION OF SLAB INSULATION

A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.

1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.

B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.3 INSTALLATION OF FOUNDATION WALL INSULATION

A. Butt panels together for tight fit.

B. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer's written instructions.

3.4 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.5 INSTALLATION OF CURTAIN-WALL INSULATION

A. Install board insulation in curtain-wall construction according to curtain-wall manufacturer's written instructions.

1. Hold insulation in place by securing metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place without touching spandrel glass. Maintain cavity width of dimension indicated on Drawings between insulation and glass.
2. Install insulation to fit snugly without bowing.

END OF SECTION 072100

SECTION 072313 - CONTINUOUS INSULATED SHEATHING PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Continuous insulated, polyisocyanurate foam core, foil-face wall sheathing panels.

B. Continuous insulation, polyisocyanurate, plywood wall panels.

1.2 RELATED SECTIONS

A. Section 033000 - Cast In Place Concrete: Concrete base wall.

B. Section 04210 - Clay Masonry: Brick facing.

C. Section 05400 - Cold Formed Metal Framing.

D. Section 07260 - Vapor Retarders.

E. Section 07270 - Air Barriers.

F. Section 09110 - Non-Structural Metal Framing.

G. Section 09200 - Gypsum Board.

1.3 REFERENCES

A. ASTM C 209 – Methods of Testing Insulating Board, Structural and Decorative.

B. ASTM C 518 – Steady State Thermal Transmission by Means of the Heat Flow Meter Apparatus (R Value)

C. ASTM C 1289 – Specifications for Faced Rigid Cellular Polyisocyanurate Thermal Insulating Board.

D. ASTM D 1037 - Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.

E. ASTM D 1621 – Test Methods for Compressive Properties of Rigid Cellular Plastics.

F. ASTM D 2126 - Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.

G. ASTM D 3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

H. ASTM E 84 (UL 723) - Standard Test Method for Surface Burning Characteristics of Building Materials

I. ASTM E 96 - Test Method for Water Vapor Transmission of Materials.

J. ASHRAE 90.1-2010 - Energy Standard for Buildings except Low-Rise Residential Buildings.

K. IBC Chapter 26 – Foam Plastic Insulation.

L. ICC-ES Evaluation Report - ICC-ESR-3174

M. DRJ Technical Evaluation Report #1402-02

N. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.

1.4 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Product Data: Manufacturer's data sheets on wall panels and fasteners to be used, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Installation methods.

C. Manufacturer's Certificate: Certify panels will conform to specified performance requirements.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall be a company that regularly manufactures and assembles specified insulation in house with no outside fabrication operations.

B. Pre-Installation Meeting: Convene minimum one week prior to commencing Work of this section. Review installation procedures and coordination required with Related Work and include the following:

1. Participants: Authorized representatives of the Contractor, Architect, Installer, and Manufacturer.

2. Review wall assemblies for potential interference and conflicts and

coordinate layout and support provisions for interfacing work.

3. Review continuous insulation wall panels installation methods and procedures related to application, including manufacturer's installation guidelines.

4. Review weather resistive membrane requirements and placement locations.

5. Review field quality control procedures.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products off the ground, in dry conditions, under cover and in manufacturer's unopened packaging until ready for installation.

1.7 SEQUENCING

A. Coordinate with the installation of vapor retarders and air seal materials specified in Section 072600 and Section 072700.

B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Insulating panels shall be XCI products produced by Hunter Panels, 15 Franklin Street, Portland, Maine 04101. Phone: (207) 761-5678 or (888) 746- 1114. Fax: (717) 960-1611. E-mail: info@hpanels.com.

B. Requests for substitutions will be considered in accordance with provisions of Section 013000.

2.2 DESIGN REQUIREMENTS

A. Perform work in accordance with all federal, state and local codes.

B. Physical properties (foil-faced insulation):

1. Water Absorption: ASTM C 209, less than 0.05 percent by volume.

2. Compressive Strength: ASTM D 1621; Type I; Grade 1. 16 psi minimum; Grade 2, 20 psi minimum and Grade 3, 25 psi.

3. Dimensional Stability: ASTM D 2126, 2 percent linear change (7 days).

4. Moisture Vapor Permeance: ASTM E 96, less than 0.05 perm.

5. Service Temperature: Minus 100 degrees to 250 degrees F.

C. Physical properties (Foam Core):

1. Compressive Strength: ASTM D 1621; Grade 2, 20 psi minimum or Grade 3, 25 psi.

2. Dimensional Stability: ASTM D 2126, 2 percent linear change.

3. Moisture Vapor Permeance: ASTM E 96, less than 1 perm.

4. Water Absorption: ASTM C 209, less than 0.1 percent by volume.

5. Service Temperature: Minus 100 degrees to 250 degrees F.

6. Resistance to Mold: ASTM D 3273 Passed (10).

D. Fire Retardant Treated Plywood: Flame spread rating of 25 or less when tested in accordance with ASTM E 84.

E. Continuous insulated sheathing panels shall meet the continuous insulation standards of ASHRAE 90.1-2010, IECC 2012 and IBC Chapter 26.

F. Continuous insulated sheathing panels evaluated and listed under ESR-3174. Tests includes the following:

1. Foam core flame spread index of 75 or less and smoke developed of 450 or less when tested in accordance with ASTM E 84 or UL 723.

2. Classified as Type I, Class 2 in accordance with ASTM C 1289.

3. DRJ Technical Evaluation Report #1402-02.

2.3 BOARD INSULATION

A. Board Insulation with Foil Facer: Panels comply with ASTM C 1289. Panels are a high thermal resistive rigid insulation panel composed of a closed cell polyisocyanurate foam core bonded to an impermeable foil facer.

1. Type: ASTM C 1289, Type I, Class 1:

a. Grade 2 (20 psi).

2. Panel Size:

a. 4 feet by 8 feet.

3. Thickness / R Value: ASTM C 518 at 75 degrees F.

a. 2.0 inches / R Value 13.3

b. Provide to the thickness indicated on the Drawings.

B. Board Insulation Bonded to Plywood: Hunter Panels Xci Ply are a high thermal resistive rigid insulation panel composed of a closed cell polyisocyanurate foam core bonded on one side to a premium performance coated glass facer on one side and fire treated plywood on the other.

1. Type: ASTM C 1289, Type V:

a. Grade 2 (20 psi).

2. Fire Retardant Treated Plywood Thickness:

a. 5/8 inch.

3. Panel Size:

a. 4 feet by 8 feet.

4. Thickness / R Value: based on ASTM C 518 at 75 degrees F (23.9 degrees C)

a. 2.1 inches / R Value 9.6 with 5/8 inch plywood facing

2.4 PANEL FASTENERS

A. Fasteners shall be approved Hunter Panel fasteners. Fasteners are a corrosion resistant type with oversized heads. Length of fasteners shall be as recommended by the panel manufacturer.

1. Hunter Panels recommends Hunter SIP SD Concrete, CMU, Steel Stud.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until exterior walls have been properly prepared.

B. Verify that all exterior wall assembly construction has been completed to the point where the insulation may correctly be installed.

C. Verify that mechanical and electrical services in walls have been installed and tested and, if appropriate, verify that adjacent materials and finishes are dry and ready to receive insulation.

D. If wall assembly 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 in accordance with manufacturer's instructions.

B. Install in exterior spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within plane of insulation.

E. Fasten insulation as recommended by the Manufacturer. Provide base support for the insulation panels as required for the exterior cladding to be installed over the panels.

F. Exposed insulation must be protected from open flame and kept dry at all times.

G. Install vapor retarders as specified in Section 072600.

H. Install air barriers as specified in Section 072700.

I. Exterior wall insulation is not intended to be left exposed for extended periods of time in excess of 45-60 days without adequate protection. If extended exposure is anticipated all exposed foam surfaces including corners, window and door openings, should be taped with a compatible waterproof tape.

J. Install exterior cladding as recommended by the cladding manufacturer and as specified in other sections of this specification.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Cover the top and edges of unfinished roof panel work to protect it from the

weather and to prevent accumulation of water in the cores of the panels.

C. Do not leave panels exposed to moisture. Wet panels shall be removed or allowed to completely dry prior to application of vapor barrier and/or roof covering.

D. Repair or replace damaged products before Substantial Completion.

END OF SECTION 072313

SECTION 072713 - MODIFIED BITUMINOUS SHEET AIR BARRIERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Self-adhering membrane air & vapor barrier for vertical wall surfaces.

B. Self-adhering membrane air & vapor barrier for horizontal roof surfaces.

C. Materials and installation for an air & vapor barrier assemblies within exterior wall assemblies as indicated on drawings.

D. Materials and installation for an air & vapor barrier assemblies within roof assemblies as indicated on drawings.

E. Materials and installation to bridge and seal the following air leakage pathways and gaps:

1. Connections of the walls to the roof air barrier.
2. Connections of the walls to the foundations.
3. Seismic and expansion joints.
4. Openings and penetrations of window frames, door frames, store front, curtain wall.
5. Barrier pre-cast concrete and other envelope systems.
6. Door frames Piping, conduit, duct and similar penetrations.
7. Masonry ties, screws, bolts and similar penetrations.
8. All other air leakage pathways through the opaque walls and roofs.

1.2 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION:

A. Flexible through-wall flashings to be built into masonry are furnished under Section 076526 – Self-Adhering Sheet Flashing.

1.3 RELATED SECTIONS

A. Section 03 30 00 - Cast-In-Place Concrete.

B. Section 06 16 00 – Sheathing.

B. Section 07 11 13 – Bituminous Dampproofing.

C. Section 07 21 00 - Thermal Insulation.

D. Section 07 53 23 – Ethylene-Propylene-Diene Membrane Roofing.

E. Section 07 62 00 - Sheet Metal Flashing and Trim: Metal through- wall flashings

F. Section 076526 – Flexible Flashings: Self-adhering through-wall flashing.

G. Section 07 92 00 - Joint Sealants: Joint sealant materials and installation.

H. Section 08 41 13 - Aluminum Framed Entrances and Storefronts.

I. Section 08 44 13 – Glazed Aluminum Curtain Wall Assemblies.

J. Section 08 51 13 - Aluminum Windows.

1.4 REFERENCES

A. ASTM C 920 Standard Specification for Elastomeric Joint Sealants

B. ASTM D 146 Standard Test Methods for Sampling and Testing Bitumen Saturated Felts and Woven Fabrics for Roofing and Waterproofing

C. ASTM D 412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension

D. ASTM D 570 Standard Test Method for Water Absorption of Plastics

E. ASTM D 903 Standard Test Method for Peel and Stripping Strength of Adhesive Bonds

F. ASTM D 1876 Standard Test Method for Peel Resistance of Adhesive

G. ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials.

H. ASTM E 154 Standard Test Methods for Water Vapor Retarders used in Contact with Earth under Concrete Slabs, on Walls or as Ground Cover

I. ASTM E 283 Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors under Specified Pressure Differences across the Specimen

J. ASTM E 330 Standard Test Method for the Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Pressure Difference

K. ASTM E 331 Standard Test Method for Water Penetration of Exterior

Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure

L. ASTM E 783 Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors

M. ASTM E 1105 Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference

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

1.5 PERFORMANCE REQUIREMENTS

A. Installed Product and Accessories shall exhibit no visible water leakage when tested per ASTM E 331 and shall perform as a liquid water drainage plane flashed to discharge to the exterior any incidental condensation or water penetration.

B. Installed Product and Accessories shall exhibit an air leakage rate not exceeding 0.02 L/s*m^2 at 75 Pa (0.004 CFM/ft^2 at 1.57 PSF) according to ASTM E 283. Air leakage shall not exceed this rate while Product and Accessories remain soundly adhered after exposure to sustained and gust wind loading according to ASTM E 330.

C. Installed Product and Accessories shall perform as a vapor barrier, installed on the predominantly warm side of the insulation.

D. Product shall consist of nominal 0.040 inch (40 mils) thickness membrane consisting of smooth surfaced, cross-laminated high- density polyethylene (HDPE) film fully-coated with rubberized asphalt adhesive. Membrane shall be provided in rolls of various widths interleaved with disposable silicone release paper.

E. Product shall meet the following requirements:

REQUIREMENT	RESULT	TEST METHOD
Air Permeance	Not more than 0.000 Liters per second per square meter of area at 75 Pa pressure differential	ASTM E-2178
Tensile Strength	Not less than 500 psi	ASTM D-412
Tensile Elongation	Not less than 1,000 percent	ASTM D-412
Puncture Resistance	Not less than 50 lb.	ASTM E 154
Low Temperature Flexibility	Unaffected at minus 25 degrees F, 0.063 inch mandrel	ASTM D 146
Peel Adhesion	Not less than 5 lb per inch of width on concrete prepared with contact adhesive	ASTM D 903

Lap Adhesion	Not less than 7.5 lb. per inch of width	ASTM D 1876
Water Vapor Permeance	Not more than 0.05 Perm	ASTM E-96, Method B
Water Absorption	Not more than 0.12 percent by weight	ASTM D 570

1.6 SUBMITTALS

A. Provide submittals in accordance with Section 013300.

B. At bid submission, provide evidence to the Architect of installer qualification

C. Shop drawings showing locations and extent of air & vapor barrier and details of all typical conditions.

D. Manufacturer's technical data sheets and material safety data sheets for Product and Accessories.

E. Manufacturer's installation instructions.

F. Manufacturer’s documentation of volatile organic compounds (VOC) content for Product and Accessories.

G. Certification of compatibility by Manufacturer, listing all materials on the project with which the Product and Accessories may come into contact.

H. Sample of Product minimum 3 inch by 4 inch size.

1.7 QUALITY ASSURANCE

A. Installer Qualifications:

1. Shall be experienced in applying the same or similar materials and shall be specifically approved in writing by Manufacturer.

B. Single-Source Responsibility: Obtain Product and Accessories from single manufacturer, including sheet membrane, air barrier sealants, primers, mastics, tapes, and adhesives.

C. Product and Accessories shall comply with all state and local regulations controlling use of volatile organic compounds (VOCs).

D. Pre-Installation Meeting: Convene one week prior to commencing Work of this section.

E. Field-Constructed Mock-Ups: Prior to installation on Project, apply Product and Accessories on mock-up to verify details under shop drawing submittals,

to demonstrate tie-ins with adjoining construction and other termination conditions and to become familiar with properties of materials in application:

1. Construct typical exterior wall and roof panels, 8 feet long by 8 feet wide, incorporating back-up wall, cladding, window and doorframe and sill, insulation, flashing, building corner condition, junction with roof system foundation wall and typical penetrations and gaps; illustrating interface of materials and seals.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, lot number and directions for storage.

B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by Manufacturer.

C. Avoid spillage. Immediately notify Owner, Architect if spillage occurs and start clean up procedures. Clean spills and leave area as it was prior to spill.

1.9 WASTE MANAGEMENT AND DISPOSAL

A. Place materials defined as hazardous or toxic waste in designated containers.

1.10 PROJECT CONDITIONS

A. Do not apply Product or Accessories during rain or accumulating snowfall.

B. Apply Product and Accessories within approved ambient and substrate temperature range stated in Manufacturer’s literature.

C. Do not apply Product or Accessories over incompatible materials.

D. Observe safety and environmental measures indicated in Manufacturer’s MSDS, and mandated by federal, state and local regulations.

1.11 WARRANTIES:

A. Provide the Manufacturer’s minimum five year material warranty.

PART 2 PRODUCTS

2.1 BASIS OF DESIGN MANUFACTURER:

A. Carlisle, Incorporated. 900 Hensley Lane, Wylie, TX 75098. Phone 1-800-527-7092. Website http://www.carlisle-ccw.com.

B. Refer to Section 125000 “Substitution Procedures” for substitution

requirements.

2.2 BASIS OF DESIGN PRODUCTS:

A. Wall Air Barrier: CCW-705 Air & Vapor Barrier.

B. Roof Air Barrier: 725TR Air & Vapor Barrier.

2.3 MATERIALS:

A. Roof Air Barrier: A 40-mil thick composite consisting of 35-mil self-adhering rubberized asphalt membrane laminated to a 5-mil UV resistant poly film with an anti-skid surface.

2.4 ACCESSORIES:

A. Provide as recommended by Manufacturer.

B. Detail Membrane: 40 mil thickness self-adhering flashing provided in rolls of various widths, select either:

C. Contact Adhesive:

1. Solvent-Based or Water-Based.

D. Mastic:

1. Solvent-based synthetic rubber or solvent-based rubber-modified asphalt.

E. Fill Compound:

1. Modified polyurethane, 2-part.

F. Insulation Adhesive:

1. As recommended by roofing insulation manufacturer.

G. Joint Sealant:

1. Sealant approved by Manufacturer. Shall conform to ASTM C 920 Type 1 or 2, Grade NS, Class 25 or 50.

H. Roof Deck Primer:

1. As recommended by Manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions affecting installation of the air & vapor barrier and accessory products for compliance with requirements. Verify that surfaces and conditions are suitable prior to commencing Work of this section. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Surfaces shall be sound, dry and free of oil, grease, dirt, excess mortar or other contaminants.

C. Surfaces shall be supported and flush at joints without large voids or sharp protrusions.

D. Masonry joints shall be struck flush and completely filled with mortar. Mortar droppings shall be removed from masonry ties and surfaces.

E. Damaged or improperly-fastened sheathing shall be remedied to comply with building code and sheathing manufacturer's requirements.

F. Inform Architect in writing of Gaps or obstructions such as steel beams, angles, plates and projections which cannot be spanned or covered by Product or anticipated problems applying Product and Accessories over substrate.

3.2 SURFACE PREPARATION

B. Fill cracks, gaps and joints exceeding ¼ inch width with fill compound or joint sealant.

C. Fill rough gaps around pipe, conduit and similar penetrations with mortar, non-shrink grout or Polyurethane Foam.

3.3 INSTALLATION

A. Allow sealants used during surface preparation to cure fully before applying Product.

B. Apply Contact Adhesive to substrate according to Manufacturer's instructions.

C. Apply Product to prepared surfaces according to Maufacturer's instructions and drawings.

D. Laps between adjacent pieces of sheet membrane shall be 2 inches or greater.

E. Sheet membrane shall bear 3 inches minimum onto dissimilar substrates.

F. Cut edges, penetrations, non-shingled laps and similar surface defects of installed Product shall be sealed with Mastic.

G. Do not apply roof primer or vapor barrier to frozen substrates. Best results are obtained when temperatures are above 40°F.

H. Do not apply roof primer or vapor barrier to damp or contaminated surfaces.

3.4 SCHEDULE

A. Seal penetrations made through installed Product according to Manufacturer's instructions and drawings.

B. Through-wall flashing installed before or after Product:

1. Self-adhering type in accordance with Section 076526.

C. Fenestration installed before or after Product: provide air and water seal between fenestration and opaque wall according to Manufacturer's instructions and drawings.

D. Board insulation installed after Product: Attach with Aerosol Insulation Adhesive plus mechanical fasteners or with insulation adhesive by others. Seal board joints in accordance with insulation manufacturer's instructions.

E. Roof air barrier: join to wall air barrier according to Manufacturer's instructions and drawings.

3.5 REPAIR AND PROTECTION

A. Protect from damage during application and remainder of construction period.

B. Inspect before covering. Repair or replace damaged material according to Manufacturer's instructions and drawings.

C. Product and Accessories are not designed for permanent exposure.

D. Cover with insulation or exterior cladding as soon as schedule allows.

E. Outdoor exposure of installed Product shall not exceed 60 days.

END OF SECTION - 072713

SECTION 072727 – VAPOR PERMEABLE AIR BARRIER

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. This Specification shall be read as a whole by all parties concerned. Each Section may contain more or less the complete Work of any trade. The Contractor is solely responsible to make clear to the Subcontractors the extent of their Work and coordinate overlapping Work.

1.2 SYSTEM DESCRIPTION

A. Supply labor, materials and equipment for a fully adhered water-resistive vapor permeable air barrier membrane system.

B. The purpose of the vapor permeable air barrier is to protect the insulated, plywood-faced sheathing panels. The air barrier membrane for the purpose of enclosing the building against leakage and water intrusion is specified in Section 072713 “Modified Bituminous Sheet Air Barrier.”

C. Install water-resistive vapor permeable air barrier, flashing, lap seam tapes, sill pan and ventilation strip accessories.

1.3 RELATED SECTIONS

A. Sheathing: Section 061600

B. Continuous Insulated Sheathing Panels: Section 072313

1.4 REFERENCE STANDARDS

A. American Association of Textile Chemists and Colorists (AATCC): ATCC 127 - Test Method for Water Resistance: Hydrostatic Pressure Test.

B. ASTM International (ASTM):

1. ASTM D 882 - Test Method for Tensile Properties of Thin Plastic Sheeting.

2. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials.

3. ASTM E 96/E 96M - Test Methods for Water Vapor Transmission of Materials.

4. ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage

Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

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

6. ASTM E2357 - Standard Test Method for determining Air Leakage of Air Barrier Assemblies.

C. International Code Council Evaluation Service, Inc. (ICC-ES):ICC-ES AC38 - Acceptance Criteria for Water- Resistive Barriers.

1.5 SUBMITTALS

A. Submit manufacturers' current product data sheets, details and installation instructions for the water-resistive vapor permeable air barrier membrane components and accessories.

B. Submit samples of the following:

1. Manufacturer's sample warranty.

1.6 QUALITY ASSURANCE

A. Single Source: Self-adhered water-resistive vapor permeable air barrier membrane components and accessories must be obtained as a single-source membrane system to ensure total system compatibility and integrity.

B. Manufacturer Qualifications

1. Manufacturer of specified products listed in this Section to have minimum 10 years of continued experience in the manufacture and supply of highly vapor permeable water resistive air barrier products successfully installed in similar project applications.

2. Manufacturer of specified products listed in this Section to have experienced in-house technical and field observation personal qualified to provide expert technical support.

C. Fire Performance Characteristics: Provide water-resistive barrier meeting the following fire-test characteristics.

1. Surface-Burning Characteristics: ASTM E 84 Class A Rated

1.7 MOCK-UP

A. Construct mock-up in accordance with Section 014000 – Quality Requirements.

B. Where directed by architect, construct typical exterior wall panel, 6 foot long by 6

foot wide incorporating the sheathing board or substrate, sill pan protection system, window frame and attachment method, clips, strapping or masonry ties, attachment of insulation and detailing of water-resistive vapor permeable air barrier membrane application, transitions and lap seams.

C. Allow 48 hours for inspection of mock-up by architect before proceeding with water- resistive vapor permeable air barrier work. Mock-up may remain as part of the Work.

1.8 PRE-INSTALLATION CONFERENCE

A. Contractor shall convene one week prior to commencing Work of this section, under provisions of Section 013100– Project Management and Coordination.

B. Ensure all contractors responsible for creating a continuous plane of water and air tightness are present.

1.9 DELIVERY, STORAGE AND HANDLING

A. Refer to current Manufacturer's product literature for proper storage and handling.

B. Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.

C. Store roll materials on end in original packaging. Protect rolls from direct sunlight and inclement weather until ready for use.

1.10 COORDINATION

A. Ensure continuity and proper shingling of the self-adhered water-resistive vapor permeable air barrier system throughout the scope of this section.

1.11 WARRANTY

A. Provide manufacturer's standard material warranty in which manufacturer agrees to provide replacement material for the self-adhered water-resistive vapor permeable air barrier sheets installed in accordance with manufacturer's instructions that fails due to material defects within 20 years of the date of Purchase.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Primary self-adhered water-resistive vapor permeable air barrier membrane components and accessories must be obtained as a single-source to ensure total system compatibility and integrity.

1. Basis of Design:

a. Self-Adhered water-resistive vapor permeable air barrier membrane by VaproShield LLC., Gig Harbor, WA, Ph (866) 731-7663, Email: info@VaproShield.com, Website: www.vaproshield.com.

b. Refer to Section 012500 “Substitution Procedures” for substitution requirements.

B. WATER-RESISTIVE VAPOR PERMEABLE AIR BARRIER MATERIALS

1. Primary self-adhered air barrier sheet membrane shall be RevealShield SA® Self-Adhered Water- Resistive Vapor Permeable Air Barrier Sheet by VaproShield, a zero VOC self-adhered vapor permeable air barrier sheet membrane consisting of multiple layers of UV stabilized proprietary membrane having the following properties:

a. Color: Black (exterior) with allowable UV exposure for 180 days.

b. Air Leakage: 0.01 cfm/ft. sq. when tested in accordance with ASTM E 2357 and 0.0000263 cfm/sq. ft. @ 75 Pa when tested in accordance with ASTM E 2178.

c. Water Vapor Permeance tested to ASTM E 96 Method B: minimum 40 perms.

d. Water Resistance tested to AATCC 127, 550 mm hydrostatic head for 5 hours: No leakage.

e. Tensile Strength tested to ASTM D 882: 44.8 lbf/inch, machine direction; 25 lbf/inch, cross-machine direction.

f. Application Temperature: Ambient temperature must be above 20 degrees F.

g. Surface Burning Characteristics tested to ASTM E 84: Class A.

h. Physical Dimensions: 0.026 inches thick and 59 inches wide and minimum 10 oz per sq. yd.

C. WATER-RESISTIVE VAPOR PERMEABLE TRANSITION AND FLASHING MEMBRANE

1. Self-adhered air barrier transition and flashing membrane shall be RevealFlashing SA™ by VaproShield, a zero VOC self-adhered water-resistive vapor permeable membrane having the following properties:

a. RevealFlashing SA™ Black: 11-3/4 inches x 100 feet long

b. Air Leakage: 0.0000263 cfm/sq. ft. @ 75 Pa when tested in accordance with ASTM E 2178

c. Water Vapor Permeance tested to ASTM E 96 Method B: minimum 40 perms

d. Water Resistance tested to AATCC 127, 550 mm hydrostatic head for 5 hours: No leakage

D. VAPROLIQUI-FLASH™ VAPOR PERMEABLE WATER RESISTIVE FLASHING FOR ROUGH OPENINGS

1. Window and door flashing shall be VaproLiqui-Flash by VaproShield, a liquid-applied vapor permeable air barrier flashing material with vapor permeance and resistance to air leakage properties compatible with the primary air barrier membrane.

E. WATER-RESISTIVE WEATHER BARRIER BATTEN ACCESSORIES

1. Water-resistive weather barrier batten accessories by VaproShield shall be made of black PVC material

a. VaproBatten™: Black vinyl extrusion with pre-formed fastener and moisture drainage channels configured to create a ventilated airspace between wall cladding and weather- resistive air barrier.

2.2 PENETRATION SEALANT

A. Provide sealant for penetrations as recommended by manufacturer and as specified under Division 07 Section: Sealants. Appropriate sealants shall be Dow 758 or VaproLiqui-Flash.

PART 3 EXECUTION

3.1 GENERAL

A. Verify that surfaces and conditions are ready to accept the Work of this section. Notify architect in writing of any discrepancies. Commencement of the Work or any parts thereof shall mean acceptance of the prepared substrates.

B. All surfaces must be dry, sound, clean and free of oil, grease, dirt, excess mortar or other contaminants detrimental to the adhesion of the water resistive air barrier membrane and flashings. Fill voids and gaps in substrate greater than ¼ inch in width to provide an even surface. Strike masonry joints full-flush.

C. Minimum application temperature self-adhered membrane and flashings to be above 20 degrees F.

D. Ensure all preparatory Work is complete prior to applying primary self-adhered vapor permeable air barrier sheet membrane.

E. Mechanical fasteners used to secure sheathing boards or penetrate sheathing boards shall be set flush with sheathing and fastened into solid backing.

3.2 COORDINATION OF SELF-ADHERED VAPOR PERMEABLE AIR BARRIER MEMBRANE INSTALLATION

A. Self-adhered vapor permeable air barrier sheets may be installed vertically or horizontally over the outside face of exterior sheathing board or substrate.

B. Complete detail Work around corners, wall openings, building transitions and penetrations prior to field applications.

C. Install self-adhered vapor permeable air barrier sheet over the outside face of exterior sheathing board or substrate, measure and pre-cut into manageable sized sheets to suit the application conditions.

D. Install self-adhered vapor permeable air barrier sheet complete and continuous to substrate in a sequential overlapping weatherboard method starting at bottom or base of wall and working up.

E. Stagger all end lap seams.

F. Roll installed membrane with roller to ensure positive contact and adhesion with substrate.

3.3 BUILDING TRANSITION CONDITIONS

A. Tie-in to structural beams, columns, floor slabs and intermittent floors, parapet curbs, foundation walls, roofing systems and at the interface of dissimilar materials with self-adhering air barrier transition and flashing membrane.

B. Align and position self-adhered air barrier transition and flashing membrane, remove protective film and press firmly into place. Provide minimum 3 inch lap on to substrates.

C. Ensure minimum 3 inch overlap at side and end laps of membrane.

D. Roll membrane and lap seams with roller to ensure positive contact and adhesion.

E. At inside and outside corners provide minimum 12 inch off-set of vertical seams.

3.4 MECHANICAL EQUIPMENT PENETRATIONS

A. Mechanical pipe, electrical conduit and/or duct work must be secured solid into position prior to installation of self-adhered vapor permeable air barrier membrane.

B. Electrical services penetrating the wall assembly and self-adhered vapor permeable air barrier membrane must be placed in appropriate conduit and secured solid into position.

C. Install manufactured flanged penetration sleeves as recommended by sleeve manufacturer.

D. For straight sided penetrations, cut and fit self-adhered vapor permeable air barrier to accommodate sleeve, install specified single sided flashing tape to seal the air barrier membrane to ductwork or preformed flange sleeve.

E. For all penetrations, refer to manufacturer's current standard details at www.vaproshield.com

3.5 VERTICAL APPLICATIONS

A. For vertical applications, align sheets with an 'inside' or 'outside' corner to avoid wrinkles and miss-alignment of subsequent applications.

B. Measure and pre-cut into manageable sized self-adhered sheets to suit the application conditions.

C. Hang self-adhered sheets over wall and extend down to lowest point of wall. Allow for excess material at bottom of wall to accommodate tie-ins and connections to adjacent surfaces.

D. Align and position self-adhered membrane, remove release film and press firmly into place. Provide minimum 3 inch overlap at side and end laps of membrane. Roll membrane and lap seams with roller to ensure contact and adhesion.

E. Continue to remove release film and apply pressure to ensure positive contact onto wall substrate.

F. Install subsequent sheets of self-adhered vapor permeable air barrier sheets in overlapping weatherboard format. Ensure sheets lay smooth and flat to surfaces. Roll membrane and lap seams with roller to ensure contact and adhesion.

3.6 BATTENS FOR RAIN SCREEN CLADDING SYSTEMS

A. Provide and install specified battens under cladding systems.

B. Coordinate spacing of battens to accommodate cladding system.

3.7 FASTENING CLIPS AND MASONRY TIES

A. Install clips and masonry ties over primary self-adhered vapor permeable air barrier membrane.

B. Secure clips and masonry ties with corrosion-resistant, or stainless steel screws

with gasketed fasteners.

C. Consult VaproShield Technical Services for recommendations on appropriate masonry tie types and methods to seal penetrations.

3.8 FIELD QUALITY CONTROL

A. Make notification of when sections of work are complete to allow review prior to covering self-adhered water- resistive vapor permeable air barrier system.

B. Owner to engage independent consultant to observe substrate and membrane installation prior to placement of cladding systems and provide written documentation of observations.

3.9 PROTECTION

A. Protect wall areas covered with self-adhered water-resistive vapor permeable air barrier from damage due to construction activities, high wind conditions, and extended exposure to inclement weather.

B. Review condition of self-adhered water-resistive vapor permeable air barrier prior to installation of cladding. Repair, or remove and replace damaged sections with new membrane.

C. Recommend to cap and protect exposed back-up walls against wet weather conditions during and after application of membrane, including wall openings and construction activity above completed self-adhered water-resistive vapor permeable air barrier installations.

D. Remove and replace water-resistive weather barrier membrane affected by chemical spills or surfactants.

END OF SECTION 072727

SECTION 074213 - CONCEALED FASTENER METAL SOFFIT SYSTEM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. The drawings and provisions of the General Conditions, Supplementary Conditions and the sections included under Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

A. This section includes exterior and/or interior concealed fastener metal soffit panels.

1.3 PERFORMANCE REQUIREMENTS

A. Structural performance: provide exterior/interior soffit cladding assemblies capable of withstanding the effects of load and stresses from dead loads, wind loads, snow loads and normal thermal movement without evidence of permanent defects of assemblies or components.

1. Dead load: As required by applicable building code.

2. Live Load: As required by applicable building code.

3. Wind Load: Uniform pressure (velocity pressure) of (Insert Design Criteria) lb/sq ft. (Insert Design Criteria), acting inward or outward.

4. Thermal Movements: Provide assemblies that allow for thermal movements resulting from the following maximum changes (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components and other detrimental effects:

    a. Temperature Change (range): 120 deg F, ambient; 180 deg, material surfaces.

B. Sealed joints shall allow free and silent movement of panels during expansion and contraction while preventing uncontrolled penetration of moisture.

C. Manufacturing and installation shall prevent deformation of exposed surfaces.

D. Design panel system to accommodate substructure tolerance of +0 to -1/8 inch.

E. Not Permitted: Vibration harmonics; wind whistles; noises caused by thermal movement; thermal movement transmitted to other building elements; loosening, weakening or fracturing of attachments or components of system.

1.4 SUBMITTALS

A. Product Data: Manufacturer's product literature for the metal soffit panel system as specified.

B. Shop Drawings: For exterior/interior concealed fastener metal panels and accessories. Include plans; elevations; sections and details.

C. Quality Assurance Submittals: Submit the following:

1. Certificates: Product certificates signed by manufacturer certifying materials comply with the specified performance characteristics and criteria, and physical requirements.

D. Samples for initial selections: Manufacturer's color charts showing the full range of colors available for units with factory-applied color finishes.

E. Affidavit certifying that the material meets the requirements specified.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum of 5 years experience in manufacturing metal panel systems similar to those specified.

B. Installer Qualifications: Acceptable to manufacturer.

1.6 DELIVERY, STORAGE & HANDLING

A. General: Comply with Division 1 Product Requirements Sections.

B. Ordering: Comply with manufacturer's ordering instructions, and lead-time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

1. Store materials in accordance with manufacturer's recommendations.

2. Handle materials carefully to avoid damage to materials and finishes.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual supporting and adjoining construction by field measurements before fabrication, and indicate recorded measurements on final shop drawings. Coordinate construction to ensure that panels fit properly to supporting and adjoining construction and coordinate schedule with construction progress to avoid delaying the work.

1. Established dimensions: Where field measurements can not be made without delaying the work, guarantee dimensions and proceed with fabrication of panels corresponding to the established dimensions.

1.8 WARRANTY

A. Project warranty refers to Conditions of the Contract for project warranty provisions. Manufacturer's warranty: submit, for Owner's acceptance, manufacturer's standard warranty documents executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights owner may have under Contract Documents.

B. The Contractor shall warrant the materials to be free of faults and defects in accordance with the General Conditions, except that the warranty shall be extended by paint manufacturer's standard multi-year warranty. The warranty shall be in writing and shall be signed by the manufacturer.

C. Materials Manufacturers: Repair or replace defective materials for a period of two (2) years.

D. Panel System Installer: Repair or replace products or components which fail due to faulty workmanship for a period of two (2) years.

E. Painted Finish: Coatings Manufacturer and applicator to warrant paint for a period of twenty (20) years after the Effective Date, the factory applied finish applied by the applicator.

1. WILL NOT chip, crack or peel (lose adhesion) but does not include minute fracturing which may occur in proper fabrication of building parts.

2. WILL NOT chalk in excess of ASTM D-4214-89 number eight (8) rating, determined by the procedure outlined in ASTM D-4214-89 specification test.

3. WILL NOT change color more than five (5) Delta-E Hunter units (square roof/wall of the sum of square Delta L, Delta a, and Delta b as determined by ASTM method D-2244.

PART 2 – PRODUCTS

2.1 CONCEALED FASTENER SOFFIT PANELS

A. General: Provide factory-formed metal soffit panels designed to be field assembled by engaging interlocking side edges of adjacent panels and mechanically attaching panels to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.

2.2 MANUFACTURER

A. Basis of Design Manufacturer:

1. Firestone Building Products, 1001 Lund Blvd., Anoka, MN 55330 Phone 800-426-7737, Fax 763-576-9596, www.firestonebpco.com

a. UC-750 Soffit Panels

b. Refer to Section 012500 “Substitution Procedures” for substitution requirements.

2.2 MATERIALS

A. Aluminum Face Sheet: ASTM B209.

1. Thickness: 0.032 inch.

2.3 FABRICATION

A. Form panels in longest practical lengths, true to shape, accurate in size, square, and free from distribution or manufacturing defects.

1. Panel Depth: 0.50 inch.

2. Panel Width: 12 inch.

3. Fabricate panels with an interlocking leg (male/female interlocking joint design).

B. Tolerances

1. Form panels in longest practical lengths, true to shape, accurate in size, square, and free from distribution or manufacturing defects.

2. Bend lines, breaks, and angles shall be sharp and true, and surfaces shall be free from warp or buckle.

C. Material surfaces shall be free of scratches or marks caused during fabrication.

D. Ensure that entire project is manufactured from single color coil paint run to ensure color uniformity.

E. Provide factory applied strippable plastic film for protection during fabrication and installation.

2.4 ACCESSORIES

A. All fasteners shall be non-corrosive type, as recommended by the panel manufacturer. Provide self-tapping screws at mounting flange and side lap joints designed to withstand building design loads.

B. Weather Resistant Membrane: As specified in section [insert specification section].

C. Flashing: Unless noted otherwise, shall be same material and gauge as for panel where exposed.

D. Panel Sealants:

1. Perimeter Joint Sealant: ASTM C90; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal wall panels and remain weathertight; and as recommended in writing by metal wall panel manufacture.

2. Panel Joint Sealant Non-Skinning Butyl Sealant: ASTM C734 Non- hardening, non-drying, non-oxidizing butyl rubber-based sealant.

E. Subgrits: Provide G90 galvanized steel of gauge and spacing required for panel structural requirements, as recommended by the panel manufacturer and in accordance with approved shop drawings. To avoid galvanic reaction, separate dissimilar metals.

F. Backing Plates: Provide metal backing plates at end splices, fabricated from material recommended by manufacture.

G. Closure Strips: Closed-cell, expanded, cellular, rubber or cross-linked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1 inch (25mm) thick, flexible closure strips; provide closure strips where indicated or necessary to ensure weathertight construction.

2.5 FINISHES, GENERAL

A. Comply with NAAMM's Metal Finishes Manual for architectural metal products for recommendations for applying and designating finishes.

2.6 FINISHES

A. Panel Finishes:

1. Coating shall be Coil-Coated Fluorocarbon Resin utilizing 70% Kynar 500 resins. Color as selected by owner/consultant from manufacturer's standard colors.

2. Number of Coats: 2-coat. Coating shall be factory applied on a continuous process paint line. Coating shall consist of a 0.2 mil prime coat, a 0.75 mil barrier coat, a 0.75 mil metallic/color coat containing 70% Kynar resins, and a 0.5 mil clear coat containing 70% Kynar resins (Note mil thickness is approximate.)

3. Relevant to the color selected, material to be painted in accordance with either AAMA specification 2605 or 2604.

4. Provide factory applied strippable plastic film for protection during fabrication and installation

B. Finish Performance:

1. Pencil Hardness – ASTM D3352-74

2. Shall be HB-H minimum (Eagle Turquoise).

3. Impact Adhesion – ASTM D294-84

    a. Coating shall show no cracking and no loss of adhesion.

4. Cure Test – NCCA 11-18

    a. Coating shall withstand 50+ double rubs of MEK.

5. Humidity Resistance – ASTM D2247-87

    a. Coating shall show no blisters after 3000 hours of 100% humidity at 95 degrees Fahrenheit.

6. Salt Spray Resistance – ASTM B117-85

    a. After 3000 hours of exposure to 5% salt fog, at 95 degrees Fahrenheit, scored sample shall show none or few #8 blisters, and less then 1/8" average creepage from scribe.

7. Weatherometer Test – ASTM D882-86/G23-88 Coating shall show no cracking, peeling, blistering or loss of adhesion after 2000 hours.

    a. Chalking Resistance – ASTM D659-86

    b. No chalking greater than #8 after 10 years Florida exposure at 45`S.

    c. Color Change – ASTM D2244-74

    d. Color change shall not exceed 5 NBS units after 10 years Florida exposure at 45 degrees south.

    e. After 5000 hours in Atlas Weatherometer coating shall show no objectionable chalking or color change.

8. Abrasion Resistance – ASTM D968-81 Coating shall resist 65+/- 15 liters/mil minimum of falling sand.

PART 3 – EXECUTION

3.1 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation. Panel substructure shall be level and plumb. Coordinate delivery of such items to project site.

3.2 INSTALLATION

A. General: Install metal soffit panels according to manufacturer's written instructions in orientation, sizes and locations indicated on drawings.

B. Erect panel level and plumb, in proper alignment in relation to substructure framing and established lines; follow SMACNA Architectural Sheet Metal manual and standard practices.

C. Panels shall be erected in accordance with approved shop drawings.

D. Panel anchorage shall be structurally sound and per engineering recommendations.

E. Where aluminum materials come in contact with dissimilar materials, an isolation shim or tape shall be installed at fastening locations.

F. Install weather resistant membrane in accordance with manufacturer's instructions.

G. Completed system shall be free from over bending, deforming, stretching and buckles.

H. Apply panels and associated items for neat and weathertight enclosure.

I. Locate and space fasteners in uniform vertical and horizontal alignment. Provide self-tapping screws at mounting flange and side lap joints designed to withstand building design loads.

J. At panel splices, nest panels with minimum 4-inch (100mm) end lap, sealed with butyl rubber sealant and fastened together as recommended by metal panel manufacture.

K. Install gaskets, joint fillers and sealants where indicated and where required for weathertight performance of metal assemblies. Provide types of gaskets, fillers and sealants indicated or if not indicated, types as recommended by metal panel manufacture.

L. Seal side joints as recommended by metal panel manufacture.

M. Prepare perimeter joints and apply sealants to comply with the requirements in Division07 Section “Joint Sealants”.

3.3 CLEANING AND PROTECTING

A. Clean exposed surfaces of panels that are not protected by temporary covering to remove fingerprints and soil during construction period.

B. Clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.

C. Protect panels from damage during construction. Use temporary protective coverings where needed as approved by the panel manufacturer.

D. Clean and touch up minor abrasions in finish with air-dried coating that matches color and gloss, and is compatible with, factory–applied finish coating.

E. Remove panels damaged beyond repair and replace with new panels to match

adjacent undamaged panels.

F. Remove protective film immediately after installation.

END OF SECTION 074213

SECTION 074456 - FIBER REINFORCED CEMENTITOUS PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fiber reinforced cement panel siding system.

B. Accessories required for complete installation.

1.2 RELATED SECTIONS

A. Section 05 40 00 - Cold-Formed Metal Framing.

B. Section 06 10 00 - Rough Carpentry.

C. Section 06 16 36 - Wood Panel Product Sheathing.

D. Section 07 90 00 - Joint Protection.

E. Section 09 20 00 - Gypsum Board.

1.3 REFERENCES

A. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

B. ASTM C 1186 - Standard Specification for Flat Non-Asbestos Fiber-Cement Sheets.

C. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Materials.

D. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure.

1.4 SYSTEM DESCRIPTION

A. Performance Requirements:

1. Design and size components to withstand live loads caused by pressure of wind acting normal to plane of wall as calculated in accordance with ANSI/ASCE 7, and as measured in accordance with ANSI/ASTM E 330.
2. Deflection: Provide system capable of withstanding wind loading within the following limitations:
   a. No permanent deformation is acceptable.
3. Design system to accommodate, without damage to system, components or deterioration of seals; movement within system; movement between system and perimeter framing components; dynamic loading and release of loads; and deflection of structural support framing.
4. Design to accommodate vertical inter-story movement and provide an allowance for the following tolerances:

a. Building floor slab live load differential deflection.
b. Structural creep.
c. Thermally induced expansion and contraction of framing members.
d. Fabrication and erection tolerances.
e. Design ultimate load capacity of anchor components to withstand 2.0 times "Design Wind Load" without failure.

5. Maintain continuous air and vapor barrier throughout assembly.

1.5 SUBMITTALS

A. Submit under provisions of Section 013300 – Submittal Procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods, including fastening patterns.

C. Shop Drawings: Provide shop drawings and erection plans for review including the following:

1. Layout of furring, weather barrier, finished sheets and fastener pattern.
2. Details at base and top of walls, corners, at window and door trim and at other openings and connections.
3. Shop drawings prepared and stamped by a structural engineer licensed in the state where the project is located.

D. Calculations: Provide wind load calculations, engineering calculations and substantiating data to validate wind resistance of roof system.

E. Product certificates including Research//Evaluation report or Code Authority approval of the system use for intended application.

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

G. Manufacturer's Certificates: Certify materials and accessory component products meet or exceed specified requirements.

H. Manufacturer's warranties. Executed by manufacturer and installer.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Provide installer with not less than three years of experience with products similar to those specified.

B. Mock-Up: Provide a mock-up of complete panel system including furring, insulation, weather barrier and panels for approval by Architect.

1. Finish areas designated by Architect.
2. Mock-up shall be a minimum of 4 panels showing one vertical and one

horizontal joint and complete installation system and fastener layout. Mock-up should also include portion a window.

3. Do not proceed with remaining work until workmanship and color are approved by Architect.
4. Refinish mock-up area as required to produce acceptable work.

C. Pre-Installation Conference:

1. Prior to any panel application, the Contractor shall convene a pre-installation conference.
2. Coordinate conference scheduling with the Architect. Conference shall be attended by the Contractor, Architect, personnel directly responsible for the installation of panels, flashing and sheet metal work and other trades interfacing with the panel work.
3. Provide a copy of meeting notes and action items to all attending parties. Note action items requiring resolution prior to start of roof work.
4. Discuss specific expectations and responsibilities, construction procedures, specification requirements, application, environmental conditions, job and surface readiness, material storage, and protection.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cement panels to site until job is ready for their installation.

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

C. Store materials off the ground, flat and under cover in a dry place until erection.

D. Keep materials dry and protect from freezing.

E. Store materials in such a way to accommodate easy inspection of the materials prior to installation.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 WARRANTY

A. Installed material shall have a manufacturer's 5 year warranty.

B. Warranty includes the repair or replacement of siding that does not comply with requirements or that fails within specified warranty period. Failures include, but are not limited to, cracking, deforming or otherwise deteriorating beyond normal weathering.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Cement Board Fabricators, which is located at: 2148 S. 41st St.; Louisville, KY 40211; Toll Free Tel: 800-366-5378; Tel: 502-774-5757; Fax: 502-774-5754; Email: request info (info@cbf11.com); Web:www.cbf11.com

B. Substitutions will only be accepted with full selection of samples.

C. Requests for substitutions will be considered in accordance with provisions of Section 012500 – Substitution Procedures.

2.2 MATERIALS

A. Prefinished Cement Board Siding Panels: SILBONIT siding sheets, fiber reinforced, cement based product conforming to ASTM C 1186 and manufactured of cement sand, cellulose fibers and fillers.

1. Panel Size:
   a. 5/16 inch 4 feet by 8 feet.
2. Colors:
   a. To be selected from Manufacturer's full range.
3. Mechanical fasteners: External tamper proof screws, stainless steel, torx head fasteners.
   a. Screws shall be length as required by the panel manufacturer for the furring material used.
   b. Steel Screws: Size: #12 by 1-1/8 inch.
   c. Use painted screws to match panel finish.
4. Continuous cushions of black EPDM rubber, 1-1/4 inch and 3-1/2 inch as required.

2.3 ACCESSORIES

A. Sheet Metal Flashing: Minimum 26 gauge hot-dipped galvanized steel sheet, or stainless steel.

B. Metal furring shall conform to the requirements of Section 09 22 16 – Non-Structural Metal Framing.

PART 3 EXECUTION

3.1 EXAMINATION

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

B. Ensure that framing is completed and that electrical rough-in, windows, doors, and flashing are in place before proceeding with work of this section.

C. 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. Repair as necessary any substrate

conditions that would be detrimental to proper installation.

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

C. Ensure that all dust, dirt, fingerprints and all other foreign marks on the material are removed prior to installation of the panels.

3.3 INSTALLATION - GENERAL

A. Install in accordance with manufacturer's instructions and the approved shop drawings.

B. Panel Cutting:
1. Cut panels using a high speed circular saw with a segmented diamond blade.
2. Cut panels from the front side and protect the face from being damaged during cutting.
3. For incidental cuts, cut panels from the front side using a jigsaw with a carbide tip blade.
4. Provide adequate ventilation during cutting. Use of a dust extractor is recommended.

C. Drilling:
1. Drilling of holes must be done from the front of the panel using a carbide tip drill bit.
2. Holes are recommended to be done using a universal drill.
3. Larger holes, or cut-outs on the panel, can be made by a jig saw with a carbide blade or a hole saw with a diamond blade.

D. Prepare structural backing with studs, backer board, weather barrier and furring as required to meet the performance requirements specified. Install fiber reinforced panels over a properly prepared support system in accordance with the manufacturer's installation instructions and approved shop drawings.

E. Install weather barrier (permeable vapor barrier) over prepared substrate.

F. Fiber reinforced cement panel siding shall be installed over an impervious weather barrier, on furring strips with black EPDM rubber strips, and with an air cavity behind the face panel to allow ventilation of the substrate.

G. Panels shall be attached to furring using the attachment pattern and fasteners indicated in the manufacturer's installation instructions and approved shop drawings.

H. Install black EPDM rubber strips to each furring member.

I. Pre-drill holes in cement boards in pattern indicated in the manufacturers installation instructions and approved shop drawings. Holes shall be of size as specified by the panel manufacturer for the fasteners being used.

J. Fasten fiber cement board to furring as per vendor's details with approved stainless steel fasteners.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Inspect walls for any damage. Replace panels that are damaged. Do not attempt to repair.

C. Ensure all dirt, dust, fingerprints and all foreign marks are immediately removed from the face of the material to avoid from permanent damage.

D. Replace damaged products before Substantial Completion.

END OF SECTION 074456

SECTION 075323 - ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Adhered ethylene-propylene-diene-monomer (EPDM) roofing system.
2. Roof insulation.

1.2 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Roofing Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.

1.5 INFORMATIONAL SUBMITTALS

A. Research/Evaluation Reports: For components of roofing system, from ICC-ES.

B. Sample Warranties: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain components including roof insulation, fasteners, adhesives, cover board, reglets, sheet flashing, etc. for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.

B. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.

C. Roofing System Design: Tested by a qualified testing agency to resist the following uplift pressures as determined by ASCE 7.

2.3 EPDM ROOFING

A. EPDM: ASTM D 4637, Type I, nonreinforced, uniform, flexible EPDM sheet.

1. Manufacturer:
   a. Basis of Design: Rubberguard EPDM by Firestone Building Products Company; 250 West 96th Street, Indianapolis, IN 46260; (800) 428-4442; http://firestonebpco.com/.

   b. Refer to Section 012500 “Substitution Procedures” for substitution requirements.

2. Thickness: 0.60”, nominal.
3. Exposed Face Color: Black.

2.4 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.

1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
2. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content:

a. Plastic Foam Adhesives: 50 g/L.
b. Gypsum Board and Panel Adhesives: 50 g/L.
c. Multipurpose Construction Adhesives: 70 g/L.
d. Fiberglass Adhesives: 80 g/L.
e. Single-Ply Roof Membrane Adhesives: 250 g/L.
f. Single-Ply Roof Membrane Sealants: 450 g/L.
g. Nonmembrane Roof Sealants: 300 g/L.
h. Sealant Primers for Nonporous Substrates: 250 g/L.
i. Sealant Primers for Porous Substrates: 775 g/L.
j. Other Adhesives and Sealants: 250 g/L.

B. Sheet Flashing: 60-mil- thick EPDM, partially cured or cured, according to application.

C. Protection Sheet: Epichlorohydrin or neoprene nonreinforced flexible sheet, 55- to 60-mil-thick, recommended by EPDM manufacturer for resistance to hydrocarbons, non-aromatic solvents, grease, and oil.

D. Bonding Adhesive: Manufacturer's standard.

E. Seaming Material: Single-component, butyl splicing adhesive and splice cleaner or Manufacturer's standard, synthetic-rubber polymer primer and 3-inch- wide minimum, butyl splice tape with release film.

F. Miscellaneous Accessories: Provide lap sealant, water cutoff mastic, metal termination bars, metal battens, pourable sealers, preformed cone and vent sheet flashings, molded pipe boot flashings, preformed inside and outside corner sheet flashings, reinforced EPDM securement strips, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.

2.5 ROOF INSULATION

A. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1 felt or glass-fiber mat facer on both major surfaces.

1. ISO 90+ GL Insulation by Firestone Building Products Company or approved equal.

B. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.6 INSULATION ACCESSORIES

A. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer.

A. Cover Board: ASTM C 1289, closed-cell polyisocyanurate core, 1/2 inch thick.

1. ISOGARD HD Cover Board by Firestone Building Products Company or approved equal.

B. Protection Mat: Woven or nonwoven polypropylene, polyolefin, or polyester fabric, water permeable and resistant to UV degradation, type and weight as recommended by roofing system manufacturer for application.

PART 3 - EXECUTION

3.1 ROOFING INSTALLATION, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions.

B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

C. Install roofing and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition and to not void warranty for existing roofing system.

3.2 SUBSTRATE BOARD INSTALLATION

A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.

1. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.

3.3 INSULATION INSTALLATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

1. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.

C. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:
1. Set each layer of insulation in insulation adhesive, firmly pressing and maintaining insulation in place.

D. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together.

1. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.

3.4 ADHERED MEMBRANE ROOFING INSTALLATION

A. Adhere roofing over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll membrane roofing and allow to relax before installing.

B. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

C. Bonding Adhesive: Apply to substrate and underside of roofing at rate required by manufacturer, and allow to partially dry before installing roofing. Do not apply to splice area of roofing.

D. In addition to adhering, mechanically fasten roofing securely at terminations, penetrations, and perimeters.

E. Adhesive Seam Installation: Clean both faces of splice areas, apply splicing cement, and firmly roll side and end laps of overlapping roofing according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing terminations.

1. Apply a continuous bead of in-seam sealant before closing splice if required by roofing system manufacturer.

F. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing terminations.

G. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.

H. Spread sealant or mastic bed over deck-drain flange at roof drains, and securely seal membrane roofing in place with clamping ring.

3.5 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.6 PROTECTING AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates, and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 075323

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Formed roof-drainage sheet metal fabrications.
2. Formed low-slope roof sheet metal fabrications.
3. Formed wall sheet metal fabrications.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Distinguish between shop- and field-assembled work.
3. Include identification of finish for each item.
4. Include pattern of seams and details of termination points, expansion joints and expansion-joint covers, direction of expansion, roof-penetration flashing, and connections to adjoining work.

C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Product test reports.

C. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1.7 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. SPRI Wind Design Standard: Manufacture and install roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressure:

1. Design Pressure: As indicated on Drawings.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.

1. Exposed Coil-Coated Finish:

    a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2. Color: As selected by Architect from manufacturer's full range.

C. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead soft, fully annealed; 2D (dull, cold rolled finish.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

    a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
    b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.

2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.4 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.

1. Obtain field measurements for accurate fit before shop fabrication.
2. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
3. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

F. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

G. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

H. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

2.5 ROOF-DRAINAGE SHEET METAL FABRICATIONS

A. Parapet Scuppers: Fabricate scuppers to dimensions required, with closure flange trim to exterior, 4-inch- wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof. Fabricate from the following materials:

1. Stainless Steel: 0.019 inch thick.

2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Fascia Cap: Fabricate in minimum 96-inch- long, but not exceeding 12-foot- long sections. Furnish with 6-inch- wide, joint cover plates. Shop fabricate interior and exterior corners.

1. Fabricate from the Following Materials:

a. Aluminum: 0.050 inch thick.

B. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:

1. Aluminum: 0.040 inch thick.

C. Counterflashing and Flashing Receivers: Fabricate from the following materials:

1. Aluminum: 0.032 inch thick.

D. Roof-Penetration Flashing: Fabricate from the following materials:

1. Stainless Steel: 0.019 inch thick.

2.7 WALL SHEET METAL FABRICATIONS

A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- long, but not exceeding 12-foot- long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch- high, end dams. Fabricate from the following materials:

1. Stainless Steel: 0.016 inch thick.

B. Opening Flashings in Frame Construction: Fabricate head, sill, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch- high, end dams. Fabricate from the following materials:

1. Aluminum: 0.032 inch thick.

C. Wall Expansion-Joint Cover: Fabricate from the following materials:

1. Aluminum: 0.040 inch thick.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
5. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.

D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

G. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.2 ROOF-DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

B. Parapet Scuppers: Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.

3.3 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate.

C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

D. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric or butyl sealant and clamp flashing to pipes that penetrate roof.

3.4 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Through-Wall Flashing: Installation of through-wall flashing is specified in Section 042613 "Masonry Veneer."

C. Opening Flashings in Frame Construction: Install continuous head, sill, and similar flashings to extend 4 inches beyond wall openings.

3.5 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION 076200

SECTION 07 65 26 - SELF-ADHERING SHEET FLASHING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Self-adhering through-wall flashing and accessory products.

B. Materials and installation of self-adhering through-wall flashing assemblies as indicated on drawings.

C. Through-wall flashing and accessories for installation in cavity wall construction in the following locations:

1. Wall bases
2. Window sills
3. Heads of openings
4. Shelf angles
5. Tops of walls
6. Parapets
7. Above projections such as bay windows
8. At other discontinuities in the cavity

1.2 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION:

A. Masonry cavity drainage products (weeps and mortar drip screen) provided in Section 042613 – Masonry Veneer.

B. Metal drip edge provided in Section 076200 – Sheet Metal Flashing and Trim.

1.3 RELATED SECTIONS

A. Section 061600 – Sheathing: Exterior sheathing over wall studs.

B. Section 071113 – Damp Proofing: bituminous damp proofing installed over concrete foundation walls.

C. Section 072100 - Thermal Insulation: Board insulation applied to exterior side of wall.

D. Section 07 27 27 – Vapor Permeable Barriers: Air barrier installed over exterior

insulated sheathing.

E. Section 0762 0 - Sheet Metal Flashing and Trim: Metal through- wall flashings, metal drip edge.

F. Section 07 92 00 - Joint Sealants: Joint sealant materials and installation.

1.4 REFERENCES

A. ASTM D 146 Standard Test Methods for Sampling and Testing Bitumen Saturated Felts and Woven Fabrics for Roofing and Waterproofing

B. ASTM D 412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension

C. ASTM D 570 Standard Test Method for Water Absorption of Plastics

D. ASTM D 903 Standard Test Method for Peel and Stripping Strength of Adhesive Bonds

E. ASTM D 1876 Standard Test Method for Peel Resistance of Adhesive

F. ASTM D 4263 Standard Test Method for Indicating Moisture Content by Plastic sheet Method

G. ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials.

H. ASTM E 154 Standard Test Methods for Water Vapor Retarders used in Contact with Earth under Concrete Slabs, on Walls or as Ground Cover

1.5 PERFORMANCE REQUIREMENTS

A. Provide a membrane constructed to perform as a through-wall flashing durably integrated with the wall assembly's water resistive barrier and cavity drainage system. The installed through-wall flashing shall perform as a liquid water drainage plane to discharge incidental condensation or water penetration to the exterior through the cavity drainage system.

B. Provide a fully-adhered, water proof membrane through-wall flashing of minimum 0.040 inch (40 mils) thickness consisting of 0.032 inch (32 mils) rubberized asphalt adhesive fully-coating 0.008 inch (8 mils) smooth surface, cross-laminated HDPE film. Membrane shall meet the following requirements:

REQUIREMENT	RESULT	TEST METHOD
Tensile Strength	Not less than 900 psi	ASTM D-412
Puncture Resistance	Not less than 80 lb.	ASTM E 154

Low Temperature Flexibility	Unaffected at minus 25 degrees F, 0.063 inch mandrel	ASTM D 146
Peel Adhesion	Not less than 5 lb per inch width on concrete prepared with contact adhesive	ASTM D 903
Lap Adhesion	Not less than 5 lb. per inch width	ASTM D 1876
Water Vapor Permeance	Not more than 0.05 Perm	ASTM E-96, Method B
Water Absorption	Not more than 0.12 percent by weight	ASTM D 570

1.6 SUBMITTALS

A. Provide submittals in accordance with Section 013300.

B. At bid submission, provide evidence to the Architect of installer qualification by Manufacturer.

C. Shop drawings showing locations of through-wall flashing and details of all typical conditions.

D. Manufacturer's technical data sheets and material safety data sheets for Product and Accessories.

E. Manufacturer's installation instructions.

F. Manufacturer’s documentation of volatile organic compounds (VOC) content for Product and Accessories.

G. Certification of compatibility by Manufacturer, listing all materials on the Project with which the Product and Accessories may come into contact.

H. Samples of Product minimum 3 inch by 4 inch size.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Installer shall be experienced in applying the same or similar materials and shall be specifically approved in writing by Manufacturer.

B. Single-Source Responsibility: Obtain Product and Accessories from single manufacturer.

C. Product and Accessories shall comply with all state and local regulations

controlling use of volatile organic compounds (VOCs).

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, lot number and directions for storage.

B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by Manufacturer.

C. Protect stored materials from direct sunlight. Do not store cylinders of Aerosol Contact Adhesive above 110 degrees F.

D. Avoid spillage. Immediately notify Owner, Architect if spillage occurs and start clean up procedures. Clean spills and leave area as it was prior to spill.

1.9 WASTE MANAGEMENT AND DISPOSAL

B. Place materials defined as hazardous or toxic waste in designated containers.

1.10 PROJECT CONDITIONS

A. Do not apply during rain or accumulating snowfall.

B. Applicator shall have full, safe access to area

C. Apply Product and accessories within temperature range indicated in Manufacturer’s literature.

1.11 WARRANTIES:

A. Provide the Manufacturer’s minimum five year material warranty.

PART 2 PRODUCTS

2.1 BASIS OF DESIGN PRODUCT:

A. Carlisle Coatings & Waterproofing, Incorporated. 900 Hensley Lane, Wylie, TX 75098. Phone 1-800-527-7092. Website http://www.carlisleccw.com:

1. Standard: CCW-705 TWF.

B. Refer to Section 012500 “Substitution Procedures” for substitution requirements.

2.2 ACCESSORIES:

A. Contact Adhesive: As recommended by Manufacturer:

1. Solvent-Based or Water-Based.

B. Mastic: As recommended by Manufacturer:

1. Solvent-based synthetic rubber.

C. Fill Compound: As recommended by Manufacturer:

1. Modified polyurethane, 2-part or solvent-based, synthetic rubber, 1-part.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions affecting installation of the through-wall flashing and accessory products for compliance with requirements. Verify that surfaces and conditions are suitable prior to commencing Work of this section. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Concrete shall be cured for a minimum of seven days.

C. Surfaces shall be sound, dry and free of oil, grease, dirt, excess mortar or other contaminants.

D. Surfaces shall be supported and flush at joints without large voids or sharp protrusions.

E. Ledge, footing, shelf angle or lintel surfaces shall be flat, or preferably sloped to provide drainage to the exterior. Surfaces shall not be oriented so that water can pond on the through-wall flashing.

F. Inform Architect in writing of anticipated problems applying Product over substrate.

3.2 SURFACE PREPARATION

A. Fill joints and cracks greater than ¼ inch width with Fill Compound struck flush.

B. Fill inside corners and angle changes with minimum ½ inch tooled bead of Fill Compound.

3.3 INSTALLATION

A. Apply Product to sound substrate. Do not apply over mechanically- attached water resistive barrier such as felt, paper or house wrap.

B. Prepare all surfaces accepting Product with Contact Adhesive.

Observe installation instructions, including coverage rates and drying times, indicated in Manufacturer's literature.

D. Apply Product over prepared surfaces according to Manufacturer's instructions and drawings.

E. Apply Mastic to edges of Product at laps, cuts and penetrations.

F. Secure vertical termination of Product with Termination Bar and Mastic, reglet with Mastic, or cast-in-place according to Manufacturer's instructions and drawings.

G. Keep edge of product at least ½ inch away from exterior finish.

3.4 SCHEDULE

A. Install through-wall flashing during or after construction of back-up wall.

B. Install through-wall flashing before or during installation of brick veneer.

C. Lap water resistive barrier over vertical termination of through-wall flashing on back-up wall. Lap and secure water resistive barrier according to water resistive barrier manufacturer's instructions.

D. Integrate through-wall flashing with adhered membrane air barrier, damp proofing or water-resistive barrier according to Manufacturer's instructions and drawings.

3.5 REPAIR AND PROTECTION

A. Protect from damage during application and remainder of construction period.

B. Inspect before covering and make repairs according to Maufacturer's instructions. Remove and replace damaged material.

C. Product is not designed for permanent exposure. Cover with exterior cladding as soon as schedule allows.

D. Outdoor exposure of installed Product shall not exceed 60 days.

END OF SECTION 076526

SECTION 077100 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copings.
2. Roof-edge specialties.
3. Reglets and counterflashings.
4. Overflow scupper.

B. Preinstallation Conference: Conduct conference at Project site.

1.2 REFERENCES

A. Factory Mutual Research Corporation (FMRC), P.O. Box 9102, Norwood, MA 02082, 617-762-4300.

B. SPRI Sheet Membrane & Component Suppliers to the Commercial Roofing Industry, 175 Highland Ave., Needham, MA 02194, 617-444-0242, fax: 617-444-6111.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For roof specialties.

1. Include plans, elevations, expansion-joint locations, keyed details, profiles, joining method, accessory location, anchorage and flashing details, adjacent construction interface, dimensions and attachments to other work. Distinguish between plant- and field-assembled work.

C. Samples: For each type of roof specialty and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For tests performed by a qualified testing agency.

B. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. High performance coping shall be CERTIFIED by the manufacturer to meet performance design criteria according to the following test standards: [select, if applicable]:

1. ANSI/SPRI ES-1 Test Method RE-3 for Coping: Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems (current edition). The coping system shall be tested simultaneously on horizontal and vertical surfaces and shall exceed horizontal and vertical design wind pressure as calculated in accord with the ANSI/SPRI ES-1 Test RE-3. Use the current edition of *ANSI/SPRI ES-1 Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems*.

2. The coping product shall be listed in current *Factory Mutual Research Corporation Approval Guide* approved for Class FM 1-90. Consult current *FM Approval Guide* or contact the factory for wall size, cleat spacing and gauge requirements.

B. Product Handling:

1. All material shall arrive in the manufacturer's original sealed, labeled containers.

2. Store materials in a dry, protected, well-vented area. The contractor shall report damaged material immediately to the delivering carrier and note such damage on the carrier's freight bill of lading.

3. Remove protective plastic surface film immediately after installation if applicable.

C. Job Conditions:

1. Verify that other trades with related work are complete before mounting coping covers.

2. Mounting surfaces shall be straight and secure; substrates shall be of proper width.

3. Refer to the construction documents, shop drawings and manufacturer's installation instructions.

4. Coordinate installation with roof membrane manufacturer's installation instructions before starting.

5. Observe all appropriate OSHA safety guidelines for this work.

1.7 WARRANTY

A. Roofing-System Warranty: Provide Manufacturer's full system warranty for roof edge systems, when installed per Manufacturer's instructions.

B. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL

A. Basis of Design Manufacturer: Firestone Building Products Company; 250 West 96th Street, Indianapolis, IN 46260; 800-428-4442; http://firestonebpco.com/roofing/

1. Refer to Section 012500 "Substitution Procedures" for substitution requirements.

2.2 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.3 COPINGS

A. Parapet Coping System: Metal coping cap with galvanized steel anchor/support cleats for capping any parapet wall. The system shall be watertight, maintenance free, and does not require exposed fasteners. Joints shall be a butt type with concealed splice plates.

B. Performance Characteristics:
   1. Coping sections shall expand and contract freely while locked in place on anchor cleats.

   2. Coping sections shall lock to anchor cleats by mechanical pressure from hardened stainless steel springs factory attached to anchor cleats.

   3. All splice plates include factory applied dual non-curing sealant strips capable of providing a watertight seal.

C. Metal:.063" aluminum with Kynar coating.

   1. Finish: Two-coat fluoropolymer.
   2. Color: As selected by Architect from manufacturer's full range.

D. Concealed splice plates: 8" wide. Finish to match finish of coping cap with factory applied dual non-curing sealant strips.

E. Anchor/Support Cleat: 20 ga. prepunched galvanized cleat with stainless steel spring mechanically locked to cleat normally 12" wide at 4'-0" on center. Mechanically fastened as indicated and detailed.

F. Fasteners: #9 x 1½" stainless steel fasteners with provided drivers. No exposed fasteners shall be permitted. Fasteners shall be electrolytically compatible.

2.4 ROOF-EDGE SPECIALTIES

A. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet and a continuous metal receiver with integral drip-edge cleat to engage fascia cover and secure single-ply roof membrane. Provide matching corner units.

   1. Una-Clad System as manufactured by Firestone Building Products Company.

   2. Formed Aluminum Sheet Fascia Covers: Aluminum sheet, 0.050 inch.

      a. Surface: Embossed finish.
      b. Finish: Two-coat fluoropolymer.
      c. Color: As selected by Architect from manufacturer's full range.

   3. Corners: Factory mitered and soldered or mechanically clinched and sealed watertight.
   4. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.
   5. Receiver: Manufacturer's standard material and thickness.

2.5 REGLETS AND COUNTERFLASHINGS

A. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:

1. Zinc-Coated Steel: Manufacturer's standard thickness.
2. Corners: Factory mitered and soldered or mechanically clinched and sealed watertight.
3. Surface-Mounted Type: Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.

B. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches and in lengths not exceeding 12 feet designed to snap into reglets or through-wall-flashing receiver and compress against base flashings with joints lapped, from the following exposed metal:

1. Zinc-Coated Steel Manufacturer's standard thickness.

C. Accessories:

1. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.
2. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

2.6 OVERFLOW SCUPPER

A. Welded Metal Scupper Sleeve:

1. Zinc-Coated Steel: Manufacturer's standard thickness.

2.7 MATERIALS

A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation.

B. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

2.8 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D 1970/D 1970M; stable after testing at 240 deg F.
2. Low-Temperature Flexibility: ASTM D 1970/D 1970M; passes after testing at minus 20 deg F.

3. Providing roofing and roof specialty Manufacturer's recommended underlayment product.

2.9 MISCELLANEOUS MATERIALS

A. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:

1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
2. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
3. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.

B. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane or silicone polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

C. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type joints with limited movement.

D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

E. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.10 FINISHES

A. Coil-Coated Aluminum Sheet Finishes:

1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.

PART 3 - EXECUTION

3.1 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

1. Apply continuously under copings, roof-edge specialties, and, reglets and counterflashings.
2. Coordinate application of self-adhering sheet underlayment under roof specialties with requirements for continuity with adjacent air barrier materials.

3.2 INSTALLATION, GENERAL

A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.
5. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum and stainless-steel roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.

C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.

1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise indicated on Drawings.

2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.

3.3 COPING INSTALLATION

A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor copings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at manufacturer's required spacing that meets performance requirements.

3.4 ROOF-EDGE SPECIALITIES INSTALLATION

A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.5 REGLET AND COUNTERFLASHING INSTALLATION

A. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashings overlap 4 inches over top edge of base flashings.

B. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches and bed with butyl sealant. Fit counterflashings tightly to base flashings.

3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as roof specialties are installed.

END OF SECTION 077100

SECTION 077123 – ROOF DRAINAGE SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manufactured gutters.
2. Manufactured downspouts.
3. Parapet scuppers.

B. Provide labor, material, and equipment necessary for furnishing a complete installation of commercial gutter system.

C. Related Work Specified Elsewhere

1. Division 5 Sections for support framing.

2. Division 6 Sections for nailers and support framing.

3. Division 7 Sections for related roofing materials.

1.2 ACTION SUBMITTALS

A. Product Data: Each type of product specified. Submit manufacturer's detailed technical product data, installation instructions and recommendations, dimensions of individual components, profiles, and finishes.

B. Shop Drawings: Show fabrication and installation of commercial gutter system including fully dimensioned roof plans, expansion joint locations, sections and details of components and other related trims.

C. Finish & Color Selection: Furnish manufacturer's technical data for specified finish and color chart showing full range of colors available.

D. Samples: For each type of roof drainage system and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For tests performed by a qualified testing agency.

B. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roof-edge drainage systems to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Where pre-engineered manufactured products are specified, other field fabricated or shop/field fabricated substitutions will not be accepted. However, where shop/field fabrications are indicated pre-engineered systems will be considered with Architect approval.

B. Obtain all components and related accessories from one single source manufacturer.

C. Follow manufacturer's printed instructions for installing commercial gutter system. Follow primary roofing manufacturer's printed instructions for installing associated roof material for flashing gutter system to roof.

1.6 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

1.7 DELIVERY, STORAGE & HANDLING

A. All products delivered shall be stored in a clean dry location prior to installation.

B. Products furnished with strippable protective masking shall not be exposed to direct sun-light for more than 30 minutes without removing masking.

C. Do not install finished materials with scars or abrasions.

1.8 PPROJECT CONDITIONS

A. Coordinate work of this Section with adjoining work for proper sequencing to ensure protection from inclement weather and to protect materials and their finish against damage.

B. Do not install commercial gutter system during inclement weather. When installing in cold climates, warm adhesives, caulks, and primers to at least 50 degrees Fahrenheit prior to application.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of design product: Designer Series Commercial Gutter System "Batten Profile", 6" size, Model Number DSB-6. Provide commercial gutter system, downspouts, accessories, and drainware as manufactured by Perimeter Systems, a division of Southern Aluminum Finishing Company, Inc. 8370 East Hwy 78, Villa Rica, GA 30180, (800) 334-9823, Online at http://www.saf.com/persys.

B. Refer to Section 012500 “Substitution Procedures” for substitution requirements.

2.2 PERFORMANCE REQUIREMENTS

A. SPRI Wind Design Standard: Manufacture and install roof-edge specialties tested according to SPRI ES-1 and capable of resisting the following design pressures:

1. Design Pressure: As indicated on Drawings.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): [120 deg F, ambient; 180 deg F, material surfaces.

2.3 GUTTERS

A. Concealed Gutter Liner shall be manufactured from 0.040" mill finished aluminum in 10'-0" lengths. Liner shall be:

1. Factory notched to receive brackets and straps.
2. Manufactured with 1" telescoping and notched end laps.

3. Factory punched with fastening holes elongated to allow for thermal movement.

B. Support Bracket shall be manufactured from 0.125" x 1.00" aluminum, heliarc welded construction, factory punched for fasteners.

C. Interior Straps shall be manufactured from 0.125" x 1.00" aluminum.

D. Batten Profile, Snap-On fascia, shall be manufactured from 0.040" aluminum, 10'-0" lengths. Fascias shall be press formed with radius dies on a CNC Press to provide repeated true and accurate profiles.

E. Fascia Splices shall be manufactured from 0.040" aluminum, 6" lengths, formed to fit the inside of the snap-on fascia.

2.4 DOWNSPOUTS

A. Downspout & Elbows: Provide downspout Model Number DS-EX, 0.125” thickness, in sizes and locations as indicated on plans. Downspouts shall be manufactured from extruded aluminum, alloy 6063-T5 finished to match gutter fascia mouldings. Downspout elbows shall have heliarc welded joints.

B. Outlets: At all downspout locations provide aluminum outlets to connect liner to downspout.

C. Wall Bracket: Provide Style 1 Wall brackets at 60" maximum spacing (minimum 2 brackets). Brackets shall be manufactured from 0.125" x 1.00" aluminum, finished to match downspout.

2.5 PARAPET SCUPPERS

A. Parapet Scuppers: Manufactured with closure flange trim to exterior, 4-inch- wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof.

1. Formed Aluminum: 0.032 inch thick.

2.6 MATERIALS

A. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

2.7 FINISHES

A. General: Apply coatings to exposed aluminum components after fabrication for maximum coating performance and to prevent crazing, abrasion, and damage to finished surfaces.

B. Pretreatment: Aluminum components shall be pretreated with solutions to remove organic and inorganic surface soils, remove residual oxides, followed by a chrome phosphate conversion coating to which organic coatings will firmly adhere.

C. Coating Type: High Performance Coating, two-coat, shop applied, 70% Polyvinylidene Fluoride (PVDF) coating based on Elf Arkema Chemicals, Inc. Kynar 500 or Ausimont U.S.A., Inc. Hylar 5000 resin, meeting AAMA 2605 specification.

D. Color: Select from manufacturer's full range of colors.

2.8 ACCESSORIES

A. Mitered Corners: Provide factory mitered corners for both fascia and liner. Fascia profiles shall be precision saw cut, heliarc tack welded to produce a picture frame joint. Concealed liner miter shall be precision saw cut with a continuous heliarc weld watertight joint.

B. Sculptured End Caps: Provide factory mitered end caps for fascias. Fascia profiles shall be precision saw cut, heliarc tack welded to produce a picture frame joint.

C. Liner End Caps: Provide mill finished aluminum liner end caps at all Fascia End Caps and wall abutments.

D. Liner Expansion Joint: Provide manufacturer's elastomeric expansion joints at 40' intervals or as shown on shop drawings.

E. Sealant: Shall be polyurethane or silicon based water-proofing type, compatible with aluminum gutter, downspout, and abutting dissimilar materials for intended application.

PART 3 - EXECUTION

3.1 EXAMINNATION

A. The installer must examine substrates and conditions under which commercial gutter system will be installed. All wood plates and/or fascia boards shall be installed true, straight, and free of splits, cracks, or other irregularities. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Prior to the installation of the commercial gutter system, soffits, extenders, and associated cornice profiles shall be installed.

B. Installer shall thoroughly read and follow manufacturer's installation instructions before proceeding with installation.

3.3 INSTALLATION, GENERAL

A. General: The commercial gutter system shall be installed in strict accordance with manufacturer's printed instructions. Deviations from the instructions are not allowed.

B. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than 12 inches apart. Attach ends with rivets and seal with sealant to make watertight. Slope to downspouts.

C. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

D. Support Brackets: Layout support brackets to provide 1/2" slope in 40 linear feet. Install support brackets with #10 x 2" stainless steel wood screws.

E. Liner: Install concealed gutter liner onto support brackets and fasten to substrates with 1-1/2" aluminum or stainless steel nails. Rivet and seal liner joints with high grade exterior sealant as recommended by gutter manufacturer.

F. Expansion Joints: Install elastomeric expansion joints as shown on plans and/or shop drawings. Maximum expansion joint spacing shall be 40' centers.

G. Locate and install downspouts before proceeding with fascia installation.

H. Install Fascia with concealed splice plates over support brackets and liner. Coordinate and align spacing of joints with associated trims if applicable. Plan spacing of joints so there are no sections of fascia shorter than 48" in length. Check horizontal alignment of fascia during installation and adjust as required. At downspout locations, neatly cut fascia to accommodate downspout.

I. Install interior straps by fully engaging them into liner and fascia, complete by securely riveting.

J. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c.

1. Provide elbows at base of downspouts at grade to direct water away from building.
2. Connect downspouts to underground drainage system indicated.

K. Parapet Scuppers: Install scuppers through parapet where indicated. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.

L. Conductor Heads: Anchor securely to wall with elevation of conductor top edge 1 inch below gutter discharge.

3.4 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as roof specialties are installed.

END OF SECTION 077100

SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof curbs.
2. Equipment supports.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of roof accessory.

B. Shop Drawings: For roof accessories.

1.3 INFORMATIONAL SUBMITTALS

A. Sample warranties.

PART 2 - PRODUCTS

2.1 ROOF CURBS

A. Roof Curbs: Internally reinforced roof-curb units capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings, bearing continuously on roof structure, and capable of meeting performance requirements; with welded or mechanically fastened and sealed corner joints, straight sides, and integrally formed deck-mounting flange at perimeter bottom.

1. Manufacturers:

a. Thybar Corporation; 913 S. Kay Avenue, Addison, IL 60101; 800-666-2872; http://www.thybar.com/

b. Greenheck; PO Box 410, Schofield, WI 54476; 715-359-6171; http://www.greenheck.com/.

c. RPS Curbs; 5030 Corporate Exchange Blvd. SE, Grand Rapids, MI 49512; (800) 624-8642; http://www.rpscurbs.com/.

d. Architect approved equal.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Material: Zinc-coated (galvanized) steel sheet, thickness as recommended by Manufacturer.

D. Construction:

1. Curb Profile: Manufacturer's standard compatible with roofing system.
2. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.
3. Top Surface: Level top of curb, with roof slope accommodated by sloping deck-mounting flange or by use of leveler frame.
4. Sloping Roofs: Where roof slope exceeds 1:48, fabricate curb with perimeter curb height tapered to accommodate roof slope so that top surface of perimeter curb is level. Equip unit with water diverter or cricket on side that obstructs water flow.
5. Insulation: Factory insulated with 1-1/2-inch- thick glass-fiber board insulation.
6. Liner: Same material as curb, of manufacturer's standard thickness and finish.
7. Nailer: Factory-installed wood nailer, continuous around curb perimeter.
8. Wind Restraint Straps and Base Flange Attachment: Provide wind restraint straps, welded strap connectors, and base flange attachment to roof structure at perimeter of curb, of size and spacing required to meet wind uplift requirements.
9. Platform Cap: Where portion of roof curb is not covered by equipment, provide weathertight platform cap formed from 3/4-inch thick plywood covered with metal sheet of same type, thickness, and finish as required for curb.
10. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as curb.

2.2 EQUIPMENT SUPPORTS

A. Equipment Supports: Metal equipment supports capable of supporting superimposed live and dead loads between structural supports, including equipment loads and other construction indicated on Drawings, spanning between structural supports; capable of meeting performance requirements; with welded corner joints, and integrally formed structure-mounting flange at bottom.

1. Manufacturers:

a. Big Foot Systems; Apex Way, Hailsham, East Sussex, BN27 3WA, United Kingdom; +44 (0) 1323-844-355; http://www.bigfootsupport.com/.

b. Architect approved equal.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Material: Zinc-coated (galvanized) steel sheet, thickness as recommended by Manufacturer.

2.3 METAL MATERIALS

A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation.

B. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized according to ASTM A 123/A 123M unless otherwise indicated.

C. Galvanized-Steel Tube: ASTM A 500/A 500M, round tube, hot-dip galvanized according to ASTM A 123/A 123M.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Glass-Fiber Board Insulation: ASTM C 726, nominal density of 3 lb/cu. ft, thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F, thickness as indicated.

C. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction and complying with AWPA C2; not less than 1-1/2 inches thick.

D. Underlayment:

1. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
2. Polyethylene Sheet: 6-mil- thick polyethylene sheet complying with ASTM D 4397.
3. Slip Sheet: Building paper, 3 lb/100 sq. ft. minimum, rosin sized.
4. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
5. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:

E. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.

F. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

G. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Verify dimensions of roof openings for roof accessories. Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.

C. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.

3.2 REPAIR AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780/A 780M.

B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 099113 "Exterior Painting."

C. Clean exposed surfaces according to manufacturer's written instructions.

D. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200

SECTION 077260 – ROOF FALL PROTECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section includes freestanding roof edge protection system, including pipe railings, uprights, bases, counterweights, fittings and delivery to site.

RELATED SECTIONS

B. Section 05500 - Metal Fabrications: Associated metal supports.

C. Section 07400 - Membrane Roofing: Coordination of roof edge protection installation.

1.2 REFERENCES

A. American National Standards Institute (ANSI) - A21.l Safety Requirements for Floor and Wall Openings, Railings and Toe Boards.

B. American National Standards Institute (ANSI) - A58.l Minimum Design Loads in Buildings and Other Structures.

C. American National Standards Institute (ANSI) - Al 17.1 Accessible and Usable Buildings and Facilities.

D. American Society of Testing and Materials (ASTM) A47 - Standard Specification for Ferrite Malleable Iron Castings.

E. American Society of Testing and Materials (ASTM) A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

F. American Society of Testing and Materials (ASTM) A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

G. American Society of Testing and Materials (ASTM) A500 - Standard Specification for cold-formed welded and seamless carbon steel structural tubing.

H. Occupational Safety & Health Administration (OSHA): 1910.23 - Guarding Floor and Wall Openings and Holes.

1.3 SUBMITTALS

A. Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Shop Drawings: Indicate profiles, sizes, connections, size and type of fasteners and accessories.
3. Field Measurements: Verify field measurements prior to assembly and/or ordering.

4. Storage and handling requirements and recommendations.
5. Installation Instructions.

B. Shop Drawings: Drawings showing fabrication and installation of handrails and guardrails including plans, elevations, sections, details of components, anchor details, and attachment to adjoining units of work.

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

1.4 QUALITY ASSURANCE

A. Railings Structural Requirements:
1. Handrail, wall rail and guardrail assemblies and attachments shall withstand a minimum concentrated load of 200 pounds applied in any direction on the top rail.
2. Infill area of guardrail system capable of withstanding a horizontal concentrated load of 200 pounds applied to one square foot (8165 g/sm) at any point in the system. Load not to act concurrently with loads on top rail of system in determining stress on guardrail.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Materials to be delivered to the job site in good condition and adequately protected against damage as handrails are a finished product.

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

1.6 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

B. Field Measurements: Where handrails and railings are indicated to fit to other construction, check actual dimensions of other construction by accurate field measurements before fabrication; show recorded measurements on final shop drawings.

1. Where field measurements cannot be made without delaying the railing fabrication and delivery, obtain guaranteed dimensions in writing by the Contractor and proceed with fabrication of products to not delay fabrication, delivery and installation.

C. Coordinate fabrication and delivery schedule of handrails with construction progress and sequence to avoid delay of railing installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Post Weight KeeGuard Roof Railing by Kee Safety, Inc.; 100 Stradtman St #8, Buffalo, NY 14206; 1 (716) 896-4949; www.keesafety.com.

B. Architect approved equal.

2.2 SYSTEMS

A. Provide pipe or tubing, fittings, and accessories as indicated or required to match design indicated on the Drawings.

1. Fittings: Cast iron.

2. Handrail Pipe, Schedule 40, Size:
   a. 1-1/2 inches - 1.90 inches O D.

B. Roof Edge Protection: Provide freestanding roof edge protection system, including pipe railings, uprights, bases, counterweights and fittings.

1. Freestanding counterweighted guardrail system with 42 inch (1067 mm) minimum height to provide a pedestrian egress barrier on the roof to withstand a minimum load of 200 lb in any direction to the top rail per OSHA Regulation 29 CFR 1910.23.
2. Pipe: Steel, 1-1/2 inches schedule 40, galvanized.
3. Rails and Posts: Galvanized Tube, 12 gauge, 1-1/2 inches 1.90 inches diameter.
4. Counterweight Levers: Galvanized Tube, 12 gauge, 1-1/4 inches 1.660 inches diameter.
5. Mounting Bases: Steel bases are galvanized and are supplied with a rubber pad on underside of the component.
6. Counterweights: Molded recycled PVC with one fixing collar per counterbalance.
7. Fasteners: stainless steel or galvanized.

C. Custom Design: Provide pipe, fittings, and accessories as indicated or required by Drawings to match design indicated.

2.3 MATERIALS

A. Pipe:
   1. Steel Pipe: Steel, 1-1/2 inches schedule 40, galvanized.

B. Fittings, Including Elbows, Crossovers, Wall flanges, Tees, Couplings:

1. Galvanized Malleable Cast Iron: Structural pipe fittings, ASTM A447 with ASTM A153 galvanizing.

C. Finish: Polyester factory applied spray coating.

D. Fasteners: Type 304 or 305 stainless steel or galvanized.

2.4 FABRICATION

A. Fit and shop assemble components in largest practical sizes for delivery to site.

B. Upright tops shall be plugged with weather and light resistant material.

C. Assemble components with joints tightly fitted and secured. Accurately form components to suit installation.

PART 3 EXECUTION

3.1 PREPARATION

A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Fit exposed connections accurately together to form tight joints. For all connections with fittings, each set screw is to be tightened to 29 foot pounds of torque.

C. Perform cutting, and fitting required for installation of handrails. Set handrails and accurately in location, alignment, and elevation, measured from established lines and levels.

3.3 PROTECTION

A. Protect installed products until completion of project.

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

END OF SECTION 077260

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

1.5 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:

a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.

1) UL in its "Fire Resistance Directory."
2) Intertek Group in its "Directory of Listed Building Products."
3) FM Global in its "Building Materials Approval Guide."

2.2 PENETRATION FIRESTOPPING SYSTEMS

A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

1. Manufacturers:

a. Hilti; Legacy Tower, Suite 1000, 7250 Dallas Parkway, Plano, TX 75024; 1-800-879-8000; https://www.us.hilti.com/

b. Tremco; 3735 Green Road, Beachwood, OH 44122; 800-321-7906; http://www.tremcosealants.com/

c. 3M; 3M Building and Commercial Services Division , 3M Center, Building 223-2N-20, St. Paul, MN 55144; 1-800-328-1687; http://www.3m.com/3M/en_US/company-us/

d. Architect approved equal.

B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

D. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.

E. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits for VOC content:

1. Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.

C. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.

D. Install fill materials by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.

2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.2 IDENTIFICATION

A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.

1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.

B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."

3.3 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2174.

B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.

C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

END OF SECTION 078413

SECTION 078443 - JOINT FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

1.5 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:

a. Joint firestopping systems shall bear classification marking of a qualified testing agency.

1) UL in its "Fire Resistance Directory."
2) Intertek Group in its "Directory of Listed Building Products."

2.2 JOINT FIRESTOPPING SYSTEMS

A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E 1966 or UL 2079.

1. Manufacturers:

a. Hilti; Legacy Tower, Suite 1000, 7250 Dallas Parkway, Plano, TX 75024; 1-800-879-8000; https://www.us.hilti.com/

b. Tremco; 3735 Green Road, Beachwood, OH 44122; 800-321-7906; http://www.tremcosealants.com/

c. 3M; 3M Building and Commercial Services Division , 3M Center, Building 223-2N-20, St. Paul, MN 55144; 1-800-328-1687; http://www.3m.com/3M/en_US/company-us/

d. Architect approved equal.

2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.

C. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

D. VOC Content: Fire-resistive joint system sealants shall comply with the following limits for VOC content:

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

E. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.

B. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

C. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

D. Install elastomeric fill materials for fire-resistive joint systems by proven techniques to produce the following results:

1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.2 IDENTIFICATION

A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use

mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."

3.3 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2393.

B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.

C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

END OF SECTION 078443

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Nonstaining silicone joint sealants.
2. Urethane joint sealants.
3. Mildew-resistant joint sealants.
4. Latex joint sealants.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product.

B. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Preconstruction laboratory test reports.

C. Preconstruction field-adhesion-test reports.

D. Field-adhesion-test reports.

E. Sample warranties.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

1.6 PRECONSTRUCTION TESTING

A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Adhesion Testing: Use ASTM C 794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Compatibility Testing: Use ASTM C 1087 to determine sealant compatibility when in contact with glazing and gasket materials.
3. Stain Testing: Use ASTM C 1248 to determine stain potential of sealant when in contact with masonry substrates.

B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates. Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

1.7 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following:

1. Architectural sealants shall have a VOC content of 250 g/L or less.
2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 775 g/L or less.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 NONSTAINING SILICONE JOINT SEALANTS

A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.

B. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Manufacturers:

a. Tremco Sealant; 3735 Green Road, Beachwood, OH 44122; 800-321-7906; http://www.tremcosealants.com/.

b. Sika; 201 Polito Avenue, Lyndhurst, NJ 07071; 1-800-933-SIKA; http://usa.sika.com/

c. Dow Corning Corporation; 2200 W Salzburg Rd., Auburn, MI 48611; 1-800-248-2481; https://www.dowcorning.com/.

d. Architect approved equal.

2.3 URETHANE JOINT SEALANTS

A. Urethane, S, NS, 25, T, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Uses T and NT.

1. Manufacturers:

a. BASF Corporation; 23700 Chagrin Boulevard; Beachwood, OH 44122; 1-800-669-2273; www.basf.com.

b. Sika; 201 Polito Avenue, Lyndhurst, NJ 07071; 1-800-933-SIKA; http://usa.sika.com/

c. Architect approved equal.

B. Urethane, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T and NT.

1. Manufacturers:

a. BASF Corporation; 23700 Chagrin Boulevard; Beachwood, OH 44122; 1-800-669-2273; www.basf.com.

b. Sika; 201 Polito Avenue, Lyndhurst, NJ 07071; 1-800-933-SIKA; http://usa.sika.com/

c. Architect approved equal.

C. Urethane, M, P, 50, T, NT: Multicomponent, pourable, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade P, Class 50, Uses T and NT.

a. Sika; 201 Polito Avenue, Lyndhurst, NJ 07071; 1-800-933-SIKA; http://usa.sika.com/

b. Tremco Sealant; 3735 Green Road, Beachwood, OH 44122; 800-321-7906; http://www.tremcosealants.com/.

c. Architect approved equal.

2.4 MILDEW-RESISTANT JOINT SEALANTS

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Manufacturers:

a. Tremco Sealant; 3735 Green Road, Beachwood, OH 44122; 800-321-7906; http://www.tremcosealants.com/.

b. Dow Corning Corporation; 2200 W Salzburg Rd., Auburn, MI 48611; 1-800-248-2481; https://www.dowcorning.com/.

c. Architect approved equal.

C. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Manufacturers:

a. Tremco Sealant; 3735 Green Road, Beachwood, OH 44122; 800-321-7906; http://www.tremcosealants.com/.

b. Dow Corning Corporation; 2200 W Salzburg Rd., Auburn, MI 48611; 1-800-248-2481; https://www.dowcorning.com/.

c. Architect approved equal.

2.5 JOINT-SEALANT BACKING

A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), Type B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

1. Manufacturers:

a. Tremco Sealant; 3735 Green Road, Beachwood, OH 44122; 800-321-7906; http://www.tremcosealants.com/.

b. Dow Corning Corporation; 2200 W Salzburg Rd., Auburn, MI 48611; 1-800-248-2481; https://www.dowcorning.com/.

c. Architect approved equal.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.6 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove laitance and form-release agents from concrete.
2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.2 INSTALLATION OF JOINT SEALANTS

A. General: Comply with ASTM C 1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

1. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.3 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:

a. Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
b. Perform one test for each 1000 feet of joint length thereafter or one test per each floor per elevation.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.4 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces JS-1.

1. Joint Locations:

   a. Control and expansion joints in brick pavers.
   b. Isolation and contraction joints in cast-in-place concrete slabs.
   c. Joints between plant-precast architectural concrete paving units.
   d. Tile control and expansion joints.
   e. Joints between different materials listed above.
   f. Other joints as indicated on Drawings.

2. Joint Sealant: Urethane, M, P, 50, T, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces JS-2.

1. Joint Locations:

   a. Construction joints in cast-in-place concrete.
   b. Joints between plant-precast architectural concrete units.
   c. Control and expansion joints in unit masonry.
   d. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces JS-3.

1. Joint Locations:

   a. Isolation joints in cast-in-place concrete slabs.
   b. Control and expansion joints in tile flooring.
   c. Other joints as indicated on Drawings.

2. Joint Sealant: Urethane, S, P, 25, T, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Joint-Sealant Application: Interior joints in non-moisture exposed vertical surfaces and horizontal nontraffic surfaces JS-4.

1. Joint Locations:

   a. Control and expansion joints on exposed interior surfaces of exterior walls.
   b. Tile control and expansion joints.
   c. Vertical joints on exposed surfaces of unit masonry, concrete, walls, and partitions.
   d. Joints on underside of plant-precast structural concrete.
   e. Other joints as indicated on Drawings.

2. Joint Sealant: Urethane, S, NS, 25, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

E. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement JS-5.

1. Joint Locations:

   a. Control joints on exposed interior surfaces of exterior walls.
   b. Perimeter joints between interior wall surfaces and frames of interior doors, and windows.
   c. Other joints as indicated on Drawings.

2. Joint Sealant: Acrylic latex.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

F. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces JS-6.

1. Joint Locations:

   a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
   b. Tile control and expansion joints where indicated.
   c. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

G. Joint-Sealant Application: Concealed mastics JS-7.

1. Joint Locations:

    a. Aluminum thresholds.
    b. Sill plates.
    c. Other joints as indicated on Drawings.

2. Joint Sealant: Butyl-rubber based.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes hollow-metal doors.

1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Product:

1. Flushline by Kawneer Company Inc.; 555 Guthridge Ct, Technology Park/Atlanta, Norcross, GA 30092; 1-700-449-555; http://www.kawneer.com/kawneer/north_america/en/info_page/home.asp.

B. Substitutions: Refer to Substitutions Section 012500 for procedures and submission requirements.

2.2 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Heavy-Duty Doors and Frames: SDI A250.8, Level 2. At locations indicated in the Door and Frame Schedule.

1. Physical Performance: Level B according to SDI A250.4.
2. Doors:

a. Type: As indicated in the Door and Frame Schedule.
b. Thickness: 1-3/4 inches.
c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch, with minimum A40 coating.
d. Core: Manufacturer's standard insulation material.

3. Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less than 2.1 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.

4. Exposed Finish: Factory.

2.3 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing).

G. Glazing: Section 088000 "Glazing."

H. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat.

2.4 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.

C. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

D. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
2. Provide loose stops and moldings on inside of hollow-metal work.
3. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.5 STEEL FINISHES

A. Factory Finish: SDI A250.3.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

2.6 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:

a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
b. At Bottom of Door: 5/8 inch plus or minus 1/32 inch.
c. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.

B. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.2 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 081113

SECTION 081213 - HOLLOW METAL FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes hollow-metal frames.

B. Related Requirements:

1. Section 081510 "Plastic Laminate Faced Wood Doors" for wood doors installed in hollow-metal frames.

1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include elevations, frame profiles, metal thicknesses, preparations for hardware, and other details.

C. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Ceco; 9159 Telecom Drive, Milan, TN 38358; 888-264-7474; http://www.cecodoor.com/en/site/cecodoor/.

B. Curries; 1502 12th St. NW, Mason City, IA 50401; 641-423-1334; http://www.curries.com/en/site/curries/

C. Architect approved equal.

2.2 REGULATORY REQUIREMENTS

A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

2.3 INTERIOR FRAMES

A. Standard-Duty Frames: SDI A250.8, Level 1. At locations indicated in the Door and Frame Schedule.

1. Physical Performance: Level C according to SDI A250.4.
2. Materials: Uncoated, cold-rolled steel sheet, minimum thickness of 0.042 inch.
3. Construction: Face welded.
4. Exposed Finish: Factory.

2.4 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:

2.5 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

B. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

C. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

D. Power-Actuated Fasteners in Concrete: From corrosion-resistant materials.

E. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

F. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing).

G. Glazing: Comply with requirements in Section 088000 "Glazing."

H. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat.

2.6 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
5. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing.
    b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c.
    c. Compression Type: Not less than two anchors in each frame.
    d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

6. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers.

C. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce frames to receive nontemplated, mortised, and surface-mounted hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

D. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
2. Provide fixed frame moldings on outside of exterior and on secure side of interior frames.
3. Provide loose stops and moldings on inside of hollow-metal work.
4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.7 STEEL FINISHES

A. Factory Finish: SDI A250.3.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

2.8 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hollow-Metal Frames: Install hollow-metal frames for doors, borrowed lites, and other openings, of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. At fire-rated openings, install frames according to NFPA 80.
    b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    c. Install frames with removable stops located on secure side of opening.
    d. Install door silencers in frames before grouting.
    e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

    a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
6. In-Place Metal Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
7. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

B. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.2 ADJUSTING AND CLEANING

A. Final Adjustments: Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081213

SECTION 081433 - STILE AND RAIL WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior stile and rail wood doors.
2. Finishing stile and rail wood doors.
3. Fitting stile and rail wood doors to frames and machining for hardware.
4. Prehanging doors in frames.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For stile and rail wood doors. Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and other pertinent data.

C. Samples: Represent typical range of color and grain for each species of veneer and solid lumber required. Finish Sample with same materials proposed for factory-finished doors.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Use only materials that comply with referenced standards and other requirements specified. Assemble exterior doors and sidelites with wet-use adhesives.

2.2 INTERIOR STILE AND RAIL WOOD DOORS

A. Interior Stile and Rail Wood Doors: Interior stock doors complying with the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards," WDMA I.S.6A, "Industry Standard for Architectural Stile and Rail Doors," and with other requirements specified.

1. Manufacturer:
   a. Masonite; Tampa, Florida; 800-663-3667; https://www.masonite.com/index.php.
   b. Architect approved equal.

2. Grade: Premium.
3. Finish: Transparent.
4. Wood Species and Cut for Transparent Finish: Idaho white, lodgepole, ponderosa, or sugar pine, plain sawed/sliced, or Red oak, quarter sawed/sliced stiles and rails, plain sawed/sliced panels. Final Wood species to be selected from manufacturer's full range.
5. Door Construction for Transparent Finish:

    a. Raised-Panel Construction: Veneered, shaped, wood-based panel product with veneer conforming to raised-panel shape.

6. Raised-Panel Thickness: 1-3/4 inches.

7. Raised-Panel Style: 6 panel.

2.3 STILE AND RAIL WOOD DOOR FABRICATION

A. Fabricate stile and rail wood doors in sizes indicated for field fitting.

B. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels unless otherwise indicated:

1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/2 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide not more than 3/8 inch from bottom of door to top of threshold.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.

C. Factory machine doors for hardware that is not surface applied.

D. Prehung Doors: Provide stile and rail doors complete with frames, and hardware.

1. Provide wood door frames that comply with Section 064800 "Wood Frames."
2. Provide hardware that complies with Section 087100 "Door Hardware."

2.4 FINISHING

A. Finish wood doors at factory that are indicated to receive transparent finish.

B. For doors indicated to be [actory finished, comply with the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards," WDMA I.S.6A, "Industry Standard for Architectural Stile and Rail Doors," and with other requirements specified.

C. Transparent Finish:

1. Grade: Premium.

2. Finish: WDMA TR-4 conversion varnish or WDMA TR-6 catalyzed polyurethane.
3. Staining: As selected by Architect from manufacturer's full range.
4. Effect: Open-grain finish.
5. Sheen: Semigloss.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hardware: For installation, see Section 087100 "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.

END OF SECTION 081433

SECTION 081510 - PLASTIC LAMINATE FACED WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Plastic laminate faced flush solid particleboard core and fire-rated mineral core wood doors.

1. For installation in hollow metal, door frames furnished under a separate Section.

B. Products Not Furnished or Installed under This Section:

1. Glass for vision lites.

2. Glazing stops for fire-rated glass.

3. Finish door hardware.

4. Door frames.

1.2 RELATED SECTIONS

A. Section 081213 – Hollow Metal Door Frames

B. Section 087100 – Finish Door Hardware

C. Section 088000 – Glass & Glazing

1.3 REFERENCES

A. Architectural Woodwork Standards as published by the Architectural Woodwork Institute, the Architectural Woodwork Manufacturers Association of Canada, and the Woodwork Institute:

1. AWI Architectural Woodwork Standards; Edition 1.

B. National Fire Protection Association:

1. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.

C. NEMA LD 3 - High Pressure Decorative Laminates.

D. Warnock Hersey:

1. ANSI/UL 10B, Fire Tests of Door Assemblies.

2. NFPA 252, Standard Methods of Fire Tests of Door Assemblies (National Fire Codes, vol. 6).

E. Window and Door Manufacturers Association (WDMA):

1. WWDA I.S.1-A - Architectural Wood Flush Doors.

1.4 SUBMITTALS

A. Product Data: Submit sufficient manufacturer's data to indicate compliance with these specifications, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Installation methods.

B. Shop Drawings: Submit shop drawings coordinated with door frame and hardware requirements.

1. Indicate door core materials and AWI construction type and high pressure decorative laminate selection.

2. Indicate door opening elevations, sizes, types, swings, undercuts required, special bevel, special blocking for hardware, and cut outs for glazing.

3. Indicate plans and elevations, materials, profiles, assembly methods, accessories, hardware, and schedule of finishes.

1.5 QUALITY ASSURANCE

A. Fire-rated Doors: Conform to building code requirements for fire rating including but not limited to:

1. Fire Door Construction: Conform to ASTM E 152 NFPA 252 or UL 10B.

2. Installed Fire-rated Door Assemblies to conform to NFPA 80 for fire-rated class as scheduled.

1.6 DELIVERY, STORAGE AND HANDLING

A. Doors: Deliver packaged individually in plastic bags and/or cardboard cartons.

1. Mark each door on top and bottom rail with opening number used on Shop Drawings.

2. Mark packages with size, swing, and door tag or opening number.

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

1. Maintain plastic bags in place during on site handling and erection.

2. Upon delivery open cartons and carefully inspect all doors for humidity damage.

3. Contact manufacturer if there are questions or problems.

1.7 PROJECT CONDITIONS

A. Doors are man-made wood fiber products and are subject to the effects of humidity and temperature. Do not use in high humidity areas.

B. Environmental Limitations:

1. Do not deliver or install doors until building is enclosed, wet work is complete, and HVAC system is operating.

2. To ensure product performance, a temperature range of 60°-80°F and a humidity range of 35-55% must be maintained during storage, installation and product life cycle.

1.8 COORDINATION

A. Coordinate Work with door frame and door submittals, hardware fabrication and installation.

1.9 WARRANTY

A. Standard Warranty: products shall be warranted to be free from defects for life of installation under normal use. Adhere to manufacturer's requirements to avoid voiding warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Marlite; 202 Harger Street, Dover, OH 44622; 800-377-1221; www.marlite.com.

B. Architect approved equal.

2.2 DOORS

A. General: Flush wood doors faced with NEMA LD 3, Grade HGS 0.048 inch thick high pressure plastic laminate:

1. Total Thickness: 1-3/4 inches.

2. Facing selection: High pressure plastic laminate selected from manufacturer's standard line of solids, patterns or wood grains.

3. Edge Banding: Matching facing laminate.

B. Non-Fire-Rated Solid Core Doors:

1. AWI Type PC-HDPL-5 and conforming to WWDA I.S.1-A:

a. Particleboard Core - average 30 pcf density core, complying with ANSI A208.1 Grade LD-1.

2. Stiles and Rails: Structural composite lumber:

a. Stile and Top and Bottom Rail Widths - 1-3/8 inches before trimming.

3. Adhesive: National Casein CL1809HVJ.

4. Provide factory cutouts for lights and black wood stops.

C. 20-Minute Fire Doors:

1. Fire Rating: ITS (Warnock Hersey) 20-minute label.

2. AWI Type PC-HDPL-5 FD1/3 and conforming to WWDA I.S.1-A.

a. Particleboard Core - Average 30 pcf density core complying with ANSI A208.1 Grade LD-1.

3. Stiles and Rails: Structural composite lumber.

a. Stile and Top and Bottom Rail Widths - 1-3/8 inches (35mm) before trimming.

4. Adhesive: Type I waterproof H.B. Fuller XR2859.

5. Provide factory cutouts for lights. Stops are specified in separate section.

D. Fire Doors Rated Over 20 Minutes:

1. Fire Rating:

a. ITS (Warnock Hersey) label in ratings specified on drawings.

2. AWI Type FD-HDPL-5:

a. Core: Non-asbestos mineral composition.

b. Cross-banding: 1/10 inch thick 3-ply wood cross-banding.

3. Stiles and Rails: Fire retardant treated structural composite lumber.

   a. Stiles, 1-3/8 inches before trimming.

   b. Rails:

      1) Top 1” width.

      2) Bottom 2” width.

4. Adhesive: Type I waterproof H.B. Fuller XR2859.

5. Provide factory cutouts for lights. Stops are specified in separate section.

2.3 FABRICATION

A. Doors: Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:

   1. Comply with clearance requirements of referenced quality standard for non rated door fitting.

   2. Comply with requirements in NFPA 80 for fire-rated doors.

   3. Factory machine doors for hardware that is not surface applied.

B. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.

C. Hardware Preparation: Prepare doors and frames for hardware specified in Section 087100.

D. Refinish field cut panel edges in accordance with manufacturer’s instruction before installation.

2.4 SOURCE QUALITY CONTROL

A. Allowable Face Plane Tolerance (Telegraphing): Variation in surface of face not more than 1/100 inch from true plane in any 3 inch span.

B. Allowable Warp Tolerance: Bow, cup, and twist not more than 1/4 inch in any 42 inches wide by 84 inches high area, or less, if door dimensions are smaller; excluding doors less than 1-3/4 inch thick that are over 36 inches wide or 84 inches high and doors with cutouts exceeding manufacturer's specified limits.

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.

B. Verify wall thickness does not exceed manufacturer's recommended tolerances of specified throat size.

3.2 INSTALLATION

A. Install all materials in strict accordance with the manufacturer's installation instructions with doors in frames plumb and true, without rack, and so doors do not fall open or closed simply due to gravity.

1. Securely anchor door frames in straight, plumb, and level condition without distortion of frames in accordance with final shop drawings. Final adjustments shall be made for proper door operation. Brace frames in position securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.

2. Install doors with all hardware specified.

3.3 FIELD QUALITY CONTROL

A. Installation Tolerances: Install non fire-rated doors with not more than 1/8" clearance at top and sides, 1/4" at bottom.

3.4 ADJUSTING, CLEANING AND PROTECTION

A. Operation: Adjust door and frame for free operation without binding, rack, or warp. Re-hang or replace doors that do not swing or operate freely.

B. Clean and remove dust and other foreign matter from panel and framing surfaces. Clean finishes in accordance with manufacturer's instructions.

C. Protect installed products until completion of project.

END OF SECTION 081510

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes access doors and frames for walls.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each type of access door and frame and for each finish specified.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND FRAMES

A. Flush Access Doors with Exposed Flanges:

1. Manufacturers:

    a. Model DSC-214M by Karp Associates, Inc.; 260 Spagnoli Road, Melville, NY 11747; 631-768-8300; http://karpinc.com/.
    b. Series BNT by Babcock-Davis; 9300 73rd Avenue North, Brooklyn Park, MN 55428; 1-888-412-3726; http://www.babcockdavis.com/
    c. Architect approved equal.

2. Description: Face of door flush with frame, with exposed flange and concealed hinge.
3. Locations: Wall.
4. Uncoated Steel Sheet for Door: 14 gage, factory finished.
5. Frame Material: 16 gage steel.
6. Latch and Lock: Cam latch, key operated Prepared for mortise cylinder with interior release.

2.2 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

C. Frame Anchors: Same material as door face.

D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.3 FABRICATION

A. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

B. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.

C. Latch and Lock Hardware:

1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.
2. Keys: Furnish two keys per lock and key all locks alike.

2.4 FINISHES

A. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Factory Finished: Apply manufacturer's standard baked-enamel or powder-coat finish immediately after cleaning and pretreating, with minimum dry-film thickness of 1 mil for topcoat.

a. Color: As selected by Architect from full range of industry colors.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 083113

SECTION 083313 - COILING COUNTER DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Counter doors.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for miscellaneous steel supports.

1.2 ACTION SUBMITTALS

A. Product Data: For each type and size of coiling counter door and accessory.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

1. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
2. Show locations of controls, locking devices, detectors or replaceable fusible links, and other accessories.
3. Include diagrams for power, signal, and control wiring.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

PART 2 - PRODUCTS

2.1 COUNTER DOOR ASSEMBLY

A. Counter Door: Coiling counter door formed with curtain of interlocking metal slats.

1. Series 651 by Overhead Door Company; 533 Riverside Industrial Pkwy, Portland, ME 04103; (207) 797-6734; http://www.overheaddoor.com/, or architect approved equal.

B. Door Curtain Material: Stainless steel.

C. Door Curtain Slats: Flat profile slats of 1-1/2-inch center-to-center height.

D. Bottom Bar: Manufacturer's standard continuous channel or tubular shape, fabricated stainless steel and finished to match door.

E. Curtain Jamb Guides: Stainless steel with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.

F. Hood: Match curtain material and finish.

1. Mounting: Face of wall.

G. Sill Configuration: No sill.

H. Locking Devices: Equip door with locking device assembly.

1. Locking Device Assembly: Single-jamb side locking bars, operable from inside with cylinder lock.

I. Manual Door Operator: Push-up operation.

J. Curtain Accessories: Equip door with push/pull handles.

K. Door Finish:
1. Stainless-Steel Finish: No. 4 (polished directional satin).
2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.2 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate coiling counter-door curtain of interlocking metal slats in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
1. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face.

B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

2.3 HOODS

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

2.4 LOCKING DEVICES

A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

1. Lock Cylinders: Cylinders standard with manufacturer and keyed to building keying system.
2. Keys: Two for each cylinder.

2.5 CURTAIN ACCESSORIES

A. Astragal: Equip each door bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.

B. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.

2.6 COUNTERBALANCING MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.7 MANUAL DOOR OPERATORS

A. General: Equip door with manual door operator by door manufacturer.

B. Push-up Door Operation: Design counterbalance mechanism so that required lift or pull for door operation does not exceed 25 lbf.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install coiling counter doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion. Lubricate bearings and sliding parts as recommended by manufacturer. Adjust seals to provide tight fit around entire perimeter.

3.2 DEMONSTRATION

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

END OF SECTION 083313

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section Includes:

1. Section Architectural aluminum storefront systems, including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of storefront units:

   a. 2 inch x 4-1/2 inch nominal dimension; Thermal; Front, Center, Back, Multi-Plane, Structural Silicone or Weatherseal Glazed (Type B); Screw Spline, Shear Block, Stick or Punched Opening Fabrication.

2. Thermally Broken Aluminum Entrances, glass and glazing, and door hardware and components:

   a. Thermal Entrance; Narrow stile, 4-1/4 inch vertical face dimension, 2-1/4 depth, moderate traffic applications.

B. Related Sections:

1. 072700 “Air Barriers”.

2. 079200 “Joint Sealants”.

3. 085113 “Aluminum Windows”.

4. 087000 “Hardware”.

5. 088000 “Glazing”.

1.3 DEFINITIONS

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

1.4 PERFORMANCE REQUIREMENTS

A. Storefront System Performance Requirements:

1. Wind loads: Provide storefront system; include anchorage, capable of withstanding wind load design pressures of 25 lbs./sq. ft. Zone 4 and 30 lbs./sq. ft. Zone 5. The design pressures are based on the International Building Code, ASCE 7-05; 2009 Edition.

2. Air Infiltration: The test specimen shall be tested in accordance with ASTM E 283. Air infiltration rate shall not exceed 0.06 cfm/ft^2 at a static air pressure differential of 6.24 psf.

3. Water Resistance: The test specimen shall be tested in accordance with ASTM E 331. There shall be no leakage at a minimum static air pressure differential of 8 psf (383 Pa) as defined in AAMA 501.

4. Uniform Load: A static air design load of 35 psf (1680 Pa) shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.

5. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than:

   a. Glass to Exterior – 0.47 (low-e) or 0.61 (clear).

   b. Glass to Center – 0.44 (low-e) or 0.61 (clear.

   c. Glass to Interior – 0.41 (low-e) or 0.56 (clear).

   d. Project Specific 0.45 BTU/hr/ft^2/°F.

6. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than:

   a. Glass to Exterior – 70_{frame} and 69_{glass} (low-e) or 69_{frame} and 58_{glass} (clear).

   b. Glass to Center – 62_{frame} and 68_{glass} (low-e) or 63_{frame} and 56_{glass} (clear).

   c. Glass to Interior – 56_{frame} and 67_{glass} (low-e) or 54_{frame} and 58_{glass} (clear).

7. Windborne-Debris-Impact Resistance Performance: Shall be tested in accordance with ASTM E 1886, information in ASTM E 1996 and TAS 201/203.

B. Aluminium-Framed Entrance Performance Requirements:

1. Wind loads: Provide entrance system; include anchorage, capable of withstanding wind load design pressures of 25 lbs./sq. ft. Zone 4 and 30 lbs./sq. ft. Zone 5. The design pressures are based on the International Building Code, ASCE 7-05; 2009 Edition.

2. Air Infiltration: For single acting offset pivot or butt hung entrances in the closed and locked position, the test specimen shall be tested in accordance with ASTM E 283 at a pressure differential of 1.57 psf (75 Pa) for pairs of doors. A single 3'0" x 7'0" entrance

door and frame shall not exceed 1.0 cfm/ft^2. A pair of 6'0" x 7'0" entrance doors and frame shall not exceed 1.0 cfm per square foot.

3. Uniform Load: A static air design load of 20 psf (958 Pa) shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 for typical application or L/180 for Small-Missile and Large-Missile impact, of the span of any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.

4. Blast Mitigation Performance: Shall be tested or proven through analysis to meet ASTM F1642, GSA-TS01, and UFC 04-010.01 performance criteria.

5. Forced Entry: Tested in accordance with AAMA 1304.

6. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than:

   a. Insulated Glass – 0.43 (low-e) or Project Specific 0.45 BTU/hr/ft^2/°F.

7. Solar Heat Gain Coefficient: Glazed thermally broken aluminum door and frame shall have a solar heat gain coefficient of no greater than 0.4 as determined according to NFRC 200.

8. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than:

   a. Insulated Glass – 57_{frame} and 71_{glass} (low-e).

9. Condensation Resistance (I): When tested to CSA A440, the condensation resistance factor shall not be less than:

   a. Insulated Glass – 48_{frame} and 69_{glass} (low-e).

10. Sound Transmission Class (STC) and Outdoor-Indoor Transmission Class (OITC): When tested in accordance with ASTM E 90, the STC and OITC ratings shall not be less than:

    a. 32 (STC) and 28 (OITC).

1.5 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, hardware, finishes, and installation instructions for each type of aluminum-framed storefront system indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, and attachments to other work, operational clearances and installation details.

C. Samples for Initial Selection: For units with factory-applied color finishes including samples of hardware and accessories involving color selection.

D. Samples for Verification: For aluminum-framed storefront system and components required.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for each type of aluminum-framed storefront.

F. Other Action Submittals:

1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An installer which has had successful experience with installation of the same or similar units required for the project and other projects of similar size and scope.

B. Manufacturer Qualifications: A manufacturer capable of providing aluminum-framed storefront system that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.

C. Source Limitations: Obtain aluminum-framed storefront system through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum-framed storefront system and are based on the specific system indicated. Refer to Division 01 Section “Product Requirements”. Do not modify size and dimensional requirements.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup for type(s) of storefront elevation(s) indicated, in location(s) shown on Drawings.

F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section “Project Management and Coordination”.

G. Structural-Sealant Glazing: Comply with ASTM C 1401, “Guide for Structural Sealant Glazing” for design and installation of structural-sealant-glazed systems.

H. Structural-Sealant Joints: Design reviewed and approved by structural-sealant manufacturer.

1.7 PROJECT CONDITIONS

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

1.8 WARRANTY

A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty.

1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product:

1. Kawneer Company Inc.; 555 Guthridge Ct, Technology Park/Atlanta, Norcross, GA 30092; 1-700-449-555; http://www.kawneer.com/kawneer/north_america/en/info_page/home.asp.

2. Trifab™ 451T (Thermal) Framing System:

a. System Dimensions: 2 inch x 4-1/2 inch.

b. Glass: Center

3. AA425 Thermal Entrance:

a. Verticale Stile: 4-1/4 inches.

b. Top Rail: 4-1/4 inches.

c. Bottom Rail: 6-1/2 inches.

d. Major portions of the door members to be 0.125 inch nomial in thickness and glazing molding to be 0.05 inch thick.

e. Glazing gaskets shall be either EPDM elastomeric extrusions or a thermoplastic elastomer.

f. Provide adjustable glass jacks to help center the glass in the door opening.

B. Substitutions: Refer to Substitutions Section 012500 for procedures and submission requirements

2.2 MATERIALS

A. Aluminum Extrusions: Alloy and temper recommended by aluminum storefront manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070 inch wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 alloy and temper.

B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum framing members, trim hardware, anchors, and other components.

C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

E. Sealant: For sealants required within fabricated storefront system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

F. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data.

G. Slide-In Type Weather Strippling: Provide woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric. Comply with AAMA 701/702.

1. Weather Seals: Provide weather stripping with integral barrier fin or fins of semi-rigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 701/702.

2.3 STOREFRONT FRAMING SYSTEM

A. Thermal Barrier (Trifab™ VG 451T):

1. Kawneer IsoLock™ Thermal Break with a ¼ inch separation consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections.

a. Thermal Break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposes shall be stainless steel.

D. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action

E. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

F. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle storefront material and components to avoid damage. Protect storefront material against damage from elements, construction activities, and other hazards before, during and after storefront installation.

2.4 GLAZING SYSTEMS

A. Glazing: As specified in Division 08 Section “Glazing”.

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, extruded EPDM rubber.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

E. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:

1. Structural Sealant: ASTM C 1184, single-component neutral-curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by a structural-sealant manufacturer for use in aluminum-framed systems indicated.

   a. Color: Black

2. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.

   a. Color: Matching structural sealant.

2.5 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: As specified in Division 084113 Section “Aluminum-Framed Entrances and Storefronts”.

B. Entrance Door Hardware: As specified in Division 084113 Section “Door Hardware”.

2.6 HARDWARE

A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum-framed entrance doors.

B. Standard Hardware:

1. Weather-stripping:

a. Meeting stiles on pairs of doors shall be equipped with two lines of weather-stripping utilizing wool pile with polymeric fin.
b. The door weathering on a single acting offset pivot or butt hung door and frame (single or pairs) shall be comprised of a thermoplastic elastomer weathering on a tubular shape with a semi-rigid polymeric backing and a wool pile with polymeric fin.

2. Sill Sweep Strips: EPDM blade gasket sweep strip in an aluminum extrusion applied to the interior exposed surface of the bottom rail with concealed fasteners (Necessary to meet specified performance tests).
3. Threshold: Extruded aluminum, thermally broken, with ribbed surface.

C. Refer to Section 087000 “Door Hardware” for additional entrance door hardware requirements.

2.7 ACCESSORY MATERIALS

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section “Joint Sealants”.

B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30 mil thickness per coat.

2.8 FABRICATION

A. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.

2. Accurately fit joints; make joints flush, hairline and weatherproof.

3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.

4. Physical and thermal isolation of glazing from framing members.

5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.

6. Provisions for field replacement of glazing.

7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

B. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

C. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.

D. Storefront Framing: Fabricate components for assembly using manufacturer's standard installation instructions.

E. Fabricate thermally broken aluminum-framed entrance doors in sizes indicated. Include a complete system for assembling components and doors.

F. Fabricate thermally broken aluminum-framed entrance doors that are reglazable without dismantling perimeter framing.

1. Door corner construction shall consist of mechanical clip fastening, SIGMA deep penetration plug welds and 1 inch long fillet welds inside and outside and outside of all four corners. Glazing stops shall be hook-in type with EPDM glazing gaskets reinforced with non-stretchable cord.

2. Accurately fit and secure joints and corners. Make joints hairline in appearance.

3. Prepare components with internal reinforcement for door hardware.

4. Arrange fasteners and attachments to conceal from view.

G. Weather-stripping: Provide weather-stripping locked into extruded grooves in door panels or frames as indicated on manufacturers drawings and details.

H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.9 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Factory Finishing:

1. Kawneer Permanodic™ AA-M10C21A44 / AA-M45C22A44, AAMA 611, Architectural Class I Color Anodic Coating.

    a. Color: To be selected from Architects full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight framed aluminum storefront system installation.

    1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.

    2. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.

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

3.2 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing aluminum-framed storefront system, accessories, and other components.

B. Install aluminum-framed storefront system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.

D. Install aluminum-framed storefront system and components to drain condensation, water penetrating joints, and moisture migrating within aluminum-framed storefront to the exterior.

E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

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

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Clean aluminum surfaces immediately after installing aluminum-framed storefronts. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

B. Clean glass immediately after installation. Comply with glass manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION 084113

SECTION 084413 GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Architectural aluminum curtain wall systems, including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of curtain wall framing.

1. Types of aluminum curtain wall include:

a. 2-1/2", outside glazed pressure plate format.
1) System depth: 7-1/2 inches for 1 inch insulating glazing.

B. Related Sections:

1. 072700 “Air Barriers”
2. 079200 “Joint Sealants”
3. 088000 “Glazing”

1.3 DEFINITIONS

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

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Glazed aluminum curtain walls shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads. Failure also includes the following:

a. Thermal stresses transferring to building structure.
b. Glass breakage.
c. Loosening or weakening of fasteners, attachments, and other components.
d. Failure of operating units.

B. Delegated Design: Design glazed aluminum curtain walls, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Wind loads: Provide Curtain Wall system; include anchorage, capable of withstanding wind load design pressures of 25 lbs./sq. ft. Zone 4 and 30 lbs./sq. ft. Zone 5. The design pressures are based on the International Building Code, ASCE 7-05; 2009 Edition.

D. Air Infiltration: The test specimen shall be tested in accordance with ASTM E 283. Air infiltration rate shall not exceed 0.06 cfm/ft^2 at a static air pressure differential of 6.24 psf (300 Pa).

E. Water Resistance, (static): The test specimen shall be tested in accordance with ASTM E 331. There shall be no leakage at a static air pressure differential of 12 psf (575 Pa) as defined in AAMA 501.

F. Water Resistance, (dynamic): The test specimen shall be tested in accordance with AAMA 501.1. There shall be no leakage at an air pressure differential of 12 psf (575 Pa) as defined in AAMA 501.

G. Uniform Load: A static air design load of 40 psf (1915 Pa) shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member at design load. At structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.

H. Seismic: When tested to AAMA 501.4, system must meet design displacement of 0.010 x the story height and ultimate displacement of 1.5 x the design displacement.

I. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than: 0.66 (clear) or Project Specific 0.45 BTU/hr/ft^2/°F.

J. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than 66 frame and 60 glass (clear).

K. Sound Transmission Loss: When tested to ASTM E90 and ASTM E1425, the Sound Transmission Class (STC) and Outdoor/Indoor Transmission Class (OITC) shall not be less than STC 31 or OITC 26 based upon 1" insulating glass (1/4", 1/2" AS, 1/4").

L. Windborne-Debris-Impact Resistance Performance: Shall be tested in accordance with ASTM E1886, information in ASTM E1996, and TAS 201/203.

M. Blast Mitigation performance: Shall be tested or proven through analysis to meet ASTM F1642, GSA-TS01, and UFC 04-010.01 performance criteria.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For glazed aluminum curtain walls. Include plans, elevations, sections, full-size details, and attachments to other work.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified preconstruction testing agency, for glazed aluminum curtain walls, indicating compliance with performance requirements.

F. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed curtain wall systems, made from 12" (304.8 mm) lengths of full-size components and showing details of the following:

1. Joinery
2. Glazing

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Installer who has had successful experience with installation of the same or similar systems required for the project and other projects of similar size and scope.

B. Manufacturer Qualifications: A manufacturer capable of fabricating glazed aluminum curtain walls that meet or exceed performance requirements.

C. Source Limitations: Obtain aluminum curtain wall system through one source from a single manufacturer.

D. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockups for type(s) of curtain wall elevation(s) indicated, in location(s) shown on Drawings.

F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section “Project Management and Coordination”.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for glazed aluminum curtain walls by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 WARRANTY

A. Manufacturer’s Warranty: Submit, for Owner’s acceptance, manufacturer’s standard warranty.

1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product:

1. Kawneer Company Inc.; 555 Guthridge Ct, Technology Park/Atlanta, Norcross, GA 30092; 1-700-449-555; http://www.kawneer.com/kawneer/north_america/en/info_page/home.asp.

a. 1600 Wall System™1 Curtain Wall – 2-1/2", outside glazed pressure plate format.
1) System depth: 7-1/2" for 1" insulating glazing.

B. Substitutions: Refer to Substitutions Section 012500 for procedures and submission requirements.

2.2 MATERIALS

A. Aluminum Extrusions: Alloy and temper recommended by glazed aluminum curtain wall manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070 thick wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 alloy and temper.

B. Aluminum sheet alloy: Shall meet the requirements of ASTM B209.

C. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim hardware, anchors, and other components.

D. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

E. Pressure Plate: Pressure plate shall be aluminum and fastened to the mullion with stainless steel screws.

F. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

G. Sealant: For sealants required within fabricated curtain wall system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

H. Thermal Barrier: Thermal separator shall be extruded of a silicone compatible elastomer that provides a minimum 1/4 inch separation.

I. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of glazed curtain wall members are nominal and in compliance with AA Aluminum Standards and Data.

2.3 CURTAIN WALL FRAMING

A. Framing Members: Manufacturer's standard extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Glazing System: 4 sided captured.
2. Glazing Plane: Front.

B. Glass: 1 inch insulating glass.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

D. Framing Sealants: Shall be suitable for glazed aluminum curtain wall as recommended by sealant manufacturer.

E. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposed shall be stainless steel.

F. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

G. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

H. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle curtain wall material and components to avoid damage. Protect curtain wall material against damage from elements, construction activities, and other hazards before, during and after installation.

2.4 GLAZING

A. Glazing: Comply with Division 08 Section “Glazing”.

B. Glazing Gaskets: Gaskets to meet the requirements of ASTM C864.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

E. Glazing Sealants: As recommended by manufacturer for joint type.

2.5 ACCESSORY MATERIALS

A. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

2.6 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from exterior.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
7. Internal weeping system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.

C. Curtain Wall Framing: Fabricate components for assembly using shear block system following manufacturer's standard installation instructions.

D. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.7 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Factory Finishing:

1. Kawneer Permanodic™ AA-M10C21A44 / AA-M45C22A44, AAMA 611, Architectural Class I Color Anodic Coating
   a. Color: To be selected from Architect's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, 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. General: Install curtain wall systems plumb, level, and true to line, without warp or rack of frames with manufacturer's prescribed tolerances and installation instructions. Provide support and anchor in place.

1. Dissimilar Materials: Provide separation of aluminum materials from sources of corrosion or electrolytic action contact points.

2. Glazing: Glass shall be outside glazed and held in place with extruded aluminum pressure plates anchored to the mullion using stainless steel fasteners spaced no greater than 9 inches on center.

3. Water Drainage: Each light of glass shall be compartmentalized using joint plugs and silicone sealant to divert water to the horizontal weep locations. Weep holes shall be located in the horizontal pressure plates and covers to divert water to the exterior of the building.

B. Related Products Installation Requirements:

1. Sealants (Perimeter): Refer to Joint Treatment (Sealants) Section.

2. Glass: Refer to Glass and Glazing Section.

   a. Reference: ANSI Z97.1, CPSC 16 CFR 1201 and GANA Glazing Manual.

3.3 FIELD QUALITY CONTROL

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

3.4 ADJUSTING, CLEANING AND PROTECTION

A. Protection: Protect installed product's finish surfaces from damage during construction. Protect aluminum curtain wall system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.

B. Cleaning: Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION 084413

SECTION 085113 ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes: Architectural aluminum windows including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of window units.

1. Types of aluminum windows include:

a. Project-out casement windows.

b. 2-13/16" system depth (1" Infill).

c. (P-HC40) Project-Out Window.

B. Related Sections:

1. 072700 “Air Barriers”

2. 079200 “Joint Sealants”

3. 084113 “Aluminum-Framed Entrances and Storefronts”

1.3 DEFINITIONS

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

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Aluminum-framed window system shall withstand the effects of the following performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Window Performance Requirements:

1. Performance Requirements: Provide aluminum windows of performance indicated that comply with AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS).

2. Air Infiltration: The test specimen shall be tested in accordance with ASTM E283 at a minimum size of 60" x 36" Project-Out. Air infiltration rate shall not exceed 0.10 cfm/ft^2 at a static air pressure differential of 6.24 psf (300 Pa).

3. Water Resistance: The test specimen shall be tested in accordance with ASTM E547 and ASTM E331 at a minimum size of 60" x 36" Project-Out. There shall be no leakage as defined in the test method at a static air pressure differential of 15 psf (720 Pa).

4. Uniform Load Deflection: A minimum static air pressure difference of (40 psf (1915 Pa)(2 Locks)) or (70 psf (3352 Pa)(3 Locks)) shall be applied in the positive and negative direction in accordance with ASTM E330. There shall be no deflection in excess of L/175 of the span of any framing member.

5. Uniform Load Structural: A minimum static air pressure difference of (60 psf (2873 Pa)(2 Locks)) or (105 psf (5027)(3 Locks)) shall be applied in the positive and negative direction in accordance with ASTM E330. The unit shall be evaluated after each load with permanent set not to exceed 0.2% of span length.

6. Component Testing: Window components shall be tested in accordance with procedures described in AAMA/WDMA/CSA 101/I.S.2/A440 and AAMA 910.

7. Thermal Transmittance (U-Factor): When tested to AAMA Specification 1503, the thermal transmittance (U-Factor) shall not be more than;

   a. Project-Out Windows: 0.68 BTU/hr/ft^2/°F. (NFRC – 0.62) or 0.45 BTU/hr/sf/°F per AAMA 507 or NFRC100 when using project specified glass.

8. Condensation Resistance Test (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, the condensation resistance factor (CFR) shall not be less than; Frame 51, Glass 54.

9. Temperature Index (I): Provide aluminum windows tested for thermal performance according to CSA-A440 with a Temperature Index (I) not less than: 47.7.

10. Forced Entry Resistance: All windows shall conform to ASTM F588, Grade 10.

11. Windborne-Debris-Impact-Resistance Performance: Shall be tested in accordance with ASTM E 1886 and information in ASTM E 1996 and TAS 201/203.

1.5 SUBMITTALS

A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of aluminum window indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances and installation details.

C. Samples for Initial Selection: For units with factory-applied color finishes including samples of hardware and accessories involving color selection.

D. Samples for Verification: For aluminum windows and components required.

E. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for each type, class, grade, and size of aluminum window. Test results based on use of downsized test units will not be accepted.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An installer which has had successful experiences with installation of the same or similar units required for this project and other projects of similar size and scope.

B. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.

C. Source Limitations: Obtain aluminum windows through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum windows and are based on the specific system indicated. Refer to Division 01 Section “Product Requirements.” Do not modify size and dimensional requirements.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup for type(s) of window(s) indicated, in location(s) shown on Drawings.

F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section “Project Management and Coordination.”

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify aluminum window openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 WARRANTY

A. Manufacturer’s Warranty: Submit, for Owner’s acceptance, manufacturer’s standard warranty.

1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product:

1. Kawneer Company Inc.; 555 Guthridge Ct, Technology Park/Atlanta, Norcross, GA 30092; 1-700-449-555; http://www.kawneer.com/kawneer/north_america/en/info_page/home.asp.

2. GLASSvent™ Windows (Project-Out).

3. 2-13/16" system depth (1" Infill).

4. P-HC40 Project-Out Window.

B. Substitutions: Refer to Substitutions Section 012500 for procedures and submission requirements.

2.2 MATERIALS

A. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.090" wall thickness at any location for the main frame and sash members.

B. Thermal Barrier: The thermal barrier shall be Kawneer consisting of low conductive polymer full depth of infill.

C. Fasteners: Nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.

D. Anchors: Nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

E. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

2.3 GLAZING

A. Glass and Glazing Materials: Refer to Division 08 Section “Glazing” for glass units and glazing requirements applicable for four sided structural silicone glazed aluminum window units.

B. Glazing System: Glazing method shall be four sided structural silicone glazed in accordance with manufacturer’s standards.

2.4 HARDWARE

A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum windows, and sized to accommodate sash weight and dimensions.

B. Project-Out: Provide the following operating hardware:

1. Stainless Steel 4-Bar Hinges

2. Cast White Bronze Cam Locking Handles

2.5 ACCESSORIES

A. Spacers, Setting Blocks, Gaskets, and Bond Breakers: Manufacturer's standard permanent, non-migrating types in hardness recommended by manufacturer, compatible with sealants, and suitable for system performance requirements.

B. Framing system gaskets, sealants, and joint fillers as recommended by manufacturer for joint type.

C. Sealants and joint fillers for joints at perimeter of window system as specified in Division 7 Section “Joint Sealants”.

D. Optional Insect Screens: Extruded aluminum frames, 6063-T6 alloy and temper, joined at corners: 18 x 16 mesh fiberglass screen cloth; frames finished to match aluminum windows; splines shall be extruded vinyl, removable to permit rescreening.

2.6 FABRICATION

A. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.

2. Accurately fit joints; make joints flush, hairline and weatherproof.

3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.

4. Physical and thermal isolation of glazing from framing members.

5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.

6. Provisions for field replacement of glazing.

7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

B. Window Vent and/or Vent Frame Joinery: Mitered and Mechanically clipped and/or staked. Factory sealed vent and /or vent frame and corner joints.

C. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

2.7 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Factory Finishing:

1. Kawneer Permanodic™ AA-M10C21A44 / AA-M45C22A44, AAMA 611, Architectural Class I Color Anodic Coating.

a. Color: To be selected from Manufacturers full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight window installation.

1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.

2. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.

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

3.2 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.

B. Install aluminum framed window system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.

D. Install aluminum framed window system and components to drain condensation, water penetrating joints, and moisture migrating within system to the exterior.

E. Separate aluminum from dissimilar materials to prevent corrosion or electrolytic action at points of contact.

3.3 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating sashes, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weather tight closure. Lubricate hardware and moving parts.

B. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

C. Clean glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

E. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

END OF SECTION 085113

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Mechanical door hardware for the following:

a. Swinging doors.
b. Bi-fold doors.

2. Electrified door hardware.

B. Products furnished, but not installed, under this Section include the products listed below. Coordinating and scheduling the purchase and delivery of these products remain requirements of this Section.

1. Exterior door thresholds and weather stripping to be installed under other Sections.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Details of electrified door hardware.

C. Other Action Submittals:

1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

a. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
b. Content: Include the following information:

1) Identification number, location, hand, fire rating, size, and material of each door and frame.
2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.

3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
4) Description of electrified door hardware sequences of operation and interfaces with other building control systems.

2. Keying Schedule: Prepared by or under the supervision of Installer, detailing Owner's final keying instructions for locks.

1.3 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.

B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as follows:

1. For door hardware, an Architectural Hardware Consultant (AHC) who is also an Electrified Hardware Consultant (EHC).

C. Source Limitations: Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

D. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C, unless otherwise indicated.

E. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

F. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

G. Accessibility Requirements: Comply with applicable provisions in the DOJ's 2010 ADA Standards for Accessible Design and ICC A117.1 for door hardware on doors in an accessible route.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
2. Comply with the following maximum opening-force requirements:

    a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
    b. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
4. Closers: Adjust door and gate closer sweep periods so that, from an open position of 90 degrees, the time required to move the door to a position of 12 degrees from the latch is 5 seconds minimum.
5. Spring Hinges: Adjust door and gate spring hinges so that, from an open position of 70 degrees, the time required to move the door to the closed position is 1.5 seconds minimum.

H. Keying Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver keys to Owner by registered mail or overnight package service.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.

    a. Exit Devices: Two years from date of Substantial Completion.
    b. Manual Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Provide door hardware for each door as scheduled on Drawings to comply with requirements in this Section.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products equivalent in function and comparable in quality to named products.
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in hardware schedule located on Drawings. Products are identified by using door hardware designations, as follows:

1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.
2. References to BHMA Designations: Provide products complying with these designations and requirements for description, quality, and function.

2.2 HINGES

A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.

1. Basis of Design Product: Model #3CB1HW by Ives-Allegion; 888-758-9823; http://us.allegion.com/brands/ives/pages/default.aspx.

    a. Refer to Section 012500 “Substitution Procedures” for substitution requirements”.

2. 3 knuckle, concealed bearing full mortise hinge.

2.3 SELF-CLOSING HINGES

A. Self-Closing Hinges: BHMA A156.17.

1. Basis of Design Product: Model #3SP1 by Ives-Allegion; 888-758-9823; http://us.allegion.com/brands/ives/pages/default.aspx.

    a. Refer to Section 012500 “Substitution Procedures” for substitution requirements”.

2. 3 knuckle, spring full mortise hinge.

2.4 MECHANICAL LOCKS AND LATCHES

A. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.
3. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.

B. Bored Locks: BHMA A156.2; Grade 1; Series 4000.

1. Basis of Design Product: ND Series by Schlage-Allegion; 888-758-9823; http://us.allegion.com/brands/ives/pages/default.aspx.

a. Refer to Section 012500 “Substitution Procedures” for substitution requirements”.

2. Lever Designs:

a. Typical: Rhodes.

b. Interior apartment doors: Athens

3. Finish: Satin Chrome Plated.

2.5 AUXILIARY LOCKS

A. Bored Auxiliary Locks: BHMA A156.5: Grade 1; with strike that suits frame.

1. Basis of Design Product: Degree Key System by Sargent; 100 Sargent Drive, P.O. Box 9725, New Haven, CT 06536-0915; 800-727-5477; http://www.sargentlock.com/

a. Refer to Section 012500 “Substitution Procedures” for substitution requirements”.

2.6 DEAD BOLTS

A. Dead Bolts: BHMA A156.5, Grade 1.

1. Basis of Design Product: Model #B660P by Schlage-Allegion; 888-758-9823; http://us.allegion.com/brands/ives/pages/default.aspx.

    a. Refer to Section 012500 “Substitution Procedures” for substitution requirements”.

2. Finish: Satin Chrome Plated.

2.7 EXIT DEVICES AND AUXILIARY ITEMS

A. Exit Devices and Auxiliary Items (Flush Wood Doors): BHMA A156.3.

1. Basis of Design Product: 98/99 Series by Von Duprin-Allegion; 888-758-9823; http://us.allegion.com/brands/ives/pages/default.aspx.

    a. Refer to Section 012500 “Substitution Procedures” for substitution requirements”.

2. Lever Style: 06 Lever.
3. Standard Single Door Strike: Model #299.

B. Exit Devices and Auxiliary Items (Full Glazed Doors): BHMA A156.3.

1. Basis of Design Product: 9400 Series by Sargent; 100 Sargent Drive, P.O. Box 9725, New Haven, CT 06536-0915; 800-727-5477; http://www.sargentlock.com/

    a. Refer to Section 012500 “Substitution Procedures” for substitution requirements”.

2. Night Latch: Standard.
3. Door Pull: Model #862.
4. Finish: Satin Stainless Steel.

2.8 LOCK CYLINDERS

A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.

1. Manufacturer: Same manufacturer as for locking devices.

B. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.

C. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

2.9 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference.

1. Existing System:

a. Master key or grand master key locks to Owner's existing system or re-key Owner's existing master key system into new keying system. Coordinate final keying system with Owner.

B. Keys: Nickel silver or Brass.

1. Quantity: In addition to one extra key blank for each lock, provide the following:

a. Cylinder Change Keys: Three.
b. Master Keys: Five.

2.10 OPERATING TRIM

A. Operating Trim: BHMA A156.6; stainless steel, unless otherwise indicated.

1. Basis of Design Product: Pull and Plates by Ives-Allegion; 888-758-9823; http://us.allegion.com/brands/ives/pages/default.aspx.

a. Refer to Section 012500 “Substitution Procedures” for substitution requirements”.

2. Door Pull:

a. Model #8102.

b. Standard mounting.

3. Pull Plate:

a. Model #8300.

b. Standard mounting.

4. Push Plate:

a. Model #8200.

b. Standard mounting.

5. Finish: Satin Chrome Plated.

2.11 SURFACE CLOSERS

A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

1. Basis of Design Product: 4000 Series by LCN-Allegion; 888-758-9823; http://us.allegion.com/brands/ives/pages/default.aspx.

    a. Refer to Section 012500 “Substitution Procedures” for substitution requirements”.

2. Closers shall have “lock-open” mechanisms where indicated on drawings.

3. Finish: Satin Chrome.

2.12 STOPS AND HOLDERS

A. Wall- and Floor-Mounted Stops: BHMA A156.16; polished cast brass, bronze, or aluminum base metal.

1. Basis of Design Product: Stops by Ives-Allegion; 888-758-9823; http://us.allegion.com/brands/ives/pages/default.aspx.

    a. Refer to Section 012500 “Substitution Procedures” for substitution requirements”.

2. Floor Stop: Model #FS13; Dome stop.

3. Wall Stop: Model #WS11.

4. Finish: Satin Chrome.

B. Electromagnetic Door Holders: BHMA A156.15, Grade 1; wall-mounted electromagnetic single unit with strike plate attached to swinging door; coordinated with fire detectors and interface with fire alarm system for labeled fire-rated door assemblies.

1. Basis of Design Product: Stops by Model 999 Rixson Assa Abloy; 3000 Highway 74 East Monroe, NC 28112; 866-474-9766; http://www.rixson.com/en/site/rixson/

    a. Refer to Section 012500 “Substitution Procedures” for substitution requirements”.

2.13 DOOR GASKETING

A. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot of crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

1. Basis of Design Product: Adhesive Gasketing by PEMKO; Pemko Manufacturing Company, 5535 Distribution Drive, Memphis, TN 38141; 800 824-3018; http://pemko.com/index.cfm.

a. Refer to Section 012500 “Substitution Procedures” for substitution requirements”.

2.14 THRESHOLDS

A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

1. Basis of Design Product: CT Series by PEMKO; Pemko Manufacturing Company, 5535 Distribution Drive, Memphis, TN 38141; 800 824-3018; http://pemko.com/index.cfm.

a. Refer to Section 012500 “Substitution Procedures” for substitution requirements”.

2.15 BI-FOLD DOOR HARDWARE

A. General: BHMA A156.14; complete sets including tracks, guides, pivots, hinges, stops, knobs, and other accessories indicated.

1. Basis of Design Product: 100FS Series by Johnson Hardware; 2100 Sterling Ave, Elkhart, IN 46516; (574) 293-5664; http://www.johnsonhardware.com/.

a. Refer to Section 012500 “Substitution Procedures” for substitution requirements”.

2.16 METAL PROTECTIVE TRIM UNITS

A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch- thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.

1. Basis of Design Product: 8400 Series by Ives-Allegion; 888-758-9823; http://us.allegion.com/brands/ives/pages/default.aspx.

a. Refer to Section 012500 “Substitution Procedures” for substitution requirements”.

2. Size: Provide minimum 42” tall kick plates where indicated on drawings.

3. Finish: Satin Chrome.

2.17 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Fire-Rated Applications:

    a. Wood or Machine Screws: For the following:

        1) Hinges mortised to doors or frames; use threaded-to-the-head wood screws for wood doors and frames.
        2) Strike plates to frames.
        3) Closers to doors and frames.

    b. Steel Through Bolts: For the following unless door blocking is provided:

        1) Surface hinges to doors.
        2) Closers to doors and frames.
        3) Surface-mounted exit devices.

3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
4. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."
5. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.18 FINISHES

A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

B. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

C. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.
3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

D. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

E. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

F. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as directed by Owner.

G. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect.

1. Configuration: Provide one power supply for each door opening with electrified door hardware.

H. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."

I. Stops: Do not mount floor stops where they will impede traffic.

J. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

K. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

L. Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

END OF SECTION 087100

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Glass for windows, doors, storefront framing, and glazed curtain walls.
2. Glazing sealants and accessories.

1.2 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Glass Samples: For each type of glass product; 12 inches square.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Preconstruction adhesion and compatibility test report.

1.5 QUALITY ASSURANCE

A. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

1.6 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.

1.7 WARRANTY

A. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

B. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. AGC Glass Co.; 11175 Cicero Drive, Suite 400, Alpharetta, GA 30022; 1-800-251-0441; http://us.agc.com/.

B. Guardian Industries; 300 Harmon Road, Auburn Hills, MI 48326; 248.340.1800; https://www.guardianglass.com/

C. PPG; P.O. Box 30170; College Station, TX 77842-31701-800-774-4332; http://www.ppgideascapes.com/en-US/Glass.aspx.

D. Trulite; 43443 Osgood Road Fremont, CA 94538; (800) 748-6730; www.trulite.com/.

E. Architect approved equal.

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the International Building Code and ASTM E 1300.

1. Design Wind Pressures: As indicated on Drawings.
2. Design Snow Loads: As indicated on Drawings.

B. Windborne-Debris-Impact Resistance: Exterior glazing shall comply with basic-protection testing requirements in ASTM E 1996 for Wind Zone 2 when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on Project and shall be installed in same manner as glazing indicated for use on Project.

C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
2. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: "Glazing Manual."
2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.

2.4 GLASS PRODUCTS

A. Silicone-Coated Spandrel Glass: ASTM C 1048, Type I, Condition C, Quality-Q3.

1. Basis of Design Product: OPACI-COAT-300 ICD High Performance Coatings; 7350 South Union Ridge Parkway, Ridgefield, WA 98642; 1-360-546-2286; http://www.icdcoatings.com/.

2. Architect approved equal.

2.5 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.

1. Sealing System: Dual seals.
2. Spacer: Manufacturer's standard spacer material and construction.

2.6 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Manufacturer:

a. Dow Corning; 2200 W. Salzburg Rd, Auburn MI 48611; 989-496-4400; http://www.dowcorning.com/

b. Architect approved equal.

2. Applications: Interior door glazing.

C. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Manufacturer:

a. Dow Corning; 2200 W. Salzburg Rd, Auburn MI 48611; 989-496-4400; http://www.dowcorning.com/

b. Architect approved equal.

2. Applications: Storefront and entry door glazing; curtainwall glazing, aluminum window glazing.

2.7 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8 MISCELLANEOUS GLAZING MATERIALS

A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

B. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

C. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

D. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

E. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

PART 3 - EXECUTION

3.1 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

3.2 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Apply heel bead of elastomeric sealant.

F. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of

removable stops. Start gasket applications at corners and work toward centers of openings.

G. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.3 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.4 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.5 CLEANING AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

3.6 LAMINATED GLASS SCHEDULE

A. Glass Type: Clear laminated glass with two plies of annealed float glass.

1. Minimum Thickness of Each Glass Ply: 3 mm.
2. Interlayer Thickness: 0.030 inch.
3. Safety glazing required.

3.7 INSULATING GLASS SCHEDULE

A. Glass Type: Low-E-coated, clear insulating glass.

1. Overall Unit Thickness: 1 inch.
2. Minimum Thickness of Each Glass Lite: 3 mm.
3. Outdoor Lite: Annealed float glass.
4. Interspace Content: Argon.
5. Indoor Lite: Annealed float glass.
6. Low-E Coating: Pyrolytic on second surface.
7. U-Factor: 0.45 maximum.
8. Solar Heat Gain Coefficient: 0.4 maximum.
9. Safety glazing required.

B. Glass Type: Silicone-coated, low-E, insulating spandrel glass.

1. Coating Color: As selected by Architect from manufacturer's full range.
2. Overall Unit Thickness: 1 inch.
3. Minimum Thickness of Each Glass Lite: 5 mm.
4. Outdoor Lite: Annealed float glass.
5. Interspace Content: Argon.
6. Indoor Lite: Annealed float glass.
7. Low-E Coating: Pyrolytic on second surface.
8. Opaque Coating Location: Fourth surface.
9. U-Factor: 0.45 maximum.

END OF SECTION 088000

SECTION 088300 - MIRRORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the following types of silvered flat glass mirrors:

1. Annealed monolithic glass mirrors.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

1.4 WARRANTY

A. Special Warranty: Manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1. Warranty Period: Five years from date of manufacture.

PART 2 - PRODUCTS

2.1 BEVELED WALL MIRRORS

A. Mirrors, General: ASTM C 1503; manufactured using copper-free, low-lead mirror coating process.

1. Manufacturers:

a. Gardner Glass Products; 301 Elkin Hwy, North Wilkesboro, NC 28659; (336) 651-9300; http://www.gardnerglass.com/

b. Architect approved equal.

2.2 MIRROR HARDWARE

A. Mounting Hardware: Provide mounting hardware per Manufacturer's instructions.

B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

2.3 FABRICATION

A. Mirror Edge Treatment: Beveled polished edge of width shown. Seal edges of mirrors with edge sealer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 INSTALLATION

A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.

B. Install mirrors with mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.

C. Clean exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Clean mirrors as recommended in writing by mirror manufacturer.

END OF SECTION 088300

SECTION 088813 - FIRE-RESISTANT GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire-rated glazing.

1.2 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Glass Samples: For each type of glass product; 12 inches square.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.4 WARRANTY

A. Manufacturer's Special Warranty on Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organization below unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."

B. Safety Glazing Labeling: Permanently mark glazing with certification label of the Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction or the manufacturer. Label shall indicate manufacturer's name, type of glass, glass thickness, and safety glazing standard with which glass complies.

2.2 GLASS PRODUCTS

A. Laminated Glass: ASTM C 1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

B. Ultraclear Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear), with visible light transmission not less than 91 percent.

2.3 FIRE-RATED GLAZING

A. Fire-Rated Glazing: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on positive-pressure testing according to NFPA 257 or UL 9, including the hose-stream test, and shall comply with NFPA 80.

B. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name; test standard; whether glazing is permitted to be used in doors or openings; if permitted in openings, whether or not glazing has passed the hose-stream test; whether or not glazing meets 450 deg F temperature-rise limitation; and the fire-resistance rating in minutes.

C. Laminated Glass with Intumescent Interlayers: Laminated glass made from multiple plies of uncoated, ultraclear float glass; with intumescent interlayers; and complying with 16 CFR 1201, Category II.

1. Manufacturers:

a. FireLite Plus by TGP; 8107 Bracken Place SE, Snoquaimie, WA 98065; 800-426-0279; http://www.fireglass.com/

b. Architect approved equal.

2.4 GLAZING ACCESSORIES

A. Provide glazing gaskets, glazing sealants, glazing tapes, setting blocks, spacers, edge blocks, and other glazing accessories that are compatible with glazing products and each other and are approved by testing agencies that listed and labeled fire-resistant glazing products with which products are used for applications and fire-protection ratings indicated.

B. Glazing Sealants for Fire-Rated Glazing Products: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated.

1. Manufacturers:

a. Dow Corning; 2200 W. Salzburg Rd, Auburn MI 48611; 989-496-4400; http://www.dowcorning.com/

b. Architect approved equal.

2. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 GLAZING

A. Use methods approved by testing agencies that listed and labeled fire-resistant glazing products.

B. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials unless more stringent requirements are indicated, including those in referenced glazing publications.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

3.2 CLEANING AND PROTECTION

A. Immediately after installation, remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Remove and replace glass that is damaged during construction period.

3.3 FIRE-RATED GLAZING SCHEDULE

A. Glass Type: 90-minute fire-protection-rated glazing with 450 deg F temperature-rise limitation; laminated glass with intumescent interlayers.

END OF SECTION 088813

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior partitions.
2. Suspension systems for interior ceilings and soffits.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Evaluation reports for firestop tracks.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
2. Protective Coating: ASTM A 653/A 653M, G60, hot-dip galvanized unless otherwise indicated.

B. Studs and Runners: ASTM C 645.

1. Steel Studs and Runners:

    a. Manufacturers:
        1) SCAFCO; 2800 E Main Ave, PO Box 3949, Spokane, WA 99202; 509-343-9000; https://www.scafco.com/steel.
        2) Clark Dietrich Building Systems; 9100 Centre Pointe Drive, Suite 210, West Chester, OH 45069; (513) 870-1100; http://www.clarkdietrich.com/
        3) Architect approved equal.

    b. Minimum Base-Metal Thickness: As indicated on Drawings and as required by performance requirements for horizontal deflection.
    c. Depth: As indicated on Drawings.

C. Slip-Type Head Joints: Where indicated, provide the following:

1. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

    a. Manufacturers:
        1) SCAFCO; 2800 E Main Ave, PO Box 3949, Spokane, WA 99202; 509-343-9000; https://www.scafco.com/steel.
        2) Clark Dietrich Building Systems; 9100 Centre Pointe Drive, Suite 210, West Chester, OH 45069; (513) 870-1100; http://www.clarkdietrich.com/
        3) Architect approved equal.

D. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Manufacturers:
    a. SCAFCO; 2800 E Main Ave, PO Box 3949, Spokane, WA 99202; 509-343-9000; https://www.scafco.com/steel.
    b. Clark Dietrich Building Systems; 9100 Centre Pointe Drive, Suite 210, West Chester, OH 45069; (513) 870-1100; http://www.clarkdietrich.com/
    c. Architect approved equal.

E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Manufacturers:
    a. SCAFCO; 2800 E Main Ave, PO Box 3949, Spokane, WA 99202; 509-343-9000; https://www.scafco.com/steel.

b. Clark Dietrich Building Systems; 9100 Centre Pointe Drive, Suite 210, West Chester, OH 45069; (513) 870-1100; http://www.clarkdietrich.com/
c. Architect approved equal.

2. Minimum Base-Metal Thickness: 0.0329 inch.

F. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-metal thickness, with minimum 1/2-inch- wide flanges.

1. Manufacturers:
a. SCAFCO; 2800 E Main Ave, PO Box 3949, Spokane, WA 99202; 509-343-9000; https://www.scafco.com/steel.
b. Clark Dietrich Building Systems; 9100 Centre Pointe Drive, Suite 210, West Chester, OH 45069; (513) 870-1100; http://www.clarkdietrich.com/
c. Architect approved equal.

2. Depth: 1-1/2 inches.
3. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.

G. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

a. Manufacturers:
1) SCAFCO; 2800 E Main Ave, PO Box 3949, Spokane, WA 99202; 509-343-9000; https://www.scafco.com/steel.
2) Clark Dietrich Building Systems; 9100 Centre Pointe Drive, Suite 210, West Chester, OH 45069; (513) 870-1100; http://www.clarkdietrich.com/
3) Architect approved equal.

2. Minimum Base-Metal Thickness: As indicated on Drawings.
3. Depth: As indicated on Drawings.

H. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.

a. Manufacturers:
1) SCAFCO; 2800 E Main Ave, PO Box 3949, Spokane, WA 99202; 509-343-9000; https://www.scafco.com/steel.
2) Clark Dietrich Building Systems; 9100 Centre Pointe Drive, Suite 210, West Chester, OH 45069; (513) 870-1100; http://www.clarkdietrich.com/
3) Architect approved equal.

2. Configuration: hat shaped.

I. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch- wide flanges.

1. Depth: As indicated on Drawings.

2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch.
3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch- diameter wire.

J. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

a. Manufacturers:
1) SCAFCO; 2800 E Main Ave, PO Box 3949, Spokane, WA 99202; 509-343-9000; https://www.scafco.com/steel.
2) Clark Dietrich Building Systems; 9100 Centre Pointe Drive, Suite 210, West Chester, OH 45069; (513) 870-1100; http://www.clarkdietrich.com/
3) Architect approved equal.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.

B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.

C. Flat Hangers: Steel sheet, in size indicated on Drawings.

D. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch- wide flanges.

1. Depth: As indicated on Drawings.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide one of the following:

1. Asphalt-Saturated Organic Felt: ASTM D 226/D 226M, Type I (No. 15 asphalt felt), nonperforated.
2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

D. Install bracing at terminations in assemblies.

E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.2 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

a. Install two studs at each jamb unless otherwise indicated.
b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

    a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

E. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Z-Shaped Furring Members:

1. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
2. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.3 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

    a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

    a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
5. Do not attach hangers to steel roof deck.
6. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
7. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.

F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Tile backing panels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Manufacturers:

B. Gypsum Wallboard: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

C. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

D. Gypsum Ceiling Board: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

E. Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: 5/8 inch, Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 SPECIALTY GYPSUM BOARD

A. Gypsum Board, Type C: ASTM C 1396/C 1396M. Manufactured to have increased fire-resistive capability.

1. Manufacturers:

a. Certainteed; 20 Moores Road; Malvern, PA 19355; 800-233-8990; http://www.certainteed.com/.

b. Georgia Pacific; 170 Shattuck Way, Newington, NH 03801; (603) 433-8000; https://www.gp.com/

c. National Gypsum Company; 2001 Rexford Road, Charlotte, North Carolina 28211; 704-365-7300; https://www.nationalgypsum.com/

d. USG Corporation; 550 West Adams Street, Chicago, IL; 800-950-3839; https://www.usg.com/content/usgcom/en.html.

e. Architect approved equal.

2. Thickness: As required by fire-resistance-rated assembly indicated on Drawings.
3. Long Edges: Tapered.

2.5 TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.

1. Manufacturers:

a. Certainteed; 20 Moores Road; Malvern, PA 19355; 800-233-8990; http://www.certainteed.com/.

b. Georgia Pacific; 170 Shattuck Way, Newington, NH 03801; (603) 433-8000; https://www.gp.com/

c. National Gypsum Company; 2001 Rexford Road, Charlotte, North Carolina 28211; 704-365-7300; https://www.nationalgypsum.com/

d. USG Corporation; 550 West Adams Street, Chicago, IL; 800-950-3839; https://www.usg.com/content/usgcom/en.html.

e. Architect approved equal.

2. Core: 5/8 inch, Type X.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

B. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or ASTM C 1325, with manufacturer's standard edges.

1. Manufacturers:

a. Certainteed; 20 Moores Road; Malvern, PA 19355; 800-233-8990; http://www.certainteed.com/.

b. Georgia Pacific; 170 Shattuck Way, Newington, NH 03801; (603) 433-8000; https://www.gp.com/

c. National Gypsum Company; 2001 Rexford Road, Charlotte, North Carolina 28211; 704-365-7300; https://www.nationalgypsum.com/

d. USG Corporation; 550 West Adams Street, Chicago, IL; 800-950-3839; https://www.usg.com/content/usgcom/en.html.

e. Architect approved equal.

2. Thickness: 5/8 inch.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.6 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: [Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
2. Shapes:

a. Cornerbead.

b. Bullnose bead.
c. LC-Bead: J-shaped; exposed long flange receives joint compound.
d. L-Bead: L-shaped; exposed long flange receives joint compound.
e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
f. Expansion (control) joint.
g. Curved-Edge Cornerbead: With notched or flexible flanges.

B. Exterior Trim: ASTM C 1047.

1. Material: Hot-dip galvanized-steel sheet, plastic, or rolled zinc.
2. Shapes:

a. Cornerbead.
b. LC-Bead: J-shaped; exposed long flange receives joint compound.
c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

2.7 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
3. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping or drying-type, all-purpose compound.

a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use setting-type, sandable topping or drying-type, all-purpose compound.
4. Finish Coat: For third coat, use setting-type, sandable topping or drying-type, all-purpose compound.

D. Joint Compound for Exterior Applications:

1. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

E. Joint Compound for Tile Backing Panels:

1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
2. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.8 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Manufacturers:

a. Dow Corning Corporation; 2200 W Salzburg Rd., Auburn, MI 48611; 1-800-248-2481; https://www.dowcorning.com/.

b. Hilti; Legacy Tower, Suite 1000, 7250 Dallas Parkway, Piano, TX 7524; 1-800-879-8000; https://www.us.hilti.com/

c. Tremco Sealant; 3735 Green Road, Beachwood, OH 44122; 800-321-7906; http://www.tremcosealants.com/.

d. USG Corporation; 550 West Adams Street, Chicago, IL; 800-950-3839; https://www.usg.com/content/usgcom/en.html.

e. Architect approved equal.

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS

A. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

B. Comply with ASTM C 840.

C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

D. For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

E. Prefill open joints, rounded or beveled edges, and damaged surface areas.

F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile or wall covering panels.
3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

    a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

H. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.

I. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

J. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.2 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 092900

SECTION 093013 - CERAMIC TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Porcelain tile.
2. Glazed wall tile.
3. Stone thresholds.
4. Tile backing panels.
5. Crack isolation membrane.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples:

1. Each type and composition of tile and for each color and finish required.

2. Grout color samples.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer employs Ceramic Tile Education Foundation Certified Installers or installers recognized by the U.S. Department of Labor as Journeyman Tile Layers.

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of each type of floor tile installation.
2. Build mockup of each type of wall tile installation.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide Standard-grade tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

2.2 TILE PRODUCTS

A. Ceramic Tile Type CT-1: Unglazed porcelain tile.

1. Haut Monde by Daltile; 7834 C F Hawn Fwy, Dallas, TX 75217; (214) 398-1411; http://www.dal-tile.com, or Architect approved equal.

2. Certification: Tile certified by the Porcelain Tile Certification Agency.
3. Face Size: 12 by 24 inches.
4. Face Size Variation: Rectified.
5. Thickness: 3/8 inch.
6. Face: Plain with square or cushion edges.
7. Dynamic Coefficient of Friction: Not less than 0.42.
8. Tile Color, Glaze, and Pattern: As selected by Architect from manufacturer's full range.
9. Grout Color: As selected by Architect from manufacturer's full range.
10. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

    a. Base Cap: Surface bullnose, module size.
    b. External Corners: Surface bullnose, module size.

B. Ceramic Tile Type CT-2: Glazed wall tile.

1. Semi-Gloss by Daltile; 7834 C F Hawn Fwy, Dallas, TX 75217; (214) 398-1411; http://www.dal-tile.com, or Architect approved equal.
2. Module Size: 3 by 6 inches.
3. Face Size Variation: Rectified.
4. Thickness: 5/16 inch.
5. Face: Pattern of design indicated, with manufacturer's standard edges.
6. Finish: Bright, opaque glaze.
7. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
8. Grout Color: As selected by Architect from manufacturer's full range.
9. Mounting: Factory, back mounted.
10. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable. Provide shapes as follows, selected from manufacturer's standard shapes:

    a. Base: Coved, module size 6 by 6 inches.
    b. Wainscot Cap: Surface bullnose, module size 6 by 6 inches.
    c. External Corners: Surface bullnose, same size as adjoining flat tile.
    d. Internal Corners: Field-butted square corners. For coved base and cap use angle pieces designed to fit with stretcher shapes.

2.3 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.

B. Marble Thresholds: ASTM C 503/C 503M, with a minimum abrasion resistance of 10 according to ASTM C 1353 or ASTM C 241/C 241M and with honed finish.

1. Description: Uniform, fine- to medium-grained white stone with gray veining.

2.4 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, Type A.

1. Manufacturers:

    a. Georgia Pacific; 170 Shattuck Way, Newington, NH 03801; (603) 433-8000; https://www.gp.com/

    b. USG Corporation; 550 West Adams Street, Chicago, IL; 800-950-3839; https://www.usg.com/content/usgcom/en.html.

    c. Architect approved equal.

2. Thickness: 5/8 inch.

2.5 CRACK ISOLATION MEMBRANE

A. General: Manufacturer's standard product that complies with ANSI A118.12 for standard performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

2.6 SETTING MATERIALS

A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.

B. Dry-Set Portland Cement Mortar: ANSI A118.1.

1. Manufacturers:

a. MAPEI Corporation; 144 E. Newport Center Drive Deerfield Beach, Florida 33442; 1-800-992-6273; http://www.mapei.com/

b. Architect approved equal.

2. For wall applications, provide nonsagging mortar.

C. Latex-Portland Cement Mortar (Thinset): ANSI A118.4.

1. Manufacturers:

a. MAPEI Corporation; 144 E. Newport Center Drive Deerfield Beach, Florida 33442; 1-800-992-6273; http://www.mapei.com/

b. Architect approved equal.

2. Provide prepackaged, dry-mortar mix to which only water must be added at Project site.
3. For wall applications, provide nonsagging mortar.

D. Water-Cleanable, Tile-Setting Epoxy: ANSI A118.3.

1. Manufacturers:

a. MAPEI Corporation; 144 E. Newport Center Drive Deerfield Beach, Florida 33442; 1-800-992-6273; http://www.mapei.com/

b. Architect approved equal.

2.7 GROUT MATERIALS

A. Water-Cleanable Epoxy Grout: ANSI A118.3.

1. Manufacturers:

a. MAPEI Corporation; 144 E. Newport Center Drive Deerfield Beach, Florida 33442; 1-800-992-6273; http://www.mapei.com/

b. Architect approved equal.

B. Grout for Pregrouted Tile Sheets: Same product used in factory to pregrout tile sheets.

2.8 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Grout Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

1. Manufacturers:

a. MAPEI Corporation; 144 E. Newport Center Drive Deerfield Beach, Florida 33442; 1-800-992-6273; http://www.mapei.com/

b. Architect approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
2. Verify that concrete substrates for tile floors installed with adhesives, bonded mortar bed, or thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.

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

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 CERAMIC TILE INSTALLATION

A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:

    a. Tile floors in wet areas.
    b. Tile floors consisting of tiles 8 by 8 inches or larger.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Where accent tile differs in thickness from field tile, vary setting bed thickness so that tiles are flush.

F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Glazed Wall Tile: 1/16 inch.
2. Porcelain Tile: 1/8 inch.

H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

I. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

J. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.

1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thinset).
2. Do not extend cleavage membrane, waterproofing, or crack isolation membrane under thresholds set in dry-set portland cement or latex-portland cement mortar. Fill joints between such thresholds and adjoining tile set on cleavage membrane, waterproofing, or crack isolation membrane with elastomeric sealant.

K. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

L. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.

M. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.

N. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.

3.4 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

A. Interior Floor Installations, Wood Subfloor:

1. Ceramic Tile Installation: TCNA F143; water-cleanable, tile-setting epoxy; epoxy grout.

a. Ceramic Tile Type: CT-1.
b. Grout: Water-cleanable epoxy grout.

B. Interior Wall Installations, Wood or Metal Studs or Furring:

1. Ceramic Tile Installation: TCNA W244C or TCNA W244F; thinset mortar on cementitious backer units or fiber-cement backer board.

a. Ceramic Tile Type: CT-2.
b. Thinset Mortar: Dry-set or Latex- portland cement mortar.
c. Grout: Water-cleanable epoxy grout.

C. Bathtub/Shower Wall Installations, Wood or Metal Studs or Furring:

1. Ceramic Tile Installation CT-2: TCNA B419; thinset mortar on coated glass-mat, water-resistant gypsum backer board.

a. Ceramic Tile Type: CT-2.
b. Thinset Mortar: Latex-portland cement mortar.
c. Grout: Water-cleanable epoxy grout.

END OF SECTION 093013

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes acoustical panels and exposed suspension systems for ceilings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Evaluation reports.

C. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to NVLAP.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.

2.2 ACOUSTICAL PANEL CEILINGS, GENERAL

A. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.

B. Acoustical Panel Standard: Comply with ASTM E 1264.

C. Metal Suspension System Standard: Comply with ASTM C 635.

D. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

2.3 ACOUSTICAL PANELS

A. Basis of Design Product: Model #5440 Soundscape by Armstrong World Industries, Inc.; P.O. Box 3001, Lancaster, PA 17604; 717-397-0611; https://www.armstrongceilings.com/.

1. Refer to Section 012500 “Substitution Procedures” for substitution requirements.

B. ASTM Classification: Type: XII, Form: 2, Pattern: E.

C. Color: As selected from manufacturer's full range.

D. LR: 0.90.

E. NRC: Type E-400 mounting according to ASTM E 795.

F. CAC: Not applicable.

G. AC: Not applicable.

H. Edge/Joint Detail: Square.

I. Thickness: 7/8 inch.

J. Modular Size: 48 by 48 inches.

2.4 METAL SUSPENSION SYSTEM

A. Provide with Manufacturer standard grouping frame kit and suspension system.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

1. Arrange directionally patterned acoustical panels as indicated on reflected ceiling plans.

END OF SECTION 095113

SECTION 095123 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes acoustical tiles and concealed suspension systems for ceilings.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Evaluation reports.

C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to NVLAP.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 50 or less.

2.2 ACOUSTICAL TILE CEILINGS, GENERAL

A. Acoustical Tile Standard: Comply with ASTM E 1264.

B. Metal Suspension System Standard: Comply with ASTM C 635.

C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

2.3 ACOUSTICAL TILES (KITCHEN, OFFICE, AND ADA BATHROOM)

A. Manufacturers:

1. Kitchen Zone by Armstrong; PO Box 3001, Lancaster, PA 17604; 1-877-ARMSTRONG; www.armstrong.com.
2. Architect approved equal.

B. Classification: Square lay-in, smooth texture.

C. Color: White.

D. NRC: Type E-400 mounting according to ASTM E 795.

E. CAC: 33.

F. Fire Rating: Class A.

G. Light Reflectance: 0.89.

H. Edge/Joint Detail: Square, kerfed and rabbeted; tongue and grooved; or butt.

I. Thickness: 5/8 inch.

J. Modular Size: 24 by 24 inches.

2.4 ACOUSTICAL TILES (SECOND FLOOR CORRIDOR & LOUNGE)

A. Manufacturers:

1. Cirrus by Armstrong; PO Box 3001, Lancaster, PA 17604; 1-877-ARMSTRONG; www.armstrong.com.
2. Architect approved equal.

B. Classification: Square Lay-in, medium texture.

C. Color: White.

D. NRC: Type E-400 mounting according to ASTM E 795.

E. CAC: 35.

F. Fire Rating: Class A.

G. Light Reflectance: 0.86.

H. Edge/Joint Detail: Square, kerfed and rabbeted; tongue and grooved; or butt.

I. Thickness: 3/4 inch.

J. Modular Size: 24 by 24 inches.

2.5 ACOUSTICAL TILES (FIRST FLOOR REPLACEMENT TILES)

1. Fine Fissured by Armstrong; PO Box 3001, Lancaster, PA 17604; 1-877-ARMSTRONG; www.armstrong.com.
2. Architect approved equal.

B. Classification: Square Lay-in, medium texture.

C. Color: White.

D. NRC: 0.55 according to ASTM E 795.

E. CAC: 35.

F. Fire Rating: Class A.

G. Light Reflectance: 0.86.

H. Edge/Joint Detail: Square.

I. Thickness: 5/8 inch.

J. Modular Size: 24 by 48 inches.

2.6 METAL SUSPENSION SYSTEM

A. 15/16” exposed Tee System.

B. Manufacturers:

1. Prelude XL by Armstrong; PO Box 3001, Lancaster, PA 17604; 1-877-ARMSTRONG; www.armstrong.com.
2. Architect approved equal.

C. Color: White.

D. Structural Classification: Intermediate-duty system.

E. Access: Upward.

F. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Manufacturer's standard moldings for edges and penetrations complying with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install acoustical tile ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders, and comply with layout shown on reflected ceiling plans.

END OF SECTION 095123

SECTION 096400 - WOOD FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Factory-finished wood flooring.
2. Wood flooring accessories.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of floor assembly and accessory. Include plans, sections, and attachment details. Include expansion provisions and trim details.

C. Samples: For each exposed product and for each color and texture specified.

PART 2 - PRODUCTS

2.1 FACTORY-FINISHED WOOD FLOORING

A. Engineered-Wood Flooring: HPVA EF.

1. Manufacturers:
   a. Springloc by Harris Wood; 2225 Eddie Williams Rd, Johnson City, TN 37601; (800) 258-5758; http://harriswoodfloors.com/.
   b. Architect approved equal.
2. Species: As selected by Architect from manufacturer's full range.
3. Thickness: 3/8 inch.
4. Construction: Five ply.
5. Face Width: 4-3/4 inches.
6. Length: Manufacturer's standard.
7. Edge Style: Beveled (eased).
8. Finish: UV urethane.
9. Color: As selected by Architect from manufacturer's full range.

2.2 ACCESSORY MATERIALS

A. Fasteners: As recommended by manufacturer, but not less than that recommended in NWFA's "Installation Guidelines."

B. Floating Floor Underlayment:

1. Manufacturer:
   a. Silent Stride Pad with vapor barrier as manufactured by MP Global Products LLC; 2500 Old Hadar Road, Norfolk, NE 68702; (888) 379-9695; http://www.mpglobalproducts.com/
   b. Architect approved equal.

2. Field Impact Insulation Class: 60
3. Sound Transmission Class: 66
4. Density: 13.3lbs/ft 3; compression resistance at 25% = 9.5 psi

C. Thresholds and Saddles: To match wood flooring. Tapered on each side.

D. Reducer Strips: To match wood flooring. 2 inches wide, tapered, and in thickness required to match height of flooring.

PART 3 - EXECUTION

3.1 PREPARATION

A. Broom or vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with flooring manufacturer's written installation instructions.

B. Provide expansion space at walls and other obstructions and terminations of flooring of not less than 3/4 inch.

C. Floating Floor Underlayment: Install over according to manufacturer's written instructions.

D. Engineered-Wood Flooring: Install floating floor.

3.3 PROTECTION

A. Protect installed wood flooring during remainder of construction period with covering of heavy kraft paper or other suitable material. Do not use plastic sheet or film that might cause condensation.

1. Do not move heavy and sharp objects directly over kraft-paper-covered wood flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION 096400

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Resilient base.
2. Resilient stair accessories.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.

PART 2 - PRODUCTS

2.1 VINYL BASE

A. Manufacturers:

1. Armstrong World Industries, Inc.; PO Box 3001, Lancaster, PA 17604; 1-877-ARMSTRONG; www.armstrong.com.

2. Johnsonite; 30000 Aurora Road Solon, OH 4439; 800-899-8916; http://johnsonite.com/.

3. Roppe Corporation; 1602 N Union St, Fostoria, OH 44830; (419) 435-8546; http://www.roppe.com/.

4. Architect approved equal.

B. Product Standard: ASTM F 1861, Type TV (vinyl, thermoplastic).

1. Group: I (solid, homogeneous).
2. Style and Location:

a. Style B, Cove: Provide in areas with resilient flooring.

C. Minimum Thickness: 0.125 inch.

D. Height: 4 inches.

E. Lengths: Cut lengths 48 inches long or coils in manufacturer's standard length.

F. Outside Corners: Job formed or preformed.

G. Inside Corners: Job formed or preformed.

H. Colors and Patterns: As selected by Architect from full range of industry colors.

2.2 VINYL STAIR ACCESSORIES

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. Manufacturers:

1. Johnsonite; 30000 Aurora Road Solon, OH 4439; 800-899-8916; http://johnsonite.com/.

2. Roppe Corporation; 1602 N Union St, Fostoria, OH 44830; (419) 435-8546; http://www.roppe.com/.

3. Architect approved equal.

C. Stair Treads: ASTM F 2169, Type TV (vinyl, thermoplastic).

1. Class: 2 (pattern; embossed, grooved, or ribbed).
2. Group: 1 (embedded abrasive strips).
3. Nosing Style: Square, adjustable to cover angles between 60 and 90 degrees.
4. Nosing Height: 2 inches.
5. Thickness: 1/4 inch and tapered to back edge.
6. Size: Lengths and depths to fit each stair tread in one piece.

D. Locations: Provide vinyl stair accessories in areas indicated.

E. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

1. Adhesives shall have a VOC content of 50 g/L or less.

C. Stair-Tread Nose Filler: Two-part epoxy compound recommended by resilient stair-tread manufacturer to fill nosing substrates that do not conform to tread contours.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
4. Moisture Testing: Proceed with installation only after substrates pass testing according to manufacturer's written recommendations, but not less stringent than the following:

    a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient products until they are the same temperature as the space where they are to be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.2 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

    a. Form without producing discoloration (whitening) at bends.

2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

    a. Miter or cope corners to minimize open joints.

3.3 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Stair Accessories:

1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
2. Tightly adhere to substrates throughout length of each piece.
3. For treads installed as separate, equal-length units, install to produce a flush joint between units.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

SECTION 09 65 19 - RESILIENT TILE FOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Resilient tile flooring and accessories.

1.2 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete.

B. Section 06 10 00 - Rough Carpentry.

C. Section 07 26 00 - Vapor Retarders.

D. Section 09 65 16 - Resilient Sheet Flooring.

E. Section 09 65 13 - Resilient Base and Accessories.

1.3 REFERENCES

A. ASTM International (ASTM):

1. ASTM C 1028 - Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.

2. ASTM E 662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.

3. ASTM E 648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

4. ASTM E 989 - Standard Classification for Determination of Impact Insulation Class (IIC).

5. ASTM F 137 - Standard Test Method for Flexibility of Resilient Flooring Materials with Cylindrical Mandrel Apparatus.

6. ASTM F 386 - Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces.

7. ASTM F 925 - Standard Test Method for Resistance to Chemicals of Resilient Flooring.

8. ASTM F 970 - Standard Test Method for Static Load Limit.

9. ASTM F 1514 - Standard Test Method for Measuring Heat Stability of Resilient Flooring by Color Change.

10. ASTM F 1515 - Standard Test Method for Measuring Light Stability of Resilient Flooring by Color Change.

11. ASTM F 1700 - Standard Specification for Solid Vinyl Floor Tile.

12. ASTM F 1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

13. ASTM F 1914 - Standard Test Methods for Short-Term Indentation and Residual Indentation of Resilient Floor Covering.

14. ASTM F 2055 - Standard Test Method for Size and Squareness of Resilient Floor Tile by Dial Gage Method.

15. ASTM F 2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

16. ASTM F 2199 - Standard Test Method for Determining Dimensional Stability of Resilient Floor Tile after Exposure to Heat.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. Product Data: Provide detailed data on each product to be used including but not limited to the following information as applicable:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Installation methods.

4. Maintenance recommendations.

C. Selection Samples: For each finish product specified, two sets of each type, colors and finish of resilient flooring and accessory required, indicating full range of color and pattern variation.

D. Closeout Submittals: Submit three copies of the following:

1. Maintenance and operation data includes - methods for maintaining installed products, and precautions against cleaning materials and methods detrimental to finishes and performance.

2. Documentation of warranty specified herein.

E. Flame Spread Certification: Submit manufacturer's certification that resilient flooring furnished for areas indicated to comply with required flame spread rating has been tested and meets or exceeds indicated or required standard.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Minimum two years experience and completed at least three projects of similar magnitude, material and complexity. Upon request, provide project references including contact names and telephone numbers for three projects.

B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Finish areas designated by Architect.

2. Do not proceed with remaining work until workmanship, color, sheen and finished appearance are approved by Architect.

1.6 DELIVERY, STORAGE, AND HANDLING

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

B. Flooring material and adhesive shall be acclimated to the installation area for a minimum of 48 hours prior to installation.

C. Store cartons of tile products flat and squarely on top of one another, not on edge.

D. Store tubes of feature strips and borders in a horizontal position. Storage in a vertical or inclined position causes uneven weight distributions, which will spaghetti the ends of the feature strips. Store all tubes lying flat.

1.7 PROJECT CONDITIONS

A. Environmental Requirements/Conditions: In accordance with manufacturer's recommendations. Areas to receive flooring shall be clean, fully enclosed, weather tight with the permanent HVAC set at a uniform temperature of at least 65 degrees F and less than 85 degrees 48 hours prior to and during and for not less than 48 hours after installation. The flooring material shall be conditioned in the same manner prior to installation.

B. Close spaces to traffic during resilient flooring installation and for a period of time after installation as recommended in writing by the manufacturer.

C. Install resilient flooring materials and accessories after other finishing operations, including painting, have been completed.

D. Where demountable partitions and other items are indicated for installation on top of sheet resilient flooring material, install flooring material before these items are to be installed.

E. Concrete substrates must be tested in accordance to ASTM F 2170 and ASTM F 1869. If the results exceed limits of the product or adhesive to be used a moisture mitigation system or damp proof membrane must be installed to bring moisture levels within specifications.

F. Store tubes of feature strips and borders in a horizontal position. Storage in a vertical or inclined position causes uneven weight distributions, which will spaghetti the ends of the feature strips. Store all tubes lying flat.

1.8 WARRANTY

A. Warranty Period: Manufacturer's standard warranty against manufacturing defects and wearing for flooring and as follows:

a. 15 year limited commercial warranty.

1.9 EXTRA MATERIALS

A. Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 1 closeout submittals requirements.

1. Quantity: Furnish quantity of flooring units equal to 2 percent of amount installed. Comply with Owner's requirements for delivery, storage and protection of extra materials.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Karndean Designflooring, which is located at: 1100 Pontiac Ct.; Export, PA 15632; Toll Free Tel: 888-266-4343; Fax: 800-887-7043; Email:request info (molly.sumner@karndean.com); Web:www.karndean.com

B. Architect approved equal.

2.2 RESILIENT TILE FLOORING

A. Resilient Tile Flooring: Loose-lay tile.

1. Dimensions: Manufacturer’s standard.

2. Finish: As selected from manufacturer’s full range.

3. Material Compliance: ASTM F 1700, BS EN 649, BSEN 654.

a. Reaction to Fire: ASTM E 662, ASTM E 648.

b. Slip Resistance: ASTM C 1028, Dry .7398, Wet .7405.

4. Antimicrobial Properties: AATCC Method 174, Part 174.

5. Wear Layer Thickness: 20 mil.

6. Tile Thickness: 0.18 inches.

7. Edge: Non-beveled edge.

2.3 ACCESSORIES

A. Cleaning and maintenance products as recommended by flooring manufacturer.

B. Adhesive: Manufacturer's recommended adhesive as follows.

1. Epoxy adhesive.

2. Tack Set Adhesive.

C. Portland based cementitious base leveler or patch. Gypsum based not acceptable.

D. Manufacturer approved underlayment grade substrate board.

PART 3 EXECUTION

3.1 EXAMINATION

A. Inspect floor to be installed immediately upon arriving at job site; perform a moisture test.

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

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

D. The installation of the resilient flooring shall not begin until the work of all other trades has been completed, particularly wet and overhead trades.

E. Areas to receive flooring shall be adequately lighted during all phases of the installation process.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Using Portland based cementitious base leveler or patch fill and cover all seams, nail heads, voids, cracks, and expansion joints. Achieve smooth, even, firmly attached substrate for best finish results. Gypsum based underlayment not acceptable.

1. Cement slabs can be floated or repaired using Portland cement based

compound. Follow patch manufacturers' instructions.

2. Once substrate flatness is achieved, 1/8 inch in 10 feet, continue with the next step.

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

D. Concrete Substrates: The Contractor shall verify to the Owner and installer a minimum of 30 days prior to the scheduled resilient flooring installation the following substrate conditions. All substrate testing shall be documented and submitted to the Architect and Owner before commencement of the flooring installation.

1. Verify that substrates are dry, free of debris, and that all surfaces have properly cured.

2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

4. Moisture Testing: Perform ASTM 1869 Calcium Chloride or ASTM 2170 In-Situ RH test and record results. Choose proper adhesive or moisture mitigation systems to meet manufacturers' specifications for moisture content. Proceed with installation only after substrates meet specifications.

3.3 INSTALLING RESILIENT TILES AND PLANKS

A. General:

1. Permanent HVAC system shall be turned on and set to a minimum of 65 degrees F for a minimum of 48 hours prior to, during and 48 hours after installation. After the installations, the maximum temperature should not exceed 125 degrees F.

2. All products shall be allowed to acclimate at least 24 hours before installation. This means product shall be placed in the same room as the install that is taking place and removed from its factory packaging.

3. Material shall be visually inspected prior to installation.

4. Ensure that all recommendations for sub-floor and jobsite conditions are met prior to beginning the installation. Once the installation is started, Contractor and installer have accepted those conditions.

5. Install in accordance with manufacturer's installation instructions for each product type and application specified.

B. Layout and Installation:

1. Position planks so the end seams are no closer than the width of the plank being installed. Maintain this approach to staggering the planks throughout the entire installation while keeping a random appearance.

2. Center tiles or planks in rooms and hallways so borders are not less than half a tile or plank when possible.

3. Cut edges shall always be installed against a wall.

4. Install using tile and plank installation techniques recommended by manufacturer.

5. Install tiles, planks, borders and feature strips in locations and configurations indicated on the Drawings.

C. Product Application:

1. Install in accordance with adhesive recommendations on the label or data sheet.

2. Refer to manufacturer's literature for selection criteria for applicator, type.

3. Using proper applicator, apply adhesive in accordance with label on adhesive.

4. For loose-lay installations only, spread a 4 inch wide band of adhesive around the perimeter of the area designated as an extreme condition area. An additional 4 inch band shall be spread at approximately 10 foot intervals forming a grid pattern.

5. For transitional areas, from loose-lay to another floor covering of a different height, a 4 inch band of adhesive should be spread across the length of the transition.

3.4 CLEANING

A. Wipe off any adhesive on floor as installation proceeds. Wait 48 hours before applying the cleaning and maintenance products.

B. Prior to installation of permanent fixtures or furniture, remove all dirt, debris, or residual adhesive and clean the floor. If desired, a protective covering may be applied at this time. Specific products and instructions are available from the manufacturer.

3.5 PROTECTION

A. Protect installed products until completion of project.

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

3.6 MAINTENANCE

A. Comply with manufacturer's instructions for proper cleaning and maintenance of the products.

END OF SECTION 096519

SECTION 09657 - RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: This section includes labor, materials and other services necessary to complete resilient sheet flooring, slip resistant sheet vinyl safety flooring systems and accessories work. Conform with requirements of all Sections of Division 1, General Requirements, as it applies to the work of this Section.

B. Related Sections:

1. Section 03300 - Cast-in-Place Concrete: Concrete finishing.

2. Division 7 - Thermal and Moisture Protection.

3. Division 15 - Mechanical.

1.02 REFERENCES

A. ASTM D 2047, Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine.

B. ASTM E 648/NFPA 253, Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

C. ASTM E662, Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.

D. ASTM F710, Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

E. ASTM F 970, Standard Test Method for Static Load Limit.

F. ASTM F1482, Standard Guide to Wood Underlayment Products Available for Use Under Resilient Flooring.

G. ASTM F1303, Standard Specification for Sheet Vinyl Floor Covering with Backing.

H. ASTM F2170, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

I. (RFCI) Resilient Floor Covering Institute

1. RFCI Standard Slab Moisture Test Method (Calcium Chloride Method)

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's current printed product literature, specifications, installation instructions, and field reports in accordance with Section 01330 - Submittal Procedures.

B. Shop Drawings: Submit shop drawings to indicate materials, details, and accessories in accordance with Section 01330 - Submittal Procedures including but limited to the following:

1. Submit a cut diagram indicating seam locations and roll direction. Use mitered seam layouts for corners when changing directions 180 degrees (e.g. when running material down corridors which bisect at a right angle), unless approved otherwise.

C. Samples: Submit duplicate 12" x 12" sample pieces of sheet material, 12" long in accordance with Section 01330 - Submittal Procedures.

D. Closeout Submittals: Submit the following:

1. Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals Section. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.

1. Training: Installer who has attended an Altro flooring installation training clinic.

B. Regulatory Requirements: Provide slip resistant sheet vinyl safety flooring in compliance with the following:

1. Americans with Disabilities Act Architectural Guidelines (ADAAG).

2. Occupational Safety & Health Administration (OSHA).

C. Mock-ups: Install at project site a job mock-up using acceptable products and manufacturer approved installation methods, including concrete substrate testing.

1. Maintenance: Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.

2. Incorporation: Mock-up may be incorporated into final construction upon Owner's approval.

D. Pre-installation Meeting: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions, manufacturer's warranty requirements, and installer qualifications.

1.05 SITE CONDITIONS

A. Temperature Requirements: If storage temperature is below 65F or the floor temperature is below 50F, the Altro safety flooring product must be moved to a warmer place and allowed to reach this temperature before unrolling or installation.

B. Maintain air temperature and structural base temperature at flooring installation area between 68F and 80F for 48 hours before, during and 24 hours after installation.

1.06 WARRANTY

A. Warranty period for shall be 10 years commencing on date of substantial completion. Refer to conditions of the contract for project warranty provisions.

PART 2 - PRODUCTS

2.01 SAFETY FLOORING

A. Basis of Design Product: Slip Resistant Sheet Vinyl Manufacturer: Walkway 20 by Altro, Telephone 800.377.5597, www.altrofloors.com.

1. Refer to section 012500 "Substitution Procedures" for substitution requirements.

B. Slip Resistance: 0.85

C. Color: To be selected by Architect from Manufacturer's full range.

2.02 ACCESSORIES

A. Vinyl welding rod: Manufacturer's standard.

B. Subfloor Filler and Leveler: Use only gray Portland cement-based "moisture tolerant" underlayments, and patching compounds. Use for filling cracks, holes or leveling. White gypsum materials are not acceptable.

C. Metal edge strips:

1. Aluminum extruded, smooth, stainless steel with lip to extend over flooring.

2.03 ADHESIVES

1. Acrylic general adhesive installed per Manufacturers requirements.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog, installation instructions.

B. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

3.02 PREPARATION

B. Always conduct moisture tests per ASTM F-2170 on all concrete slabs regardless of age or grade level. ASTM F-2170 Internal Relative Humidity (IRH) test results must not exceed 85%.

C. Do not proceed with work until results of moisture condition tests are acceptable.

D. When patching, a *moisture tolerant* patching compound must always be used.

3.03 INSTALLATION

A. Install safety flooring in accordance Manufacturer. All Seams shall be heat welded.

3.04 CLEANING

A. Cleaning: Remove temporary coverings and protection of adjacent work areas.

1. Repair or replace damaged installed products.

2. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance.

B. Protection:

1. Sweep or vacuum all construction debris and dust first, then clean the flooring with an auto scrubber.

3.05 PROTECTION

A. Cover and protect finished installation from damage from other trades using a non-staining, temporary floor protection system, such as a reusable textured plastic sheeting.

B. Flooring shall be covered and protected from all other trades during construction with a suitable non-staining protective covering without taping to the surface of the flooring.

END OF SECTION 096570

SECTION 096720 - SEAMLESS EPOXY QUARTZ AND MARBLE-CHIP FLOORING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fluid applied epoxy quartz and marble-chip flooring and cove base.

B. Glaze.

1.2 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

B. Selection Samples: For each finish product specified, submit two samples 4 by 4 inches in size illustrating color, chip size and variation, and matrix color.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Installation shall be performed by an applicator approved by the manufacturer of the floor surfacing materials. The Contractor shall furnish a certified installer certificate.

B. Pre-Application Meeting: Convene a pre-application meeting two weeks before the start of application of the floor coating system. Require attendance of parties directly affecting work of this section, including the Contractor and Applicator. Review the surface preparation, application, cleaning, protection and coordination with other work.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

   1. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
   2. Refinish mock-up area as required to produce acceptable work.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Store materials in accordance with the manufacturer's instructions.

   1. Store materials in dry, enclosed area with adequate protection from moisture.
   2. Keep containers sealed until ready for use.

C. Storage Temperature: Store between 65 degrees F and 90 degrees F.

1.5 PROJECT CONDITIONS

A. Roof shall be completed and building enclosed prior to flooring commencement.

B. Maintain temperature range of between 65 degrees F and 90 degrees F 24 hours before, during, and 72 hours after installation of flooring.

C. Ventilate area where flooring is being installed. Post and enforce NO SMOKING or OPEN FLAME signs until flooring has cured.

D. Provide uniform lighting of 50 fc in area of installation.

E. Restrict traffic from area where flooring is being installed or is curing.

1.6 WARRANTY

A. Provide ten year warranty under provisions of Section 01770.

B. Warranty: Include coverage for delamination (separating of layers) of floor and cove base materials and degradation of surface finish.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Everlast Epoxy Systems Inc, which is located at: 637 NW State Road 47 ; Lake City, FL 32025; Tel: 386-719-9979; Fax: 386-719-6982; Email: info@everlastepoxy.com ; Web: www.everlastepoxy.com

B. Architect approved equal.

2.2 MATERIALS

A. General:

1. Material shall include select silica quartz and marble-chip aggregate fillers.
2. Floor system shall be a 100 percent solid, unpigmented epoxy resin system.
3. Base: A three-component, integral troweled base and cove consisting of floor resin and hardner, silica quartz and marble-chip aggregates as used in the floor, and finely graded silica aggregate, 6 inches height or as scheduled.
4. Glaze: High performance, chemical resistant, two-component, clear sealer.
5. Color as selected by Architect from manufacturers standard color range.

B. Epoxy Floor: A 100 percent solids epoxy, marble-chip and quartz aggregate that is a troweled in place, evenly textured, slip-resistant finish of between 1/8 inch and 3/16 inch thickness.

1. System shall not require primer (unless needed due to the substrate), bond coat, grout or sealer components for application.

C. Glaze:

1. Anti-Skid finish – Epoxy Floor with 1 coat of glaze with medium anti-skid broadcast into during the application.

PART 3 - EXECUTION

3.1 EXAMINATION

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

1. Verify that substrate is ready to receive work, and that sub-floor surface is clean, dry, and free of substances which could affect bond.
2. Concrete hydrostatic, capillary or moisture pressure must be no greater than 3.0 lbs./1000 sf/ 24 hours. Substrates in contact with the ground must have a properly installed, functioning and effective vapor barrier to help prevent potential problems resulting from hydrostatic, capillary or moisture vapor emission. Concrete must contain less than 3% moisture when tested per ASTM D1864.
3. Maintain minimum concrete surface temperature between 55 and 85°F., and relative humidity below 80% for a minimum of 48 hours before, during , and after installation, or until cured. Surface temperature must be 5°F. Above dew point.
4. Beginning work constitutes acceptance of substrate.

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

3.2 PREPARATION

A. Substrate Requirements:
1. Contractor to provide positive drainage at floor drains.
2. Floor drains shall be set no higher than 1/8 inch above slab.
3. Floor sinks shall be set in accordance with local codes and regulations.
4. Gaps between wall sheathing and substrate shall be filled prior to flooring commencement per flooring manufacturer's requirements.
5. FRP and any other wall finish should terminate with a J-mould or other trim at least 6 inches above finish floor.
6. The substrate shall be clean, dry and sound. Remove dust, laitance, grease, curing compounds, waxes, foreign particles and any previously applied potentially incompatible coatings by scarifying, chipping, wire brushing, acid etching, or pressure washing. If pressure washing or any other liquid method is used for preparation, substrate should be fully rinsed, squeeze-dry mopped and allowed to completely dry.
7. Concrete: New concrete must cure for at least 28 days at 70°F, and have been free from water for at least 7 days. Swollen areas should be chipped out and any cracks, spalls, joints or other depressions filled with our underlayment. The concrete should be at least 2500 psi. Concrete hydrostatic, capillary or moisture pressure must be no greater than 3.0 lbs./1000 sf/24 hours.

3.3 INSTALLATION - FLOORING

A. Apply flooring in accordance with manufacturer's instructions. Apply to a minimum thickness of 1/8 inch. Finish to smooth level surface sloped to drains.

B. Provide base and cove at vertical surfaces.

3.4 TOLERANCES

A. Maximum Variation from Flat Surface: 1/8 inch in 10 feet.

3.5 PROTECTION

A. Protect finished installation during construction.

B. Do not permit traffic over finished floor surfaces for 42 hours.

3.6 PROTECTION

A. Protect installed products until completion of project.

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

END OF SECTION 096720

SECTION 097200 - WALL COVERINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This section includes labor, materials and other services necessary to complete vinyl wall covering panels.

B. Conform with requirements of all Sections of Division 1, General Requirements, as it applies to the work of this Section.

1.2 RELATED SECTIONS

A. Section 092216 – Gypsum (Cementitious) substrate board.

B. Section 054000 – Cold-Formed Metal Framing.

1.3 REFERENCES

A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.

B. American Society for Testing & Materials (ASTM):

1. AST ASTM E 84-05 Standard Test Method for Surface Burning Characteristics of Building Materials. CLASS A

2. ASTM D5420 Gardner Impact Exceeds 80 inch pounds

1.4 SYSTEM DESCRIPTION

A. Performance Requirements: Provide wall covering panels which have been manufactured by to maintain performance criteria stated by manufacturer without defects.

1.5 SUBMITTALS

A. Product Data: Submit manufacturer’s current printed product literature, specifications, installation instructions, and field reports in accordance with Section 01330 - Submittal Procedures.

B. Shop Drawings: Submit shop drawings to indicate materials, details, and accessories in accordance with Section 01330 - Submittal Procedures including but limited to the following:

1. Submit a layout diagram indicating the location of each panel and joining method.

C. Samples: Submit duplicate sample pieces of wall covering panel material, as well as accessory pieces in accordance with Section 01330 - Submittal Procedures.

D. Quality Assurance Submittals: Submit the following:

1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

2. Manufacturer's Instructions: Current published manufacturer's installation and maintenance instructions.

E. Closeout Submittals: Submit the following:

1. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.

2. Warranty: Warranty documents specified herein.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.

1. Training: Installer who has a min. of five years of experience installing wall covering panels.

B. Mock-ups: Install at project site a job mock-up using acceptable products and manufacturer approved installation methods. Obtain Owner's and Consultant's acceptance of finish color, texture and pattern, and workmanship standards.

1. Mock-Up Size: Minimum 6 feet by 6 feet.

2. Maintenance: Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.

3. Incorporation: Mock-up may be incorporated into final construction upon Owner's approval.

C. Pre-installation Meeting: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements.

1.7 DELIVERY, STORAGE & HANDLING

A. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Store materials protected from exposure to harmful weather conditions, at temperature and humidity conditions recommended by manufacturer.

D. Store panels in temperature controlled environments. Leave protective blue film on panel until ready to use.

1.8 WASTE MANAGEMENT AND DISPOSAL

A. Deposit all packaging materials in appropriate container on site for recycling or reuse.

B. Avoid using landfill waste disposal procedures when recycling facilities are available.

C. Keep all discarded packaging away from children.

1.9 PROJECT CONDITIONS

A. Temperature Requirements: If storage temperature is below 65F, the wall panels must be moved to a warmer place and allowed to reach this temperature before installation. For further information, refer to current Manufacturer Installation Guide.

B. Maintain air temperature and structural base temperature at installation area between 65F and 80F for 48 hours before, during and 24 hours after installation.

1.10 WARRANTY

A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.

B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

C. Warranty Period for wall covering panels shall be 1 year commencing on Date of Substantial Completion.

1.11 EXTRA MATERIALS

A. Provide extra materials of product and adhesives in accordance with Section 01780 - Closeout Submittals.

B. Upon completion of the work of this section and store where directed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Altro

1. Basis of Design Product: Puraguard™ by Altro; 80 Industrial Way, Wilmington MA 01887; 800.565.4658; www.altrofloors.com.

2. Refer to Section 012500 “Substitution Procedures” for substitution requirements.

2.2 PVCu WALL COVERING (FOR COMMERCIAL KITCHENS)

A. Semi-rigid PVCu panel:

1. Thickness: 0.080 inches.
2. Panel Width: 4 feet.
3. Panel Height 10 feet.
4. Weight per panel: 23.37 lbs.

2.3 ACCESSORIES

A. Joint Strips:

1. 2-Part Joint Strip: 10 feet, white.

B. Start and Edge Trim:

1. 2-Part Start and Edge Trim – 10 feet, white.

C. Corners, Covers and Gasket Trims:

1. Internal/External Corner: 10 feet.
2. External Corner Cover: 10 feet.
3. Gasket Trim: 10 feet.

D. Optional Accessories:

1. Stainless Steel Corner Protector – Dimensions: 4 feet x 3 inches x 3 inches.

2. C4 CAP Strip – Length 72 inches, white.

E. Acrylic Adhesive: For dry, climate controlled areas, use a one-part, water-based, acrylic adhesive as recommended by manufacturer.

F. Polyurethane Adhesive: The default adhesive for most installations, suitable for wet area, non-climate controlled areas, and non-absorbent surfaces a two-part resin-based polyurethane adhesive as recommended by manufacturer.

G. Sanitary Sealant and Mastic Compounds and Tools: As recommended by manufacturer.

1. Color: Clear.

2.4 SOURCE QUALITY

A. Source Quality: Obtain wall products from a single manufacturer.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog, installation instructions and product label instructions for installation.

3.2 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

3.3 SUBSTRATE PREPARATION

A. Walls should be smooth and level. High points must be removed and low points filled with filler intended for the substrate and environmental conditions.

B. Surfaces must be permanently dry and free from all substances that may contribute to adhesive bond failure.

C. Remove loose paint and conduct an adhesive bond test with paint.

D. Exterior walls must be adequately damp-proofed and insulated.

E. Dry wall substrates should be paint ready.

3.4 PREPARATION

A. All surfaces must be free from dust and cleaned prior to installation. The working environment must also be dust free.

B. All electrical switches, power points etc., should be in a first fix / installation state. All electrical equipment should only be moved or altered by a qualified electrician.

C. All plumbing should have pipe-work removed to a first fix or installation state and “tails” left protruding from the substrate. Panels can then be drilled and slid over the pipe tails. All holes should be drilled 1/8” oversize to allow for expansion, then sealed with sanitary sealant. Plumbing should always be done by a qualified plumber.

D. Hot pipes and steam pipes should be insulated and a 1/8” to 1/4” expansion gap should be created when installing panels around these pipes, then sealed with sanitary sealant.

E. All pipes, fixing bolts, etc. extending through the panels should have a minimum 1/8” expansion gap and be sealed using sanitary sealant.

F. If fitting to door frames, these must be in place prior to installation of wall panels.

G. Prior to installation, it is advisable to complete any painting which comes in contact with wall panels, as sealant used at junctions is non-paintable.

H. Panels should be stored flat and be pre-conditioned a minimum of 24 hours in ambient temperatures similar to the prevailing operational conditions.

I. The panels must be stored on a level flat surface off the ground (risk of condensation on the panels if stored on damp surfaces). Storage on uneven surfaces could cause the panels to distort prior to installation.

J. First, check the room using a 6’ level to ensure all walls are flat, paying particular attention to the corners, window reveals, and door entrances. These need to be inspected to ensure they are free of any debris or irregularities, which could prevent the panels from laying flat to the substrate after the adhesive has been applied and the panel installed.

3.5 INSTALLATION

A. PVC Wall Installation: Install wall panels in accordance with the current Manufacturer’s Installation Guide.

3.6 FIELD QUALITY REQUIREMENTS

A. Manufacturer’s Field Services: Upon Owner’s request, provide manufacturer’s field service consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer’s instructions.

1. Site Visits: 2.

3.7 CLEANING

A. Clean wall panels with a diluted soap/detergent solution.

B. When cleaning wall panel surfaces, temperature of water shall not exceed 140° F.

C. Pressure cleaning with hot water may be used with the pressure nozzle a minimum of 2 feet away from the surface, not recommended with acrylic adhesive installations.

D. To reduce the buildup of static, cleaning the panels with an anti-static solution is recommended.

3.8 PROTECTION

4. Do not install near open heat sources (ovens, etc). Stainless steel panels should be used in such areas.

END OF SECTION 097200

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Steel.
2. Gypsum board.

1.2 DEFINITIONS

A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.

1.4 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Product: Sherwin Williams; 101 W Prospect Ave., Cleveland, Ohio 44115; 1-800-474-3794; http://www.sherwin-williams.com/

1. Refer to Section 12500 “Substitution Procedures” for substitution requirements.

B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Interior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

B. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base:

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Primers, Sealers, and Undercoaters: 200 g/L.
4. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
5. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
6. Pretreatment Wash Primers: 420 g/L.
7. Floor Coatings: 100 g/L.

D. Colors: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 INTERIOR PAINTING SCHEDULE

A. Steel Substrates:

1. Epoxy System:

a. Prime Coat: Primer, acrylic, anti-corrosive, for metal.

1) Pro-Cryl Universal Primer by Sherwin-Williams or approved equal.

b. Intermediate Coat: Epoxy, high build, Eg-shel.

1) Pro Industrial Water Based Catalyzed Epoxy by Sherwin-Williams or approved equal.

c. Topcoat: Epoxy, Eg-shel.

1) Pro Industrial Water Based Catalyzed Epoxy by Sherwin-Williams or approved equal.

B. Gypsum Board Substrates:

1. Latex over Latex Primer System:

a. Prime Coat: Primer sealer, latex, interior.

1) ProMar 200 Zero VOC Interior Latex Primer by Sherwin-Williams or approved equal.

b. Intermediate Coat: Latex, interior, matching topcoat.

c. Topcoat: Latex, interior, flat (MPI Gloss Level 1).

1) ProMar 200 Zero VOC Interior Latex Paint by Sherwin-Williams or approved equal.

2) Locations: Ceilings

d. Topcoat: Latex, interior (MPI Gloss Level 3).

1) ProMar 200 Zero VOC Interior Latex Paint by Sherwin-Williams or approved equal.

2) Locations: Walls.

END OF SECTION 099123

SECTION 099300 - STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and application of wood stains and transparent finishes on the following substrates:

1. Interior Substrates:

a. Dressed lumber (finish carpentry or woodwork).

1.2 DEFINITIONS

A. MPI Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

C. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

D. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

E. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples: For each type of finish system and in each color and gloss of finish required.

1.4 QUALITY ASSURANCE

A. Mockups: Apply mockups of each finish system indicated and each color selected to verify preliminary selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each type of finish system and substrate.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..

b. Other Items: Architect will designate items or areas required.

2. Final approval of stain color selections will be based on mockups.

a. If preliminary stain color selections are not approved, apply additional mockups of additional stain colors selected by Architect at no added cost to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide products indicated in wood finish systems schedules or comparable products by one of the following:

1. Minwax; 10 Mountainview Road, Upper Saddle River, NJ 07458; 800-523-9299; http://www.minwax.com/.

B. Products: Subject to compliance with requirements, available product that may be incorporated into the Work include, but are not limited to products listed in wood finish systems schedules for the product category indicated.

2.2 MATERIALS, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior stains and finishes applied at project site, the following VOC limits, exclusive of colorants added to a tint base.

1. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
2. Shellacs, Clear: VOC not more than 730 g/L.
3. Stains: VOC not more than 250 g/L.
4. Primers, Sealers, and Undercoaters: 200 g/L.

D. Stain Colors: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Interior Wood Substrates: 15 percent, when measured with an electronic moisture meter.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Proceed with finish application only after unsatisfactory conditions have been corrected.

1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.

1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each substrate condition and as specified.

1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.

3.3 APPLICATION

A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 CLEANING AND PROTECTION

A. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

B. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.5 INTERIOR WOOD -FINISH-SYSTEM SCHEDULE

A. Wood Substrates: Wood trim, architectural woodwork and wood doors and frames.

1. Polyurethane Varnish over Stain System:

a. Prime Coat: Water Based Pre-Stain Wood Conditioner.

1) Minwax Pre-Stain.

b. Stain Coat: Water based stain for interior wood.

1) Minwax Wood Stain.

c. First Intermediate Coat: Polyurethane varnish matching topcoat.
d. Second Intermediate Coat: Polyurethane varnish matching topcoat.
e. Topcoat: Varnish, interior, polyurethane, water based, oil modified, clear gloss (MPI Gloss Level 4).

1) Minwax Oil-Modified Polyurethane.

END OF SECTION 099300

SECTION 099600 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of high-performance coating systems on the following substrates:

1. Exterior Substrates:
   a. Steel.

1.2 DEFINITIONS

A. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

B. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

C. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.

B. Samples: For each type of coating system and in each color and gloss of topcoat indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following Manufacturers:

1. Sherwin Williams; Cleveland, OH; www.sherwin-williams.com

2. Sumter Coatings; Sumpter, SC 29105; www.sumtercoatings.com

3. TNEMEC; Kansas City, MO 64120; www.tnemec.com

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

B. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
3. Products shall be of same manufacturer for each coat in a coating system.

C. Colors: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

C. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and coating systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.

3.3 APPLICATION

A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

B. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Steel Substrates:

1. Epoxy System:

a. Prime Coat: Primer, epoxy, anti-corrosive, for metal.

b. Intermediate Coat: Epoxy, high build, low gloss.

c. Topcoat: Epoxy, gloss.

END OF SECTION 099600

SECTION 101419 - DIMENSIONAL LETTER SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Back-lit, opaque, molded-plastic dimensional characters.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For dimensional letter signs.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
3. Show message list, typestyles, graphic elements, and layout for each sign at least half size.
4. Show locations of electrical service connections.
5. Include diagrams for power, signal, and control wiring.

C. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Thermal Movements: For exterior dimensional characters>, allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 DIMENSIONAL CHARACTERS

A. Molded-Plastic Characters: Characters having uniform faces and profiles, and as follows:

1. Manufacturers:

a. ACE Sign Systems, Inc.; 3621 W Royerton Rd, Muncie, IN 47304; 765-288-1000; http://www.acesign.com/.

b. Gemini Incorporated; 103 Mensing Way, Cannon Falls, MN 55009; 1-800-538-8377; https://www.geminisignproducts.com/.

c. Signs & Decal Corp; 410 Morgan Ave, Brooklyn, NY 11211; (718) 486-6400; http://signsanddecal.com/

d. Architect approved equal.

2. Illuminated Characters: Backlighted characters with concealed LED lighting including transformers, insulators, and other accessories; with provision for servicing and concealing connections to building electrical system. Space lamps apart from each other and away from character surfaces as needed to illuminate evenly.

a. Power: As indicated on electrical Drawings.

3. Color: Manufacturer's standard integral color process, in color as selected by Architect from manufacturer's full range.

2.3 DIMENSIONAL CHARACTER MATERIALS

A. Acrylic Sheet: ASTM D 4802, Type UVF (UV filtering).

2.4 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.
2. For exterior exposure, furnish nonferrous-metal, stainless-steel, or hot-dip galvanized devices unless otherwise indicated.

3. Sign Mounting Fasteners:

    a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.

2.5 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
2. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
4. Internally brace signs for stability and for securing fasteners.
5. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.

3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Mounting Methods:

1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.

a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.

C. Remove temporary protective coverings and strippable films as signs are installed.

END OF SECTION 101419

SECTION 101423 - PANEL SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Room-identification signs.
2. Salvation Army logo on building exterior.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For panel signs.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.

C. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

1.3 INFORMATIONAL SUBMITTALS

A. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Thermal Movements: For exterior signs, allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F.

B. Accessibility Standard: Comply with applicable provisions in ICC A117.1 for signs.

2.2 SIGNS

A. Room-Identification Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Basis-of-Design Product: ADA Unisex Restroom Sign by Alpha Dog ADA Signs; 4321 Anthony Court, Unit #7; Rocklin, CA 95677; 888-586-7154; https://www.alphadogadasigns.com/

2. Size: 6 x 8 inches.
3. Laminated-Sheet Sign: Photopolymer face sheet with raised graphics laminated to acrylic backing sheet to produce composite sheet.

a. Composite-Sheet Thickness: 0.125 inch.
b. Color(s): As selected by Architect from manufacturer's full range.

4. Sign-Panel Perimeter: Finish edges smooth.

a. Edge Condition: Beveled.
b. Corner Condition in Elevation: Rounded.

5. Mounting: Surface mounted to wall with adhesive or two-face tape.

B. Exterior Salvation Army Logo Sign:

1. Coordinate design, size, and material with Owner.

2.3 PANEL-SIGN MATERIALS

A. Acrylic Sheet: ASTM D 4802, Type UVF (UV filtering).

2.4 ACCESSORIES

A. Adhesives: As recommended by sign manufacturer and with a VOC content of 70 g/L or less for adhesives used inside the weatherproofing system and applied on-site when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch thick, with adhesive on both sides.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Install signs so they do not protrude or obstruct according to the accessibility standard.
3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.

B. Mounting Methods:

1. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.

2. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

C. Remove temporary protective coverings and strippable films as signs are installed.

END OF SECTION 101423

SECTION 102600 - WALL PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Corner guards.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Material certificates.

C. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of wall- and door-protection units that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CORNER GUARDS

A. Surface Mounted, Stainless Steel Corner Guards:

1. Manufacturers:

a. Cap Industries, Inc., 10722 Tucker Street, Beltsville, MD. 20705 USA; 301-937-4383; www.cornerguard.net.

b. Koroseal Wall Protection Systems; 3875 Embassy Parkway, Fairlawn, Ohio 44333; A855-753-5474; http://koroseal.com/.

c. Architect approved equal.

2. Dimensions:

a. Leg Length: 2-inches.

b. Angle: 90 Degrees.

3. Finish: Stainless Steel: No. #4 Satin finish.

2.2 MATERIALS

A. Stainless Steel: Type 304, 16 gauge.

B. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation Quality: Install wall and door protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

B. Mounting Heights: Install wall protection in locations and at mounting heights indicated on Drawings.

C. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.

1. Provide anchoring devices and suitable locations to withstand imposed loads.
2. Adjust end caps as required to ensure tight seams.

END OF SECTION 102600

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Private-use bathroom accessories.
3. Warm-air dryers.
4. Hand sanitizer dispensers.

1.2 RELATED SECTIONS

A. Section 260500 “General Requirements for Electrical Work: Electrical supply, conduit, wiring, boxes, and wiring devices for hand dryers.

1.3 REFERENCES

A. ICC/ANSI A117.1 - American National Standard for Accessible and Useable Buildings and Facilities; 1998.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings showing dimensions, method of attachment, and required supports.

1.5 INFORMATIONAL SUBMITTALS

A. Sample warranty.

B. Electrical wiring diagrams for connection of hand dryers.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.7 WARRANTY

A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PUBLIC-USE WASHROOM ACCESSORIES

A. Toilet Tissue (Roll) Dispenser:

1. Model #B-274 by Bobrick; 6901 Tujunga Avenue, North Hollywood, California 91605; 818-764-1000; http://www.bobrick.com/, or Architect approved equal.
2. Description: Double-roll dispenser.
3. Mounting: Surface mounted.
4. Operation: Plastic spindles, concealed locking device; theft-resistant.
5. Capacity: Designed for 4-1/2- or 5-inch- diameter tissue rolls.
6. Material and Finish: Satin-finish aluminum bracket with plastic spindle.

B. Liquid-Soap Dispenser:

1. Model #818615 by Bobrick; 6901 Tujunga Avenue, North Hollywood, California 91605; 818-764-1000; http://www.bobrick.com/, or Architect approved equal.

2. Description: Designed for dispensing antibacterial soap in liquid or lotion form.
3. Mounting: Horizontally oriented, surface mounted.
4. Capacity: 40 oz..
5. Materials: Satin finish, Type 316 stainless-steel.
6. Lockset: Tumbler type.
7. Refill Indicator: Window type.

C. Grab Bar:

1. Manufacturer: Bobrick; 6901 Tujunga Avenue, North Hollywood, California 91605; 818-764-1000; http://www.bobrick.com/, or Architect approved equal.
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.

a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.

4. Outside Diameter: 1-1/4 inches.
5. Configuration and Length: As indicated on Drawings.

D. Mirror Unit:

1. B-293 2436 by Bobrick; 6901 Tujunga Avenue, North Hollywood, California 91605; 818-764-1000; http://www.bobrick.com/, or Architect approved equal.

2. Frame: Stainless steel, fixed tilt.

   a. Corners: Manufacturer's standard.

3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.

   a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
   b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

4. Size: As indicated on Drawings.

2.2 PRIVATE-USE BATHROOM ACCESSORIES

A. Toilet Tissue Dispenser:

1. Manufacturer: American Standard model #8334.230 or Architect approved equal.
2. Description: Single-roll dispenser.
3. Mounting: Surface mounted.
4. Capacity: Designed for 4-1/2- or 5-inch- diameter tissue rolls.
5. Material and Finish: Polished Chrome.

B. Robe Hook:

1. Manufacturer: American Standard model #8334.230 or Architect approved equal.
2. Description: Double-prong unit.
3. Material and Finish: Polished chrome.

C. Towel Bar:

1. Manufacturer: American Standard model #8334.024 or Architect approved equal.
2. Description: 3/4-inch- round tube with circular end brackets.
3. Mounting: Flanges with concealed fasteners.
4. Length: 24 inches.
5. Material and Finish: Polished Chrome.

2.3 WARM AIR DRYERS

A. Manufacturers:

1. Basis of Design Manufacturer: Excel Dryer Inc., 357 Chestnut St., P. O. Box 365, East Longmeadow, MA 01028; Tel: 413-525-4531; Web: www.exceldryer.com.

2. Substitutions: Substitutions shall be permitted in accordance with section 012500 “Substitution Procedures”.

B. High Efficiency Heated Air Hand Dryer: XLERATOR; high speed, energy efficient, rapid drying, automatic sensor, adjustable speed and sound control, adjustable heat control, electric hand dryer; surface mounted or semi-recessed; entire dryer internally grounded.

1. Model XL-SB:

a. Cover: Stainless steel.

b. Finish: Brushed Number 4 finish.

C. Mounting:

1. Surface Mounted.

D. Controls: Automatic, activated by infrared optical sensor located next to the air outlet. Dryer will operate as long as hands are under the air outlet.

E. Air Outlet: Delivers focused air stream of 19,000 LFM at nozzle and 16,000 LFM at average hand position of 4 inches (102 mm) below air outlet.

F. Power Source:

1. 208 - 277 Volts, 5.6 - 6.2 Amps, 50/60 Hz, 1160 - 1490 Watts.

G. Combination Motor and Blower: Series commutated, through-flow discharge, vacuum type; 5/8 HP, 20,000 RPM. Airflow rate: 19,000 linear feet per minute at air outlet, 16,000 linear feet per minute at average hand position of 4 inches below air outlet.

H. Heater: Nichrome wire element, mounted inside blower housing to be vandal resistant. Heater Safeguard: Automatic resetting thermostat to open when airflow is restricted and close when airflow is resumed.

I. Air Temperature: 135 degrees F measured at average hand position of 4 inches below air outlet. Air Heater Output: 970 watts.

J. All metal parts coated according to Underwriters Laboratories, Inc. requirements.

2.4 HAND SANITIZER DISPENERS

A. Basis of Design Product: Foam Manual Dispenser by Tork; Cira Centre, Suite 2600, 2929 Arch Street; Philadelphia, PA 19104; 1-866-SCA-TORK; http://www.torkusa.com/.

1. Refer to Section 012500 “Substitution Procedures” for substitution requirements.

B. Material: Plastic.

C. Dimensions:

1. Height: 11.3 inches.

2. Width: 4.5 inches.

3. Depth: 4.1 inches

D. Color: White

E. Refills: Foam alcohol-free hand sanitizer.

2.5 FABRICATION

A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Coordinate requirements for power supply, conduit, disconnect switches and wiring.

C. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

D. Mount dryers at heights indicated on Drawings.

END OF SECTION 102800

SECTION 102819 - TUB AND SHOWER DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes frameless shower doors and enclosures.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Sample warranties.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of tub and shower doors and enclosures that fail in materials or workmanship within specified warranty period without monetary limitation.

1. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FRAMELESS ENCLOSURES

A. Frameless glass panels with mounting and operating hardware of types and sizes required to support imposed loads.

1. Manufacturers:

a. Lattis Model #K-705824-L by Kohler Co.; 444 Highland Drive, Kohler, WI 53044; 1-800-456-4537; http://www.corporate.kohler.com.

b. Architect approved equal.

B. Hardware and Trim: Manufacturer's standard units as indicated and as required for complete installation.

1. Materials:

a. Aluminum:

1) Finish: Clear anodic.
2) Color: Silver.

C. Swinging Doors: Hinged for 90 degrees out swing. Self-centering when doors are within 15 degrees of closed position. Soft bulb seal or wipes; affixed to door to direct water back into enclosure and provide a tight water seal.

1. Hinges: Top-and-bottom pivots.

D. Fixed Panels: Top-and-bottom mounts; match hinges in material and finish.

E. Glazing: Safety glazing materials complying with 16 CFR 1201, Category II, with permanently etched identification acceptable to authorities having jurisdiction.

1. Glass Nominal Thickness: As determined by manufacturer based on panel size.
2. Clear Glass: ASTM C 1048, Type I, Quality-Q3, Class I (clear), Kind FT.
3. Protective, Self-Cleaning, Glass Coating: Clear float glass with a coating on first surface having both photocatalytic and hydrophilic properties that act to loosen dirt and to cause water to sheet evenly over the glass instead of beading.

F. Fasteners: Manufacturer's standard stainless-steel or other noncorrosive fasteners.

G. Sealant: Mildew-resistant, single-component, nonsag, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

1. Sealant shall have a VOC content of 250 g/L or less.

H. Materials:

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

a. Sheet and Plate: ASTM B 209.
b. Extrusions: ASTM B 221.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Clean substrates, removing projections, filling voids, and sealing joints.

B. Set units level, plumb, and true to line, without warp or rack of frames and panels, and anchor securely in place.

C. Fasten components securely in place, with provisions for thermal movement. Install with concealed fasteners unless otherwise indicated.

D. Install components to drain and return water to tub or shower.

E. Install doors to produce smooth operation and tight fit at contact points.

F. Repair, refinish, or replace components damaged during installation.

3.2 ADJUSTING AND CLEANING

A. Adjust operating parts and hardware for smooth, quiet operation and watertight closure. Lubricate hardware and moving parts.

B. Remove nonpermanent labels, and clean surfaces immediately after installation.

END OF SECTION 102819

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each mounting bracket indicated.

1. Manufacturers:

a. Amerex Corporation.

b. Sentry by Ansul Incorporated.

c. Buckeye Fire Equipment.

d. Kidde Home Safety.

e. Nystrom.

f. Potter Roemer.

g. Strike First Corporation of America.

h. Architect approved equal.

2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.

B. Wet Chemical Type: UL-rated 1A:K, 6 liter capacity, with a blend of potassium acetate and potassium citrate solution in stainless-steel container; with pressure-indicating gage.

C. Monoammonium Phosphate Type: UL-rated 4 A: 80 B:C, 10-lb nominal capacity, with dry chemical in manufacturer's standard enameled-metal container.

2.3 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.

1. Manufacturers:

a. Amerex Corporation.

b. Ansul Incorporated.

c. Buckeye Fire Equipment.

d. Nystrom.

e. Potter Roemer.

f. Strike First Corporation of America.

g. Architect approved equal.

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

1. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher.

C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416

SECTION 107000 – EXTERIOR SUN CONTROL DEVICES

PART 1 – GENERAL

1.1 SUMMARY

A. This section includes products to assist in controlling the effects of the sun.

B. Related work specified elsewhere:

1. Sheet Metal Work Section.

C. Work included in this section.

The extent of the extruded aluminum sunshade system is shown on the contract drawings and hereby defined to include all sunshade devices of the type shown and specified herein.

1.2 INDUSTRY STANDARD

A. Reference: Products and executions are specified in this section by reference to the following industry and/or trade specifications or standards of the following:

B. National Association of Architectural Metal Manufacturers (NAAMM), the Aluminum Association (AA), American Architectural Manufacturers Association (AAMA).

1.3 SUBMITTALS

A. Product data:

1. Manufacturer's technical and descriptive data.

B. Shop Drawings:

1. Submit for architect's approval prior to commencement of any work or fabrication under this section. Shop drawings shall show all areas of work profiles and sections of all components, finishes and fastening details.

C. Structural Calculations:

1. Submit comprehensive analysis of design loads, dead, live, snow, wind and thermal movements. Calculations shall be stamped and signed by a professional engineer registered in the jurisdiction where the project is located.

D. Warranties:

1. The work in this section shall be guaranteed against defects in material and workmanship for a period of one (1) year from date of acceptance of the building. Contractor shall replace and repair any defects at no cost to the owner.

E. Samples: Finish.

1.4 Components

A. Shipping and Handling:

1. Deliver materials to the job site ready for erection. Assembled units to be packaged and shipped to prevent damage during freight and storage on site.

PART 2 – PRODUCTS

2.1 MATERIALS

A. General: Metal shall be free from defects impairing strength, durability or appearance.

1. Aluminum – ASTM B 221, alloys 6063-T5 and 6063-T6 for extrusions. ASTM B 209, alloys 5052-H32 or greater.

2. Fasteners – Unless otherwise noted, fasteners shall be 300 series non-magnetic stainless steel. ASTM A-307, grade A or better

2.2 MANUFACTURERS

A. Acceptable Manufacturers:

1. Mayo-30" Airfoil Sunshades (Ireland Series) as manufactured by Architectural Grilles and Sunshades, Inc. (AGS, Inc.) 9950 W. 190th, Street Mokena, IL 60448; (708) 479-9458; http://www.agsshade.com/

2. Architect approved equal.

2.3 COMPONENTS

A. Sunshade Blades: 3" 6063 T5 extruded aluminum.

B. Outriggers: 1/4 inch thick 6063 T5 extruded aluminum.

C. Tube Fascia: 2-1/2 inch diameter round 6063 T5 extruded aluminum.

D. Brackets: Aluminum brackets with stainless steel thru-bolts as provided by Manufacturer.

E. Turnbuckles: 1 inch diameter rod with turnbuckle assembly as provided by Manufacturer.

D. Components shall be shop assembled in large practical sections to allow for immediate erection.

2.3 ALUMINUM FINISH

A. Class I, clear anodic finish: AA-M12C22A41 (Mechanical Finish: Chemical finished: etched,

medium matte; anodic coating: Architectural class I, clear coating 0.018 mm or thicker) complying with AAMA 607.1.

PART 3 – EXECUTION

3.1 FIELD DIMENSIONS

A. Verify conditions: Examine areas where work is to be performed and identify any conditions that could be detrimental to proper or timely completion.

B. General Contractor shall field confirm openings and elevations as shown on shop drawings prior to fabrication.

C. Installation should not proceed until all conditions are satisfactory.

3.2 ERECTION

A. Qualified installer needs to comply with manufacturer's installation instructions.

B. Verify all dimensions and the supporting structure and provide accurate field measurements, so that the sunshades will be properly designed, fabricated and fitted to the structure.

C. Anchor sunshades to the building per the architectural drawings.

D. A maximum of +/- 1/8" tolerance between any column to column spacing is acceptable.

E. Do not cut or trim any sunshade components without written approval by Manufacturer.

F. Do not erect any damaged or deformed members. Remove or replace any damaged members in the erection process as directed by Manufacturer.

G. Set sunshade units level, plumb, with uniform joints.

H. Qualified installer to erect after all adjacent painting, roofing and masonry had been completed.

3.3 CLEANING

A. Clean exterior sunshades surfaces to prevent buildup of dust and debris, refer to Manufacturer's cleaning instructions based on the finish of the material

3.4 PROTECTION

A. Protect sunshade materials after installation to prevent damage by other tradespersons.

END OF SECTION 107000

SECTION 113100 - RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cooking appliances.
2. Kitchen exhaust ventilation.
3. Refrigeration appliances.
4. Clothes washers and dryers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Field quality-control reports.

C. Sample warranties.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 WARRANTY

A. Special Warranties: Manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Appliances: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 RANGES

A. Manufacturer: General Electric or Architect approved equal.

B. Electric Range: Freestanding range with one oven(s) and complying with AHAM ER-

1. Basis-of-Design Product: Model #JB650EFES by General Electric or Owner approved equal.
2. Electric Burner Elements: Five radiant-type burners.
3. Anti-Tip Device: Manufacturer's standard.
4. Material: Slate finish with manufacturer's standard cooktop.

2.3 MICROWAVE OVENS

A. Manufacturer: General Electric or Architect approved equal.

B. Microwave Oven:

1. Basis-of-Design Product: Model # PEB7226EHES by General Electric or Owner approved equal.
2. Capacity: 2.2 cu. ft.
3. Microwave Power Rating: Manufacturer's standard.
4. Material: Slate finish.

2.4 KITCHEN EXHAUST VENTILATION

A. Basis OF Design Product: Model #413004 by Broan or Owner approved equal.
1. Type: Wall-mounted, exhaust-hood system.
2. Exhaust Fan: Two-speed fan built into hood and with manufacturer's standard capacity.

a. Venting: Nonvented, recirculating type with charcoal filter.

3. Finish: Stainless steel.

2.5 REFRIGERATOR/FREEZERS

A. Manufacturer: General Electric or Architect approved equal.

B. Refrigerator/Freezer: Two-door refrigerator/freezer with freezer on top and complying with AHAM HRF-1.

1. Basis-of-Design Product: Model #GTE18GMHES by General Electric or Owner approved equal.
2. Type: Freestanding.
3. Storage Capacity: 17.5 cu. ft.
4. General Features:

a. Interior light in refrigeration compartment.

5. Energy Performance, ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product-labeling program.
6. Front Panel(s): Slate finish.

2.6 DISHWASHERS

A. Manufacturer: General Electric or Architect approved equal.

B. Dishwasher: Complying with AHAM DW-1.

1. Basis-of-Design Product: Model # GDF610PMJES by General Electric or Owner approved equal.
2. Type: Built-in undercounter.
3. Energy Performance, ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product-labeling program.
4. Front Panel: Slate finish.

2.7 CLOTHES WASHERS AND DRYERS (APARTMENT MODELS)

A. Manufacturer: Blomberg Appliances or Architect approved equal.

B. Clothes Washer: Complying with AHAM HLW-1.

1. Basis-of-Design Product: Model # WM 98400 SX by Blomberg Appliances or Owner approved equal.
2. Stacking and undercounter washers in "Type" Subparagraph below are front-loading units.
3. Type: Stacking, front-loading unit.
4. Capacity: 2.5 cu. ft.
5. Agitator: Impeller (without spindle).
6. Energy Performance, ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product-labeling program.
7. Water-Efficient Clothes Washer: Provide clothes washer with modified energy factor greater than or equal to 2.0 and water factor less than 5.5.
8. Appliance Finish: Enamel.
9. Front-Panel Finish: Porcelain enamel.

C. Clothes Dryer: Complying with AHAM HLD-1.

1. Basis-of-Design Product: Model # DHP 24412 W by Blomberg Appliances or Owner approved equal.
2. Type: Stacking, frontloading, electric, ventless unit.
3. Capacity: 4.1 cu. ft.
4. Features:
   a. Interior drum light.
   b. Stacking kit to stack dryer over washer.

5. Appliance Finish: Enamel.
6. Front-Panel Finish: Porcelain enamel.

2.8 CLOTHES WASHER/DRYER COMBINATION (KITCHEN)

A. Clothes Washer/Dryer Combination: Complying with AHAM HLW-1.

1. Basis-of-Design Product: Model #GUD27ESSJWW by GE Appliances or Owner approved equal.
2. Type: Freestanding stacked washer/dryer unit with dual-drum design and electric dryer; washer is top loading.
3. Washer-Drum Capacity: 3.2 cu. ft.
4. Dryer-Drum Capacity: 5.9 cu. ft.
5. Water-Efficient Clothes Washer: Provide clothes washer with modified energy factor greater than or equal to 2.0 and water factor less than 5.5.
6. Appliance Finish: Enamel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.

B. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

C. Range Anti-Tip Device: Install at each range according to manufacturer's written instructions.

3.2 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After installation, start units to confirm proper operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.

B. An appliance will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 113100

SECTION 11 40 00 - FOODSERVICE EQUIPMENT

PART 1 - GENERAL

1 RELATED DOCUMENTS

A The general conditions of division 1 including supplementary conditions and general requirements apply to the work specified in this section.

2 RELATED WORK, NOT INCLUDED BY FOODSERVICE EQUIPMENT CONTRACTOR

A Plumbing: Refer to division 22 00 00 including
1 Rough-in
2 Piping for supply and waste lines.
3 Traps, grease traps, line strainers, tail pieces, valves, stops, shutoffs, and miscellaneous fittings required for complete installation.
4 Final connection, including mounting of foodservice equipment contractor supplied faucets and waste assemblies.

B Ventilation: Refer to division 23 00 00 including
1 Final utility connections.
2 Exhaust Hoods and Fans to be received and installed by HVAC contractor.

C Electrical: Refer to division 26 00 00 including
1 Rough-in.
2 Conduit, wiring, line and disconnect switches, safety cutoffs and fittings, control panels, fuses, boxes and fittings required for complete installation.
3 Final connections, including mounting and wiring of starters and switches furnished as part of the foodservice equipment (unless otherwise indicated on the drawing).

3 WORK INCLUDED IN THIS SECTION

A Furnish point of connections and install all foodservice equipment here-in, including that which is reasonably inferred, with all related items necessary to complete work shown on contract drawings and/or required by these specifications.

B Electrical Work:
1 Interwiring of foodservice equipment between components within equipment, such as heating elements, switches, thermostats, motors, etc., complete with junction box or disconnect switch as is applicable, ready for final connection.
2 Voltages shall be as indicated on contract drawings. Any difference in electrical characteristics at job site from those shown on contract documents

must be submitted to the architect for consideration prior to ordering equipment.

C Plumbing Work:

1 Furnish all equipment with faucets and sink waste assemblies as specified in this section. All plumbing fixtures to be in compliance with S.3874 (The Reduction of Lead in Drinking Water Act)

4 SUBMITTALS

A Submit shop drawings as required by general conditions.

B Shop drawings and bound brochures covering manufactured or "buy-out" items covering all work and equipment included in this contract shall be submitted to owner as soon as possible after award of contract. After approval, foodservice contractor shall furnish to architect sets of shop drawings and brochures, corrected as required by virtue of review comments, for distribution to various interested trades on project. All cost of reproduction shall be part of contract.

C Provide fully dimensioned rough-in plans at 1/4" scale, showing all required mechanical, electrical, ventilation, water waste, and refrigeration services for equipment and rough-in locations for same. Rough-in locations shown shall make allowances for traps, switches, etc., thereby not requiring interpretation or adjustment on the part of other contractors. Drawings shall indicate dimensions for floor depressions, wall openings, etc., for equipment.

D Foodservice equipment contractor shall visit site to verify all rough-in and sleeve locations prior to installation of finished floors, and shall cooperate with other contractors involved in proper location of same.

E Fully dimensioned and detailed shop drawings of custom-fabricated equipment items shall be submitted, drawn at 3/4" and 1/2" scale for plans, elevations, and sections, respectively. Drawings shall show all details of construction, installation, and relation to adjoining and related work where cutting or close fitting is required. Drawings shall show all reinforcements, anchorage, and other work required for complete installation of all fixtures.

F Do not begin fabrication of custom-manufactured equipment until approvals of shop drawings have been received, and until field measurements have been taken by foodservice equipment contractor, where such measurements are necessary to assure proper conformance with intent of contract drawings and specifications.

G Make field measurements, giving due consideration to any architectural, mechanical, or structural discrepancies that may occur during construction of building. No extra compensation will be allowed for any difference between actual measurements secured at job site and dimensions shown on drawings. Field

measurements shall be submitted to architect for consideration before proceeding with fabrication of equipment.

H Submit illustrated brochures for manufactured or "buy-out" equipment items complete with illustrations, specifications, line drawings, rough-in requirements, and list of accessories or other specified additional requirements. Brochures shall be bound and shall include data on all equipment that is to be provided, arranged in numerical sequence that conforms to item numbers of specifications. Omission of data does not reduce obligation to provide items as specified.

5 SUBSTITUTIONS – STANDARDS

A Proposals shall be based on brands, materials, and forms of construction specified unless products of other manufacturers that conform to requirements of plan and specifications are approved in writing by owner as equal to that as specified.

B Any equipment offered for approval as "equal" to equipment specified must conform to space limitations of layout. Cost of any deviation from kind or location of mechanical service provided in layout due to furnishing of an approved equal will be the responsibility of foodservice contractor, at no extra cost to owner.

C If no equals are approved in writing by owner, the brands and materials specified must be furnished, and no other substitution will be permitted subsequent to award of contract except by specific change order issued by owner.

6 DRAWINGS

A Drawings that constitute part of contract documents indicate general arrangement of piping and location of equipment. Should it be necessary to deviate from arrangement indicated in order to meet structural conditions, make such deviations without expense to owner.

B Specifications and drawings are reasonably exact, but their extreme accuracy is not guaranteed. Drawings and specifications are for assistance and guidance of contractor, and exact locations, distances, and levels shall be governed by the building.

7 MANUFACTURER’S DIRECTIONS

A Follow manufacturer's directions in all cases where manufacturers of articles used in this contract furnish directions or prints covering points not shown on drawings or specifications.

8 QUALITY ASSURANCE

A It is required that all custom-fabricated equipment such as tables, sinks, countertops, etc., be manufactured by a foodservice equipment fabricator who has a plant, personnel and engineering required. Such manufacturer shall be subject to approval of architect. All work in the above category shall be manufactured by one manufacturer, and shall be of uniform design and finish.

B Manufacturer of this equipment must be able to show that he is now and for the past five years has been engaged in manufacture or distribution of equipment, as required under this contract.

C Manufacturer of this equipment herein specified shall be a recognized distributor for items of equipment specified herein that are of other manufacture than his own.

D Only manufacturers who can meet the foregoing qualifications will be acceptable.

9 INDUSTRY STANDARDS

A Electrically operated and/or heated equipment, fabricated or otherwise, shall conform to latest standards of National Electric Manufacturers Association and of Underwriters Laboratories, Inc., and shall bear the U.L. label.

B Items of foodservice equipment furnished shall conform to standards of National Sanitation Foundation, Ann Arbor, Michigan, and shall bear the N.S.F seal.

C Foodservice equipment shall be installed in accordance with N.S.F. standards.

D Work and material shall be in compliance with requirements of applicable codes, ordinances, and regulations, including but not limited to those of the National Fire Protection Association, State Fire Marshal, State Board of Health, Local Health Codes, etc.

E Rulings and interpretations of enforcing agencies shall be considered part of regulations.

10 EQUIPMENT HANDLING AND STORAGE

A Deliver equipment to site, properly crated and protected, and store in safe place. Protect from damage until time for installation.

11 GUARANTEE

A Equipment furnished under this contract shall be guaranteed for a period of one year from the date of final acceptance thereof against defective materials, designs, and workmanship. Upon receipt of notice of failure, any part or parts shall be replaced promptly, at the expense of foodservice equipment contractor. Until replacement equipment is installed, owner shall have full use of defective

equipment. Warranty shall include labor, all parts, and driving time to and from job site.

B This guarantee shall include installation, start-up, and one-year free service for all self-contained refrigeration equipment furnished under this contract, with evidence of manufacturer's one-year guarantee on entire cabinet, and additional four-year warranty on sealed compressor motor assembly.

12 OPERATING AND MAINTENANCE MANUALS

A After completion of installation, foodservice equipment contractor shall present to owner three sets of all operating and maintenance manuals, covering all mechanically operated equipment furnished under this contract, each set being bound in loose leaf binder having durable cover. Include in each binder a list of names, addresses, and telephone numbers of service agencies authorized to make necessary repairs and/or adjustments of equipment furnished under this contract.

PART 2 - PRODUCTS

1 MANUFACTURED EQUIPMENT

A Except as may be specified otherwise under individual item specifications in "Equipment Schedule," all items of standard manufactured equipment furnished shall be complete in accord with manufacturer's standard specifications for specific unit or model called for, including finishes, components, attachments, appurtenances, etc., except as follows:

B Substitutions for manufactured equipment specified will be accorded consideration under terms set forth in "Substitutions-Standards."

2 FABRICATED EQUIPMENT

A Work shall be done in an approved workmanlike manner, to complete satisfaction of owner.

B Stainless steel shall be U.S. standard gauges as called for, 18-8, Type 304, not over .012% maximum carbon, No. 4 finish.

C Galvanized iron shall be Armco or equal. Framework of galvanized iron shall be welded construction, having welds smooth, and where galvanizing has been burned off, touched up with high-grade aluminum bronze.

D Legs and crossrails shall be continuously welded, unless otherwise noted, and ground smooth.

E Bottom of legs at floor shall be fitted with sanitary stainless steel bullet-type foot, with no less than 1-1/2" adjustment.

F Legs shall be fastened to equipment as follows:
1 To sinks by means of closed gussets. Gussets shall be stainless steel, reinforced with bushings, having set screws for securing legs.
2 To tables and drainboards with closed gussets which shall be welded to galvanized (when not exposed) or S/S (when exposed) hat channels, 14 gauge or heavier, exposed hat sections having closed ends. Bracing shall be underside of tops.

G Closed gussets shall be 3" minimum diameter at top, welded to frame members or to sink bottom.

H Sinks, unless otherwise specified, shall be furnished with lever-type waste outlets with connected overflows. Where exposed, furnish wastes chromium plated.

I Rolls shall be 1 1/2" diameter, except as detailed to the contrary, with corners bullnosed, ground, and polished.

J Seams and joints shall be shop-welded. Welds to be ground and polished to match original finish. Materials 18 gauge or heavier shall be welded.

K Metal tops shall be one-piece welded construction, unless specified otherwise, reinforced on underside with galvanized hat channels welded in place. Crossbracing not to be more than 30" on center.

L Drawers to be 18-gauge stainless steel channel-type housing and drawer cradle, both cradle and housing being reinforced and welded at corners, housing being secured to underside of tabletop, and both housing and cradle being sized for and fitted with 20" x 20" x 5" deep thermo plastic drawer insert having coved corners. Drawer insert shall be easily removable from cradle without tools or having to remove entire drawer.

M Drawer fronts and doors: Except where single-pan construction is indicated, provide double-pan type, not less than 5/8" thick, with seams on inside face. Deaden sound by inserting mineral wool insulation between pans.

N Hardware shall be solid materials and except where unexposed or specified to the contrary, of cast brass, chrome-plated. Identify all hardware with manufacturer's name and number so that broken or worn parts may be ordered and replaced.

O Fabricate sink compartments with 3/4" coved vertical and horizontal corners. Multiple-compartment partitions to be double thickness, continuously welded where sheets join at top. Front of multiple-compartment sinks to be continuous on exterior. Bottoms to be creased to drain.

P Ends of fixtures, splashbacks, shelves, etc., shall be finished flush to walls or adjoining fixtures.

Q Dishtables, drainboards, splashbacks, and turn-up edges shall have radius bends in all horizontal and vertical corners, coved at intersections.

R Rounded and coved corners or radius bends shall be 1/2" radius or longer.

S Undersides of tops to be coated with sound deadening tacky tape. Sinks are to be coated with Component Hardware sound deadening compound.

T Shelves are to be turned up 2" on back edge. Turn other edges down 1 1/2" to form open channels. Reinforce shelf units to support 40 lbs. per square foot loading, plus 100% impact loading.

U Casework at fabricator's option, unless otherwise indicated. Provide either box-type framing or open-channel-type (complying with N.S.F. requirements in either case).

V Enclosures: Except as indicated, provide each unit of casework (base, wall overhead, and free-standing) with a complete-enclosure metal cabinet, including fronts, backs, tops, bottoms, and sides.

W Metal components, unless specified or noted otherwise, to be the following gauges:

1	Tabletops	14-gauge	Stainless steel
2	Wall shelves	16-gauge	"
3	Undershelves	16-gauge	"
4	Drawer fronts (single pan)	16-gauge	"
5	Enclosed cabinet bases	18-gauge	"
6	Sinks and Drainboard	14-gauge	"
7	Exhaust hoods	18-gauge	"
8	Legs (1-5/8" dia.)	16-gauge	"
9	Cross bracing (1" dia.)	16-gauge	"
10	Doors (outer pan)	18-gauge	"
11	Doors (inner pan)	20-gauge	"

3 HEATING EQUIPMENT

A Wherever heating equipment or thermostat control for such equipment is specified, it shall be complete, and of the materials, size, and rating specified within equipment items or details. All such equipment shall be designed and installed to be easily cleaned or to be easily removed for cleaning.

B Electrical appliances or heating element circuits of 120 volts shall not exceed 1650 watts, unless specifically shown to the contrary.

4 SWITCHES AND CONTROLS

A All internal wiring for fabricated equipment items, including all electrical devices, wiring, controls, switches, etc., built into or forming an integral part of these items shall be furnished and installed by foodservice equipment contractor in his factory or building site with all items complete to junction box for final connection to building lines by electrical contractor.

B Provide standard 3-prong plugs to fit "U" slot grounding-type receptacles, for all equipment items powered by plugging into 110-120 volts, single-phase AC.

5 CONNECTION TERMINALS

A All equipment shall be complete with connection terminals as standardized by equipment manufacture, except where specified otherwise.

6 LOCKS

A Fit all doors for reach-in refrigerated compartments with locking-type latches.

7 LAMINATE PLASTICS

A Wherever laminate plastic materials are specified, veneer all materials using urea base cement, waterproof, and heatproof. Rubber base adhesives are not acceptable. Apply materials directly over close-grained plywood face exposed surfaces and edges with 1/16" material, and corresponding back faces with 1/32" reject material. Place top sheet on and over finished edge.

PART 3 - EXECUTION

1 EXECUTION

A Work under this contract and covered under this section of specification includes but not limited to:
1. Cutting of holes and/or ferrules on equipment for piping, drains, electrical outlets, conduits, etc., as required to coordinate installation of kitchen and foodservice equipment work of the other contractors on project.
2. Field checking of building and rough-in requirements, and submission of brochures and shop drawings, all as required herein before under "submittals."
3. Repair of all damage to premises as result of this installation, and removal of all debris left by those engaged in this installation.
4. Having all foodservice equipment fixtures completely cleaned and ready for operation when building is turned over to owner.

2 INSTALLATION PROCEDURES

A Foodservice equipment contractor shall make arrangements for receiving his custom-fabricated and "buy-out" equipment and shall make delivery into building as requisitioned by his installation superintendent. He shall not consign any of his equipment to owner or to any other contractor unless he has written acceptance from them and has made satisfactory arrangements for the payment of all freight and handling charges.

B Foodservice equipment contractor shall deliver all of his custom-fabricated and "buy-out" equipment temporarily in its final location, permitting trades to make necessary arrangements for connection of service lines.

C This contractor shall coordinate his work and cooperate with other trades working at site toward the orderly progress of the project.

D Owner or owner's agent shall have access at all times to plant or shop in which custom-fabricated equipment is being manufactured, from time contract is let until equipment is shipped, in order that progress of work can be checked, as well as any technical problems that may arise in coordination of equipment with building. Any approval given at this point of manufacturer shall be tentative, subject to final inspection and test after complete installation.

E Foodservice equipment contractor shall assist owner, and/or owner's agent, in making any desired tests during or prior to final inspection of equipment; he shall remove immediately any work or equipment rejected by owner, and/or owner's agent, replacing the same with work conforming to contract requirements.

F This contractor shall keep premises free from accumulation of his waste material and rubbish, and at completion of his work shall remove his rubbish and implements, leaving areas of his workroom clean.

G This contractor shall provide and maintain coverings or other protection for finished surfaces and other parts of his equipment subject to damage during and after erection. After removal of protective coverings, all field joints shall be ground and polished, and entire work shall be thoroughly cleaned and polished.

3 TRIMMING AND SEALING EQUIPMENT

A Seal completely spaces between all units to walls, ceilings, floors, and adjoining (not portable) units with enclosed bodies against entrances of food particles or vermin by means of trim strips, welding, soldering, or commercial joint material best suited to nature of equipment and adjoining surface material.

B Close ends of all hollow sections.

C Equipment butting against walls, ceilings, floor surfaces, and corners to fit tightly against same; backsplashes or risers that fit against wall to be neatly scribed and

sealed with a N.S.F. approved clear silicone sealant, wiping excess out of joint to fillet radius. Where required to prevent shifting of equipment and breaking wall seal, anchor item to floor or wall.

4 TESTING AND DEMONSTRATION OF EQUIPMENT

A After complete installation, all items of equipment furnished under this contract shall be thoroughly tested to ensure proper and safe operation.

B Foodservice equipment contractor shall arrange to have all manufactured, mechanically operated equipment furnished under this contract demonstrated by manufacturer's representatives. These representatives to instruct owner's designated personnel in use, care, and maintenance of all items of equipment after same are in working order. Demonstration and instruction shall be held on dates designated by owner.

C Foodservice equipment contractor shall provide a competent service representative to be present when installation is put into operation.

5 ITEMIZED SPECIFICATIONS

Item #: 1
Description: Shelving Unit
Manufacturer: Cambro
Model #: ESU-Series
SIS #: T037
Quantity: 2

Specification:

Each unit to be a 4-Shelf Cambro Elements Series Starter Stationary Unit with the following features: Shelf Plates only with Camguard antimicrobial. 3 Post Heights 64", 72", 84". 3 Shelf Widths 18", 21", 24". 5 Shelf Lengths 36", 42", 48", 54", 60".
Each Starter Unit shall include: 4 stationary posts with leveling feet installed pre-assembled with post connectors and wedges, 1 bag of 32 stationary traverse dovetails (16 ea. A and B), Vented shelf plates (for 4 shelves), 8 stationary traverses and instructions.
Posts: Proprietary non-corrosive composite material. Post Connectors: Glass Filled Polypropylene. Traverses: Proprietary non-corrosive composite material. Vented/Solid Shelf Plates: Reinforced polypropylene with Camguard antimicrobial. Corner Connectors: Glass Filled Polypropylene. Adjustable Foot: Glass Filled Nylon. Seismic Foot: Stainless Steel post and wide foot plate, 3 holes for bolts. (Bolts not provided) Divider Bars: Glass Filled Nylon. Wall Fastener: Stainless Steel. Dovetails: Resin Nylon Wedges: Resin Polypropylene

(1) One unit at 21" x 48" x 72" high. (model # ESU214872V4)

(1) One unit at 21" x 60" x 72" high. (model # ESU216072V4)

Item #: 2
Description: Walk-In Cooler
Manufacturer: Bally
Model #: Custom
SIS #: T037
Quantity: 1

Specification:

Sectional walk-in refrigerators and freezers complete with doors shall be manufactured by Bally Refrigerated Boxes, Inc. Unit to be complete as shown on plans and in detail. Overall size of walk-in shall be 15'-5 1/2" by 7'-9" by 8'-6" high with floor.
Foam core of panels shall be Underwriters Laboratories-listed as having flame spread of 25 or lower and smoke generation of 450 or lower when tested in accordance with ASTME-84-76. Panel shall be approved by Factory Mutual as a Class I building type. They shall be foamed using HCF 245A expanding agent and shall have a zero ozone depletion factor. The use of any expanding agent using R-22 and/or Pentane are specifically excluded.
All work and materials shall be in full accordance with local and/or state ordinances, and with any other prevailing rules and regulations. Bally Refrigerated Boxes, Inc. is not responsible for furnishing items required by regulations, unless specified or shown on the drawings or contained in the specifications.
Panels shall consist of interior and exterior metal skins precisely formed with steel dies and roll-form equipment and thoroughly checked with gauges for accuracy. The metal skins shall be placed into heated molds and liquid urethane injected between them. Urethane shall be foamed-in-place (poured, not frothed) and, when completely heat cured, shall bind tenaciously to the metal skins to form an insulated panel. Panels shall contain 100 percent urethane insulation and have no wood or structural members between the skins. To insure tight joints, panel edges must have foamed-in-place tongues and grooves with a flexible vinyl gasket on the interior and exterior of all tongue edges. Gaskets shall be resistant to damage from oil, fats, water and detergents and must be NSF-approved. Panel thickness shall be 4 inches.

Finishes:

- Interior Floor: Galvanized (16 GA)
- Interior Walls: Embossed White (190 Series)
- Interior Ceiling: Embossed White (190 Series)
- Exposed Exterior Walls: Embossed White (190 Series)
- Exterior Floor: Embossed White (190 Series)
- Exterior Ceiling: Walls: Embossed White (190 Series)

All panels except corner panels shall be made in 23" and 46" widths, fully interchangeable for fast, easy assembly. Panels 11-1/2", 17-1/4" or 34-1/2" wide are

to be furnished only if required to fit the allocated space. To assure perfect alignment and maximum strength, corner panels shall employ a right-angle configuration with exterior horizontal dimensions of 12" on each side.

Panels shall be equipped with Bally Speed-lok diaphragmatic joining devices. The distance between locks shall not exceed 46". Each device shall consist of a cam-action, hooked locking arm placed in one panel, and a steel rod positioned in the adjoining panel, so that when the arm is rotated, the hook engages the rod and draws the panels tightly together with cam action. Arms and rods shall be housed in individual steel pockets. Pockets on one side of the panel shall be connected to pockets on the other side in width, by use of 2"-wide metal straps set into and completely surrounded by the insulation. When panels are joined together, these straps shall form lock-to-lock connections for extra strength.

Floor Construction: Bally furnishes floor panels only. All construction and preparation for Bally floor panels must be provided by others. Floor panel construction shall be similar to that described in sections 7 and 8 above, but with 16-gauge smooth galvanized interior skin; thickness of floor panel shall be 4" and is NSF-approved. Floor panels shall be placed in a rough depression in floor 6” below finished floor of kitchen and leveled. A 2” thick finished floor shall be installed on top of walk-in floor panel as shown in detail. Setting bed and finished floor finish to be supplied and installed by others. Door shall be cut to accept tile and grout under door threshold.

Hinged Entrance Door Panels: Each door shall be 36" wide x 84" high. The number of doors, location and direction of swing is specified on the plans. Doors are in-fitting and flush-mounted. Construction shall be as specified in section 7 above. Magnetic core, thermoplastic gaskets installed on the top edge and both sides of the door shall keep the door in a closed position, forming a tight seal; a flexible, dual-blade wiper gasket shall be installed at the bottom of the door. NSF-approved gaskets shall be replaceable and resistant to damage from oil, fats, water and detergent. A heavy U-channel structural steel frame around the perimeter of the door opening shall prevent racking or twisting; steel frame is to be reinforced for hardware attachment. Anti-condensate heater wire shall be concealed behind the metal edge of the door jambs. the door panel shall also include a vapor-proof interior lamp; junction box for 120 volts, 60 cycle, 1 phase, a.c. service (15-amp maximum); 2"-dia. flush-face dial thermometer. Hardware shall be two spring-loaded, self-closing hinges; cylinder latch with provision for padlocking and safety release mechanism; door closer. All with satin aluminum finish.

Options and Accessories:

- Walk-in doors shall be modified to accept a tile and grout floor under threshold.
- Floor to be installed on rough depression in floor 6” below finished floor of kitchen and leveled. A 2” thick finished floor shall be installed on top of walk-in floor panel as shown in detail. Setting bed and finished floor finish to be supplied and installed by others.
- Each door shall be complete with a 14" x 24" three pane heated observation window.
- Each door to be complete with strip curtains.
- Trim pieces to seal off box from walls and ceiling.

- Super door feature: Each door shall be complete with 3 heavy duty spring mounted hinges and aluminum diamond plate mounted on the interior and exterior of each door and frame 32" high.
- Alarm System: Each compartment shall be supplied with Audio-Visual Alarm with digital temperature readout Hi/Low set point with dry contact. Modularm model 75LC Multi-Monitor.
- Bally standard pressure relief port. (Freezer Compartment)
- (2) Two Kason LED 1810 48" light with strips. (1 Per Compartment)
- (2) Two Kason LED 1802 Vapor Proof Light Fixtures (1 Per Compartment)

Mechanical Refrigeration System: Bally shall provide pre-assembled remote quiet line refrigeration equipment which shall include all necessary components factory installed on both evaporator and condensing units. All components shall be pre-wired, so that job site work is limited to making electrical connection to each condensing unit and each evaporator, interconnecting wiring between assemblies is specifically excluded. Contractor shall be responsible for all refrigeration tubing connections between the assemblies. All necessary electrical equipment and refrigeration tubing shall be furnished by the electrical and refrigeration contractors. Contractor shall supply pre-assembled remote systems which include mounted expansion valve and liquid solenoid. All coils to be constructed of heavy gauge aluminum with easy access/quick disconnect fan, motor and mount assemblies. All evaporators shall be equipped with Bally SmartVap Controller and shall include lockable disconnect switch mounted on evaporator. The SmartVap shall control all defrost and thermostat operations. The controller will allow for tighter control of the temperature within the walk-in. Fan guard shall be constructed of high density polyethylene with built-in throw boosters. Electric defrost coil shall include corrosion proof stainless steel heater elements. Easy access to heaters (mounted on face or bottom of coil not requiring end clearance). Condensing units shall be air-cooled, semi-hermetic, outdoor units with the following features. Weatherproof electric control panel with compressor contactor, on/off switch and fused control circuit. Discharge vibration eliminator. Fan guard. Spring mounted accessible semi-hermetic compressor. Adjustable dual pressure control. Oil failure control on all applicable models. Large receiver with fusible plug and valves. Copper tubing secured with Hydrosorb, Crush-a-Clamp. Liquid line filter drier (sweat connection), sight glass, shut-off valve. Removable hood. Crankcase heater. Energy efficient PSC condenser fan motors. Fan cycle control on two fan models over 2-HP. Head pressure control valve (adjustable type on low temp, fixed type on med or high temp). Suction filter and vibration eliminator, 2-HP and larger.

Cooler:	Compressor:	BQHA 008 E6 HS2AB
	Evaporator Coil:	BLP 209MA-SV-S2BEC
Freezer:	Compressor:	BQHA 010 L6 HS2AF
	Evaporator Coil:	BLP 104LE-SV-S2BEC

Refrigerant shall be R404-A on both coolers and freezers.

Each refrigeration system to be complete with the following options:

- Heated and insulated receiver. (Below 10 degrees)
- Wind Guard.

Piping: Furnish and install the interconnecting piping between the condensing unit and the respective unit coolers. Piping shall be installed in a neat and workmanlike manner with adjustable hangers spaced at no more than six (6) foot intervals on horizontal runs; and six (6) foot intervals on vertical runs.
Line sizes shall be in accordance with Copeland Handbook standards and best refrigeration practice, to assure: Proper feed to evaporator, avoid excessive pressure drop, prevent excessive amounts of lubricating oils from being trapped in any part of the system, Protect the compressor from loss of lubrication at all times, prevent liquid refrigerant from entering the compressor during operating or idle time, to maintain a clean and dry system.
Refrigeration Piping shall be type "L" ACR grade, hard-drawn seamless copper tubing, wrought type copper fittings, Silver-bearing soldered joints.
Condensate Drain: Furnish and install condensate drain piping from the unit cooler to open drain. Piping shall consist of: 7/8" type "L" copper tubing supported 36" on center maximum, in such a way that there will be 1" clearance between the wall and the tubing. Provide a union or slip fitting at the connection to the evaporator drain pan to allow easy disassembly for service and cleaning. drain piping shall be "P-Trapped" and pitched at least 1” per foot thru the wall of the refrigerated area and discharged with-in 2" of a floor drain. Freezer drain line shall be wrapped with heat tape and insulated to prevent condensate freezing.
Piping Insulation: Suction line shall be covered with 1/2" thick Armaflex insulation, the insulation shall be applied to these lines in accordance with manufacturer's recommendations and, as they are being installed so that insulation will not be split. All joints shall be completely sealed with overlapping, cemented material to prevent the formation of frost on the lines. Penetrations shall be sealed with non-hardening caulking compound. The exposed ends of the penetration must be trimmed.
Refrigerant Testing: each system shall be triple-evacuated prior to charging. Fifteen hundred (1500) and Five Hundred (500) microns of vacuum shall be drawn successively and broken with dry refrigerant. After the third evacuation, the system shall be charged.
Guarantee: The equipment shall be guaranteed to maintain the specified temperatures. All mechanical refrigeration equipment shall be mechanically guaranteed for a period of one (1) year after date of acceptance of owner. The emergency service shall be provided free of charge, whenever necessary on a 24 hour, seven day-per-week basis. Any leaks that occur during the first year of operation after acceptance by the owner, shall be repaired and the necessary refrigerant added at no expense to the owner. The year service shall be provided by the installing company and under no circumstances will the service be sublet to another refrigeration contractor. The name of the installer/service agency for the guarantee period shall be located in a highly visible place on the condensing unit. The complete refrigeration package shall be provided with a (5) year parts warranty. This includes both the condensing unit and evaporator coil in their entirety as supplied by Bally.

Warranties: Bally shall warrant that any part of the structure it supplies (except the refrigeration system and its related accessories) is free from defects in materials or workmanship under normal use and service. The insulated panel portion of the structure is warranted free of defects under normal use and service for a period of ten (10) years from date of installation (but in no event shall the warranty be in force for more than ten (10) years and six (6) months from the date the product was first shipped by Bally). Panel surface condition is warranted free from defects under normal use and service for one year from installation, provided the panel is stored and installed according to Bally's instructions. Mechanical (including hardware, gaskets, Speed-lok assemblies, aluminum weather roofs) and electrical components, except refrigeration systems (which are covered by a separate warranty) are warranted to be free from defects under normal use and service for one year from date of installation. (In no case shall this portion of the warranty be in force for more than one year and six months from date the product was first shipped from Bally.) The warranty shall not include any labor charges for replacement or repair of defective parts or refrigeration. Full warranty information is to be provided with the walk-in.

Item #: 3
Description: Evaporator Coil, Cooler
Manufacturer: Bally
Model #: BLP 209MA-SV-S2BEC
SIS #: T037
Quantity: 1

Specification:

As specified under Item # 2.

Item #: 4
Description: Compressor, Cooler
Manufacturer: Bally
Model #: BQHA 008 E6-HS2AB
SIS #: T037
Quantity: 1

Specification:

As specified under Item # 2.

Item #: 5
Description: Walk-In Freezer
Manufacturer: Bally
Model #: Custom
SIS #: T037

Quantity: 1

Specification:

As specified under Item # 2.

Item #: 6
Description: Evaporator Coil, Freezer
Manufacturer: Bally
Model #: BLP 104LE-SV-S2BEC
SIS #: T037
Quantity: 1

Specification:

As specified under Item # 2.

Item #: 7
Description: Compressor, Freezer
Manufacturer: Bally
Model #: BQHA 010 L6-HS2AF
SIS #: T037
Quantity: 1

Specification:

As specified under Item # 2.

Item #: 8
Description: Shelving Unit
Manufacturer: Cambro
Model #: ESU184272V4
SIS #: T037
Quantity: 7

Specification:

Each unit to be a 4-Shelf Cambro Elements Series Starter Stationary Unit with the following features: Shelf Plates only with Camguard antimicrobial. 3 Post Heights 64", 72", 84". 3 Shelf Widths 18", 21", 24". 5 Shelf Lengths 36", 42", 48", 54", 60".
Each Starter Unit shall include: 4 stationary posts with leveling feet installed pre-assembled with post connectors and wedges, 1 bag of 32 stationary traverse dovetails (16 ea. A and B), Vented shelf plates (for 4 shelves), 8 stationary traverses and instructions.

Posts: Proprietary non-corrosive composite material. Post Connectors: Glass Filled Polypropylene. Traverses: Proprietary non-corrosive composite material. Vented/Solid Shelf Plates: Reinforced polypropylene with Camguard antimicrobial. Corner Connectors: Glass Filled Polypropylene. Adjustable Foot: Glass Filled Nylon. Seismic Foot: Stainless Steel post and wide foot plate, 3 holes for bolts. (Bolts not provided) Divider Bars: Glass Filled Nylon. Wall Fastener: Stainless Steel. Dovetails: Resin Nylon Wedges: Resin Polypropylene

(2) Two units at 18" x 42" x 72" high. (model # ESU184272V4)
(3) Three units at 18" x 48" x 72" high. (model # ESU184872V4)
(1) One unit at 18" x 54" x 72" high. (model # ESU185472V4)
(1) One unit at 18" x 60" x 72" high. (model # ESU186072V4)

Item #: 9
Description: Tray/Silverware Dispenser
Manufacturer: Delfield
Model #: T-1418 (Verify Tray Size)
SIS #: T037
Quantity: 1

Specification:

Unit to be model T-1418 Mobile Enclosed Tray and Silverware Dispenser as manufactured by Delfield and with the following features:
Cabinet top shall be 16-gauge stainless steel with all corners welded, polished and reinforced with heavy-gauge channels. Cabinet exterior panels shall be 20-gauge stainless steel. Bottom shall be 14-gauge galvanized steel. Unit shall have (4) 4.00” diameter polyolefin swivel casters (all locking), and non-marking gray bumpers at each corner.
Dispenser platform carrier shall be 18-gauge stainless steel and shall be removable for cleaning. Each dispenser shall be field adjustable by adding or removing stainless steel extension springs located inside the elevator housing.

Unit to be complete with the following options and accessories:

- Eight-hole silverware bin with stainless steel cylinders.
- Wrap-around bumper.
- Laminate panels.
- Verify tray size with owner before ordering.

Item #: 10
Description: Mixer, 40-Quart
Manufacturer: Globe
Model #: SP40
SIS #: T037
Quantity: 1

Specification:

Unit to be model SP40, 40-Quart Mixer as manufactured by Globe Food Equipment Company and with the following features:

- Powerful custom built 2 HP motor.
- Three fixed speeds.
- Gear-driven, high torque transmission.
- Heat-treated hardened steel alloy gears and shafts.
- Permanently lubricated transmission.
- Thermal overload protection.
- Front-mounted digital controls with 60-minute timer and last batch recall.
- Rigid cast iron body.
- NSF approved enamel gray paint.
- Industry standard #12 attachment hub.
- Safety interlocked bowl guard and bowl lift.
- Non-slip rubber feet.
- 6-foot cord and ground plug.
- High-quality stainless steel removable bowl guard with built-in ingredient chute.
- Interlocking guard is easy to attach and remove for cleaning.
- Dish machine safe.

Standard Accessories:

- 40-Quart stainless steel bowl.
- Flat beater (aluminum)
- Stainless steel wire whip
- Spiral dough hook (aluminum)

Electrical:

- 208/60/3 Volts, 2-HP, 7-Amps.

Warranty

- Two-year parts and one-year labor.

Unit to be complete with the following options and accessories:

- Slicer/shredder/grater for #12 hub

Item #: 11
Description: Hot Food Counter
Manufacturer: Fabricated
Model #: Custom
SIS #: T037
Quantity: 1

Specification:

Unit to be size and shape as shown on plan and in detail. 8'-0" x 30" x 34" high. Unit to feature 14-gauge stainless steel top with square channel edge on all four sides, polished to a #4 satin finish. Understructure to be rigidly braced with stainless steel channeling. Table to have stainless steel undershelf notched and welded to stainless steel legs. Unit to have stainless steel gussets and adjustable bullet feet. Unit top to be complete with a 22-1/4" x 69-1/4" reinforced cut-out for the installation of Hot Food Wells, Item # 12. Hot Food Wells to be located as per plan. Unit to make provisions for the mounting of Food Protector, Item # 13.

Item #: 12
Description: Hot Food wells
Manufacturer: Atlas Metal
Model #: WIH-5-DME
SIS #: T037
Quantity: 1

Specification:

Unit to be model WIH-5-DME Electrically Heated Individual Controls Hot Pan as manufactured by Atlas Metal and with the following features:
Top: Constructed of 18 gauge, type 304 stainless steel, die stamped with a raised perimeter bead. There shall be a solid vinyl gasket under the beaded edge to form a seal to the counter top, thus preventing seepage or marring of the counter top.
Hot Food Wells: Individual hot food wells shall be 18-gauge, type 304 stainless steel, one-piece construction, all welded, ground and polished to a uniform finish. All corners are coved with a minimum 1/4" radius. Each well is provided with an 850-watt heating element.
Insulation: The pan is fully insulated with high density fiberglass, 1" thick on all sides, 2" thick on the bottom and enclosed with a 22-gauge galvanized steel outer case.
Electrical: The unit is provided with an individual thermostat control with a pilot light for each well. All heating elements and controls are pre-wired, and a 6' long, 3-wire cord and plug is provided, extending from the control box located under the unit, on operator's left. Bottom of outer case can be removed for access to electrical components.

Unit to be complete with the following options and accessories:

- DME - Individual drain for each well with manifold to single valve w/ rear extension.

Item #: 13
Description: Food Protector
Manufacturer: English
Model #: M-101A
SIS #: T037

Quantity: 1

Specification:

Unit to be model M-101A Pass-Over Food Protector as manufactured by English Mfg. Inc. and with the following features:
Posts:

- 1” Diameter stainless steel posts.
- 2” Diameter stainless steel flange.
- Stainless steel glass clips.
- Brushed #4 stainless steel finish.

Unit:

- NSF Certified.
- Mounting hardware provided.
- Clear tempered glass with polished edges. 3/8” Glass.

Unit to be complete with the following options and accessories:

- (2) Two glass end panels.
- (1) One intermediate support post.
- Round flange mounting option.
- Length to be 6’-6” long. (Centerline of Post to Centerline of Post)

Item #: 14
Description: Hand Sink
Manufacturer: Advance/Tabco
Model #: 7-PS-90
SIS #: T037
Quantity: 3

Specification:

Unit to be model 7-PS-90 stainless steel hand sink as manufactured by Advance/Tabco and with the following features:
Features: One-piece Deep Drawn sink bowl design. Sink bowl is 10" x 14" x 5" deep. Countertop die formed recessed edge offers the ultimate in design and function. All sink bowls have a large liberal radius with a minimum dimension of 2" and rectangular in design for increased capacity. Keyhole wall mount bracket. Stainless steel basket drain 1-1/2” IPS. Flush to wall unit. “Hands Free” splash mounted gooseneck faucet furnished with aerator. Foot Pedal Valve for water operation. Easy removable panel to access hidden plumbing.
Material: Heavy gauge type 304 series stainless steel. Wall mounting bracket is stainless steel and of offset design. All fittings are brass/nickel plated unless otherwise indicated.
Mechanical: Single pedal mixing valve with 3/8” NPT Female. Built in check valve. Front operated temperature adjustment.

Construction: All TIG welded. Welded areas blended to match adjacent surfaces and to a satin finish. Die formed Countertop Edge with a 3/8" No-Drip offset. One sheet of stainless steel is used. There are no welded seams other than corners.

Item #: 15
Description: Cold Food Counter
Manufacturer: Fabricated
Model #: Custom
SIS #: T037
Quantity: 1

Specification:

Unit to be size and shape as shown on plan and in detail. 6'-0" x 30" x 34" high. Unit to feature 14-gauge stainless steel top with square channel edge on all four sides, polished to a #4 satin finish. Understructure to be rigidly braced with stainless steel channeling. Table to have stainless steel undershelf notched and welded to stainless steel legs. Unit to have stainless steel gussets and adjustable bullet feet. Unit top to be complete with a 24-1/2" x 57-3/4" reinforced cut-out for the installation of Cold Food Wells, Item # 16. Cold Food Wells to be located as per plan. Unit to make provisions for the mounting of Food Protector, Item # 17.

Item #: 16
Description: Cold Food Wells
Manufacturer: Atlas Metal
Model #: RM-2
SIS #: T037
Quantity: 1

Specification:

Unit to be model RM-2 Refrigerated with Side Coils, Self-Contained Cold Pan as manufactured by Atlas Metal and with the following features:
Top: Constructed of 18 gauge, type 304 stainless steel, die stamped with a raised perimeter bead. There shall be a solid vinyl gasket under the beaded edge to form a seal to the counter top, thus preventing seepage or marring of the counter top. Embossed mounting lugs are provided along the inner surface, 3" down from the top, to hold the pan rails and a full set of removable separator channels in place.
Liner: The inner liner shall be 18 gauge, type 304 stainless steel with a 3" recessed top, one-piece construction, all welded, ground and polished to a uniform finish. All corners are coved with a minimum 1/4" radius. The liner has copper tubing firmly soldered to the top 3" on all sides. A 3/4 dia. drain with strainer, 4" PVC nipple, and valve is provided.
Insulation: The pan is fully insulated with high density polystyrene, 1" thick on all sides, 2" thick on the bottom and enclosed with a 22-gauge galvanized steel outer case.

Refrigeration System: The compressor housing shall be fabricated from 14-gauge galvanized and bolted to the base of the unit. A fully self-contained condensing unit is provided with a hermetically sealed compressor and digital electronic thermostat/thermometer. The system is fully charged with CFC free refrigerant and ready to operate.
Note: Proper ventilation must be provided in the counter.
Electrical: The unit will be wired for 15 amps., 120 volts, single phase operation with an on/off switch and pilot light. A 6' long, 3-wire cord and plug (NEMA 5-15P) will be provided.

Unit to be complete the following options and accessories:

- 5YW – 5-Year Compressor Warranty.
- RDVE – Rear Drain Valve Extension.

Item #: 17
Description: Food Protector
Manufacturer: English
Model #: M-106
SIS #: T037
Quantity: 1

Specification:

Unit to be model M-106 Self-Serve Food Protector as manufactured by English Mfg. Inc. and with the following features:
Posts:

- 1” Diameter stainless steel posts.
- 2” Diameter stainless steel flange.
- Stainless steel glass clips.
- Brushed #4 stainless steel finish.

Unit:

- NSF Certified.
- Mounting hardware provided.
- Clear tempered glass with polished edges. 3/8” Glass.

Unit to be complete with the following options and accessories:

- (2) Two glass end panels.
- Round flange mounting option.
- Length to be 36” long. (Centerline of Post to Centerline of Post)

Item #: 18
Description: Slicer
Manufacturer: Hobart
Model #: HS6N
SIS #: T037
Quantity: 1

Specification:

Unit to be model HS6N Slicer as manufactured by Hobart and with the following features:

KNIFE:

- 13" CleanCut Knife: The knife is approximately 13 inches, constructed of 304L stainless steel and high performance Stellite alloy. Knife cover is retained magnetically, and is quickly removed by pulling straight back on the top cover knob.
- Removable Ring Guard Cover: Fits on top of ring guard to catch food debris. When removed, reveals a 0.12" space between knife and guard for easier flossing. Ring guard is made with Zytel™ plastic and can be washed in warewasher or three compartment sink.
- Zero Knife Exposure: Knife edge is not exposed during cleaning or sharpening procedures.
- Top Mounted Borazon Stone Sharpener: Single action operation utilizing two Borazon stones to sharpen and hone in five seconds. Removable, top mounted and warewasher safe. When sharpener is removed for cleaning, knife edge is completely shielded. Borazon stones have a lifetime guarantee.

MOTOR:

- Poly V-Belt Knife Drive System: Knife is driven by a Hobart Poly V belt and runs at 430 rpm for optimal performance.
- 1/2 H.P. Knife Drive Motor: 1/2 H.P. permanently lubricated ball bearings. Single phase capacitor-start, induction run.

INTERLOCKS:

- No Volt Release: In the event of a power loss, slicer must be restarted before operation can continue.

HOUSING AND BASE

- Sanitary Burnished Aluminum Base: One-piece base has fewer places to harbor soil and is easier to clean. Limits holes or crevices in which food can lodge.
- Finish: Stainless steel top cover, anodized aluminum product tray and gauge plate.
- Exclusive Tilting, Removable Carriage System: Aluminum product tray tilts easily for mid-day cleaning and is removable for thorough cleaning and sanitation procedures. The carriage has 12.5" manual travel.
- Electroless Nickel Plated Single Slide Rod with Reservoir Wick in Transport: Transport slide rod is E-Nickel electroless plated. Slide rod bearings feature an oil reservoir/oil wick.
- Double-Action Indexing Cam: A solid construction index knob moves the gauge plate via a barrel cam ensuring consistent slice thickness across machine and over time. First revolution of index cam for precision slicing; second revolution for thicker slicing selection.
- Spring Kickstand: Helps hold slicer in tilted position for cleaning beneath the machine.

- Ergonomic Style Handle: Specially shaped and positioned for ease of use during manual operation.
- Rear Mounted, Removable Meat Grip Arm: Rear mounted grip is high strength thermoplastic. Swings out of way when not in use.
- Electrical Specification: 120/60/1; 5.4 Amps.
- Switch: Moisture protected push button switch.
- Cord & Plug: 6-foot, three-wire power supply cord and plug. Plug not furnished on export models.
- Capacity: The carriage will take food up to 5-3⁄4" x 10-3⁄4" rectangle or 7.5" in diameter.
- Gauge Plate: Gauge plate is a heavy aluminum extrusion with machined grooves for smooth feeding. Adjustable to cut any thickness of slice up to 1".
- Warranty: All parts and service coverage for one year including knife. Lifetime guarantee on Borazon stones in the sharpening system.

Item #: 19
Description: Refrigerator, Work Top
Manufacturer: Continental
Model #: CRA93-BS
SIS #: T037
Quantity: 1

Specification:

Unit to be model CRA93-BS 93” Worktop Refrigerator with Solid Doors and 6” Backsplash as manufactured by Continental and with the following features:
REFRIGERATION SYSTEM:

- Performance-rated refrigeration system
- Environmentally-safe R-134a refrigerant
- Unique forced air design utilizes fans (approx. every 12”) across the entire back of unit for even distribution of cold
- Automatic, energy saving, non-electric
- condensate evaporator
- Non-corrosive, plasticized fin evaporator coil
- Easily serviceable, slide-out condensing unit

CABINET ARCHITECTURE:

- 2” non-CFC polyurethane foam insulation
- Spring loaded, self-closing doors
- Magnetic snap-in door gaskets
- Heavy-duty, epoxy-coated steel shelves
- 5” casters
- Completely enclosed, vented and removable rear and side grills.
- Refrigerated door section above the condensing unit

MODEL FEATURES:

- Expansion valve for quick recovery
- Built-in, off cycle defrost timer

- Interior hanging thermometer
- Field rehingeable doors

Item #: 20
Description: Work Table with Sink
Manufacturer: Fabricated
Model #: Custom
SIS #: T037
Quantity: 1

Specification:

Unit to be size and shape as shown on plan and in detail. 8'-0" long x 30" wide x 36" high to work surface. Unit to feature 14-gauge stainless steel top, marine edged on front and both ends and polished to a #4 satin finish. Backsplash to be coved 3/4" up 10" high with 2" return to wall at 45 degrees with ends closed. Understructure to be rigidly braced with stainless steel channeling. Table to have stainless steel undershelf with corners notched and welded to stainless steel legs. Area below sinks shall remain open for plumbing connections. Unit to have stainless steel gussets and adjustable bullet feet. Table shall come complete with (2) one 20" x 20" x 12" deep coved corner sink bowl with 2" lever waste assemblies with built-in overflows. Unit shall come complete with (1) one T&S Brass Model B-0231-CC splash mounted mixing faucet with 12" swing nozzle.

Item #: 21
Description: Tray Slide
Manufacturer: Fabricated
Model #: Custom
SIS #: T037
Quantity: 1

Specification:

Unit to be 8'-0" long by 10" deep, turned down 2" on front and rear with 1/2" return at 90 degrees. 2" overhang on kitchen side. Tray slide to be constructed of 14-gauge stainless steel with stainless steel reinforcement and brackets for attaching to wall. Tray slide surface to be mounted at 34"-AFF and exposed ends to be capped. Top surface to be flat and flush with serving equipment. Tray slide shall have 3" extensions to both ends on kitchen side for the termination of the rolling shutter. See drawings for details.

Unit shall be complete with one stainless steel window frame. Sized and shape as shown on plan and in detail. Constructed of 16-gauge type 304 stainless steel and polished to a #4 satin finish. Unit to be telescoping (split) type frame construction

with 2” flush return on kitchen side and 2” return at 90 degrees with ½” return to wall on cafeteria side with all ends closed.

Item #: 22
Description: Tray Slide
Manufacturer: Fabricated
Model #: Custom
SIS #: T037
Quantity: 1

Specification:

Unit to be 6’-0" long by 10" deep, turned down 2" on front and rear with 1/2" return at 90 degrees. 2” overhang on kitchen side. Tray slide to be constructed of 14-gauge stainless steel with stainless steel reinforcement and brackets for attaching to wall. Tray slide surface to be mounted at 34"-AFF and exposed ends to be capped. Top surface to be flat and flush with serving equipment. Tray slide shall have 3” extensions to both ends on kitchen side for the termination of the rolling shutter. See drawings for details.

Unit shall be complete with one stainless steel window frame. Sized and shape as shown on plan and in detail. Constructed of 16-gauge type 304 stainless steel and polished to a #4 satin finish. Unit to be telescoping (split) type frame construction with 2” flush return on kitchen side and 2” return at 90 degrees with ½” return to wall on cafeteria side with all ends closed.

Item #: 23
Description: Shelf, Wall Cap
Manufacturer: Advance/Tabco
Model #: PA-24-72
SIS #: T037
Quantity: 1

Specification:

Unit to be model PA-24-72 Stainless Steel Pass-Thru Shelf as manufactured by Advance/Tabco and with the following features:
Features:

- New Hat Channel design allows shelf to be freely positioned.
- Includes Wall Mounting Brackets for Securing Shelf to Desired Position.
- Furnished with 1-1/2” sanitary roll down along length at front and rear.
- Ends are square with 1-1/2” turn down at wall dimension.

Construction:

- All TIG welded.
- Exposed welded areas polished to match adjacent surface.

Material:

- Heavy Gauge Stainless Steel Shelf and Brackets.
- Heavy Gauge Galvanized Hat Channel.

Item #: 24
Description: Work Table
Manufacturer: Fabricated
Model #: Custom
SIS #: T037
Quantity: 1

Specification:

Unit to be size and shape as shown on plan and in detail. 8'-0" long x 30" wide x 36" high to work surface. Unit to feature 14-gauge stainless steel top, rolled edged on front and both ends and polished to a #4 satin finish. Backsplash to be coved 3/4" up 10" high with 2" return to wall at 45 degrees with ends closed. Understructure to be rigidly braced with stainless steel channeling. Table to have stainless steel undershelf with corners notched and welded to stainless steel legs. Unit to have stainless steel gussets and adjustable bullet feet. Table shall come complete with (1) one premium double pan drawer assembly.

Item #: 25
Description: Wall Shelf
Manufacturer: Advance/Tabco
Model #: WS-12-96-16
SIS #: T037
Quantity: 2

Specification:

Unit to be model WS-12-96-16 Wall Shelf as manufactured by Advance/Tabco and with the following features: Shelf shall be furnished with a 1-1/2" sanitary downward rolled rim on front with a 1-1/2" turn-up edge at rear. Ends are turned down square. Unit shall be constructed of 16-gauge type "430" stainless steel. Units shall be secured to the wall by means of stainless steel bolts through welded support brackets. Brackets can be positioned to accommodate wall studs. Units 7 ft. and larger are furnished with 3 brackets

Item #: 26
Description: Food Processor
Manufacturer: Robot Coupe
Model #: R2N Ultra
SIS #: T037

Quantity: 1

Specification:

Unit to be model R2N Ultra Food Processor as manufactured by Robot Coupe and with the following features:
Motor Base:

- Direct drive induction motor (no belt) for intensive use.
- Power1 HP
- Stainless steel motor shaft.
- Built in on / off / pulse buttons.
- Speed: 1725 rpm.
- Pulse button for better cut precision.

Cutter Function:

- 3 qt. stainless steel cutter bowl with handle, and high resistance smooth blade assembly.

Vegetable Function:

- Vegetable preparation attachment equipped with 2 hoppers.
  - (1) large hopper (surface: 12 square inches)
  - (1) cylindrical hopper (Ø: 2 1/4'').
  - Removable bowl and lid.
- Removable chute and feed lead for dishwasher safe and easy cleaning.
- Vertical pusher presses on vegetables for uniform cuts.
- Large range of 23 stainless steel discs available as option.

Accessories Included:

- Cutter attachment: lid and high resistance stainless steel smooth blade assembly with removable cap.
- Vegetable attachment: chute, feed lead and discharge plate.
- Supplied with 2 mm (5/64'') grating and 4mm (5/32'') slicing discs

Item #: 27
Description: Fryer
Manufacturer: Pitco
Model #: 35C+
SIS #: T037
Quantity: 2

Specification:

Each unit shall be a model 35C+S Economy Tube Fired Gas Fryer as manufactured by Pitco Frialator, Inc. and with the following features:
Construction:

- Welded tank with an extra smooth peened finish ensures easy cleaning.
- Long-lasting, high-temperature alloy stainless steel heat baffles are mounted in the heat exchanger tubes to provide maximum heating and combustion efficiency.

- Standing pilot light design provides a ready flame when heat is required.
- Cabinet front and door are constructed of stainless steel with galvanized sides and back.

Controls:

- Thermostat maintains selected temperature automatically between 200°F (93°C) and 400°F
- (190°C-CE).
- Integrated gas control valve acts as a manual and pilot valve, automatic pilot valve, gas filter, pressure regulator (for gas pressure higher then ½ psi needs external regulator), and automatic main valve.
- Gas control valve prevents gas flow to the main burner until pilot is established and shuts off all gas flow automatically if the pilot flame goes out.
- Temperature limit switch safely shuts off all gas flow if the fryer temperature exceeds the upper limit.

Operations:

- Front 1-1/4" (3.2 cm) NPT drain for quick draining.
- Standing pilot and thermostat maintain temperature automatically at the selected temperature (between 200°F (93°C) and 400°F (190°C-CE)).

Standard Accessories:

- Cabinet - stainless steel front, door
- Galvanized sides and back
- Tank - mild steel with stainless front
- Built-in integrated flue deflector
- Two nickel plated oblong, wire mesh baskets
- One nickel-plated tube rack
- One drain extension
- One drain line clean-out rod
- Removable basket hanger for easy cleaning
- 6" adjustable legs

Unit to be complete with the following options and accessories:

- Stainless Steel Tanks
- Covers
- (1) One joining trim strip.

Each unit to be complete with (1) one Dormont model 1675KITCFS48, 48" long 3/4" flexible gas hose with quick disconnect, and restraining device.

Unit to have factory authorized start-up, which shall include but not limited to calibration, lighting of pilots, start-up and testing. Start-up shall be scheduled and coordinated with job site mechanical and electrical contractors so that issues can be resolved at time of start-up. Start-up should only be scheduled after all mechanical systems to the foodservice equipment have been cleaned, tested, and confirmed operational.

Item #: 28

Description: Equipment Stand, Freezer Base
Manufacturer: Continental
Model #: DL60GF
SIS #: T037
Quantity: 1

Specification:

Unit to be model DL60GF Griddle Stand, Freezer as manufactured by Continental Refrigerator and with the following features:
Refrigeration System:

- Performance-rated refrigeration system
- Environmentally-safe R-404A refrigerant
- Side-mounted, automatic, energy saving non-electric condensate evaporato
- Non-corrosive, plasticized fin evaporator coil.
- Easily serviceable, front slide-out condensing unit.

Cabinet Architecture:

- High density, non-CFC polyurethane foamed-in-place insulation.
- Easy glide, fully extendable drawers designed to hold 6” deep pans side-by-
- One-piece, snap-in magnetic drawer gaskets.
- Heavy-duty drawer track with built-in drawer safety clips
- Drawers designed to hold 250 lb. capacity.
- 4” casters on support plates.
- Stainless steel case back.
- Reinforced stainless steel work top with drip guard marine edge

Model Features:

- Capillary dial thermometer
- Front breathing
- Automatic electric defrost

Item #: 29
Description: Griddle
Manufacturer: Star Manufacturing
Model #: 636TSPF
SIS #: T037
Quantity: 1

Specification:

Unit to be model 636TSPF Star-Max Gas Griddle with Thermostatic Control and Safety Pilot as manufactured by Star Manufacturing and with the following features:
Gas griddles are constructed with stainless steel panel and double wall aluminized steel side panels. Griddle plate is 1" thick, 4-1/2" high tapered wrap-around stainless steel splash guard come standard. Unit has a 3-1/4" wide front grease trough with grease chute and a 4-1/2 quart stainless steel grease drawer. Unit is heated by 28,300 BTU aluminized steel burner for every 12" of griddle width and is controlled

by a throttling type thermostat embedded into griddle plate. Thermostat knobs are protected by a stainless steel bull nose front. An automatic safety pilot is provided for each burner. Griddles are supplied with 4" high die cast nickel plated steel legs that have a 1-3/8" adjustment. Gas connection is 3/4" N.P.T. male and a convertible pressure regulator is provided. Units are approved for installation within 6" of combustible and non-combustible surfaces and are UL Gas certified and UL Sanitation listed.

Unit to be complete with (1) one Dormont model 1675KITCFS48, 48” long 3/4” flexible gas hose with quick disconnect, and restraining device.

Unit to have factory authorized start-up, which shall include but not limited to calibration, lighting of pilots, start-up and testing. Start-up shall be scheduled and coordinated with job site mechanical and electrical contractors so that issues can be resolved at time of start-up. Start-up should only be scheduled after all mechanical systems to the foodservice equipment have been cleaned, tested, and confirmed operational.

Item #: 30
Description: Char-Broiler
Manufacturer: Star Manufacturing
Model #: 6124RCBF
SIS #: T037
Quantity: 1

Specification:

Unit to be model 6124RCBF Star-Max Radiant Style Gas Char-Broiler as manufactured by Star Manufacturing and with the following features:
Gas char-broilers are constructed with stainless steel front panel and double wall aluminized steel side panels. Units have 40,000 BTU (35,000 BTU on propane gas) cast iron burner for every 12" of width and are controlled by an adjustable valve. Two contoured stainless steel radiants per burner are provided. Cooking surface is a heavy duty cast iron grate type that is adjustable in height. A stainless steel water pan is provided. Control knobs are protected by a stainless steel bull nose front. A standing pilot is provided. Char-broilers are supplied with 4" high die cast nickel plated legs that have a 1-3/8" adjustment. Gas connection is 3/4" N.P.T. male and a convertible pressure regulator is provided. Unites are UL Gas Certified for U.S. and Canada. UL sanitation approved.

Unit to be complete with (1) one Dormont model 1675KITCFS48, 48” long 3/4” flexible gas hose with quick disconnect, and restraining device.

Unit to have factory authorized start-up, which shall include but not limited to calibration, lighting of pilots, start-up and testing. Start-up shall be scheduled and coordinated with job site mechanical and electrical contractors so that issues can be resolved at time of start-up. Start-up should only be scheduled after all mechanical

systems to the foodservice equipment have been cleaned, tested, and confirmed operational.

Item #: 31
Description: Spare Number
Manufacturer: None
Model #: None
SIS #: T037
Quantity: 0

Specification:

Item #: 32
Description: Range, 8-Burner
Manufacturer: Vulcan
Model #: 48S-8B
SIS #: T037
Quantity: 1

Specification:

Unit to be model 48S-8B Endurance Gas Restaurant Range with 8-Open Burners as manufactured by Vulcan and with the following features:
48" wide gas restaurant range, Vulcan Model No. 48S-8B. Fully MIG welded aluminized steel frame for added durability. Stainless steel front, sides, backriser, highshelf and 6" adjustable legs. Extra deep crumb tray with welded corners. Eight 30,000 BTU/hr. open top burners with lift-off burner heads. Energy saving flashtube open burner ignition system (one pilot for every two burners) shrouded for reliability. Heavy duty cast grates, easy lift-off 12" x 12½" in the front and 12" x 14½" in the back to better accommodate stock pots or large pans. Grates have a built in aeration bowl for greater efficiency. Burner knobs are cool to the touch, high temperature material. One oven: 35,000 BTU/hr. standard bakers depth ovens with porcelain oven bottom and door panel, measures 27"d x 26⅜"w x 14"h. Oven thermostat adjusts from 250°F to 500°F with a low setting. Oven is supplied with two racks, two rack guide sets, and four rack positions. Oven door is heavy duty with an integrated door hinge/spring mechanism requiring no adjustment. 1" rear gas connections with rear manifold and pressure regulator. Total input 275,000 BTU/hr.
Exterior Dimensions:34"d x 48"w x 58"h on 6" adjustable legs.

Unit to be complete with the following options and accessories:

- Casters (set of four)

Unit to be complete with (1) one Dormont model 16100KITCFS48, 48” long 1” flexible gas hose with quick disconnect, and restraining device.

Each unit to have factory authorized start-up, which shall include but not limited to calibration, lighting of pilots, start-up and testing. Start-up shall be scheduled and coordinated with job site mechanical and electrical contractors so that issues can be resolved at time of start-up. Start-up should only be scheduled after all mechanical systems to the foodservice equipment have been cleaned, tested, and confirmed operational.

Item #: 33
Description: Steamer
Manufacturer: AccuTemp
Model #: E62083D100SGL
SIS #: T037
Quantity: 1

Specification:

Unit to be model E62083D100SGL E6 Stand Mounted Connectionless Evolution, 6-Pan, Electric Boilerless Convection Connectionless Steamer as manufactured by AccuTemp and with the following features:

- Fast cook times with patent-pending Steam Vector Technology, which utilizes no moving parts.
- Cook and Hold (Variable-Temperature) operating modes.
- No hood required (in most states).
- Easy-to-use digital controls, with digital temperature display
- Independent digital electronic timer with programmable presets
- 3 Gallon water reservoir.
- No water or drain line.
- No water filtration or treatment required.
- No warranty exclusions for water quality.
- Front-mounted drain valve.
- No scheduled de-liming or maintenance.
- Heavy-duty, field-reversible door.
- Door can be opened at any time during cooking cycle.
- Cast aluminum heating element is not exposed to water.
- Multiple kW heat inputs available for all cooking needs.
- Steamer cavity constructed of reinforced 14 ga. 304 stainless steel.
- Easy-to-clean control panel.
- Automatic altitude compensation.
- Dishwasher-safe one-piece wire pan racks.
- Dishwasher-safe SVT steam collector and distributor pan.
- English and Spanish operating instructions on door.
- Simplified service access panel.
- Low water, high water and over-temp indicator lights.
- 5’ power cord with plug included.
- One year parts and labor warranty.
- Lifetime Service & Support Guarantee

- UL LISTED Safety Certification (UL 197)
- UL EPH Sanitation Certification (NSF 4)
- Stainless steel support stand with casters, bullet feet or flanged feet.

Unit to have factory authorized start-up, which shall include but not limited to calibration, lighting of pilots, start-up and testing. Start-up shall be scheduled and coordinated with job site mechanical and electrical contractors so that issues can be resolved at time of start-up. Start-up should only be scheduled after all mechanical systems to the foodservice equipment have been cleaned, tested, and confirmed operational.

Item #: 34
Description: Convection Oven, Double
Manufacturer: Blodgett
Model #: DFG100 Double
SIS #: T037
Quantity: 1

Specification:

Unit to be model DFG-100 Double Compartment Convection Oven as manufactured by Blodgett and with the following features:
Each oven compartment shall have porcelainized steel liner and shall accept five 18" x 26" standard full-size bake pans in left-to-right positions. Doors shall have dual pane thermal glass windows with single porcelain handle and simultaneous operation. Each unit shall be gas heated with electronic spark ignition and shall cook by means of a dual-flow system combining direct and indirect heat. Air in baking chamber distributed by dual inlet blower wheel powered by a two speed, 1/3 HP motor with thermal overload protection. Each oven chamber shall be fitted with two commercial lamps and five chrome-plated removable racks. Control panel shall be recessed with Cook/Cool Down mode selector, solid state manual infinite thermostat (200-500 degree F), and 60-minute timer.

Unit to be complete with the following options and accessories:

- 6” Casters.
- SSI-M – Solid state infinite control with manual timer.
- Gas manifold for double section.

Unit to be complete with (1) one Dormont model 1675KITCFS48PS, 48” long 3/4” flexible gas hose with quick disconnect, restraining device and Posi-Set.

Unit to have factory authorized start-up, which shall include but not limited to calibration, lighting of pilots, start-up and testing. Start-up shall be scheduled and coordinated with job site mechanical and electrical contractors so that issues can be resolved at time of start-up. Start-up should only be scheduled after all mechanical systems to the foodservice equipment have been cleaned, tested, and confirmed operational.

Item #: 35
Description: Exhaust Hood (By Others)
Manufacturer: By Others
Model #: By Others
SIS #: T037
Quantity: 1

Specification:

Unit to be supplied and installed by others and is not in the Foodservice Equipment Contract.

Item #: 36
Description: Heated/Holding Cabinet
Manufacturer: F.W.E.
Model #: MTU-12D
SIS #: T037
Quantity: 1

Specification:

Unit to be model MTU-12D Moisture-Temp Universal Cabinet as manufactured by Food Warming Equipment and with the following features:
Construction: Heliarc welded, single unit construction of type 304 stainless steel, 20-gauge polished exterior, 24-gauge stainless steel interior with easy-to-clean coved corners. Welded tubular base frame shall be 1" square, heavy gauge stainless steel tubing, with 10-gauge stainless steel reinforcing stress plates at corners.
Insulation: “Ultra-Guard” UG-26 high-density fiberglass insulation throughout; top, back, bottom, sides and door(s).
Handles: Form grip flush-in-wall hand grips recess mounted on each side of unit.
Doors and Latches: Flush mounted, stainless steel insulated doors. High temperature gasket sealed; gasket shall be cabinet mounted. Each door stall have two (2) heavy-duty edge mount die cast hinges. Door latch shall be edge mounted, full grip, and positive closing. The hinge and latch mountings are reinforced with stainless steel backing plates.
Casters: Polyurethane tire casters with Zerk grease (lubrication) fittings in a configuration of two (2) rigid, and two (2) swivel with brake. Casters shall have a reinforced yoke welded to 10-gauge caster mounting plate. The caster mounting plate shall be secured to a 10-gauge stainless steel reinforcing stress plate via welded in place stainless steel studs. The reinforcing stress plates shall be welded to the heavy gauge tubular frame of the unit.
Tray Slides: Welded rod-style tray slides are chrome plated and epoxy coated for greater durability and sanitation. Fully adjustable, removable and designed to give secure bottom tray support. Removable stainless steel uprights shall be punched on 1-1/2” (38) spacing, O.C., for easy tray adjustment, and shall easily lift off heavy-duty stainless steel brackets without the use of tools for cleaning.

Moisture-Temp System/Controls: Built in humidified holding system shall include two (2) separate long life Incoloy nickel-chromium alloy heating elements per cavity; separate, adjustable controls shall be provided for each function. One to control the interior air temperature, and one to control the interior air moisture with hydro immersion water bath. An oversized and baffled, stainless steel water reservoir shall be removable for ease of cleaning/sanitation. System shall have a Hi-Temp, self-lubricated, impedance protected fan-cooled blower motor for moist air distribution. Controls shall be up-front, recessed and eye-level for convenience and safety, and shall include a full range thermostat adjustable to actual temperature. Thermostat shall include temperature scale marked in ten degree increments (F/C) from 90° to 190°F (30° to 90°C). An operational range thermometer, adjustable moisture control (moist to crisp), 20 amp On/Off power switch, humidity cycle light, and thermostat cycling light shall also be included.
Electrical Characteristics: 3 wire grounded 10 foot extension power cord and plug, side mounted for safety. 120-Volt, single phase, 1650 watts, 13.75 amps. NEMA 5-15P Plug. Dedicated circuit.

Unit to be complete with the following options and accessories:

- Dutch doors.
- Full extension bumper.

Item #: 37
Description: Salad Bar
Manufacturer: Delfield
Model #: SCSC-60-B
SIS #: T037
Quantity: 1

Specification:

Unit to be model SCSC-60-B Refrigerated cold pan serving counter, 52” x 21.62” cold pan size as manufactured by Delfield and with the following features:
Exterior body is constructed of 18-gauge stainless steel side panels and 14-gauge galvanized bottom. All exterior side panels are reinforced with overlapping corners and are
welded in place. All body cutouts are reinforced with 14-gauge galvanized channel supports.
Exterior top is constructed of 14-gauge stainless steel, welded, ground and polished into one integral unit.
The refrigerated cold pan is 7” deep and constructed of stainless steel to hold 4” deep pans. The cold pan is separated from the exterior top by a thermal break. Copper refrigeration tubing is attached to the sides of the cold pan and is fully insulated with foamed in place environmentally friendly, Kyoto Protocol Compliant, Non ODP (Ozone Depletion Potential), Non GWP (Global Warming Potential) polyurethane insulation. Cold pan is equipped with a 1” I.P.S. drain with drain valve located at the bottom of the unit. Temperatures of 33°F to 41°F are maintained with

pans recessed 2" at 86°F ambient room temperature. Pans rest on die-stamped cold pan. Pans by others.
Refrigeration system uses HFC-404A refrigerant and has a self-contained 115-volt, 60 Hertz, single phase hermetically sealed condensing unit with adjustable cold pan pressure
control. Unit is wired with a 3-wire, grounded, maximum 10' cord and plug. Unit has an on/off switch mounted on the exterior.
Casters: Unit is mounted on 5" diameter swivel casters with non-marking tires and plate brakes. Overall height of caster assembly is 6.00".

Unit to be complete with the following options and accessories:

- (2) Two model "A" Stainless Steel Tray Slides.
- Laminate exterior panels.
- Provisions for mounting Sneeze Guard, Item # 38.

Item #: 38
Description: Sneeze Guard
Manufacturer: English
Model #: M-120IS
SIS #: T037
Quantity: 1

Specification:

Unit to be model M-120IS Island Self-Serve Food Protector as manufactured by English Mfg. Inc. and with the following features:
Posts:

- 1" Diameter stainless steel posts.
- 2" Diameter stainless steel flange.
- Stainless steel glass clips.
- Brushed #4 stainless steel finish.

Unit:

- NSF Certified.
- Mounting hardware provided.
- Clear tempered glass with polished edges. 3/8" Glass.

Unit to be complete with the following options and accessories:

- (2) Two glass end panels.
- Round flange mounting option.
- Length to be 56" long. (Centerline of Post to Centerline of Post)
- Unit to be sized to fit Salad Bar, Item # 37.
- Unit to be sent to Delfield for coordination and installation.

Item #: 39
Description: Spare Number
Manufacturer: None

Model #: None
SIS #: T037
Quantity: 0

Specification:

Item #: 40
Description: Dishtable, Soiled
Manufacturer: Fabricated
Model #: Custom
SIS #: T037
Quantity: 1

Specification:

Unit to be size and shape as shown on plan and in detail. Unit to feature 14-gauge stainless steel, type 304 18/8, and polished to a #4 satin finish. All seams to be welded, ground smooth and polished. All horizontal and vertical bends to be rounded to a 3/4" radius with all intersections to have coved corners. 2'-6" wide x 2'-10" high with 3" rolled rim on front edges. Top shall be shall extend through pass opening and have an inverted “V” edge. Edge shall be turned down 2" with ½” returned to wall with ends closed. Carry 10" high flat backsplash to wall behind tracks of rolling service door. Extend 10" high side splash through opening. Balance of 10" high splash to have 2" return at 45° with ends closed. Top to be complete with one 20" x 20" x 6" deep pre-rinse sink with removable stainless steel removable rack guides. Included with this unit shall be a T&S Brass Model B-133 pre-rinse spray and B-109-1 wall bracket. Table to include a minimum of six stainless steel leg assemblies with stainless steel feet and stainless steel undershelf notched and welded to legs. Make provisions for disposer control panel, disposer collar, and holes for vacuum breaker in backsplash.

Unit shall be complete with one stainless steel window frame. Sized and shape as shown on plan and in detail. Constructed of 16-gauge type 304 stainless steel and polished to a #4 satin finish. Unit to be telescoping (split) type frame construction with 2” flush return on kitchen side and 2” return at 90 degrees with ½” return to wall on cafeteria side with all ends closed. Pass-thru window frame shall be fitted with (1) one 12” wide x 48” long intermediate shelf 12” above work surface of dishtable. (2) Two sets of three 12” long x 3” wide tray guides shall be supplied and fixed to stainless steel window frame as shown in plans. Spacing between guides to be approximately 7”. Width between guides to be coordinated with owners trays.

Item #: 41
Description: Disposer
Manufacturer: Insinkerator
Model #: SS-200-7-MRS
SIS #: T037

Quantity: 1

Specification:

Unit to be model SS-200-7-MRS 2-HP Disposer as manufactured by Insinkerator and with the following features:

- Grind Chamber: Corrosion Resistant Stainless Steel.
- Mounting: 3/4" (19.1 mm) rubber mounting above grinding chamber isolates sound and eliminates vibration. Mounting is enclosed in chrome plated covers for sanitation and appearance.
- Motor: 2 HP Induction Motor, 1725 RPM, totally enclosed to provide protection against outside moisture. Controlled power air flow cools motor for efficiency and longer life. Built-in thermal overload protection.
- Cutting Elements: Stationary and rotating shredding elements made from cast nickel chrome alloy for long life and corrosion resistance, designed for reverse action grinding.
- Main Bearings: Double-tapered Timken roller bearings provide a shock absorbing cushion.
- Motor Seals: Triple lip seal protects motor from water damage. Secondary spring-loaded oil seal provides double protection against water and loss of grease.
- Finish: All Stainless Steel and Chrome plated. Paint-free for lasting sanitation.
- Warranty: 1-year full warranty from date of installation.
- A Disposer Package Includes: 1 Mounting/Bowl Assembly, 1 Electrical Control, 1 Syphon Breaker, 1 Solenoid Valve, and 1 Flow Control Valve.

Unit to be complete with the following options and accessories:

- # 7 Collar Adapter.
- MRS Manual Reverse Switch Electrical Control.
- Siphon Breaker (13412) (chrome, 45° fittings).

Item #: 42
Description: Condensate Hood (By Others)
Manufacturer: By Others
Model #: By Others
SIS #: T037
Quantity: 1

Specification:

Unit to be supplied and installed by others and is not in the Foodservice Equipment Contract.

Item #: 43
Description: Dishwasher with Booster Heater

Manufacturer: Hobart
Model #: AM15
SIS #: T037
Quantity: 1

Specification:

Unit to be model AM15 AM Select Dishwasher as manufactured by Hobart and with the following features:
The microcomputer-based control system is built into the AM Select dishwasher. Unit shall have standard electrical specifications of 208-240/60/3 and is equipped with a reduced voltage pilot circuit transformer.
Construction: Drawn tank, tank shelf and feet constructed of 16-gauge stainless steel. Wash chamber and front trim panel above motor compartment are polished, satin finish. Frame is 12-gauge stainless steel, chamber is 18 gauge, and removable trim panels are 20 gauge.
Chamber Lift: Chamber coupled by stainless steel handle, spring counterbalanced. Chamber guided for ease of operation and long life.
Pump: With stainless steel pump and impeller, integral with motor assures alignment and quiet operation. Pump shaft seal with stainless steel parts and a carbon ceramic sealing interface. Easily removable impeller housing permits ease of inspection. Capacity 160 GPM. Pump is completely self-draining.
Motor: Built for Hobart, 2 H.P., with inherent thermal protection, grease-packed ball bearings, splash-proof design, ventilated. Single-phase is capacitor-start, induction-run type. Three-phase is squirrel-cage, induction type.
Microcomputer Control System: Hobart microcomputer controls, assembled within water-resistant enclosure, provide built-in performance and reliability. The microcomputer control, relays and contactors are housed behind a stainless steel enclosure, hinged to provide easy access for servicing. The line voltage electrical components are completely wired with 105°C, 600V thermoplastic insulated wire with stranded conductors and routed through listed electrical conduit. Electrical components are wired with type ST cord. Line disconnect switch NOT furnished.
Cycle Operation: The microcomputer-timing program is started by closing the doors, which actuates the door cycle switch. The microcomputer energizes the wash pump motor contactor during the wash portion of the program. After the wash, a dwell permits the upper wash manifold to drain. At the end of the dwell, the final rinse solenoid valve is energized. After the final rinse valve closes, Sani-Dwell (Hot Water Mode only) permits sanitization to continue. The Rinse display remains on during this period, completing the program. If the microcomputer is interrupted during a cycle by the door-cycle switch, the microcomputer is reset to the beginning of the program.
Hot Water Sanitizing (58 racks per hour) – 57 seconds: 38 Second Wash, 2 Second Dwell, 10 Second Rinse, 7 Second Sani-Dwell. Other programs can be pre-selected by your Hobart service technician.
Manual wash cycle selector also provides selection of 2-, 4- or 6-minute wash cycles for heavier washing applications.
Wash: Hobart revolving stainless steel wash arms with unrestricted openings above and below provide thorough distribution of water jets to all dishware surfaces. Arms

are easily removable for cleaning and are interchangeable. Stainless steel tubing manifold connects upper and lower spray system.
Rinse: Rotating rinse arms, both upper and lower, feature 14 rinse nozzles. The stainless steel upper and lower rinse arms are easily removable without tools for inspection and are interchangeable. Diaphragm-type rinse control solenoid valve mounted outside machine. Machine is equipped with special hot water vacuum breaker on downstream side of rinse valve – mounted 6" above uppermost rinse opening. Easy open brass line strainer furnished.
Fill: Microcomputer controlled fill valve installed on upstream side of rinse vacuum breaker. Ratio fill method is used giving the correct fill at any flowing water pressure. (20 PSIG minimum necessary for proper rinsing.)
Drain and Overflow: Large bell type automatic overflow and drain valve controlled from inside of machine. Drain automatically closed by lowering chamber. Drain seal is large diameter, high temperature “O” ring. Cover for overflow is integral part of the standpipe.
Strainer System: Equipped with large, exclusive self-flushing, easily removable perforated stainless steel, one-piece strainer and large capacity scrap basket. Submerged scrap basket minimizes frequent removal and cleaning.
Heating Equipment: Standard tank heat is 5KW electric immersion heating element. Regulated power infrared gas immersion tube system is optional at extra cost. A solid-state igniter board controls the gas valve and provides flame ignition. A transformer steps the control circuit voltage down to 24 volts to power the igniter board and gas valves.

Unit to be complete with the following options and accessories:

- Sense-A-Temp 70° F rise electric booster heater.
- Single point electrical connection for booster equipped machines.
- ¾” pressure regulator valve.
- Drain water tempering kit.

Item #: 44
Description: Sink, 3-Compartment
Manufacturer: Advance/Tabco
Model #: 94-63-54-18RL
SIS #: T037
Quantity: 1

Specification:

Unit to be model 94-63-54-18RL Regaline Stainless Steel Three Compartment Sink as manufactured by Advance/Tabco and be complete with the following features:
One piece Deep Drawn sink bowls with integral splash-type drainboards. Featuring the single bowl unit design. All sinks have a large liberal radii with a minimum dimension of 3". Placement of the welded leg assembly insures stability and furnishes direct support of the column load requirement for the entire sink unit.

Construction: All TIG welded. Welded areas blended to match adjacent surfaces and to a satin finish. Gussets welded to a die-embossed reinforcing channel.
Materials: Bowls and Top to be 14-gauge type 304 stainless steel. Legs to be 1-5/8" diameter tubular stainless steel with front and rear cross bracing. Stainless steel gussets and 1" adjustable metal bullet feet.
Each sink bowl to measure 18" x 24" x 14" deep. Drainboards to be 18" long. Overall length to be 97".

Unit to be complete with the following options and accessories:

- (3) Three model K-15 lever operated waste assemblies with built-in overflows.
- (1) One model K-111 splash mounted faucet.

Item #: 45
Description: Dishtable, Clean
Manufacturer: Advance/Tabco
Model #: DTC-S30-60R
SIS #: T037
Quantity: 1

Specification:

Unit to be model DTC-S30-60R Stainless Steel Dishtable as manufactured by Advance/Tabco and with the following features:
Unit to feature 14 gauge stainless steel, type 304 18/8, and polished to a #4 satin finish. All seams to be welded, ground smooth and polished. Top shall be turned up 3" and finished with a 1-1/2" sanitary rolled edge. All horizontal and vertical bends to be rounded to a 3/4" radius with all intersections to have coved corners. Splash to be 10" high with 2" return to wall at 45 degrees. Unit to have stainless steel gussets and stainless steel adjustable bullet feet.

Unit to be complete with the following options and accessories:

- (1) One model DTA-SS-42 Stainless Steel Undershelf.

Item #: 46
Description: Spare Number
Manufacturer: None
Model #: None
SIS #: T037
Quantity: 0

Specification:

Item #: 47
Description: Milk Dispenser

Manufacturer: Silver King
Model #: SKMAJ2/C4
SIS #: T037
Quantity: 1

Specification:

Unit to be model SKMAJ2/C4 Majestic Series Milk Dispenser as manufactured by Silver King and with the following features:

- Cabinet: Stainless steel exterior and interior.
- Refrigeration: CFC-free, 134a refrigerant, hermetically sealed, high efficiency, self-contained refrigeration system. Adjustable temperature control and temperature indicator on front of door.
- Door: Heavy duty hinges. Easily removable door gasket for ease in cleaning.
- Dispenser Valve: Spring loaded lift type valve for dripless operation and optimum sanitation.
- Electrical: Standard 115 volt, 60 Hz, single phase. Also available in 230-volt, 50Hz, single phase.
- Listings: ETL Safety (U.S. and Canada), ETL Sanitation.
- Warranty: One year parts and labor warranty on cabinet and refrigeration system. Five-year warranty on compressor.

Item #: 48
Description: Coffee Brewer
Manufacturer: Bunn
Model #: Dual SH (27900.0001)
SIS #: T037
Quantity: 1

Specification:

Unit to be model Dual SH (27900.0001) Coffee Brewer as manufactured by Bunn.

Unit to be complete with the following options and accessories:

- (2) Two model SH-1.5-0001 (27850.0001) Soft Heat Coffee Server.
- (1) One model FLIT-20138.1000 (20138.1000) Paper Filters
- (1) One model EQHP-25-0005 (39000.0005) EQHP-25 Easy Clear High Water System.

Item #: 49
Description: Ice/Beverage Dispenser
Manufacturer: SerVend
Model #: SV-150
SIS #: T037
Quantity: 1

Specification:

Unit to be model SV-150 Ice/Beverage Dispenser as manufactured by SerVend and with the following features:

- One-piece ABS base provides a solid foundation as well as adding structural rigidity to the dispenser.
- Enhanced agitation and drive system provides consistent ice dispense and ease of serviceability.
- Long-lasting LED lighting illuminates the merchandiser while reducing energy usage and lifetime costs.
- Patented Rocking Chute™ simplifies ice dispensing and storage.
- Multi-port flex manifold adds carb/noncarb flexibility. Fast flavor change-overs reduce service complexity.
- Unit to have (6) six valves. Verify and coordinate beverage types with owner.

Item #: 50
Description: Ice Machine
Manufacturer: Manitowoc
Model #: IY-0524A
SIS #: T037
Quantity: 2

Specification:

Unit to be model IY-0524A Ice Machine as manufactured by Manitowoc and with the following features:
Designed for operators who know that ice is critical to their business, the Indigo™ Series ice machine's preventative diagnostics continually monitor itself for reliable ice production. Improvements in clean ability and programmability make your ice machine easy to own and less expensive to operate.

- Space-Saving Design – Up to 485 lbs. daily ice production and only 22" wide.
- Intelligent Diagnostics – provide 24-hour preventative maintenance and diagnostic feedback for trouble free operation.
- Acoustical Ice Sensing Probe – for reliable operation in challenging water conditions.
- EasyRead Display – communicates operating status, cleaning reminders, and asset information through a blue illuminated display.
- Programmable Ice Production – by On/Off Time, Ice Volume or Bin Level (with accessory bin level control) further improves energy efficiency and savings.
- Easy to Clean Foodzone – Hinged front door swings out for easy access. Removable water-trough, distribution tube, curtain, and sensing probes for fast and efficient cleaning. Select components made with AlphaSan® antimicrobial.
- DuraTech™ Exterior – provides superior corrosion resistance. Stainless finish with innovative clear-coat resists fingerprints and dirt.

Each unit to be complete with the following options and accessories:

- LuminIce™ Growth Inhibitor controls the growth of bacteria and yeast within the foodzone.
- Arctic Pure Water Filter.

The unit in the kitchen shall be complete with the following options and accessories:

- (1) One model B-420 Ice Bin.

Item #: 51
Description: Toaster, Conveyor
Manufacturer: Hatco
Model #: TRH-60
SIS #: T037
Quantity: 1

Specification:

Unit to be model TRH-60 Toast-Rite Electric Conveyor Toaster as manufactured by Hatco and with the following features:
The electric Toast-Rite® Conveyor Toaster shall be a Hatco model TRH-60 as manufactured by the Hatco Corporation, Milwaukee, WI 53234 U.S.A. The toaster shall have the capacity to toast up to 10 pieces per minute and it shall be rated at 3.838 kW, 208 volts, single phase. The toaster shall be of stainless steel design and shall include a front mounted control panel with a toast selector knob, variable speed control knob, and an aluminum toast collector pan. The toaster will have multiple metal sheathed heating elements and an impedance protected motor. It shall be complete with factory attached UL listed 4' cord and plug.
Comes with 24/7 parts and service assistance (U.S. and Canada only).

Item #: 52
Description: Microwave Oven
Manufacturer: Amana
Model #: RFS12TS
SIS #: T037
Quantity: 1

Specification:

Unit to be model RFS12TS Medium Volume Commercial Microwave Oven as manufactured by Amana and with the following features:
Commercial microwave 10 touch pad control panel shall be programmable with the ability to program up to 100 menu items and shall have automatic cooking capability for up to two portions. Touch pad shall include Braille for ADA compliance. Cooking timer shall be 60 minute, countdown style with a time entry option and an adjustable

end of cycle audible signal. LED display shall be backlit. There shall be 5 power levels, 4 cooking stages and defrost mode. Microwave output shall be 1200 watts distributed by two magnetrons with rotating antennas to provide superior even heating throughout the cavity. Heavy duty door shall have a tempered glass window and a lift and pull handle with a 90° + opening for easy access. An interior light shall facilitate monitoring without opening the door. The large 1.2 cubic ft. (34 liter) cavity shall accommodate a 14" (356 mm) platter. Interior ceramic shelf shall be sealed and recessed on oven bottom to reduce plate-to-shelf edge impact. Oven shall have a stainless steel interior and exterior and be stackable to save counter and shelf space. Air filter shall be easily accessible and removable from the front of the oven and have a "clean filter" reminder feature. Microwave oven shall comply with standards set by the U.S Department of Health and Human Services, ETL for safety and sanitation.

END OF SECTION 114000

SECTION 122113 - HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Horizontal louver blinds with aluminum slats.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Product test reports.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

PART 2 - PRODUCTS

2.1 HORIZONTAL LOUVER BLINDS, ALUMINUM SLATS

A. Manufacturers:

1. Summit 8 & 6 by CACO, Inc. Window Fashions.
2. Hunter Douglas Contract.
3. Levoior Contract.
4. Springs Window Fashions.
5. Architect approved equal.

B. Material Flame-Resistance Rating: Comply with NFPA 701. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

C. Slats: Aluminum; alloy and temper recommended by producer for type of use and finish indicated; with crowned profile and radius corners.

1. Width: 1 inch.
2. Thickness: Manufacturer's standard.

3. Features:

D. Headrail: Formed steel or extruded aluminum; long edges returned or rolled. Headrails fully enclose operating mechanisms on three sides.
   1. Manual Lift Mechanism:
      a. Lift-Cord Lock: Variable; stops lift cord at user-selected position within blind full operating range.
      b. Operator: Extension of lift cord(s) through lift-cord lock mechanism to form cord pull.
   2. Manual Tilt Mechanism: Enclosed worm-gear mechanism and linkage rod that adjusts ladders.
      a. Tilt: Full.
      b. Tilt: Two-direction, positive stop or lockout limited at an angle of 60 degrees from horizontal, both directions.
      c. Operator: Solid-plastic wand.
   3. Manual Lift-Operator and Tilt-Operator Lengths: Manufacturer's standard.
   4. Manual Lift-Operator and Tilt-Operator Locations: Manufacturer's standard unless otherwise indicated.

E. Bottom Rail: Formed-steel or extruded-aluminum tube that secures and protects ends of ladders and lift cords and has plastic- or metal-capped ends.
   1. Type: Manufacturer's standard.

F. Ladders: Braided cord.

G. Mounting Brackets: With spacers and shims required for blind placement and alignment indicated.

H. Hold-Down Brackets and Hooks or Pins: Manufacturer's standard.

I. Side Channels and Perimeter Light Gap Seals: Manufacturer's standard.

J. Colors, Textures, Patterns, and Gloss:
   1. Slats: As selected by Architect from manufacturer's full range.
   2. Components: Provide rails, cords, ladders, and materials exposed to view matching or coordinating with slat color unless otherwise indicated.

2.2 HORIZONTAL LOUVER BLIND FABRICATION

A. Product Safety Standard: Fabricate horizontal louver blinds to comply with WCMA A 100.1 including requirements for corded, flexible, looped devices; lead content of components; and warning labels.

B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:

1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which blind is installed less 1/4 inch per side or 1/2 inch total, plus or minus 1/8 inch. Length equal to head-to-sill dimension of opening in which blind is installed less 1/4 inch, plus or minus 1/8 inch.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install horizontal louver blinds level and plumb, aligned and centered on openings, and aligned with adjacent units according to manufacturer's written instructions.

1. Locate so exterior slat edges are not closer than 1 inch from interior faces of glass and not closer than 1/2 inch from interior faces of glazing frames through full operating ranges of blinds.
2. Install mounting and intermediate brackets to prevent deflection of headrails.
3. Install with clearances that prevent interference with adjacent blinds, adjacent construction, and operating hardware of glazed openings, other window treatments, and similar building components and furnishings.

B. Adjust horizontal louver blinds to operate free of binding or malfunction through full operating ranges.

C. Clean horizontal louver blind surfaces after installation according to manufacturer's written instructions.

END OF SECTION 122113

SECTION 122413 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes manually operated roller shades.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.

B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.

C. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Product test reports.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. RB 500 Roller Shades by Hunter Douglas Contract; 1 Blue Hill Plaza, 21st Floor, Pearl River, NY 10965; 800-727-8953; http://www.hunterdouglasarchitectural.com/.

B. Top Fascia System by Roll-A-Shade; 12101 Madera Way, Riverside, CA, 92503; 1 (888) 245-5077; http://www.rollashade.com/.

C. Architect approved equal.

2.2 ROLLER SHADES

A. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.

1. Bead Chains: Manufacturer's standard.

a. Loop Length: Full length of roller shade.
b. Limit Stops: Provide upper and lower ball stops.
c. Chain-Retainer Type: Chain tensioner, jamb mounted.

B. Spring Operating Mechanisms: Roller contains spring sized to accommodate shade size indicated. Provide with positive locking mechanism that can stop shade movement at each half-turn of roller and with manufacturer's standard pull.

C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

1. Roller Mounting Configuration: Single roller.
2. Roller Drive-End Location: Right side of inside face of shade.
3. Direction of Shadeband Roll: Regular, from back of roller.
4. Shadeband-to-Roller Attachment: Manufacturer's standard method.

D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.

E. Shadebands:

1. Shadeband Material: Light-filtering fabric.
2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.

a. Type: Enclosed in sealed pocket of shadeband material.
b. Color and Finish: As selected by Architect from manufacturer's full range.

F. Installation Accessories:

1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.

a. Shape: L-shaped.
b. Height: Manufacturer's standard height required to conceal roller and shadeband when shade is fully open, but not less than 4 inches.
2. Installation Accessories Color and Finish: As selected from manufacturer's full range.

2.3 SHADEBAND MATERIALS

A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

B. Light-Filtering Fabric: Woven fabric, stain and fade resistant.

1. Source: Roller-shade manufacturer.
2. Type: Woven PVC-coated fiberglass and PVC-coated polyester.
3. Weave: Mesh.
4. Weight: 6.0 - 20.7 oz./sq. yd..
5. Roll Width: Coordinate w/ window width.
6. Orientation on Shadeband: Up the bolt.
7. Openness Factor: 10 percent.
8. Color: As selected by Architect from manufacturer's full range.

2.4 ROLLER-SHADE FABRICATION

A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.

B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:

1. Outside of Jamb Installation: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.

C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible except as follows:

1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:4, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.
2. Railroaded Materials: Railroad material where material roll width is less than the required width of shadeband and where indicated. Provide battens and seams as required by railroaded material to produce shadebands with full roll-width panel(s) plus, if required, one partial roll-width panel located at top of shadeband.

PART 3 - EXECUTION

3.1 ROLLER-SHADE INSTALLATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance of the Work.

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

C. Install roller shades level, plumb, and aligned with adjacent units, according to manufacturer's written instructions.

1. Shadebands: Located so shadeband is not closer than 2 inches to interior face of glass. Allow clearances for window operation hardware.

D. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

E. Clean roller-shade surfaces after installation, according to manufacturer's written instructions.

END OF SECTION 122413

SECTION 123216 – MANUFACTURED PLASTIC-LAMINATE-FACED CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes commercial dining hall cabinets.

B. Related Requirements:

1. Section 057500 "Ornamental Formed Metal."

2. Division 06 Section: “Rough Carpentry” for blocking within walls to adequately support casework.

3. Division 07 Section: “Preformed Joint Seals” for caulking of casework and/or countertops to abutting walls.

4. Division 09 Section: “Resilient Base and Accessories” for resilient base applied to manufactured casework.

1.2 DEFINITIONS

A. Exposed: In casework, surfaces visible when drawers and opaque doors (if any) are closed; behind clear glass doors; bottoms of cabinets 42" or more above finished floor; and tops of cabinets less than 78" above finished floor.

B. Semi-Exposed: In casework, surfaces that become visible when opaque doors are open or drawers are extended; bottoms of cabinets more than 30" or tops of cabinets less than 42" above finished floor.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Cabinets.
2. Cabinet hardware.

B. Shop Drawings: Include plans, elevations, details, and attachments to other work. Show materials, finishes, filler panels, and hardware.

C. Samples: For cabinet finishes.

1. Hardware samples may be requested.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For casework.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer that is certified for chain of custody by an FSC-accredited certification body.

B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

1.6 WARRANTY

A. Manufacturer shall offer a five-year warranty against defective material and workmanship.

PART 2 - PRODUCTS

2.1 CABINETS

A. Manufacturers:

1. Case Systems, 2700 James Savage Road, Midland, Michigan 48642 (989) 496-9510.

2. Advanced Cabinet Systems, 1629 S. Joaquin Dr. Marion, IN 46953, (765) 677-8000.

3. Cosney Corporation, 2105 Daniels Street, Long Lake, MN 55356, (952) 249-0616.

4. Architect approved equal.

2.2 CABINET MATERIALS

A. General:

1. Adhesives and Composite Wood and Agrifiber Products: Do not use products that contain urea formaldehyde.
2. Hardwood Plywood: NAUF/FSC; made with adhesive containing no urea formaldehyde.

B. Surface Materials:

1. Acceptable laminate color, pattern, and finish as either scheduled or otherwise indicated on drawings or as selected by Architect from manufacturer's standards types and nominal thickness including:

    a. Vertical surface decorative grade VGS: .028" thick.
    b. General purpose decorative grade HGS: .048" thick
    c. Cabinet decorative liner grade CLS: .020" thick.
    d. Non- decorative backer grade BKH: .028" thick.
    e. Thermally fused melamine laminate.

C. Edge banding:

1. PVC shall be applied utilizing hot melt adhesive and radiused by automatic trimmers. Edging shall be available in a variety of color options.

D. Adhesives:

1. PVA

    a. Adhesives shall be mechanically applied.
    b. NAUF, no VOC.

2.3 FABRICATION

A. General Cabinet Body Construction:

1. Cabinet Box Style shall be reveal overlay.

2. Cabinet Box Core shall be NAUF/FSC plywood.

3. Bottoms and ends of cabinets, and tops of tall cabinets and tops and bottoms of wall cabinets (all structural components) shall be ¾ -inch thick.

4. All panels shall be manufactured with balanced construction.

5. Fixed interior components such as fixed shelves shall be full 3/4" thick and attached with concealed interlocking mechanical fasteners.

6. Cabinet body exterior surfaces shall be VGS.

7. Cabinet body interior surfaces shall be thermally fused.

8. Cabinet body front edge shall be .020" PVC.

9. Backs of cabinets are 1/2" thick surfaced both sides for balanced construction and fully captured on both sides and bottom.

10. A 5mm diameter row hole pattern 32mm (1-1/4") on center shall be bored in cabinet ends for adjustable shelves. This row hole pattern shall also serve for hardware mounting and replacement and/or relocation of cabinet components.

B. Base Cabinet Construction:

1. Base cabinets shall have a solid 3/4" thick sub-top (of core as specified above), fastened between the ends with interlocking mechanical fasteners.

C. Toe Base of Cabinet:

1. Individual bases shall be constructed of: NAUF/FSC Plywood factory applied to base and tall cabinets and shall support and carry the load of the end panels, and the cabinet bottom, directly to the floor. The base shall be let in from the sides and back of the cabinet to allow cabinets to be installed tightly together and tight against a wall, also to conceal the top edge of applied vinyl base molding (not supplied by casework manufacturer). There shall be a front to back center support for all bases over 30" wide.

2. Toe Base Height: 4 inches.

3. Toe Base Options Attached.

D. Drawer Fonts and Solid Doors:

1. All drawer fronts and solid door components shall be: NAUF/FSC Plywood surfaced both sides for balanced construction.

2. Options shall be HPL Door and Drawer Front Exterior and Grade CLS on Interior.

3. Surfaces shall be HPL Grade VGS.

4. Door and front edges shall be: 3mm PVC.

E. Doors

1. Solid Doors shall be 3/4" thick core.

F. Shelves

1. Adjustable:

a. Adjustable shelves shall be NAUF/FSC Plywood core, with balanced surfaces.

b. Adjustable shelves in closed cabinets shall be 1" for All Shelves.

c. Adjustable shelf edge on open cabinets shall be .020" PVC on All Four Edges.

2.4 FINISHES

A. Plastic Laminate Casework Colors:

1. High Pressure Laminate is available in non-premium, non-specialty and manufacturers' standard suede finishes from our select laminate manufacturers, including:

a. Wilsonart® in a "60" or "38" matte finish.
b. Color: To be selected by Architect from Manufacturer's full range.

B. Accessories:

1. Hinges:

a. 5-Knuckle Hinge: Finish to be selected by Architect from Manufacturer's full range.

2. Pulls:

a. Plastic Bow Pulls: Finish to be selected by Architect from Manufacturer's full range.

3. Countertop Supports: Finish to be selected by Architect from Manufacturer's full range.

2.5 Accessories

A. Hardware

1. 5-Knuckle Hinges / Reveal Overlay:

a. Hinges shall be: .095" thick steel five-knuckle hospital-tip, institutional Grade (Grade 1 per ANSI/BHMA A156.9) quality with .187" diameter tight pin. Each hinge shall be secured with a minimum of nine No. 8 screws. Hinge shall permit door to swing 270 degrees without binding. Doors less than 48" in height shall have two hinges.

2. Pulls:

a. One pull shall be: located at the centerline of the drawer, regardless of width, to ensure ease of operation and maximize drawer slide life.

b. Plastic bow pull, 10mm diameter with 96mm O.C. mounting holes.

3. Shelf Clips:

a. Shelf clips shall be injected molded clear plastic, with a double pin engagement 32mm on center and shall have 3/4" and 1" anti-tip locking tabs as approved in AWI 400B-T-9 for premium Grade. Shelf clips shall be: single pin plastic shelf clip with anti-tip locking tabs, used for all 1/4" hardboard shelves.

PART 3 - EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements:

1. Deliver casework once painting, and similar requirements have been completed that will not damage casework. This includes ensuring spaces are enclosed and weather tight.

2. All casework shall be blanket wrapped for protection during shipping.

B. Storage and Handling:

1. Casework must be protected from dust, dirt and/or other trades.

2. Countertops are stacked, properly supported and spaced evenly to avoid warping. Large pieces are stacked first on the pallets with shorter pieces stacked on top.

3.2 INSTALLATION

A. Casework shall not be: installed until concrete, masonry, and drywall/plaster work is dry.

B. The casework contractor shall verify all critical building dimensions prior to fabrication of casework.

C. Provide all labor for unloading, distribution, and installation of casework and related items as specified.

D. The casework manufacturer shall re-configure the casework arrangements to dimensions requiring 2-1/2" or less of filler at each end of wall-to-wall elevations, and to ensure a complete and satisfactory installation.

E. Install cabinets with no variations in flushness of adjoining surfaces; use concealed shims. Where cabinets abut other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips, and moldings in finish to match cabinet face.

F. Install cabinets without distortion so doors and drawers fit the openings, are aligned, and are uniformly spaced. Complete installation of hardware and accessories as indicated.

G. Install cabinets level and plumb to a tolerance of 1/8 inch in 8 feet.

H. All casework shall be: securely anchored to horizontal wall blocking, not to plaster lathe or wall board.

I. Fasten cabinets to adjacent units and to backing.

1. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips or No. 10 wafer-head sheet metal screws through the metal backing or metal framing behind the wall finish.

3.3 ADJUSTING AND CLEANING

A. Adjust cabinets and hardware so doors and drawers are centered in openings and operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

END OF SECTION 123530

SECTION 123530 - RESIDENTIAL CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes kitchen and vanity cabinets.

B. Related Requirements:

1. Section 123623.13 "Plastic Laminate Clad Countertops."

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Cabinets.
2. Cabinet hardware.

B. Shop Drawings: Include plans, elevations, details, and attachments to other work. Show materials, finishes, filler panels, and hardware.

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For casework.

PART 2 - PRODUCTS

2.1 CABINETS

A. Manufactures:

1. Debut Series by Legacy Cabinets; 285 Legacy Boulevard, Eastaboga, AL 36260; (256) 831-4895; http://www.legacycabinetsllc.com/
2. Architect approved equal.

B. Finish: Maple.

C. Face Style: Full Overlay, Solid wood frame with Veneer center panel.

D. Door Style: To be selected from Manufacturer’s full range.

E. Cabinet Style: Solid wood Face frame.

F. Cabinet Construction: “Standard” particle board cabinet

G. Exposed Cabinet End Finish: Wood veneer.

2.2 CABINET MATERIALS

A. General:

1. Adhesives and Composite Wood and Agrifiber Products: Do not use products that contain urea formaldehyde.
2. Hardwood Lumber: Kiln dried to 7 percent moisture content.
3. Softwood Lumber: Kiln dried to 10 percent moisture content.
4. Hardwood Plywood: HPVA HP-1; made with adhesive containing no urea formaldehyde.
5. Hardboard: ANSI A135.4, Class 1 Tempered.

2.3 CABINET HARDWARE

A. General: Manufacturer's standard units complying with BHMA A156.9, of type, size, style, material, and finish as indicated by manufacturer's designations.

B. Pulls: Back-mounted decorative pulls and Back-mounted knobs.

C. Hinges: Concealed European-style, self-closing hinges.

D. Drawer Guides: Epoxy-coated-metal, self-closing drawer guides; designed to prevent rebound when drawers are closed; with nylon-tired, ball-bearing rollers; and complying with BHMA A156.9, Type B05011 or Type B05091.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install cabinets with no variations in flushness of adjoining surfaces; use concealed shims. Where cabinets abut other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips, and moldings in finish to match cabinet face.

B. Install cabinets without distortion so doors and drawers fit the openings, are aligned, and are uniformly spaced. Complete installation of hardware and accessories as indicated.

C. Install cabinets level and plumb to a tolerance of 1/8 inch in 8 feet.

D. Fasten cabinets to adjacent units and to backing.

1. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.

3.2 ADJUSTING AND CLEANING

A. Adjust cabinets and hardware so doors and drawers are centered in openings and operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

END OF SECTION 123530

SECTION 123623.13 - PLASTIC-LAMINATE-CLAD COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes plastic-laminate countertops.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

C. Samples:

1. Plastic laminates, for each color, pattern, and surface finish.

1.3 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install countertops until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE COUNTERTOPS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades indicated for construction, installation, and other requirements.

B. Grade: Premium.

C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS.

1. Manufacturers:
   a. Formica Corporation; 10155 Reading Rd, Cincinnati, OH 45241; (513) 786-3400; https://www.formica.com/en/us.
   b. Lamin-Art, Inc.; 1670 Basswood Road, Schaumburg, IL 60173; (800) 323-7624; http://www.laminart.com/.

c. Wilsonart; 2501 Wilsonart Drive, P.O. Box 6110, Temple, Texas 76503; (800) 433-3222; http://www.wilsonart.com/.
d. Architect approved equal.

D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As selected by Architect from manufacturer's full range in the following categories:

a. Solid colors, matte finish.

b. Patterns, matte finish.

E. Edge Treatment: Decorative edge, bullnose.

F. Core Material at Sinks: Particleboard made with exterior glue, medium-density fiberboard made with exterior glue, or exterior-grade plywood.

G. Core Thickness: 1-1/8 inch.

H. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.

2.2 FABRICATION

A. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets. Ease edges to radius indicated for the following:

1. Edge Profile: Decorative edge, bullnose.

B. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

C. Shop cut openings to maximum extent possible to receive appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

1. Seal edges of openings in countertops with a coat of varnish.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.

3.2 INSTALLATION

A. Grade: Install countertops to comply with same grade as item to be installed.

B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.

1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items.
2. Seal edges of cutouts by saturating with varnish.

C. Field Jointing: Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required.

1. Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.

D. Install countertops level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

E. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

F. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
2. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.
3. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

END OF SECTION 123623.13

SECTION 124813 - ENTRANCE FLOOR MATS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Resilient entrance mats.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

PART 2 - PRODUCTS

2.1 ENTRANCE FLOOR MATS, GENERAL

A. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1.

2.2 RESILIENT ENTRANCE MATS

A. Manufacturers:

1. MAXtread by Babcock-Davis; 9300 73rd Avenue North, Brooklyn Park, MN 55428; 1-888-412-3726; http://www.babcockdavis.com/.
2. Architect approved equal.

B. Carpet-Type Mats: Polypropylene carpet bonded to 1/8- to 1/4-inch- thick, flexible vinyl backing to form mats 3/8 or 7/16 inch thick with nonraveling edges.

1. Colors, Textures, and Patterns: As selected by Architect from full range of industry colors.
2. Mat Size: As indicated.

2.3 FABRICATION

A. Floor Mats: Shop fabricate units to greatest extent possible in sizes indicated. Unless otherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install surface-type units to comply with manufacturer's written instructions at locations indicated; coordinate with entrance locations and traffic patterns.

END OF SECTION 124813

SECTION 22 00 00

PLUMBING, GENERAL PURPOSE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 90.1 - IP	(2010) Energy Standard for Buildings Except Low-Rise Residential Buildings

NSF INTERNATIONAL (NSF)

NSF/ANSI 61	(2015) Drinking Water System Components - Health Effects

1.2 SUBMITTALS

SD-03 Product Data

Fixtures

List of installed fixtures with manufacturer, model, and flow rate.

Flush Valve Water Closets

Flush Tank Water Closets

Wall Hung Lavatories

Countertop Lavatories

Kitchen Sinks

Water Heaters;

Pumps;

Backflow Prevention Assemblies;

Shower Faucets;
Floor Drains
Floor Drains with Cleanouts
Frost Proof Wall Hydrants
Shower Base

SD-06 Test Reports

Tests, Flushing and Disinfection

Test reports in booklet form showing all field tests performed to adjust each component and all field tests performed to prove compliance with the specified performance criteria, completion and testing of the installed system. Each test report shall indicate the final position of controls.

Test of Backflow Prevention Assemblies; .

Certification of proper operation shall be as accomplished in accordance with state regulations by an individual certified by the state to perform such tests. If no state requirement exists, the Contractor shall have the manufacturer's representative test the device, to ensure the unit is properly installed and performing as intended. The Contractor shall provide written documentation of the tests performed and signed by the individual performing the tests.

SD-10 Operation and Maintenance Data

Plumbing System; G

1.3 STANDARD PRODUCTS

Specified materials and equipment shall be standard products of a manufacturer regularly engaged in the manufacture of such products. Specified equipment shall essentially duplicate equipment that has performed satisfactorily at least two years prior to bid opening. Standard products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year use shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2 year period.

1.3.1 Manufacturer's Nameplate

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.4 DELIVERY, STORAGE, AND HANDLING

Handle, store, and protect equipment and materials to prevent damage before and during installation in accordance with the manufacturer's recommendations, and as approved by the Contracting Officer. Replace damaged or defective items.

1.5 PERFORMANCE REQUIREMENTS

1.6 PROJECT/SITE CONDITIONS

The Contractor shall become familiar with details of the work, verify dimensions in the field, and advise the Architect and Mechanical Engineer of any discrepancy before performing any work.

1.7 ACCESSIBILITY OF EQUIPMENT

Install all work so that parts requiring periodic inspection, operation, maintenance, and repair are readily accessible. Install concealed valves, expansion joints, controls, dampers, and equipment requiring access, in locations freely accessible through access doors.

PART 2 PRODUCTS

2.1 Materials

Materials for various services shall be in accordance with TABLES I and II.

2.1.1 Pipe Joint Materials

Solder containing lead shall not be used with copper pipe. Joints and gasket materials shall conform to the following:

e. Brazing Material: Brazing material shall conform to AWS A5.8/A5.8M, BCuP-5.

f. Brazing Flux: Flux shall be in paste or liquid form appropriate for use with brazing material. Flux shall be as follows: lead-free; have a 100 percent flushable residue; contain slightly acidic reagents; contain potassium borides; and contain fluorides.

g. Solder Material: Solder metal shall conform to ASTM B32.

h. Solder Flux: Flux shall be liquid form, non-corrosive, and conform to ASTM B813, Standard Test 1.

i. PTFE Tape: PTFE Tape, for use with Threaded Metal or Plastic Pipe.

o. Plastic Solvent Cement for ABS Plastic Pipe: ASTM D2235.

q. Plastic Solvent Cement for CPVC Plastic Pipe: ASTM F493.

t. Press fittings for Copper Pipe and Tube: Copper press fittings shall conform to the material and sizing requirements of ASME B16.18 or ASME B16.22 and performance criteria of IAPMO PS 117. Sealing elements for copper press fittings shall be EPDM, FKM or HNBR. Sealing elements shall be factory installed or an alternative supplied fitting manufacturer. Sealing element shall be selected based on manufacturer's approved application guidelines.

u. Copper tubing shall conform to ASTM B88, Type K, L or M.

2.1.2 Miscellaneous Materials

Miscellaneous materials shall conform to the following:

a. Water Hammer Arrester: PDI WH 201. Water hammer arrester shall be piston type.

f. Metallic Cleanouts: ASME A112.36.2M.

g. Plumbing Fixture Setting Compound: A preformed flexible ring seal molded from hydrocarbon wax material. The seal material shall be nonvolatile nonasphaltic and contain germicide and provide watertight, gastight, odorproof and verminproof properties.

k. Gauges - Pressure and Vacuum Indicating Dial Type - Elastic Element: ASME B40.100.

l. Thermometers: ASTM E1. Mercury shall not be used in thermometers.

2.1.3 Pipe Insulation Material

Insulation shall be as specified in Section 23 07 00 THERMAL INSULATION FOR MECHANICAL SYSTEMS.

2.2 PIPE HANGERS, INSERTS, AND SUPPORTS

Pipe hangers, inserts, and supports shall conform to MSS SP-58.

2.3 VALVES

Valves shall be provided on supplies to equipment and fixtures. Valves 2-1/2 inches and smaller shall be bronze with threaded bodies for pipe and solder-type connections for tubing. Pressure ratings shall be based upon the application. Grooved end valves may be provided if the manufacturer certifies that the valves meet the performance requirements of applicable MSS standard. Valves shall conform to the following standards:

Description	Standard
Cast-Iron Swing Check Valves, Flanged and Threaded Ends	MSS SP-71
Ball Valves with Flanged Butt-Welding Ends for General Service	MSS SP-72
Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends	MSS SP-110
Backwater Valves	ASME A112.14.1
Vacuum Relief Valves	ANSI Z21.22/CSA 4.4
Water Pressure Reducing Valves	ASSE 1003
Water Heater Drain Valves	ASME BPVC SEC IV, Part HLW-810: Requirements for Potable-Water Heaters Bottom Drain Valve
Trap Seal Primer Valves	ASSE 1018

Temperature and Pressure Relief Valves for Hot Water Supply Systems	ANSI Z21.22/CSA 4.4
Temperature and Pressure Relief Valves for Automatically Fired Hot Water Boilers	ASME CSD-1 Safety Code No., Part CW, Article 5

2.3.1 Wall Hydrants (Frostproof)

ASSE 1019 with vacuum-breaker backflow preventer shall have a nickel-brass or nickel-bronze wall plate or flange with nozzle and detachable key handle. A brass or bronze operating rod shall be provided within a galvanized iron casing of sufficient length to extend through the wall so that the valve is inside the building, and the portion of the hydrant between the outlet and valve is self-draining. A brass or bronze valve with coupling and union elbow having metal-to-metal seat shall be provided. Valve rod and seat washer shall be removable through the face of the hydrant. The hydrant shall have 3/4 inch exposed hose thread on spout and 3/4 inch male pipe thread on inlet.

2.3.2 Relief Valves

Water heaters and hot water storage tanks shall have a combination pressure and temperature (P&T) relief valve. The pressure relief element of a P&T relief valve shall have adequate capacity to prevent excessive pressure buildup in the system when the system is operating at the maximum rate of heat input. The temperature element of a P&T relief valve shall have a relieving capacity which is at least equal to the total input of the heaters when operating at their maximum capacity. Relief valves shall be rated according to ANSI Z21.22/CSA 4.4. Relief valves for systems where the maximum rate of heat input is less than 200,000 Btuh shall have 3/4 inch minimum inlets, and 3/4 inch outlets. Relief valves for systems where the maximum rate of heat input is greater than 200,000 Btuh shall have 1 inch minimum inlets, and 1 inch outlets. The discharge pipe from the relief valve shall be the size of the valve outlet.

2.3.3 Thermostatic Mixing Valves

Provide thermostatic mixing valve for hand sinks and lavatory faucets. Mixing valves, thermostatic type, pressure-balanced or combination thermostatic and pressure-balanced shall be line size and shall be constructed with rough or finish bodies either with or without plating. Each valve shall be constructed to control the mixing of hot and cold water and to deliver water at a desired temperature regardless of pressure or input temperature changes. The control element shall be of an approved type. The body shall be of heavy cast bronze, and interior parts shall be brass, bronze, corrosion-resisting steel or copper. The valve shall be equipped with necessary stops, check valves, unions, and sediment strainers on the inlets. Mixing valves shall maintain water temperature within 5 degrees F of any setting.

2.4 FIXTURES

Fixtures for use by the physically handicapped shall be in accordance with ICC A117.1. Vitreous China, nonabsorbent, hard-burned, and vitrified throughout the body shall be provided. Porcelain enameled ware shall have

specially selected, clear white, acid-resisting enamel coating evenly applied on surfaces. No fixture will be accepted that shows cracks, crazes, blisters, thin spots, or other flaws. Fixtures shall be equipped with appurtenances such as traps, faucets, stop valves, and drain fittings. Each fixture and piece of equipment requiring connections to the drainage system, except grease interceptors, shall be equipped with a trap. Brass expansion or toggle bolts capped with acorn nuts shall be provided for supports, and polished chromium-plated pipe, valves, and fittings shall be provided where exposed to view. Fixtures with the supply discharge below the rim shall be equipped with backflow preventers. Internal parts of flush valves and flushometer valves, shower mixing valves, shower head face plates, pop-up stoppers of lavatory waste drains, and pop-up stoppers and overflow tees and shoes of bathtub waste drains shall be copper alloy with all visible surfaces chrome plated.

2.4.1 Commercial Flush Valve Water Closets

American Standard - Madera FloWise

ASME A112.19.2/CSA B45.1, vitreous china, siphon jet, elongated bowl, floor-mounted, floor outlet. Top of toilet seat height above floor shall be 17 to 19 inches for wheelchair water closets. Provide wax bowl ring including plastic sleeve. Provide white solid plastic elongated open-front seat.

Water flushing volume of the water closet and flush valve combination shall not exceed 1.1 to 1.6 gallons per flush.

Provide large diameter flush valve including angle control-stop valve, vacuum breaker, tail pieces, slip nuts, and wall plates; exposed to view components shall be chromium-plated or polished stainless steel. Flush valves shall be nonhold-open type. Mount flush valves not less than 11 inches above the fixture. Mounted height of flush valve shall not interfere with the hand rail in ADA stalls.

2.4.2 Residential Flush Tank Water Closets

American Standard - Cadet Pro Elongated Toilet

ASME A112.19.2/CSA B45.1, white vitreous china, , siphon jet, round bowl, pressure assisted, floor-mounted, floor outlet. Top of toilet seat height above floor shall be 14 to 15 inches, except 17 to 19 inches for wheelchair water closets. Provide wax bowl ring including plastic sleeve. Water flushing volume of the water closet shall not exceed 1.28 gallons per flush. Provide white solid plastic round closed-front seat with cover.

2.4.3 Wall Hung Lavatories

American Standard - Lucerne Wall-Hung Lavatory

American Standard - Monterrey Single Control Centerset Faucet

ASME A112.19.2/CSA B45.1, white vitreous china, ,straight back type, minimum dimensions of 19 inches, wide by 17 inches front to rear, with supply openings for use with top mounted centerset faucets, and openings for concealed arm carrier installation. Provide aerator with faucet. Water flow rate shall not exceed 0.5 gpm when measured at a flowing water pressure of 60 psi. Provide ASME A112.6.1M concealed chair carriers with vertical steel pipe supports and concealed arms for the lavatory. Mount

lavatory with the front rim 34 inches above floor and with 29 inches minimum clearance from bottom of the front rim to floor. Provide top mounted washerless centerset lavatory faucets.

2.4.4 Residential Shower

American Standard - Studio 60" x 32" Shower Base

American Standard - Porstmouth FloWise Shower Only Trim Kit

High gloss acrylic shower base with fiberglass reinforcement. Shower drain with stainless steel drain plate, left hand outlet. Include pressure-balance valve

2.4.5 Residential Countertop Lavatories

American Standard - Rondalyn Countertop Sink

American Standard - Portsmouth Two Handle Lavatory Faucet with Brass Crescent Spout

ASME A112.19.2/CSA B45.1, white vitreous china, ,self-rimming, minimum dimensions of 19 inches wide by 17 inches front to rear, with supply openings for use with top mounted centerset faucets. Furnish template and mounting kit by lavatory manufacturer. Provide aerator with faucet. Water flow rate shall not exceed 0.5 gpm when measured at a flowing water pressure of 60 psi. Mount counter with the top surface 34 inches above floor and with 29 inches minimum clearance from bottom of the counter face to floor. Provide top mounted washerless widespread lever lavatory faucets with pop-up drain.

2.4.6 Residential Kitchen Sinks

American Standard - Stainless Steel Double Bowl Undermount 30-7/8"

American Standard - Monterrey Two-Handle Top-Mount Kitchen Faucet with 5" Gooseneck Spout

ASME A112.19.3/CSA B45.4, 18 gage stainless steel with integral mounting rim for flush installation, two compartments, with undersides fully sound deadened, with supply openings for use with top mounted washerless sink faucets with hose spray, and with 3.5 inch drain outlet. Provide aerator with faucet. Water flow rate shall not exceed 2.2 gpm when measured at a flowing water pressure of 60 psi. Provide stainless steel drain outlets and stainless steel cup strainers. Provide separate 1.5 inch P-trap and drain piping to vertical vent piping from each compartment. Provide top mounted washerless sink faucets with hose spray.

2.5 BACKFLOW PREVENTERS

Backflow prevention devices must be approved by the Portland Water District.

Backflow preventers with intermediate atmospheric vent shall conform to ASSE 1012. Reduced pressure principle backflow preventers shall conform to ASSE 1013. Hose connection vacuum breakers shall conform to ASSE 1011. Pipe applied atmospheric type vacuum breakers shall conform to ASSE 1001. Pressure vacuum breaker assembly shall conform to ASSE 1020. Air gaps in plumbing systems shall conform to ASME A112.1.2.

2.6 DRAINS

2.6.1 Floor Drains

Floor drains shall consist of a galvanized body, integral seepage pan, and adjustable perforated or slotted chromium-plated bronze, nickel-bronze, or nickel-brass strainer, consisting of grate and threaded collar. Floor drains shall be cast iron except where metallic waterproofing membrane is installed. Drains shall be of double drainage pattern for embedding in the floor construction. The seepage pan shall have weep holes or channels for drainage to the drainpipe. The strainer shall be adjustable to floor thickness. A clamping device for attaching flashing or waterproofing membrane to the seepage pan without damaging the flashing or waterproofing membrane shall be provided when required. Drains shall be provided with threaded connection. Between the drain outlet and waste pipe, a neoprene rubber gasket conforming to ASTM C564 may be installed, provided that the drain is specifically designed for the rubber gasket compression type joint. Floor and shower drains shall conform to ASME A112.6.3. Provide drain with trap primer connection, trap primer, and connection piping. Primer shall meet ASSE 1018.

2.7 Floor Drain with Cleanout

Sioux Chief - 800 Series Integral Trap Floor Drain

Integral trap floor drain with plugged cleanout access inside sump area. Trap primer port. Nickel-bronze strainer.

2.8 TRAPS

Unless otherwise specified, traps shall be plastic per ASTM F409 or copper-alloy adjustable tube type with slip joint inlet and swivel. Traps shall be without a cleanout. Provide traps with removable access panels for easy clean-out at sinks and lavatories. Tubes shall be copper alloy with walls not less than 0.032 inch thick within commercial tolerances, except on the outside of bends where the thickness may be reduced slightly in manufacture by usual commercial methods. Inlets shall have rubber washer and copper alloy nuts for slip joints above the discharge level. Swivel joints shall be below the discharge level and shall be of metal-to-metal or metal-to-plastic type as required for the application. Nuts shall have flats for wrench grip. Outlets shall have internal pipe thread, except that when required for the application, the outlets shall have sockets for solder-joint connections. The depth of the water seal shall be not less than 2 inches. The interior diameter shall be not more than 1/8 inch over or under the nominal size, and interior surfaces shall be reasonably smooth throughout. A copper alloy "P" trap assembly consisting of an adjustable "P" trap and threaded trap wall nipple with cast brass wall flange shall be provided for lavatories. The assembly shall be a standard manufactured unit and may have a rubber-gasketed swivel joint.

2.9 WATER HEATERS

Water heater types and capacities shall be as indicated. Each water heater shall have replaceable anodes. Hot water systems utilizing recirculation systems shall be tied into building off-hour controls. A factory pre-charged expansion tank shall be installed on the cold water supply to each water heater. Expansion tanks shall be specifically designed for use on potable water systems and shall be rated for 200 degrees F water

temperature and 150 psi working pressure. The expansion tank size and acceptance volume shall be minimum 3 gallon tank volume and 1.5 gallon acceptance volume.

2.9.1 Automatic Storage Type

Heaters shall be complete with control system, temperature gauge, and pressure gauge, and shall have ASME rated combination pressure and temperature relief valve.

2.9.1.1 Indirect Heater Type

High temperature hot water (HTHW) heaters with storage system shall be the assembled product of one manufacturer, and be ASME tested and "U" stamped to code requirements under ASME BPVC SEC VIII D1. The heat exchanger shall be single wall type that separates the potable water from the heat transfer medium with a space vented to the atmosphere in accordance with the UPC.

2.10 MISCELLANEOUS PIPING ITEMS

2.10.1 Escutcheon Plates

Provide one piece or split hinge metal plates for piping entering floors, walls, and ceilings in exposed spaces. Provide chromium-plated on copper alloy plates or polished stainless steel finish in finished spaces. Provide paint finish on plates in unfinished spaces.

2.10.2 Pipe Sleeves

Provide where piping passes entirely through walls, ceilings, roofs, and floors. Sleeves are not required where supply drain, waste, and vent (DWV) piping passes through concrete floor slabs located on grade, except where penetrating a membrane waterproof floor.

2.10.2.1 Sleeves in Masonry and Concrete

Provide steel pipe sleeves or schedule 40 PVC plastic pipe sleeves. Sleeves are not required where drain, waste, and vent (DWV) piping passes through concrete floor slabs located on grade. Core drilling of masonry and concrete may be provided in lieu of pipe sleeves when cavities in the core-drilled hole are completely grouted smooth.

2.10.2.2 Sleeves Not in Masonry and Concrete

Provide 26 gage galvanized steel sheet or PVC plastic pipe sleeves.

2.10.3 Pipe Hangers (Supports)

Provide MSS SP-58 Type 1 with adjustable type steel support rods, except as specified or indicated otherwise. Attach to steel joists with Type 19 or 23 clamps and retaining straps. Attach to Steel W or S beams with Type 21, 28, 29, or 30 clamps. Attach to steel angles and vertical web steel channels with Type 20 clamp with beam clamp channel adapter. Attach to horizontal web steel channel and wood with drilled hole on centerline and double nut and washer. Attach to concrete with Type 18 insert or drilled expansion anchor. Provide Type 40 insulation protection shield for insulated piping.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

The plumbing system shall be installed complete with necessary fixtures, fittings, traps, valves, and accessories, in accordance with the Portland Water District standard details. Piping shall be connected to the exterior service lines or capped or plugged if the exterior service is not in place.

3.1.1 Water Pipe, Fittings, and Connections

3.1.1.1 Utilities

The piping shall be extended to fixtures, outlets, and equipment. The hot-water and cold-water piping system shall be arranged and installed to permit draining. The supply line to each item of equipment or fixture, except faucets, flush valves, or other control valves which are supplied with integral stops, shall be equipped with a shutoff valve to enable isolation of the item for repair and maintenance without interfering with operation of other equipment or fixtures. Supply piping to fixtures, faucets, hydrants, shower heads, and flushing devices shall be anchored to prevent movement.

3.1.1.2 Cutting and Repairing

The work shall be carefully laid out in advance, and unnecessary cutting of construction shall be avoided. Damage to building, piping, wiring, or equipment as a result of cutting shall be repaired by mechanics skilled in the trade involved.

3.1.1.3 Protection of Fixtures, Materials, and Equipment

Pipe openings shall be closed with caps or plugs during installation. Fixtures and equipment shall be tightly covered and protected against dirt, water, chemicals, and mechanical injury. Upon completion of the work, the fixtures, materials, and equipment shall be thoroughly cleaned, adjusted, and operated. Safety guards shall be provided for exposed rotating equipment.

3.1.1.4 Mains, Branches, and Runouts

Piping shall be installed as indicated. Pipe shall be accurately cut and worked into place without springing or forcing. Structural portions of the building shall not be weakened. Aboveground piping shall run parallel with the lines of the building, unless otherwise indicated. Branch pipes from service lines may be taken from top, bottom, or side of main, using crossover fittings required by structural or installation conditions. Supply pipes, valves, and fittings shall be kept a sufficient distance from other work and other services to permit not less than 1/2 inch between finished covering on the different services. Bare and insulated water lines shall not bear directly against building structural elements so as to transmit sound to the structure or to prevent flexible movement of the lines. Water pipe shall not be buried in or under floors unless specifically indicated or approved. Changes in pipe sizes shall be made with reducing fittings. Use of bushings will not be permitted except for use in situations in which standard factory fabricated components are furnished to accommodate specific accepted installation practice. Change in direction shall be made with fittings, except that bending of pipe 4 inches and smaller will be permitted, provided a pipe bender is used and

wide sweep bends are formed. The center-line radius of bends shall be not less than six diameters of the pipe. Bent pipe showing kinks, wrinkles, flattening, or other malformations will not be acceptable.

3.1.1.5 Pipe Drains

Pipe drains indicated shall consist of 3/4 inch hose bibb with renewable seat and ball valve ahead of hose bibb. At other low points, 3/4 inch brass plugs or caps shall be provided. Disconnection of the supply piping at the fixture is an acceptable drain.

3.1.1.6 Commercial-Type Water Hammer Arresters

Commercial-type water hammer arresters shall be provided on hot- and cold-water supplies and shall be located as generally indicated, with precise location and sizing to be in accordance with PDI WH 201. Water hammer arresters, where concealed, shall be accessible by means of access doors or removable panels. Commercial-type water hammer arresters shall conform to ASSE 1010. Vertical capped pipe columns will not be permitted.

3.1.2 Joints

Installation of pipe and fittings shall be made in accordance with the manufacturer's recommendations. Mitering of joints for elbows and notching of straight runs of pipe for tees will not be permitted. Joints shall be made up with fittings of compatible material and made for the specific purpose intended.

3.1.2.1 Threaded

Threaded joints shall have American Standard taper pipe threads conforming to ASME B1.20.1. Only male pipe threads shall be coated with graphite or with an approved graphite compound, or with an inert filler and oil, or shall have a polytetrafluoroethylene tape applied.

3.1.2.2 Mechanical Couplings

Mechanical couplings may be used in conjunction with grooved pipe for aboveground, ferrous or non-ferrous, domestic hot and cold water systems, in lieu of unions, brazed, soldered, welded, flanged, or threaded joints.

Mechanical couplings are permitted in accessible locations including behind access plates. Flexible grooved joints will not be permitted, except as vibration isolators adjacent to mechanical equipment. Rigid grooved joints shall incorporate an angle bolt pad design which maintains metal-to-metal contact with equal amount of pad offset of housings upon installation to ensure positive rigid clamping of the pipe.

Designs which can only clamp on the bottom of the groove or which utilize gripping teeth or jaws, or which use misaligned housing bolt holes, or which require a torque wrench or torque specifications will not be permitted.

Grooved fittings and couplings, and grooving tools shall be provided from the same manufacturer. Segmentally welded elbows shall not be used. Grooves shall be prepared in accordance with the coupling manufacturer's latest published standards. Grooving shall be performed by qualified grooving operators having demonstrated proper grooving procedures in accordance with the tool manufacturer's recommendations.

The Contracting Officer shall be notified 24 hours in advance of test to demonstrate operator's capability, and the test shall be performed at the work site, if practical, or at a site agreed upon. The operator shall demonstrate the ability to properly adjust the grooving tool, groove the pipe, and to verify the groove dimensions in accordance with the coupling manufacturer's specifications.

3.1.2.3 Unions and Flanges

Unions, flanges and mechanical couplings shall not be concealed in walls, ceilings, or partitions. Unions shall be used on pipe sizes 2-1/2 inches and smaller; flanges shall be used on pipe sizes 3 inches and larger.

3.1.2.4 Copper Tube and Pipe

a. Brazed. Brazed joints shall be made in conformance with AWS B2.2/B2.2M, ASME B16.50, and CDA A4015 with flux and are acceptable for all pipe sizes. Copper to copper joints shall include the use of copper-phosphorus or copper-phosphorus-silver brazing metal without flux. Brazing of dissimilar metals (copper to bronze or brass) shall include the use of flux with either a copper-phosphorus, copper-phosphorus-silver or a silver brazing filler metal.

b. Soldered. Soldered joints shall be made with flux and are only acceptable for piping 2 inches and smaller. Soldered joints shall conform to ASME B31.5 and CDA A4015. Soldered joints shall not be used in compressed air piping between the air compressor and the receiver.

c. Copper Tube Extracted Joint. Mechanically extracted joints shall be made in accordance with ICC IPC.

d. Press connection. Copper press connections shall be made in **strict** accordance with the manufacturer's installation instructions for manufactured rated size. The joints shall be pressed using the tool(s) approved by the manufacturer **of that joint**. Minimum distance between fittings shall be in accordance with the manufacturer's requirements.

3.1.2.5 Plastic Pipe

Acrylonitrile-Butadiene-Styrene (ABS) pipe shall have joints made with solvent cement. PVC and CPVC pipe shall have joints made with solvent cement elastomeric, threading, (threading of Schedule 80 Pipe is allowed only where required for disconnection and inspection; threading of Schedule 40 Pipe is not allowed), or mated flanged.

3.1.2.6 Other Joint Methods

3.1.3 Dissimilar Pipe Materials

Connections between ferrous and non-ferrous copper water pipe shall be made with dielectric unions or flange waterways. Dielectric waterways shall have temperature and pressure rating equal to or greater than that specified for the connecting piping. Waterways shall have metal connections on both ends suited to match connecting piping. Dielectric waterways shall be internally lined with an insulator specifically designed to prevent current flow between dissimilar metals. Dielectric flanges shall meet the performance requirements described herein for dielectric waterways. Connecting joints between plastic and metallic pipe shall be

made with transition fitting for the specific purpose.

3.1.4 Pipe Sleeves and Flashing

Pipe sleeves shall be furnished and set in their proper and permanent location.

3.1.4.1 Sleeve Requirements

Unless indicated otherwise, provide pipe sleeves meeting the following requirements:

Secure sleeves in position and location during construction. Provide sleeves of sufficient length to pass through entire thickness of walls, ceilings, roofs, and floors.

Sleeves shall not be installed in structural members, except where indicated or approved. Rectangular and square openings shall be as detailed. Each sleeve shall extend through its respective floor, or roof, and shall be cut flush with each surface, except for special circumstances. Pipe sleeves passing through floors in wet areas such as mechanical equipment rooms, lavatories, kitchens, and other plumbing fixture areas shall extend a minimum of 4 inches above the finished floor.

Unless otherwise indicated, sleeves shall be of a size to provide a minimum of 1/4 inch clearance between bare pipe or insulation and inside of sleeve or between insulation and inside of sleeve. Sleeves in bearing walls and concrete slab on grade floors shall be steel pipe or cast-iron pipe. Sleeves in nonbearing walls or ceilings may be steel pipe, cast-iron pipe, galvanized sheet metal with lock-type longitudinal seam, or plastic.

Except as otherwise specified, the annular space between pipe and sleeve, or between jacket over insulation and sleeve, shall be sealed as indicated with sealants conforming to ASTM C920 and with a primer, backstop material and surface preparation as specified in Section 07 92 00 JOINT SEALANTS. The annular space between pipe and sleeve, between bare insulation and sleeve or between jacket over insulation and sleeve shall not be sealed for interior walls which are not designated as fire rated.

Sleeves through below-grade walls in contact with earth shall be recessed 1/2 inch from wall surfaces on both sides. Annular space between pipe and sleeve shall be filled with backing material and sealants in the joint between the pipe and masonry wall as specified above. Sealant selected for the earth side of the wall shall be compatible with dampproofing/waterproofing materials that are to be applied over the joint sealant. Pipe sleeves in fire-rated walls shall conform to the requirements in Section 07 84 00 FIRESTOPPING.

3.1.4.2 Waterproofing

Waterproofing at floor-mounted water closets shall be accomplished by forming a flashing guard from soft-tempered sheet copper. The center of the sheet shall be perforated and turned down approximately 1-1/2 inches to fit between the outside diameter of the drainpipe and the inside diameter of the cast-iron or steel pipe sleeve. The turned-down portion of the flashing guard shall be embedded in sealant to a depth of approximately 1-1/2 inches; then the sealant shall be finished off flush to floor level between the flashing guard and drainpipe. The flashing guard of sheet copper shall extend not less than 8 inches from the drainpipe and shall be

lapped between the floor membrane in a solid coating of bituminous cement. If cast-iron water closet floor flanges are used, the space between the pipe sleeve and drainpipe shall be sealed with sealant and the flashing guard shall be upturned approximately 1-1/2 inches to fit the outside diameter of the drainpipe and the inside diameter of the water closet floor flange. The upturned portion of the sheet fitted into the floor flange shall be sealed.

3.1.4.3 Pipe Penetrations of Slab on Grade Floors

Where pipes, fixture drains, floor drains, cleanouts or similar items penetrate slab on grade floors, except at penetrations of floors with waterproofing membrane as specified in paragraphs FLASHING REQUIREMENTS and WATERPROOFING, a groove 1/4 to 1/2 inch wide by 1/4 to 3/8 inch deep shall be formed around the pipe, fitting or drain. The groove shall be filled with a sealant as specified in Section 07 92 00 JOINT SEALANTS.

3.1.4.4 Pipe Penetrations

Provide sealants for all pipe penetrations. All pipe penetrations shall be sealed to prevent infiltration of air, insects, and vermin.

3.1.5 Fire Seal

Where pipes pass through fire walls, fire-partitions, fire-rated pipe chase walls or floors above grade, a fire seal shall be provided as specified in Section 07 84 00 FIRESTOPPING.

3.1.6 Supports

3.1.6.1 General

Hangers used to support piping 2 inches and larger shall be fabricated to permit adequate adjustment after erection while still supporting the load. Pipe guides and anchors shall be installed to keep pipes in accurate alignment, to direct the expansion movement, and to prevent buckling, swaying, and undue strain. In the support of multiple pipe runs on a common base member, a clip or clamp shall be used where each pipe crosses the base support member. Spacing of the base support members shall not exceed the hanger and support spacing required for an individual pipe in the multiple pipe run. Threaded sections of rods shall not be formed or bent.

3.1.6.2 Pipe Hangers, Inserts, and Supports

Installation of pipe hangers, inserts and supports shall conform to MSS SP-58 except as modified herein.

a. Types 5, 12, and 26 shall not be used.

b. Type 3 shall not be used on insulated pipe.

d. Type 19 and 23 C-clamps shall be torqued per MSS SP-58 and shall have both locknuts and retaining devices furnished by the manufacturer. Field-fabricated C-clamp bodies or retaining devices are not acceptable.

e. Type 20 attachments used on angles and channels shall be furnished with an added malleable-iron heel plate or adapter.

f. Type 24 may be used only on trapeze hanger systems or on fabricated frames.

h. Type 40 shields shall:

(1) Be used on insulated pipe less than 4 inches.

(3) Have a high density insert for all pipe sizes. High density inserts shall have a density of 8 pcf or greater.

i. Horizontal pipe supports shall be spaced as specified in MSS SP-58 and a support shall be installed not over 1 foot from the pipe fitting joint at each change in direction of the piping. Pipe supports shall be spaced not over 5 feet apart at valves. Operating temperatures in determining hanger spacing for PVC or CPVC pipe shall be 120 degrees F for PVC and 180 degrees F for CPVC. Horizontal pipe runs shall include allowances for expansion and contraction.

j. Vertical pipe shall be supported at each floor, except at slab-on-grade, at intervals of not more than 15 feet nor more than 8 feet from end of risers, and at vent terminations. Vertical pipe risers shall include allowances for expansion and contraction.

l. Pipe hangers on horizontal insulated pipe shall be the size of the outside diameter of the insulation. The insulation shall be continuous through the hanger on all pipe sizes and applications.

n. Hangers and supports for plastic pipe shall not compress, distort, cut or abrade the piping, and shall allow free movement of pipe except where otherwise required in the control of expansion/contraction.

3.1.6.3 Structural Attachments

Attachment to building structure concrete and masonry shall be by cast-in concrete inserts, built-in anchors, or masonry anchor devices. Inserts and anchors shall be applied with a safety factor not less than 5. Supports shall not be attached to metal decking. Supports shall not be attached to the underside of concrete filled floor or concrete roof decks unless approved by the Structural Engineer of Record. Masonry anchors for overhead applications shall be constructed of ferrous materials only.

3.1.7 Pipe Cleanouts

Pipe cleanouts shall be the same size as the pipe except that cleanout plugs larger than 4 inches will not be required. Cleanouts in connection with other pipe, where indicated, shall be T-pattern, 90-degree branch drainage fittings with cast-brass screw plugs, except plastic plugs shall be installed in plastic pipe. Plugs shall be the same size as the pipe up to and including 4 inches. Cleanouts on pipe concealed in partitions shall be provided with chromium plated bronze, nickel bronze, nickel brass or stainless steel flush type access cover plates. Round access covers shall be provided and secured to plugs with securing screw. Cleanouts in finished walls shall have access covers and frames installed flush with the finished wall. Cleanouts installed in finished floors subject to foot traffic shall be provided with a chrome-plated cast brass, nickel brass, or nickel bronze cover secured to the plug or cover frame and set flush with the finished floor. Heads of fastening screws shall not project above the cover surface. Where cleanouts are provided with adjustable heads, the heads shall be cast iron.

3.2 WATER HEATERS AND HOT WATER STORAGE TANKS

3.2.1 Relief Valves

No valves shall be installed between a relief valve and its water heater or storage tank. The P&T relief valve shall be installed where the valve actuator comes in contact with the hottest water in the heater. Whenever possible, the relief valve shall be installed directly in a tapping in the tank or heater; otherwise, the P&T valve shall be installed in the hot-water outlet piping. A vacuum relief valve shall be provided on the cold water supply line to the hot-water storage tank or water heater and mounted above and within 6 inches above the top of the tank or water heater.

3.2.2 Heat Traps

Piping to and from each water heater and hot water storage tank shall be routed horizontally and downward a minimum of 2 feet before turning in an upward direction.

3.2.3 Connections to Water Heaters

Connections of metallic pipe to water heaters shall be made with dielectric unions or flanges.

3.2.4 Expansion Tank

A pre-charged expansion tank shall be installed on the cold water supply between the water heater inlet and the cold water supply shut-off valve. The Contractor shall adjust the expansion tank air pressure, as recommended by the tank manufacturer, to match incoming water pressure.

3.3 FIXTURES AND FIXTURE TRIMMINGS

Polished chromium-plated pipe, valves, and fittings shall be provided where exposed to view. Angle stops, straight stops, stops integral with the faucets, or concealed type of lock-shield, and loose-key pattern stops for supplies with threaded, sweat or solvent weld inlets shall be furnished and installed with fixtures. Where connections between copper tubing and faucets are made by rubber compression fittings, a beading tool shall be used to mechanically deform the tubing above the compression fitting. Exposed traps and supply pipes for fixtures and equipment shall be connected to the rough piping systems at the wall, unless otherwise specified under the item. Floor and wall escutcheons shall be as specified. Drain lines and hot water lines of fixtures for handicapped personnel shall be insulated and do not require polished chrome finish. Plumbing fixtures and accessories shall be installed within the space shown.

3.3.1 Fixture Connections

Where space limitations prohibit standard fittings in conjunction with the cast-iron floor flange, special short-radius fittings shall be provided. Connections between earthenware fixtures and flanges on soil pipe shall be made gastight and watertight with a closet-setting compound or neoprene gasket and seal. Use of natural rubber gaskets or putty will not be permitted. Fixtures with outlet flanges shall be set the proper distance from floor or wall to make a first-class joint with the closet-setting compound or gasket and fixture used.

3.3.2 Flushometer Valves

Flushometer valves shall be secured to prevent movement by anchoring the long finished top spud connecting tube to wall adjacent to valve with approved metal bracket. Flushometer valves for water closets shall be installed 39 inches above the floor, except at water closets intended for use by the physically handicapped where flushometer valves shall be mounted at approximately 30 inches above the floor and arranged to avoid interference with grab bars. In addition, for water closets intended for handicap use, the flush valve handle shall be installed on the wide side of the enclosure.

3.3.3 Height of Fixture Rims Above Floor

Lavatories shall be mounted with rim 31 inches above finished floor. Installation of fixtures for use by the physically handicapped shall be in accordance with ICC A117.1.

3.3.4 Shower Bath Outfits

The area around the water supply piping to the mixing valves and behind the escutcheon plate shall be made watertight by caulking or gasketing.

3.3.5 Fixture Supports

Fixture supports for off-the-floor lavatories, urinals, water closets, and other fixtures of similar size, design, and use, shall be of the chair-carrier type. The carrier shall provide the necessary means of mounting the fixture, with a foot or feet to anchor the assembly to the floor slab. Adjustability shall be provided to locate the fixture at the desired height and in proper relation to the wall. Support plates, in lieu of chair carrier, shall be fastened to the wall structure only where it is not possible to anchor a floor-mounted chair carrier to the floor slab.

3.3.6 Access Panels

Access panels shall be provided for concealed valves and controls, or any item requiring inspection or maintenance. Access panels shall be of sufficient size and located so that the concealed items may be serviced, maintained, or replaced.

3.3.7 Sight Drains

Sight drains shall be installed so that the indirect waste will terminate 2 inches above the flood rim of the funnel to provide an acceptable air gap.

3.3.8 Traps

Each trap shall be placed as near the fixture as possible, and no fixture shall be double-trapped. Traps installed on steel pipe or copper tubing shall be recess-drainage pattern, or brass-tube type. Traps installed on plastic pipe may be plastic conforming to ASTM D3311.

3.3.9 Shower Pans

Before installing shower pan, subfloor shall be free of projections such as nail heads or rough edges of aggregate. Drain shall be a bolt-down, clamping-ring type with weepholes, installed so the lip of the subdrain is flush with subfloor.

3.4 ESCUTCHEONS

Escutcheons shall be provided at finished surfaces where bare or insulated piping, exposed to view, passes through floors, walls, or ceilings, except in boiler, utility, or equipment rooms. Escutcheons shall be fastened securely to pipe or pipe covering and shall be satin-finish, corrosion-resisting steel, polished chromium-plated zinc alloy, or polished chromium-plated copper alloy. Escutcheons shall be either one-piece or split-pattern, held in place by internal spring tension or setscrew.

3.5 TESTS, FLUSHING AND DISINFECTION

3.5.1 Plumbing System

The following tests shall be performed on the plumbing system in accordance with , except that the drainage and vent system final test shall include the smoke test.

b. Building Sewers Tests.

c. Water Supply Systems Tests.

3.5.1.1 Test of Backflow Prevention Assemblies

Backflow prevention assembly shall be tested using gauges specifically designed for the testing of backflow prevention assemblies.

Backflow prevention assembly test gauges shall be tested annually for accuracy in accordance with the requirements of State or local regulatory agencies. If there is no State or local regulatory agency requirements, gauges shall be tested annually for accuracy in accordance with the requirements of University of Southern California's Foundation of Cross Connection Control and Hydraulic Research or the American Water Works Association Manual of Cross Connection (Manual M-14), or any other approved testing laboratory having equivalent capabilities for both laboratory and field evaluation of backflow prevention assembly test gauges. Report form for each assembly shall include, as a minimum, the following:

Data on Device	Data on Testing Firm
Type of Assembly	Name
Manufacturer	Address
Model Number	Certified Tester
Serial Number	Certified Tester No.
Size	Date of Test
Location	
Test Pressure Readings	Serial Number and Test Data of Gauges

If the unit fails to meet specified requirements, the unit shall be repaired and retested.

3.5.1.2 Shower Pans

After installation of the pan and finished floor, the drain shall be temporarily plugged below the weep holes. The floor area shall be flooded with water to a minimum depth of 1 inch for a period of 24 hours. Any drop in the water level during test, except for evaporation, will be reason for rejection, repair, and retest.

3.5.2 Defective Work

If inspection or test shows defects, such defective work or material shall be replaced or repaired as necessary and inspection and tests shall be repeated. Repairs to piping shall be made with new materials. Caulking of screwed joints or holes will not be acceptable.

3.5.3 System Flushing

3.5.3.1 During Flushing

Before operational tests or disinfection, potable water piping system shall be flushed with potable water. Sufficient water shall be used to produce a water velocity that is capable of entraining and removing debris in all portions of the piping system. This requires simultaneous operation of all fixtures on a common branch or main in order to produce a flushing velocity of approximately 4 fps through all portions of the piping system. Contractor shall provide adequate personnel to monitor the flushing operation and to ensure that drain lines are unobstructed in order to prevent flooding of the facility. Contractor shall be responsible for any flood damage resulting from flushing of the system. Flushing shall be continued until entrained dirt and other foreign materials have been removed and until discharge water shows no discoloration. All faucets and drinking water fountains, to include any device considered as an end point device by NSF/ANSI 61, Section 9, shall be flushed a minimum of 0.25 gallons per 24 hour period, ten times over a 14 day period.

3.5.3.2 After Flushing

System shall be drained at low points. Strainer screens shall be removed, cleaned, and replaced. After flushing and cleaning, systems shall be prepared for testing by immediately filling water piping with clean, fresh potable water. Any stoppage, discoloration, or other damage to the finish, furnishings, or parts of the building due to the Contractor's failure to properly clean the piping system shall be repaired by the Contractor. When the system flushing is complete, the hot-water system shall be adjusted for uniform circulation. Flushing devices and automatic control systems shall be adjusted for proper operation according to manufacturer's instructions. Comply with ASHRAE 90.1 - IP for minimum efficiency requirements. Unless more stringent local requirements exist, lead levels shall not exceed limits established by 40 CFR 141.80 (c)(1). The water supply to the building shall be tested separately to ensure that any lead contamination found during potable water system testing is due to work being performed inside the building.

3.6 TABLES

TABLE I

PIPE AND FITTING MATERIALS FOR DRAINAGE, WASTE, AND VENT PIPING SYSTEMS

Item #	Pipe and Fitting Materials	SERVICE A	SERVICE B	SERVICE C	SERVICE D
19	Acrylonitrile-Butadiene-Styren (ABS) plastic drain, waste, and vent pipe and fittings ASTM D2661, ASTM F628	X	X	X	X
20	Polyvinyl Chloride plastic drain, waste and vent pipe and fittings, ASTM D2665, ASTM F891, (Sch 40) ASTM F1760	X	X	X	X

SERVICE:
A - Underground Building Soil, Waste and Storm Drain
B - Aboveground Soil, Waste, Drain In Buildings
C - Underground Vent
D - Aboveground Vent

TABLE II

PIPE AND FITTING MATERIALS FOR PRESSURE PIPING SYSTEMS

Item #	Pipe and Fitting Materials	SERVICE A	SERVICE B
7	Seamless copper pipe, ASTM B42	X	X
8	Seamless copper water tube, ASTM B88, ASTM B88M	X**	X**
9	Cast bronze threaded fittings, ASME B16.15 for use with Item 7	X	X
10	Wrought copper and bronze solder-joint pressure fittings, ASME B16.22 for use with Items 7 and 8	X	X

TABLE II

PIPE AND FITTING MATERIALS FOR PRESSURE PIPING SYSTEMS

Item #	Pipe and Fitting Materials	SERVICE A	SERVICE B
11	Cast copper alloy solder-joint pressure fittings, ASME B16.18 for use with Item 8	X	X
14	Polyethylene (PE) plastic pipe (SDR-PR), based on controlled outside diameter, ASTM D3035	X	
37	Crosslinked Polyethylene (PEX) Plastic Pipe ASTM F877	X	X
38	Press Fittings	X	X
	SERVICE: A - Cold Water Service Aboveground B - Hot and Cold Water Distribution 180 degrees F Maximum Aboveground Indicated types are minimum wall thicknesses. ** - Type L - Hard *** - Type K - Hard temper with brazed joints only or type K-soft temper without joints in or under floors **** - In or under slab floors only brazed joints		

-- End of Section --

SECTION 23 00 00

AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEMS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASME INTERNATIONAL (ASME)

ASME A13.1	(2007; R 2013) Scheme for the Identification of Piping Systems

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 90A	(2015) Standard for the Installation of Air Conditioning and Ventilating Systems
NFPA 96	(2014) Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA 1966	(2005) HVAC Duct Construction Standards Metal and Flexible, 3rd Edition

1.2 SYSTEM DESCRIPTION

Furnish ductwork, piping offsets, fittings, and accessories as required to provide a complete installation. Coordinate the work of the different trades to avoid interference between piping, equipment, structural, and electrical work. Provide complete, in place, all necessary offsets in piping and ductwork, and all fittings, and other components, required to install the work as indicated and specified.

1.2.1 Service Labeling

Label equipment, including fans, air handlers, terminal units, etc. with labels made of self-sticking, plastic film designed for permanent installation. Labels shall be in accordance with the typical examples below:

SERVICE	LABEL AND TAG DESIGNATION
Air handling unit Number	AHU -
Condenser Unit Number	CU-

SERVICE	LABEL AND TAG DESIGNATION
Energy Recovery Ventilator Number	ERV-
Exhaust Fan Number	EF -
Exhaust Hood Number	EH-
Indirect Water Heater Number	IDWH-
Pump Number	P-
Roof-Top Unit Number	RTU-

Label and arrow piping in accordance with the following:

a. Each point of entry and exit of pipe passing through walls.

c. In congested or hidden areas and at all access panels at each point required to clarify service or indicated hazard.

d. In long straight runs, locate labels at distances within eyesight of each other not to exceed 75 feet. All labels shall be visible and legible from the primary service and operating area.

1.2.2 Color Coding

Color coding of all piping systems shall be in accordance with ASME A13.1 .

1.3 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings
Detail Drawings;

SD-03 Product Data
Duct Connectors
Duct Access Doors;
Manual Balancing Dampers;
Automatic Smoke-Fire Dampers
Diffusers
Registers and Grilles
Louvers
Centrifugal Type Power Roof Ventilators
Ceiling Exhaust Fans
Air Handling Units;
Energy Recovery Devices;
Variable Refrigerant Flow Split-System Heat Pump

SD-08 Manufacturer's Instructions

Manufacturer's Installation Instructions
Operation and Maintenance Training

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals;
Manual Balancing Dampers;
Centrifugal Fans;
Ceiling Exhaust Fans;
Air Handling Units;
Energy Recovery Devices;
Variable Refrigerant Flow Split-System Heat Pumps

1.4 DELIVERY, STORAGE, AND HANDLING

Protect stored equipment at the jobsite from the weather, humidity and temperature variations, dirt and dust, or other contaminants. Additionally, cap or plug all pipes until installed. Cover open ductwork during construction. Protect openings from dust and debris.

PART 2 PRODUCTS

2.1 ANCHOR BOLTS

Provide anchor bolts for equipment placed on concrete equipment pads or on concrete slabs. Bolts to be of the size and number recommended by the equipment manufacturer and located by means of suitable templates. Installation of anchor bolts shall not degrade the surrounding concrete.

2.2 DUCT SYSTEMS

2.2.1 Metal Ductwork

Provide metal ductwork construction, including all fittings and components, that complies with SMACNA 1966, as supplemented and modified by this specification .

a. Provide radius type elbows with a centerline radius of 1.5 times the width or diameter of the duct where space permits. Otherwise, elbows having a minimum radius equal to the width or diameter of the duct or square elbows with factory fabricated turning vanes are allowed.

b. Provide sealants that conform to fire hazard classification specified in Section 23 07 00 THERMAL INSULATION FOR MECHANICAL SYSTEMS and are suitable for the range of air distribution and ambient temperatures to which it is exposed. Do not use pressure sensitive tape as a sealant.

c. Make spiral lock seam duct, and flat oval with duct sealant and lock with not less than 3 equally spaced drive screws or other approved methods indicated in SMACNA 1966. Apply the sealant to the exposed male part of the fitting collar so that the sealer is on the inside of the joint and fully protected by the metal of the duct fitting. Apply one brush coat of the sealant over the outside of the joint to at least 2 inch band width covering all screw heads and joint gap. Dents in the male portion of the slip fitting collar are not acceptable. Fabricate outdoor air intake ducts and plenums with watertight soldered or brazed joints and seams.

2.2.1.1 General Service Duct Connectors

Provide a flexible duct connector approximately 6 inches in width where sheet metal connections are made to fans or where ducts of dissimilar metals are connected. For round/oval ducts, secure the flexible material

by stainless steel or zinc-coated, iron clinch-type draw bands. For rectangular ducts, install the flexible material locked to metal collars using normal duct construction methods. Provide a composite connector system that complies with NFPA 701 and is classified as "flame-retardent fabrics" in UL Bld Mat Dir.

2.2.2 Duct Access Doors

Provide hinged access doors conforming to SMACNA 1966 in ductwork and plenums where indicated and at all air flow measuring primaries, automatic dampers, fire dampers, coils, thermostats, and other apparatus requiring service and inspection in the duct system. Provide access doors upstream and downstream of air flow measuring primaries and heating and cooling coils. Provide doors that are a minimum 15 by 18 inches, unless otherwise shown. Where duct size does not accommodate this size door, make the doors as large as practicable. Equip doors 24 by 24 inches or larger with fasteners operable from inside and outside the duct. Use insulated type doors in insulated ducts.

2.2.3 Diffusers, Registers, and Grilles

Provide factory-fabricated units of steel that distribute the specified quantity of air evenly over space intended without causing noticeable drafts, air movement faster than 50 fpm in occupied zone, or dead spots anywhere in the conditioned area. Provide outlets for diffusion, spread, throw, and noise level as required for specified performance. Provide sound power level as indicated. Provide diffusers and registers with volume damper with accessible operator, unless otherwise indicated; or if standard with the manufacturer, an automatically controlled device is acceptable. Provide opposed blade type volume dampers for all diffusers and registers.Where the inlet and outlet openings are located less than 7 feet above the floor, protect them by a grille or screen according to NFPA 90A.

2.2.3.1 Diffusers

Provide diffuser types indicated. Furnish ceiling mounted units with anti-smudge devices, unless the diffuser unit minimizes ceiling smudging through design features. Provide diffusers with air deflectors of the type indicated. Install ceiling mounted units with rims tight against ceiling. Provide sponge rubber gaskets between ceiling and surface mounted diffusers for air leakage control. Provide suitable trim for flush mounted diffusers. For connecting the duct to diffuser, provide duct collar that is airtight and does not interfere with volume controller. Provide return or exhaust units that are similar to supply diffusers.

2.2.3.2 Registers and Grilles

Provide units as indicated. Furnish registers with sponge-rubber gasket between flanges and wall or ceiling.

2.2.4 Air Vents, Penthouses, and Goosenecks

Fabricate air vents, penthouses, and goosenecks from galvanized steel sheets with galvanized structural shapes. Provide sheet metal thickness, reinforcement, and fabrication that conform to SMACNA 1966. Accurately fit and secure louver blades to frames. Fold or bead edges of louver blades for rigidity and baffle these edges to exclude driving rain. Provide air vents, penthouses, and goosenecks with bird screen.

2.2.5 Bird Screens and Frames

Provide bird screens that conform to ASTM E2016, No. 2 mesh, aluminum or stainless steel. Provide "medium-light" rated aluminum screens. Provide "light" rated stainless steel screens. Provide removable type frames fabricated from either stainless steel or extruded aluminum.

2.2.6 Radon Exhaust Ductwork

Fabricate radon exhaust ductwork installed in or beneath slabs from Schedule 40 PVC pipe that conforms to ASTM D1785. Provide fittings that conform to ASTM D2466. Use solvent cement conforming to ASTM D2564 to make joints. Otherwise provide metal radon exhaust ductwork as specified herein.

2.3 AIR SYSTEMS EQUIPMENT

2.3.1 Fans

Provide all fans with an AMCA seal. Connect fans to the motors directly Provide fan and motor assemblies with vibration-isolation supports or mountings as indicated. Use vibration-isolation units that are standard products with published loading ratings. Provide standard AMCA arrangement, rotation, and discharge as indicated. Provide power ventilators that conform to UL 705 and have a UL label.

2.3.1.1 Centrifugal Type Power Roof Ventilators

Provide direct driven centrifugal type fans with backward inclined, non-overloading wheel. Provide hinged or removable and weatherproof motor compartment housing, constructed of heavy gauge aluminum. Provide fans with birdscreen, disconnect switch, gravity dampers, roof curb, and extended base. Provide dripproof type motor enclosure.

2.4 AIR HANDLING UNITS

2.4.1 Factory-Fabricated Air Handling Units

Provide units as indicated. Units shall include fans, coils, airtight insulated casing, prefilters, secondary filter sections, and diffuser sections where indicated, adjustable V-belt drives, belt guards for externally mounted motors, access sections where indicated, mixing box vibration-isolators, and appurtenances required for specified operation. Provide vibration isolators as indicated. Physical dimensions of each air handling unit shall be suitable to fit space allotted to the unit with the capacity indicated. Provide air handling unit that is rated in accordance with AHRI 430 and AHRI certified for cooling.

2.5 TERMINAL UNITS

2.5.1 Variable Refrigerant Flow Mini-Split Heat Pump

The heat pump air conditioning system shall be a Mitsubishi Electric MXZ-C variable capacity Hyper Heating multi-zone series. The system shall consist of two (2) to four (4), five (5), or eight (8) slim silhouette, compact, wall mounted indoor fan coil sections with digital wireless remote controller, and/or ceiling recessed indoor units with a wired, wall mounted remote controller connected to a compact horizontal discharge outdoor unit which shall be of an inverter driven heat pump design.

The system components shall be tested by a Nationally Recognized Testing Laboratory (NRTL) and shall bear the ETL label. All wiring shall be in accordance with the National Electrical Code (N.E.C.). The units shall be rated in accordance with Air-conditioning, Heating and Refrigeration Institute's (AHRI) Standard 240 and bear the AHRI Certification label. The units shall be manufactured in a facility registered to ISO 9001 and ISO 14001, which is a set of standards applying to product and manufacturing quality and environmental management and protection set by the International Standard Organization (ISO). A dry air holding charge shall be provided in the indoor section. System efficiency shall meet or exceed 14.7 SEER when part of a multi system (2:1 / 3:1 / 4:1 / 5:1 / 6:1 / 7:1 / 8:1).

Unit shall be stored and carefully handled according to the manufacturer's recommendations. The wireless remote controller, for the wall mounted and floor standing indoor units, shall be shipped inside the carton and packaged with the indoor unit and shall be able to withstand 105°F storage temperatures and 95% relative humidity without adverse effect. The remote controller, for the ceiling recessed unit, either wireless or wired, shall be shipped separately.

The casing shall be fabricated of galvanized steel, bonderized, finished with an electrostatically applied, thermally fused acrylic or polyester powder coating for corrosion protection. Assembly hardware shall be cadmium plated for weather resistance. Two (2) mild steel mounting feet, traverse mounted across the cabinet base pan, welded mount, providing four (4) slotted mounting holes shall be furnished. Assembly shall withstand lateral wind gust up to 155 MPH to meet applicable weather codes.

The unit shall be furnished with a direct drive, high performance propeller type fan. The condenser fan motor shall be a variable speed, direct current (DC) motor and shall have permanently lubricated bearings. Fan speed shall be switch automatically according to the number of operating indoor units and the compressor operating frequency. The fan motor shall be mounted with vibration isolation for quiet operation. The fan shall be provided with a raised guard to prevent contact with moving parts. The outdoor unit shall have horizontal discharge airflow.

The outdoor unit coil shall be of nonferrous construction with lanced or corrugated plate fins on copper tubing. The coil shall be protected with an integral guard. Refrigerant flow from the outdoor unit to the indoor units shall be independently controlled by means of individual electronic linear expansion valves for each indoor unit. Outdoor unit shall be pre-charged with sufficient R-410a refrigerant to satisfy the outdoor unit coil and compressor. All refrigerant lines between outdoor and indoor units shall be of annealed, refrigeration grade copper tubing, ARC Type, meeting ASTM B280 requirements, individually insulated in twin-tube, flexible, closed-cell, CFC-free (ozone depletion potential of zero), elastomeric material for the insulation of refrigerant pipes and tubes with thermal conductivity equal to or better than 0.27 BTU-inch/hour per Sq Ft / °F, a water vapor transmission equal to or better than 0.08 Perm-inch and superior fire ratings such that insulation will not contribute significantly to fire and up to 1" thick insulation shall have a Flame-Spread Index of less than 25 and a Smoke-development Index of less than 50 as tested by ASTM E 84 and CAN / ULC S-102. All refrigerant connections between outdoor and indoor units shall be flare type.

The compressor shall be a high performance, hermetic, inverter driven,

variable speed, scroll type. The compressor motor shall be direct current (DC) type equipped with a factory supplied and installed inverter drive package. The outdoor unit shall be equipped with a suction side refrigerant accumulator. The compressor will be equipped with an internal thermal overload. The compressor shall be mounted to avoid the transmission of vibration.

The outdoor unit shall have a 3/8" liquid line connection and a 5/8" gas line connection. Pipe lines running from the outdoor unit shall connect to a 3-port, a 5-port branch box, or a combination of both.

2.6 ENERGY RECOVERY DEVICES

2.6.1 Energy Recovery Ventilator

Provide energy recovery ventilator unitas indicated on drawing M600 or M601 that is factory-fabricated for indoor installation, consisting of a flat plate cross-flow heat exchanger, cooling coil, supply air fan and motor and exhaust air fan and motor. The casing shall be 20 gauge G90, galvanized steel, double wall construction with one inch insulation. Install backdraft damper and wall hoods will birdscreens.

2.7 SUPPLEMENTAL COMPONENTS/SERVICES

2.7.1 Refrigerant Piping

The requirements for refrigerant piping are specified in Section 23 23 00 REFRIGERANT PIPING.

2.7.2 Water or Steam Heating System Accessories

The requirements for water heating accessories such as expansion tanks are specified in Section 23 21 13.00 20 LOW TEMPERATURE WATER (LTW) HEATING SYSTEM.

2.7.3 Condensate Drain Lines

Provide and install condensate drainage for each item of equipment that generates condensate in accordance with Section except as modified herein. Provide and install condensate pump per the manufacturer's requirements if required to provide condensate drainage.

2.7.4 Insulation

The requirements for shop and field applied insulation are specified in Section 23 07 00 THERMAL INSULATION FOR MECHANICAL SYSTEMS.

2.7.5 Controls

The requirements for controls are specified in Section 23 05 93 TESTING, ADJUSTING, AND BALANCING OF HVAC SYSTEMS Section 23 09 53.00 20 SPACE TEMPERATURE CONTROL SYSTEMS.

PART 3 EXECUTION

3.1 EXAMINATION

After becoming familiar with all details of the work, verify all dimensions

in the field, and advise the Architect and Mechanical Engineer of any discrepancy before performing the work.

3.2 INSTALLATION

a. Install materials and equipment in accordance with the requirements of the contract drawings and approved manufacturer's installation instructions. Accomplish installation by workers skilled in this type of work. Perform installation so that there is no degradation of the designed fire ratings of walls, partitions, ceilings, and floors.

b. No installation is permitted to block or otherwise impede access to any existing machine or system. Install all hinged doors to swing open a minimum of 120 degrees. Provide an area in front of all access doors that clears a minimum of 3 feet. In front of all access doors to electrical circuits, clear the area the minimum distance to energized circuits as specified in OSHA Standards, part 1910.333 (Electrical-Safety Related work practices)and an additional 3 feet.

c. Except as otherwise indicated, install emergency switches and alarms in conspicuous locations. Mount all indicators, to include gauges, meters, and alarms in order to be easily visible by people in the area.

3.2.1 Condensate Drain Lines

Provide water seals in the condensate drain from all units . Provide a depth of each seal of 2 inches plus the number of inches, measured in water gauge, of the total static pressure rating of the unit to which the drain is connected. Provide water seals that are constructed of 2 tees and an appropriate U-bend with the open end of each tee plugged. Provide pipe cap or plug cleanouts where indicated. Connect drains indicated to connect to the sanitary waste system using an indirect waste fitting. Insulate air conditioner drain lines as specified in Section 23 07 00 THERMAL INSULATION FOR MECHANICAL SYSTEMS.

3.2.2 Equipment and Installation

Provide frames and supports for tanks, compressors, pumps, valves, air handling units, fans, coils, dampers, and other similar items requiring supports. Floor mount or ceiling hang air handling units as indicated. Anchor and fasten as detailed. Set floor-mounted equipment on not less than 4 inch concrete pads or curbs doweled in place unless otherwise indicated. Make concrete foundations heavy enough to minimize the intensity of the vibrations transmitted to the piping, duct work and the surrounding structure, as recommended in writing by the equipment manufacturer. Provide concrete for foundations.

3.2.3 Access Panels

Install access panels for concealed valves, vents, controls, dampers, and items requiring inspection or maintenance of sufficient size, and locate them so that the concealed items are easily serviced and maintained or completely removed and replaced. Provide access panels as specified in Section 05 50 13 MISCELLANEOUS METAL FABRICATIONS.

3.2.4 Metal Ductwork

Install according to SMACNA 1966 unless otherwise indicated. Install duct supports for sheet metal ductwork according to SMACNA 1966, unless

otherwise specified. Do not use friction beam clamps indicated in SMACNA 1966. Erect supports on the risers that allow free vertical movement of the duct. Attach supports only to structural framing members and concrete slabs. Do not anchor supports to metal decking unless a means is provided and approved for preventing the anchor from puncturing the metal decking. Where supports are required between structural framing members, provide suitable intermediate metal framing. Where C-clamps are used, provide retainer clips.

3.2.4.1 Radon Exhaust Ductwork

Perforate subslab suction piping where indicated. Install PVC joints as specified in ASTM D2855.

3.2.5 Kitchen Exhaust Ductwork

3.2.5.1 Ducts Conveying Smoke and Grease Laden Vapors

Provide ducts conveying smoke and grease laden vapors that conform to requirements of NFPA 96. Make seams, joints, penetrations, and duct-to-hood collar connections with a liquid tight continuous external weld. Provide duct material that is a minimum 18 gauge, Type 304L or 316L, stainless steel .

3.2.5.2 Exposed Ductwork

Provide exposed ductwork that is fabricated from minimum 18 gauge, Type 304L or 316L, stainless steel with continuously welded joints and seams. Pitch ducts to drain at hoods and low points indicated. Match surface finish to hoods.

3.2.5.3 Concealed Ducts Conveying Moisture Laden Air

Fabricate concealed ducts conveying moisture laden air from minimum 18 gauge, Type 300 series, stainless steel . Continuously weld, braze, or solder joints to be liquid tight. Pitch ducts to drain at points indicated. Make transitions to other metals liquid tight, companion angle bolted and gasketed.

3.2.6 Dust Control

To prevent the accumulation of dust, debris and foreign material during construction, perform temporary dust control protection. Protect the distribution system (supply and return) with temporary seal-offs at all inlets and outlets at the end of each day's work. Keep temporary protection in place until system is ready for startup.

3.2.7 Insulation

Provide thickness and application of insulation materials for ductwork, piping, and equipment according to Section 23 07 00 THERMAL INSULATION FOR MECHANICAL SYSTEMS. Externally insulate outdoor air intake ducts and plenums up to the point where the outdoor air reaches the conditioning unit.

3.2.8 Duct Test Holes

Provide holes with closures or threaded holes with plugs in ducts and plenums as indicated or where necessary for the use of pitot tube in balancing the air system. Plug insulated duct at the duct surface, patched

over with insulation and then marked to indicate location of test hole if needed for future use.

3.2.9 Power Roof Ventilator Mounting

Provide foamed 1/2 inch thick, closed-cell, flexible elastomer insulation to cover width of roof curb mounting flange. Where wood nailers are used, predrill holes for fasteners.

3.3 EQUIPMENT PADS

Provide equipment pads to the dimensions shown or, if not shown, to conform to the shape of each piece of equipment served with a minimum 3-inch margin around the equipment and supports. Allow equipment bases and foundations, when constructed of concrete or grout, to cure a minimum of 14 calendar days before being loaded.

3.4 CUTTING AND PATCHING

Install work in such a manner and at such time that a minimum of cutting and patching of the building structure is required. Make holes in exposed locations, in or through existing floors, by drilling and smooth by sanding. Use of a jackhammer is permitted only where specifically approved. Make holes through masonry walls to accommodate sleeves with an iron pipe masonry core saw.

3.5 CLEANING

Thoroughly clean surfaces of piping and equipment that have become covered with dirt, plaster, or other material during handling and construction before such surfaces are prepared for final finish painting or are enclosed within the building structure. Before final acceptance, clean mechanical equipment, including piping, ducting, and fixtures, and free from dirt, grease, and finger marks.

3.6 PENETRATIONS

Provide sleeves and prepared openings for duct mains, branches, and other penetrating items, and install during the construction of the surface to be penetrated. Cut sleeves flush with each surface. Place sleeves for round duct 15 inches and smaller. Build framed, prepared openings for round duct larger than 15 inches and square, rectangular or oval ducts. Sleeves and framed openings are also required where grilles, registers, and diffusers are installed at the openings. Provide one inch clearance between penetrating and penetrated surfaces except at grilles, registers, and diffusers. Pack spaces between sleeve or opening and duct or duct insulation with mineral fiber conforming with ASTM C553, Type 1, Class B-2.

3.6.1 Sleeves

Fabricate sleeves, except as otherwise specified or indicated, from 20 gauge thick mill galvanized sheet metal. Where sleeves are installed in bearing walls or partitions, provide black steel pipe conforming with ASTM A53/A53M, Schedule 20.

3.6.2 Framed Prepared Openings

Fabricate framed prepared openings from 20 gauge galvanized steel, unless otherwise indicated.

3.6.3 Insulation

Provide duct insulation in accordance with Section 23 07 00 THERMAL INSULATION FOR MECHANICAL SYSTEMS continuous through sleeves and prepared openings except firewall penetrations. Terminate duct insulation at fire dampers and flexible connections. For duct handling air at or below 60 degrees F, provide insulation continuous over the damper collar and retaining angle of fire dampers, which are exposed to unconditioned air.

3.6.4 Closure Collars

Provide closure collars of a minimum 4 inches wide, unless otherwise indicated, for exposed ducts and items on each side of penetrated surface, except where equipment is installed. Install collar tight against the surface and fit snugly around the duct or insulation. Grind sharp edges smooth to prevent damage to penetrating surface. Fabricate collars for round ducts 15 inches in diameter or less from 20 gauge galvanized steel. Fabricate collars for square and rectangular ducts, or round ducts with minimum dimension over 15 inches from 18 gauge galvanized steel. Fabricate collars for square and rectangular ducts with a maximum side of 15 inches or less from 20 gauge galvanized steel. Install collars with fasteners a maximum of 6 inches on center. Attach to collars a minimum of 4 fasteners where the opening is 12 inches in diameter or less, and a minimum of 8 fasteners where the opening is 20 inches in diameter or less.

3.6.5 Firestopping

Where ducts pass through fire-rated walls, fire partitions, and fire rated chase walls, seal the penetration with fire stopping materials as specified in Section 07 84 00 FIRESTOPPING.

3.7 FIELD PAINTING OF MECHANICAL EQUIPMENT

Clean, pretreat, prime and paint metal surfaces; except aluminum surfaces need not be painted. Apply coatings to clean dry surfaces. Clean the surfaces to remove dust, dirt, rust, oil and grease by wire brushing and solvent degreasing prior to application of paint, except clean to bare metal on metal surfaces subject to temperatures in excess of 120 degrees F. Where more than one coat of paint is specified, apply the second coat after the preceding coat is thoroughly dry. Lightly sand damaged painting and retouch before applying the succeeding coat. Provide aluminum or light gray finish coat.

3.7.1 Temperatures less than 120 degrees F

Immediately after cleaning, apply one coat of pretreatment primer applied to a minimum dry film thickness of 0.3 mil, one coat of primer applied to a minimum dry film thickness of one mil; and two coats of enamel applied to a minimum dry film thickness of one mil per coat to metal surfaces subject to temperatures less than 120 degrees F.

3.8 TESTING, ADJUSTING, AND BALANCING

The requirements for testing, adjusting, and balancing are specified in Section 23 05 93 TESTING, ADJUSTING AND BALANCING FOR HVAC. Begin testing, adjusting, and balancing only when the air supply and distribution, including controls, has been completed, with the exception of performance tests.

3.9 PERFORMANCE TESTS

After testing, adjusting, and balancing is complete as specified, test each system as a whole to see that all items perform as integral parts of the system and temperatures and conditions are evenly controlled throughout the building. Record the testing during the applicable season. Make corrections and adjustments as necessary to produce the conditions indicated or specified.

Submit test reports for the ductwork leak test upon completion of testing. .

3.10 CLEANING AND ADJUSTING

Provide a temporary bypass for water coils to prevent flushing water from passing through coils. Thoroughly clean ducts, plenums, and casing of debris and blow free of small particles of rubbish and dust and then vacuum clean before installing outlet faces. Wipe equipment clean, with no traces of oil, dust, dirt, or paint spots. Provide temporary filters prior to startup of all fans that are operated during construction, and install new filters after all construction dirt has been removed from the building, and the ducts, plenums, casings, and other items specified have been vacuum cleaned. Maintain system in this clean condition until final acceptance. Properly lubricate bearings with oil or grease as recommended by the manufacturer. Tighten belts to proper tension. Adjust control valves and other miscellaneous equipment requiring adjustment to setting indicated or directed. Adjust fans to the speed indicated by the manufacturer to meet specified conditions. Maintain all equipment installed under the contract until close out documentation is received, the project is completed and the building has been documented as beneficially occupied.

3.11 OPERATION AND MAINTENANCE

3.11.1 Operation and Maintenance Manuals

Submit manuals at least 2 weeks prior to field training.

3.11.2 Operation And Maintenance Training

Conduct a training course for the members of the operating staff as designated by the Architect. Make the training period consist of a total of 2 hours of normal working time and start it after all work specified herein is functionally completed and the Performance Tests have been approved. Conduct field instruction that covers all of the items contained in the Operation and Maintenance Manuals as well as demonstrations of routine maintenance operations. Submit the proposed On-site Training schedule concurrently with the Operation and Maintenance Manuals and at least 14 days prior to conducting the training course.

-- End of Section --

SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASSOCIATED AIR BALANCE COUNCIL (AABC)

AABC MN-1	(2002; 6th ed) National Standards for Total System Balance

NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB)

NEBB PROCEDURAL STANDARDS	(2005) Procedural Standards for TAB (Testing, Adjusting and Balancing) Environmental Systems

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA 1780	(2002) HVAC Systems - Testing, Adjusting and Balancing, 3rd Edition
SMACNA 1972 CD	(2012) HVAC Air Duct Leakage Test Manual - 2nd Edition

1.2 DEFINITIONS

a. AABC: Associated Air Balance Council

b. COTR: Contracting Officer's Technical Representative

c. DALT: Duct air leakage test

d. DALT'd: Duct air leakage tested

e. HVAC: Heating, ventilating, and air conditioning; or heating, ventilating, and cooling

f. NEBB: National Environmental Balancing Bureau

g. Out-of-tolerance data: Pertains only to field acceptance testing of Final DALT or TAB report. When applied to DALT work, this phase means When applied to TAB work this phase means "a measurement taken during TAB field acceptance testing which does not fall within the range of plus 5 to minus 5 percent of the original measurement reported on the TAB Report for a specific parameter."

h. Season of maximum heating load: The time of year when the outdoor temperature at the project site remains within plus or minus 30 degrees Fahrenheit of the project site's winter outdoor design temperature,

throughout the period of TAB data recording.

i. Season of maximum cooling load: The time of year when the outdoor temperature at the project site remains within plus or minus 5 degrees Fahrenheit of the project site's summer outdoor design temperature, throughout the period of TAB data recording.

j. Season 1, Season 2: Depending upon when the project HVAC is completed and ready for TAB, Season 1 is defined, thereby defining Season 2. Season 1 could be the season of maximum heating load, or the season of maximum cooling load.

k. Sound measurements terminology: Defined in AABC MN-1, NEBB MASV, or SMACNA 1858 (TABB).

l. TAB: Testing, adjusting, and balancing (of HVAC systems)

m. TAB'd: HVAC Testing/Adjusting/Balancing procedures performed

n. TAB Agency: TAB Firm
r. TABB: Testing Adjusting and Balancing Bureau

1.2.1 Similar Terms

In some instances, terminology differs between the Contract and the TAB Standard primarily because the intent of this Section is to use the industry standards specified, along with additional requirements listed herein to produce optimal results.

The following table of similar terms is provided for clarification only. Contract requirements take precedent over the corresponding AABC, NEBB, or TABB requirements where differences exist.

SIMILAR TERMS			
Contract Term	AABC Term	NEBB Term	TABB Term
TAB Standard	National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems	Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems	International Standards for Environmental Systems Balance
TAB Specialist	TAB Engineer	TAB Supervisor	TAB Supervisor
Systems Readiness Check	Construction Phase Inspection	Field Readiness Check & Preliminary Field Procedures	Field Readiness Check & Prelim. Field Procedures

1.3 WORK DESCRIPTION

The work includes duct air leakage testing (DALT) and testing, adjusting, and balancing (TAB) of new heating, ventilating, and cooling (HVAC) air and water distribution systems including equipment and performance data, ducts,

and piping which are located within, on, under, between, and adjacent to buildings.

Perform TAB in accordance with the requirements of the TAB procedural standard recommended by the TAB trade association that approved the TAB Firm's qualifications. Comply with requirements of AABC MN-1, NEBB PROCEDURAL STANDARDS, or SMACNA 1780 (TABB) as supplemented and modified by this specification section. All recommendations and suggested practices contained in the TAB procedural standards are considered mandatory.

Conduct DALT and TAB of the equipment and submit the specified DALT and TAB reports for approval. Conduct DALT testing in compliance with the requirements specified in SMACNA 1972 CD, except as supplemented and modified by this section. Conduct DALT and TAB work in accordance with the requirements of this section.

1.3.1 Air Distribution Systems

Test, adjust, and balance systems (TAB) in compliance with this section, before applying insulation to exterior of air distribution systems as specified under Section 23 07 00 THERMAL INSULATION FOR MECHANICAL SYSTEMS.

1.3.2 Water Distribution Systems

TAB systems in compliance with this section, before applying insulation to water distribution systems as specified under Section 23 07 00 THERMAL INSULATION FOR MECHANICAL SYSTEMS.

Terminate piping insulation immediately adjacent to each flow control valve, automatic control valve, or device. Seal the ends of pipe insulation and the space between ends of pipe insulation and piping, with waterproof vapor barrier coating.

After completion of work under this section, insulate the flow control valves and devices as specified under Section 23 07 00 THERMAL INSULATION FOR MECHANICAL SYSTEMS.

1.3.3 TAB SCHEMATIC DRAWINGS

Show the following information on TAB Schematic Drawings:

1. A unique number or mark for each piece of equipment or terminal.

2. Air quantities at air terminals.

3. Air quantities and temperatures in air handling unit schedules.

4. Water quantities and temperatures in thermal energy transfer equipment schedules.

5. Water quantities and heads in pump schedules.

6. Water flow measurement fittings and balancing fittings.

7. Ductwork Construction and Leakage Testing Table that defines the DALT test requirements, including each applicable HVAC duct system ID or mark, duct pressure class, duct seal class, and duct leakage test pressure.

1.3.4 Related Requirements

1.4 SUBMITTALS

Submit the following:

SD-06 Test Reports

Certified Final DALT Report; G

SD-07 Certificates

Independent TAB Agency and Personnel Qualifications;

DALT and TAB Submittal and Work Schedule;

1.5 QUALITY ASSURANCE

1.5.1 Independent TAB Agency and Personnel Qualifications

To secure approval for the proposed agency, submit information certifying that the TAB agency is a first tier subcontractor who is not affiliated with any other company participating in work on this contract, including design, furnishing equipment, or construction. Further, submit for approval:

a. Independent AABC or NEBB or TABB TAB agency:

TAB agency: AABC registration number and expiration date of current certification; or NEBB certification number and expiration date of current certification; or TABB certification number and expiration date of current certification.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 WORK DESCRIPTIONS OF PARTICIPANTS

Comply with requirements of this section.

3.2 DALT PROCEDURES

3.2.1 Instruments, Consumables and Personnel

Provide instruments, consumables and personnel required to accomplish the D uct Air Leakage test (DALT) field work. Follow the same basic procedure specified below for TAB Field Work, including maintenance and calibration of instruments, accuracy of measurements, preliminary procedures, field work, workmanship and treatment of deficiencies. Calibrate and maintain instruments in accordance with manufacturer's written procedures.

3.2.2 DALT Testing

Perform DALT on each system. Use the duct class, seal class, leakage class and the leak test pressure data indicated on the drawings, to comply with

the procedures specified in SMACNA 1972 CD.

3.2.3 Prerequisite for TAB Field Work

Do not commence TAB field work prior to the completion and approval, for all systems, of the Final DALT Report.

3.3 TAB PROCEDURES

3.3.1 TAB Field Work

Test, adjust, and balance the HVAC systems until measured flow rates (air and water flow) are within plus or minus 5 percent of the design flow rates as specified or indicated on the contract documents.

Provide instruments and consumables required to accomplish the TAB work. Calibrate and maintain instruments in accordance with manufacturer's written procedures.

Test, adjust, and balance the HVAC systems until measured flow rates (air and water flow) are within plus or minus 5 percent of the design flow rates as specified or indicated on the contract documents.

3.3.2 Preliminary Procedures

TAB engineer is to locate, in the field, test ports required for testing. It is the responsibility of the sheet metal contractor to provide and install test ports as required by the TAB engineer.

3.3.3 TAB Air Distribution Systems

3.3.3.1 Rooftop Air Conditioning

Rooftop air conditioning systems including fans, coils, ducts, plenums, and air distribution devices for supply air, return air, and outside air.

3.3.3.2 Energy Recovery Units

Energy Recovery Unit systems including fans, diffusers, grilles, and louvers for supply air, return air, outside air, and exhaust air.

3.3.3.3 Exhaust Fans

Exhaust fan systems including fans, ducts, plenums, grilles, and hoods for exhaust air.

3.3.4 TAB Water Distribution Systems

3.3.4.1 Heating Hot Water

Heating hot water systems including boilers, hot water converters (e.g., heat exchangers), pumps, coils, system balancing valves and flow measuring devices.

3.4 MARKING OF SETTINGS

Upon the final TAB work approval, permanently mark the settings of HVAC adjustment devices including valves, gauges, splitters, and dampers so that adjustment can be restored if disturbed at any time. Provide permanent

markings clearly indicating the settings on the adjustment devices which result in the data reported on the submitted TAB report.

3.5 MARKING OF TEST PORTS

The TAB team is to permanently and legibly mark and identify the location points of the duct test ports. If the ducts have exterior insulation, make these markings on the exterior side of the duct insulation. Show the location of test ports on the as-built mechanical drawings with dimensions given where the test port is covered by exterior insulation.

-- End of Section --

SECTION 23 07 00

THERMAL INSULATION FOR MECHANICAL SYSTEMS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. At the discretion of the Government, the manufacturer of any material supplied will be required to furnish test reports pertaining to any of the tests necessary to assure compliance with the standard or standards referenced in this specification.

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 90.1 - IP	(2010) Energy Standard for Buildings Except Low-Rise Residential Buildings

ASTM INTERNATIONAL (ASTM)

ASTM C1136	(2012) Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation
ASTM C195	(2007; R 2013) Standard Specification for Mineral Fiber Thermal Insulating Cement
ASTM C534/C534M	(2014) Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
ASTM C547	(2015) Standard Specification for Mineral Fiber Pipe Insulation
ASTM C795	(2008; R 2013) Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel
ASTM C920	(2014a) Standard Specification for Elastomeric Joint Sealants
ASTM E84	(2015b) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E96/E96M	(2014) Standard Test Methods for Water Vapor Transmission of Materials

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-69	(2003; Notice 2012) Pipe Hangers and

Supports - Selection and Application (ANSI Approved American National Standard)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 90A — (2015) Standard for the Installation of Air Conditioning and Ventilating Systems

UNDERWRITERS LABORATORIES (UL)

UL 723 — (2008; Reprint Aug 2013) Test for Surface Burning Characteristics of Building Materials

1.2 SYSTEM DESCRIPTION

1.2.1 General

Provide field-applied insulation and accessories on mechanical systems as specified herein; factory-applied insulation is specified under the piping, duct or equipment to be insulated.

1.3 SUBMITTALS

SD-03 Product Data

Pipe Insulation Systems;
Duct Insulation Systems;

SD-08 Manufacturer's Instructions

Pipe Insulation Systems;
Duct Insulation Systems;

1.4 DELIVERY, STORAGE, AND HANDLING

Materials shall be delivered in the manufacturer's unopened containers. Materials delivered and placed in storage shall be provided with protection from weather, humidity, dirt, dust and other contaminants. The Contracting Officer may reject insulation material and supplies that become dirty, dusty, wet, or contaminated by some other means. Packages or standard containers of insulation, jacket material, cements, adhesives, and coatings delivered for use, and samples required for approval shall have manufacturer's stamp or label attached giving the name of the manufacturer and brand, and a description of the material, date codes, and approximate shelf life (if applicable). Insulation packages and containers shall be asbestos free.

PART 2 PRODUCTS

2.1 STANDARD PRODUCTS

Provide materials which are the standard products of manufacturers regularly engaged in the manufacture of such products and that essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening.

2.1.1 Surface Burning Characteristics

Unless otherwise specified, insulation must have a maximum flame spread index of 25 and a maximum smoke developed index of 50 when tested in accordance with ASTM E84. Flame spread, and smoke developed indexes, shall be determined by ASTM E84 or UL 723. Test insulation in the same density and installed thickness as the material to be used in the actual construction. Prepare and mount test specimens according to ASTM E2231.

2.2 MATERIALS

Provide insulation that meets or exceed the requirements of ASHRAE 90.1 - IP. Insulation exterior shall be cleanable, grease resistant, non-flaking and non-peeling. Materials shall be compatible and shall not contribute to corrosion, soften, or otherwise attack surfaces to which applied in either wet or dry state. Materials shall be asbestos free.

2.2.1 Adhesives

2.2.1.1 Mineral Fiber Insulation Cement

Cement shall be in accordance with ASTM C195.

2.2.1.2 Contact Adhesive

Adhesives may be any of, but not limited to, the neoprene based, rubber based, or elastomeric type that have a maximum flame spread index of 25 and a maximum smoke developed index of 50 when tested in accordance with ASTM E84. The adhesive shall not adversely affect, initially or in service, the insulation to which it is applied, nor shall it cause any corrosive effect on metal to which it is applied. Any solvent dispersing medium or volatile component of the adhesive shall have no objectionable odor and shall not contain any benzene or carbon tetrachloride. The dried adhesive shall not emit nauseous, irritating, or toxic volatile matters or aerosols when the adhesive is heated to any temperature up to 212 degrees F. The dried adhesive shall be nonflammable and fire resistant. Flexible Elastomeric Adhesive: Comply with MIL-A-24179, Type II, Class I. Provide product listed in FM APP GUIDE.

2.2.2 Caulking

ASTM C920, Type S, Grade NS, Class 25, Use A.

2.2.3 Corner Angles

Nominal 0.016 inch aluminum 1 by 1 inch with factory applied kraft backing. Aluminum shall be ASTM B209, Alloy 3003, 3105, or 5005.

2.2.4 Fittings

Fabricated Fittings are the prefabricated fittings for flexible elastomeric pipe insulation systems in accordance with ASTM C1710. Together with the flexible elastomeric tubes, they provide complete system integrity for retarding heat gain and controlling condensation drip from chilled-water and refrigeration systems. Flexible elastomeric, fabricated fittings provide thermal protection (0.25 k) and condensation resistance (0.05 Water Vapor Transmission factor). For satisfactory performance, properly installed protective vapor retarder/barriers and vapor stops shall be used

on high relative humidity and below ambient temperature applications to reduce movement of moisture through or around the insulation to the colder interior surface.

2.2.5 Finishing Cement

ASTM C450: Mineral fiber hydraulic-setting thermal insulating and finishing cement. All cements that may come in contact with Austenitic stainless steel must comply with ASTM C795.

2.2.6 Staples

Outward clinching type ASTM A167, Type 304 or 316 stainless steel.

2.2.7 Jackets

2.2.7.1 Polyvinyl Chloride (PVC) Jackets

Polyvinyl chloride (PVC) jacket and fitting covers shall have high impact strength, ultraviolet (UV) resistant rating or treatment and moderate chemical resistance with minimum thickness 0.030 inch.

2.2.7.2 Vapor Barrier/Vapor Retarder

Apply the following criteria to determine which system is required.

a. On ducts, piping and equipment operating below 60 degrees F or located outside shall be equipped with a vapor barrier.

2.2.8 Wire

Soft annealed ASTM A580/A580M Type 302, 304 or 316 stainless steel, 16 or 18 gauge.

2.2.9 Insulation Bands

Insulation bands shall be 1/2 inch wide; 26 gauge stainless steel.

2.2.10 Sealants

Sealants shall be chosen from the butyl polymer type, the styrene-butadiene rubber type, or the butyl type of sealants. Sealants shall have a maximum permeance of 0.02 perms based on Procedure B for ASTM E96/E96M, and a maximum flame spread index of 25 and a maximum smoke developed index of 50 when tested in accordance with ASTM E84.

2.3 PIPE INSULATION SYSTEMS

Conform insulation materials to Table 1 and minimum insulation thickness as listed in Table 2 and meet or exceed the requirements of ASHRAE 90.1 - IP. Limit pipe insulation materials to those listed herein and meeting the following requirements:

2.3.1 Aboveground Cold Pipeline (-30 to 60 deg. F)

Insulation for outdoor, indoor, exposed or concealed applications, shall be as follows:

2.3.1.1 Flexible Elastomeric Cellular Insulation

Closed-cell, foam- or expanded-rubber materials containing anti-microbial additive, complying with ASTM C534/C534M, Grade 1, Type I or II. Type I, Grade 1 for tubular materials. Type II, Grade 1, for sheet materials. Type I and II shall have vapor retarder/vapor barrier skin on one or both sides of the insulation, and require an additional exterior vapor retarder covering for high relative humidity and below ambient temperature applications.

2.3.2 Aboveground Hot Pipeline (Above 60 deg. F)

Insulation for outdoor, indoor, exposed or concealed applications shall meet the following requirements. Supply the insulation with manufacturer's recommended factory-applied jacket/vapor barrier.

2.3.2.1 Mineral Fiber

ASTM C547, Types I, II or III, supply the insulation with manufacturer's recommended factory-applied jacket.

2.3.2.2 Flexible Elastomeric Cellular Insulation

Closed-cell, foam- or expanded-rubber materials containing anti-microbial additive, complying with ASTM C534/C534M, Grade 1, Type I or II to 220 degrees F service. Type I for tubular materials. Type II for sheet materials.

2.4 DUCT INSULATION SYSTEMS

2.4.1 Duct Insulation Jackets

2.4.1.1 All-Purpose Jacket

Provide insulation with insulation manufacturer's standard reinforced fire-retardant jacket with or without integral vapor barrier as required by the service. In exposed locations, provide jacket with a white surface suitable for field painting.

PART 3 EXECUTION

3.1 APPLICATION - GENERAL

Insulation shall only be applied to unheated and uncooled piping and equipment. Flexible elastomeric cellular insulation shall not be compressed at joists, studs, columns, ducts, hangers, etc. The insulation shall not pull apart after a one hour period; any insulation found to pull apart after one hour, shall be replaced.

3.1.1 Installation

Except as otherwise specified, material shall be installed in accordance with the manufacturer's written instructions. Insulation materials shall not be applied until tests specified in other sections of this specification are completed. Material such as rust, scale, dirt and moisture shall be removed from surfaces to receive insulation. Insulation shall be kept clean and dry. Insulation shall not be removed from its shipping containers until the day it is ready to use and shall be returned to like containers or equally protected from dirt and moisture at the end

of each workday. Insulation that becomes dirty shall be thoroughly cleaned prior to use. If insulation becomes wet or if cleaning does not restore the surfaces to like new condition, the insulation will be rejected, and shall be immediately removed from the jobsite. Joints shall be staggered on multi layer insulation. Mineral fiber thermal insulating cement shall be mixed with demineralized water when used on stainless steel surfaces. Insulation, jacketing and accessories shall be installed in accordance with MICA Insulation Stds plates except where modified herein or on the drawings.

3.1.2 Firestopping

Where pipes and ducts pass through fire walls, fire partitions, above grade floors, and fire rated chase walls, the penetration shall be sealed with fire stopping materials as specified in Section 07 84 00 FIRESTOPPING. The protection of ducts at point of passage through firewalls must be in accordance with NFPA 90A. All other penetrations, such as piping, conduit, and wiring, through firewalls must be protected with a material or system of the same hourly rating that is listed by UL, FM, or a NRTL.

3.1.3 Installation of Flexible Elastomeric Cellular Insulation

Install flexible elastomeric cellular insulation with seams and joints sealed with rubberized contact adhesive. Flexible elastomeric cellular insulation shall not be used on surfaces greater than 220 degrees F. Stagger seams when applying multiple layers of insulation. Protect insulation exposed to weather and not shown to have vapor barrier weatherproof jacketing with two coats of UV resistant finish or PVC or metal jacketing as recommended by the manufacturer after the adhesive is dry and cured.

3.1.3.1 Adhesive Application

Apply a brush coating of adhesive to both butt ends to be joined and to both slit surfaces to be sealed. Allow the adhesive to set until dry to touch but tacky under slight pressure before joining the surfaces. Insulation seals at seams and joints shall not be capable of being pulled apart one hour after application. Insulation that can be pulled apart one hour after installation shall be replaced.

3.1.3.2 Adhesive Safety Precautions

Use natural cross-ventilation, local (mechanical) pickup, and/or general area (mechanical) ventilation to prevent an accumulation of solvent vapors, keeping in mind the ventilation pattern must remove any heavier-than-air solvent vapors from lower levels of the workspaces. Gloves and spectacle-type safety glasses are recommended in accordance with safe installation practices.

3.1.4 Pipes/Ducts/Equipment That Require Insulation

Insulation is required on all pipes, or ducts, except for omitted items as specified.

3.2 PIPE INSULATION SYSTEMS INSTALLATION

3.2.1 Pipe Insulation

3.2.1.1 General

Pipe insulation shall be installed on aboveground hot and cold pipeline systems as specified below to form a continuous thermal retarder/barrier, including straight runs, fittings and appurtenances unless specified otherwise. Installation shall be with full length units of insulation and using a single cut piece to complete a run. Cut pieces or scraps abutting each other shall not be used. Pipe insulation shall be omitted on the following:

a. Pipe used solely for fire protection.

b. Chromium plated pipe to plumbing fixtures. However, fixtures for use by the physically handicapped shall have the hot water supply and drain, including the trap, insulated where exposed.

c. Sanitary drain lines.

d. Air chambers.

e. Adjacent insulation.

f. ASME stamps.

g. Access plates of fan housings.

h. Cleanouts or handholes.

3.2.1.2 Pipes Passing Through Walls, Roofs, and Floors

Pipe insulation shall be continuous through the sleeve.

Provide an aluminum jacket or vapor barrier/weatherproofing self adhesive jacket (minimum 2 mils adhesive, 3 mils embossed) less than 0.0000 permeability, greater than 3 ply standard grade, silver, white, black and embossed with factory applied moisture retarder over the insulation wherever penetrations require sealing.

3.2.1.2.1 Penetrate Interior Walls

The aluminum jacket or vapor barrier/weatherproofing - self adhesive jacket (minimum 2 mils adhesive, 3 mils embossed) less than 0.0000 permeability, greater than 3 plies standard grade, silver, white, black and embossed shall extend 2 inches beyond either side of the wall and shall be secured on each end with a band.

3.2.1.2.2 Penetrating Floors

Extend the aluminum jacket from a point below the backup material to a point 10 inches above the floor with one band at the floor and one not more than 1 inch from the end of the aluminum jacket.

3.2.1.2.3 Penetrating Exterior Walls

Continue the aluminum jacket required for pipe exposed to weather through

the sleeve to a point 2 inches beyond the interior surface of the wall.

3.2.1.2.4 Penetrating Roofs

Insulate pipe as required for interior service to a point flush with the top of the flashing and sealed with flashing sealant. Tightly butt the insulation for exterior application to the top of flashing and interior insulation. Extend the exterior aluminum jacket 2 inches down beyond the end of the insulation to form a counter flashing. Seal the flashing and counter flashing underneath with metal jacketing/flashing sealant.

3.2.1.2.5 Hot Water Pipes Supplying Lavatories or Other Similar Heated Service

Terminate the insulation on the backside of the finished wall. Protect the insulation termination with two coats of vapor barrier coating with a minimum total thickness of 1/16 inch applied with glass tape embedded between coats (if applicable). Extend the coating out onto the insulation 2 inches and seal the end of the insulation. Overlap glass tape seams 1 inch. Caulk the annular space between the pipe and wall penetration with approved fire stop material. Cover the pipe and wall penetration with a properly sized (well fitting) escutcheon plate. The escutcheon plate shall overlap the wall penetration at least 3/8 inches.

3.2.1.2.6 Domestic Cold Water Pipes Supplying Lavatories or Other Similar Cooling Service

Terminate the insulation on the finished side of the wall (i.e., insulation must cover the pipe throughout the wall penetration). Protect the insulation with two coats of weather barrier mastic (breather emulsion type weatherproof mastic impermeable to water and permeable to air) with a minimum total thickness of 1/16 inch. Extend the mastic out onto the insulation 2 inches and shall seal the end of the insulation. The annular space between the outer surface of the pipe insulation and caulk the wall penetration with an approved fire stop material having vapor retarder properties. Cover the pipe and wall penetration with a properly sized (well fitting) escutcheon plate. The escutcheon plate shall overlap the wall penetration by at least 3/8 inches.

3.2.1.3 Pipes Passing Through Hangers

Insulation, whether hot or cold application, shall be continuous through hangers. All horizontal pipes 2 inches and smaller shall be supported on hangers with the addition of a Type 40 protection shield to protect the insulation in accordance with MSS SP-69. Whenever insulation shows signs of being compressed, or when the insulation or jacket shows visible signs of distortion at or near the support shield, insulation inserts as specified below for piping larger than 2 inches shall be installed, or factory insulated hangers (designed with a load bearing core) can be used.

3.2.1.3.1 Horizontal Pipes Larger Than 2 Inches at 60 Degrees F and Above

Supported on hangers in accordance with MSS SP-69, and Section 22 00 00 PLUMBING, GENERAL PURPOSE.

3.2.1.3.2 Vertical Pipes

Supported with either Type 8 or Type 42 riser clamps with the addition of two Type 40 protection shields in accordance with MSS SP-69 covering the

360-degree arc of the insulation. An insulation insert of cellular glass or calcium silicate shall be installed between each shield and the pipe. The insert shall cover the 360-degree arc of the pipe. Inserts shall be the same thickness as the insulation, and shall extend 2 inches on each end beyond the protection shield. When insulation inserts are required in accordance with the above, and the insulation thickness is less than 1 inch, wooden or cork dowels or blocks may be installed between the pipe and the shield to prevent the hanger from crushing the insulation, as an option instead of installing insulation inserts. The insulation jacket shall be continuous over the wooden dowel, wooden block, or insulation insert. The vertical weight of the pipe shall be supported with hangers located in a horizontal section of the pipe. When the pipe riser is longer than 30 feet, the weight of the pipe shall be additionally supported with hangers in the vertical run of the pipe that are directly clamped to the pipe, penetrating the pipe insulation. These hangers shall be insulated and the insulation jacket sealed as indicated herein for anchors in a similar service.

3.2.1.3.3 Inserts

Covered with a jacket material of the same appearance and quality as the adjoining pipe insulation jacket, overlap the adjoining pipe jacket 1-1/2 inches, and seal as required for the pipe jacket. The jacket material used to cover inserts in flexible elastomeric cellular insulation shall conform to ASTM C1136, Type 1, and is allowed to be of a different material than the adjoining insulation material.

3.2.1.4 Flexible Elastomeric Cellular Pipe Insulation

Flexible elastomeric cellular pipe insulation shall be tubular form for pipe sizes 6 inches and less. Seams shall be staggered when applying multiple layers of insulation. Sweat fittings shall be insulated with miter-cut pieces the same size as on adjacent piping. Screwed fittings shall be insulated with sleeved fitting covers fabricated from miter-cut pieces and shall be overlapped and sealed to the adjacent pipe insulation.

3.2.1.5 Pipe Insulation Material and Thickness

Pipe insulation materials must be as listed in Table 1 and must meet or exceed the requirements of ASHRAE 90.1 - IP.

TABLE 1

Insulation Material for Piping

Service					
	Material	Specification	Type	Class	VR/VB Req'd
Cold Domestic Water Piping and Makeup Water					
	Flexible Elastomeric Cellular	ASTM C534/C534M	I		No
Hot Domestic Water Supply & Recirculating Piping (Max 200 F)					
	Mineral Fiber	ASTM C547	I	1	No
	Flexible Elastomeric Cellular	ASTM C534/C534M	I		No
Refrigerant Suction Piping (35 degrees F nominal)					

TABLE 1

Insulation Material for Piping

Service					
	Material	Specification	Type	Class	VR/VB Req'd
	Flexible Elastomeric Cellular	ASTM C534/C534M	I		No
Exposed Lavatory Drains, Exposed Domestic Water Piping & Drains to Areas for Handicapped Personnel					
	Flexible Elastomeric Cellular	ASTM C534/C534M	I		No
Condensate Drain Located Inside Building					
	Flexible Elastomeric Cellular	ASTM C534/C534M	I		No
Note: VR/VB = Vapor Retarder/Vapor Barrier					

TABLE 2

Piping Insulation Thickness (inch)
Do not use integral wicking material in Chilled water applications exposed to outdoor ambient conditions in climatic zones 1 through 4.

Service						
	Material	Tube And Pipe Size (inch)				
		<1	1-<1.5	1.5-<4	4-<8	> or = >8
Cold Domestic Water Piping, Makeup Water & Drinking Fountain Drain Piping						
	Flexible Elastomeric Cellular	0.5	0.5	1	N/A	N/A
Hot Domestic Water Supply & Recirculating Piping (Max 200 F)						
	Mineral Fiber	1	1	1.5	1.5	1.5
	Flexible Elastomeric Cellular	1	1	1	N/A	N/A
Refrigerant Suction Piping (35 degrees F nominal)						
	Flexible Elastomeric Cellular	0.5	1	1	N/A	N/A
Exposed Lavatory Drains, Exposed Domestic Water Piping & Drains to Areas for Handicapped Personnel						
	Flexible Elastomeric Cellular	0.5	0.5	0.5	0.5	0.5
Condensate Drain Located Inside Building						

TABLE 2

Piping Insulation Thickness (inch)
Do not use integral wicking material in Chilled water applications exposed to outdoor ambient conditions in climatic zones 1 through 4.

Service						
	Material	Tube And Pipe Size (inch)				
		<1	1-<1.5	1.5-<4	4-<8	> or = >8
	Flexible Elastomeric Cellular	0.5	0.5	0.5	N/A	N/A

3.2.2 Aboveground Cold Pipelines

The following cold pipelines for minus 30 to plus 60 degrees F, shall be insulated in accordance with Table 2 except those piping listed in subparagraph Pipe Insulation in PART 3 as to be omitted. This includes but is not limited to the following:

a. Make-up water.

c. Refrigerant suction lines.

f. Air conditioner condensate drains.

h. Exposed lavatory drains and domestic water lines serving plumbing fixtures for handicap persons.

i. Domestic cold water.

3.2.2.1 Insulation Material and Thickness

Insulation thickness for cold pipelines shall be determined using Table 2.

3.2.2.2 Installing Insulation for Straight Runs Hot and Cold Pipe

Apply insulation to the pipe with tight butt joints. Seal all butted joints and ends with joint sealant and seal with a vapor retarder coating.

3.2.2.2.1 Factory Self-Sealing Lap Systems

May be used when the ambient temperature is between 40 and 120 degrees F during installation. Install the lap system in accordance with manufacturer's recommendations. Use a stapler only if specifically recommended by the manufacturer. Where gaps occur, replace the section or repair the gap by applying adhesive under the lap and then stapling.

3.2.2.2.2 Staples

Coat all staples, including those used to repair factory self-seal lap systems, with a vapor retarder coating or PVDC adhesive tape or greater than 3 ply laminate jacket - less than 0.0000 perm adhesive tape. Coat all

seams, except those on factory self-seal systems, with vapor retarder coating or PVDC adhesive tape or greater than 3 ply laminate jacket - less than 0.0000 perm adhesive tape.

3.2.2.2.3 Breaks and Punctures in the Jacket Material

Patch by wrapping a strip of jacket material around the pipe and secure it with adhesive, staple, and coat with vapor retarder coating or PVDC adhesive tape or greater than 3 ply laminate jacket - less than 0.0000 perm adhesive tape. Extend the patch not less than 1-1/2 inches past the break.

3.2.2.2.4 Penetrations Such as Thermometers

Fill the voids in the insulation and seal with vapor retarder coating or PVDC adhesive tape or greater than 3 ply laminate jacket - less than 0.0000 perm adhesive tape.

3.2.2.2.5 Flexible Elastomeric Cellular Pipe Insulation

Install by slitting the tubular sections and applying them onto the piping or tubing. Alternately, whenever possible slide un-slit sections over the open ends of piping or tubing. Secure all seams and butt joints and seal with adhesive. When using self seal products only the butt joints shall be secured with adhesive. Push insulation on the pipe, never pulled. Stretching of insulation may result in open seams and joints. Clean cut all edges. Rough or jagged edges of the insulation are not be permitted. Use proper tools such as sharp knives.

3.2.2.3 Insulation for Fittings and Accessories

a. Pipe insulation shall be tightly butted to the insulation of the fittings and accessories. The butted joints and ends shall be sealed with joint sealant and sealed with a vapor retarder coating or PVDC adhesive tape or greater than 3 ply laminate jacket - less than 0.0000 perm adhesive tape.

d. Anchors attached directly to the pipe shall be insulated for a sufficient distance to prevent condensation but not less than 6 inches from the insulation surface.

e. Insulation shall be marked showing the location of unions, strainers, and check valves.

3.2.3 Aboveground Hot Pipelines

3.2.3.1 General Requirements

All hot pipe lines above 60 degrees F, except those piping listed in subparagraph Pipe Insulation in PART 3 as to be omitted, shall be insulated in accordance with Table 2. This includes but is not limited to the following:

a. Domestic hot water supply & re-circulating system.

Insulation shall be covered, in accordance with manufacturer's recommendations, with a factory applied Type I jacket or field applied aluminum where required or seal welded PVC.

3.2.3.2 Insulation for Fittings and Accessories

Pipe insulation shall be tightly butted to the insulation of the fittings and accessories. The butted joints and ends shall be sealed with joint sealant. Insulation shall be marked showing the location of unions, strainers, check valves and other components that would otherwise be hidden from view by the insulation.

3.2.3.2.1 Precut or Preformed

Place precut or preformed insulation around all fittings and accessories. Insulation shall be the same insulation as the pipe insulation, including same density, thickness, and thermal conductivity.

3.2.3.2.2 Rigid Preformed

Where precut/preformed is unavailable, rigid preformed pipe insulation sections may be segmented into the shape required. Insulation of the same thickness and conductivity as the adjoining pipe insulation shall be used. If nesting size insulation is used, the insulation shall be overlapped 2 inches or one pipe diameter. Elbows insulated using segments shall conform to MICA Tables 12.20 "Mitered Insulation Elbow".

3.3 DUCT INSULATION SYSTEMS INSTALLATION

Except for oven hood exhaust duct insulation, corner angles shall be installed on external corners of insulation on ductwork in exposed finished spaces before covering with jacket. Air conditioned spaces shall be defined as those spaces directly supplied with cooled conditioned air (or provided with a cooling device such as a fan-coil unit) and heated conditioned air (or provided with a heating device such as a unit heater, radiator or convector).

3.3.1 Duct Insulation Minimum Thickness

Duct insulation minimum thickness in accordance with Table 4.

Table 4 - Minimum Duct Insulation(R-value)	
Fresh Air Intake Ducts	R-6
Supply Air Ducts in Concealed Spaces	R-3.5
Exhaust Air Ducts	R-6

3.3.2 Insulation and Vapor Retarder/Vapor Barrier for Cold Air Duct

Insulation and vapor retarder/vapor barrier shall be provided for the following cold air ducts and associated equipment.

c. Exhaust air ducts.

i. Fresh air intake ducts.

3.3.3 Duct Test Holes

After duct systems have been tested, adjusted, and balanced, breaks in the insulation and jacket shall be repaired in accordance with the applicable

section of this specification for the type of duct insulation to be repaired.

3.4 EQUIPMENT INSULATION SYSTEMS INSTALLATION

3.4.1 General

Equipment insulation shall be omitted on the following:

f. Duct Test/Balance Test Holes.

-- End of Section --

SECTION 23 09 53.00 20

SPACE TEMPERATURE CONTROL SYSTEMS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3-4 2014; AMD 4-6 2014) National Electrical Code
NFPA 90A	(2015) Standard for the Installation of Air Conditioning and Ventilating Systems

1.2 SYSTEM DESCRIPTION

Provide new and modify existing space temperature control systems complete and ready for operation.

1.3 SYSTEM REQUIREMENTS

Provide control systems composed of any combination of electric, analog electronic or pneumatic devices. Indicated control system devices of a particular type do not intend a requirement for the device unless the requirement is specifically indicated. Requirements apply to field installed control systems.

1.4 PERFORMANCE REQUIREMENTS

Provide control systems to maintain the required heating, ventilating, and cooling (HVAC) conditions by performing the functions and sequences of operations indicated. Control systems shall be complete, including all equipment and appurtenances, and ready for operation. Control systems shall be furnished, installed, tested, calibrated, and started up by, or under the supervision of trained technicians certified by the Contractor as qualified and regularly employed in such work. Control system equipment, valves, panels and dampers shall bear the manufacturer's nameplate.

1.5 DESIGN REQUIREMENTS

1.5.1 Control System Diagrams

For each system, indicate HVAC process flow and location of devices relative to flow and to the HVAC control panel, the connections of control devices in control loops, references of control device contacts and device operating coils to line numbers of a ladder diagram and sequencing diagrams showing the operation of valves, dampers, and contacts relative to controller output, and HVAC process variables.

1.5.2 Operating Parameters

Indicate operating parameters for devices shown on the control system diagram such as setpoints, ranges, limits, differentials, outside air temperature schedules, contact operating points, and HVAC equipment operating time schedules.

1.5.3 Arrangement Drawing

Arrangement diagram of each HVAC control system panel coordinated with device identifiers on the control system diagram.

1.6 SUBMITTALS

Submit the following:

SD-02 Shop Drawings

Control System Diagrams for each HVAC system;

Operating Parameters;

Sequence of Operation;

SD-03 Product Data

Actuators;

Valves;

Dampers;

Fire Protection Devices;

Sensors;

Thermostats;

Sunshields;

Pressure Switches;

Indicating Devices;

Controllers;

Pressure Gages;

Control Panels;

SD-06 Test Reports

InstallerCalibration Adjustment And Commissioning Reports;

SD-08 Manufacturer's Instructions

SD-10 Operation and Maintenance Data

Space Temperature Control System

1.7 QUALITY ASSURANCE

1.7.1 Standard Products

a. Material and equipment shall be standard products of manufacturers regularly engaged in the manufacturing of such products, using similar materials, design and workmanship.

b. The equipment items shall be supported by a service organization.

1.7.2 Verification of Dimensions

Contractor shall become familiar with details of work, shall verify dimensions in the field, and shall advise the Architect and Mechanical Engineer of any discrepancy before performing work.

1.7.3 Modification of References

Accomplish work in accordance with ASME B31.1, ASME B31.5, NFPA 70, and NFPA 90A, except as modified herein or indicated otherwise for equipment, materials, installation, examination, inspection, and testing. Consider the advisory or recommended provisions to be mandatory, as though the word "shall" had be substituted for the words "should" or "could" or "may," wherever they appear. Interpret reference to "authority having jurisdiction" and "owner" to mean the Contracting Officer.

1.7.4 Commissioning Procedures

Define procedures specific to each control system including instructions on how to set control parameters and setpoints, proportional, integral and derivative mode constants, contact output settings, positioner range adjustments, and calibration checks of transmitters

1.7.5 Calibration Adjustment and Commissioning Reports

Submit specific to each HVAC control system, including settings adjustments and results of calibration checks

1.7.6 Space Temperature Control System

In addition to the requirements specified in the paragraph SUBMITTALS, meet the following requirements. Submit Operation and Maintenance Manuals for items of equipment listed under paragraph PRODUCT DATA. Manual shall contain full hardware support documentation, which shall include but not be limited to the following:

a. General description and specifications

f. Preventive maintenance requirements and a maintenance checklist

g. Detailed schematics and assembly drawings

j. Complete as-built control drawings, schedules, and sequence of operation

k. Controller configuration and parameter setting procedures

m. Manufacturer supplied operator manuals for equipment

n. Qualified service organization list

PART 2 PRODUCTS

2.1 AUTOMATIC CONTROL VALVES

Provide automatic control valves.

2.1.1 Two-Way Valves

Two-way modulating valves shall have equal percentage characteristics.

2.1.2 Three-Way Valves

Three-way valves shall provide constant total flow throughout full plug travel.

2.1.3 Valves for Hot Water Service

Valves for hot water service below 250 Degrees F shall conform to ASME B16.1. Bodies for valves 2 inches and smaller shall be brass or bronze, with threaded-end or union-end connections.

2.2 FIRE PROTECTION DEVICES

Provide smoke detectors in return and supply air ducts on the downstream side of the filters in accordance with NFPA 90A, except as otherwise indicated. Provide UL listed or FM approved detectors for duct installation.

2.2.1 Smoke Detectors

Provide in each air-handling system with supply air capacity greater than 2000 cfm in accordance with NFPA 90A. Locate downstream of the supply air filters and prior to any branch connection in accordance with NFPA 72.

2.3 THERMOSTATS

Provide thermostats for each zone as indicated on Drawings. Provide lockable thermostat guard for Dining Hall Seating Area and Kitchen thermostats and the Community Room thermostat.

2.3.1 Ranges

Thermostat ranges shall be selected so that the setpoint is adjustable without tools between plus or minus 10 degrees F of the setpoint indicated.

2.3.2 Microprocessor-Based Room Thermostats

Microprocessor-based room thermostats shall have built-in keypads for

scheduling of day and night temperature settings. When out of the scheduling mode, thermostats shall have continuous 12-hour time display, with AM and PM indication, continuous display of day of the week, and either continuous display of room temperature with display of temperature setpoint on demand, or continuous display of temperature setpoint with display of room temperature on demand. In the programmable mode, use the display for setting and interrogating time program ON-OFF setpoints for each day of the week. The time program shall allow two separate temperature setback intervals per day. Thermostats shall have a means for temporary and manual override of program schedule, with automatic program restoration on the following day. Thermostats shall have a replaceable battery to maintain timing and to maintain the schedule in memory for one year in the event of a power outage. Maximum differential shall be 2 degrees F.

PART 3 EXECUTION

3.1 INSTALLATION

Perform installation under the supervision of competent technicians regularly employed in the installation of control systems. Provide components for a complete and operational control system. Provide control system complete and ready for operation, as specified and indicated. Provide dielectric isolation where dissimilar metals are used for connection and support. Penetrations through and mounting holes in the building exterior shall be watertight. Control system installation shall provide adequate clearance for control system maintenance by maintaining access spaces between coils, to mixed-air plenums, and as required to calibrate, remove, repair, or replace control system devices. Control system installation shall not interfere with the clearance requirements for mechanical and electrical system maintenance. Install devices mounted in or on piping or ductwork, on building surfaces, in mechanical and electrical spaces, or in occupied space ceilings in accordance with manufacturer's recommendations. Provide control devices to be installed in piping and ductwork with required gaskets, flanges, thermal compounds, insulation, piping, fittings, and manual valves for shutoff, equalization, purging, and calibration. Certify that installation of control system is complete and technical requirements of this section have been met.

3.1.1 Sensors

Provide sensors in locations to sense the appropriate condition. Install sensor and transmitter where easily accessible and serviceable without special tools. Sensors shall be calibrated to the accuracy specified in the contract, and operate correctly when installed. Do not install sensors designed for one application in the place of another application (e.g., replacing a duct sensor with a room sensor).

3.1.1.1 Room Sensors

Provide on interior walls to sense average room conditions. Avoid locations which may be covered by office furniture. Do not mount room sensors on exterior walls if other locations are available. Mount centerline of sensor 5 feet above finished floor.

3.1.1.2 Duct Temperature Sensors

Provide sensors in ductwork in general locations as indicated. Select specific sensor location within duct to accurately sense appropriate air

temperatures. Locate sensor connection boxes in position not obstructed by ducts or equipment. Install gaskets between sensor housing and duct wall. Seal duct and insulation penetrations. Install duct averaging sensors between two rigid supports in serpentine position to sense average conditions. Sensor shall have a total minimum length of one linear foot per 4 square feet of duct area. Sensor shall be mounted a minimum of 3 inches from outside wall surface. Thermally isolate temperature sensing elements from supports. Provide duct access doors to averaging sensors.

3.1.1.3 Immersion Temperature Sensors

Provide thermowells for sensors measuring temperatures in liquid applications or pressure vessels. Locate wells to sense continuous flow conditions. Do not install wells using extension couplings. Where piping diameters are smaller than the length of the wells, provide wells in piping at elbows to effect proper flow across entire area of the well. Wells shall not restrict flow area to less than 70 percent of pipe area. Increase piping size as required to avoid restriction. Temperature sensors shall be installed in thermowells with thermal transmission material to speed the response of temperature measurement. Provide thermowells with sealing nuts to contain thermal transmission material.

3.1.2 Pressure Sensors

3.1.2.1 Duct Static Pressure

Duct static pressure sensor shall be located where indicated on drawings. If no location is indicated, it should be located approximately two-thirds of distance from supply fan to the end of duct with greatest pressure drop.

3.1.3 Valves

Provide valve with stems upright where possible but with stems not lower than horizontal. Provide positioners where indicated and where necessary to prevent overlap of heating and cooling where one controller operates more than one pneumatic device and to maintain the proper dead band between heating and cooling.

3.1.4 Access Doors

Provide access doors in ductwork to service airflow monitoring devices, devices with averaging elements, and low-temperature protection thermostats (freezestats).

3.2 FIELD QUALITY CONTROL

a. Demonstrate compliance of HVAC control systems. Furnish personnel, equipment, instrumentation, and supplies necessary to perform calibration and site testing. Calibrate test equipment in accordance with NIST standards. Ensure that tests are performed or supervised by competent employees of the control system installer or the control system manufacturer regularly employed in testing and calibration of control systems.

b. Testing shall include field tests and the performance verification test. Field tests shall demonstrate proper calibration of instrumentation, input and output devices, and operation of specific equipment. The performance verification test shall ensure proper execution of sequence of operation and proper tuning

of control loops.

3.2.1 Coordination With HVAC System Balancing

Tune the control system after air and hydronic systems have been balanced, minimum damper positions have been set, and a report has been issued.

3.2.2 Performance Verification Test

Conduct the performance verification tests to demonstrate that the control system maintains setpoints and that the control loops are tuned for the correct sequence of operation. Specifically, the performance verification test shall demonstrate that the HVAC system operates properly through the complete sequence of operation (e.g., seasonal, occupied and unoccupied, warm up, etc.), for specified control sequences. Demonstrate that the control system performs the correct sequence of control.

3.3 TRAINING

Provide a qualified instructor to conduct training courses for designated personnel in maintenance and operation of HVAC and control systems. Orient training to the specific system being installed under the contract.

3.4 QUALIFIED SERVICE ORGANIZATION LIST

The qualified service organization list shall include names and telephone numbers of organizations qualified to service HVAC control systems.

3.5 COMMISSIONING

Commissioning of control systems is specified in the pre-field TAB engineering report described in Section 23 05 93 TESTING, ADJUSTING AND BALANCING.

-- End of Section --

SECTION 23 09 93

SEQUENCES OF OPERATION FOR HVAC CONTROL

PART 1 GENERAL

1.1 DEFINITIONS

For definitions related to this Section, see Section 23 09 00 INTRUMENTATION AND CONTROL FOR HVAC.

1.2 SUBMITTALS

Submittals related to this Section are specified in Section 23 09 00 INTRUMENTATION AND CONTROL FOR HVAC.

PART 2 EXECUTION

2.1 SEQUENCES OF OPERATION FOR OCCUPANCY SCHEDULING

2.1.1 System Mode

Operate air handling units (AHUs) in Occupied, Warm-Up-Cool-Down, or Unoccupied modes as specified. Boilers for hydronic loads do not require scheduling; these systems receive requests for heating/cooling from their loads.

2.2 SEQUENCES OF OPERATION FOR AIR HANDLING UNITS

2.2.1 All-Air Small Package Unitary System

Install DDC hardware to perform this Sequence of Operation. Unless otherwise specified, all modulating control must be proportional-integral (PI) control.

2.2.1.1 Fan ON-AUTO Switch

2.2.1.1.1 ON

With the thermostat fan ON-AUTO switch in the ON position, the DDC Hardware must start and continuously run the fan.

2.2.1.1.2 AUTO

With the thermostat fan ON-AUTO switch in the AUTO position, the DDC Hardware operates the fan according to HEAT-OFF-COOL switch.

2.2.1.2 HEAT-OFF-COOL Switch

2.2.1.2.1 HEAT-COOL

With the thermostat switch in the HEAT or COOL positions, use the DDC Hardware to operate the package unit according to the Occupancy Mode.

2.2.1.2.2 OFF

With the thermostat switch in the OFF position, de-energize the heating unit and cooling unit with the DDC Hardware.

2.2.1.3 Occupancy Modes

2.2.1.3.1 Occupied

The unit DDC Hardware must be in the Occupied Mode when the local space occupancy input(s) indicate that the space is occupied or when the input from the System Scheduler is occupied.

2.2.1.3.2 Unoccupied

The unit DDC Hardware must be in the Unoccupied Mode when the local space occupancy input(s) indicate that the space is unoccupied and when the input from the System Scheduler is unoccupied.

2.2.1.4 Safeties

Run the unit subject to the unit manufacturer's safeties.

2.2.1.5 Zone Temperature Control

a. In the Occupied Mode the zone temperature setpoint (ZN-T-SP) must be at the configured setpoint or at the occupant-adjustable setpoint via the wall-mounted thermostat, as indicated.

b. In the Unoccupied Mode the zone temperature setpoint must be at the configured setpointas indicated.

c. Cycle the fan, cooling unit, heating unit with the DDC Hardware, in accordance with the HEAT-COOL switch setting, to maintain zone temperature at setpoint.

2.2.2 Energy Recovery Ventilator

Provide control panel in Community Room. Install boost switches in Apartment bathroom and kitchen. Unit shall ventilate constantly when Community Room or Apartment is occupied.

2.3 SEQUENCES OF OPERATION FOR HYDRONIC SYSTEMS

2.3.1 Hydronic Heating Hot Water from Distributed [Steam][HTHW] Converter

Install zone thermostats as indicated on drawings. Heat call from thermostat opens zone valve and end switch on any zone valve sends enable signal to heating zone pump in boiler room.

-- End of Section --

SECTION 23 11 25

FACILITY GAS PIPING

PART 1 GENERAL

1.1 SUMMARY

This specification section applies to incidental underground piping under building, above ground steel piping and corrugated stainless steel tubing (CSST) both outside (up to 5 feet beyond exterior walls) and within buildings in compliance with NFPA 54/AGA Z223.1, "Fuel Gas Piping".

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z21.1	(2010; Addenda A 2011; Addenda B 2012) Household Cooking Gas Appliances
ANSI Z21.15/CSA 9.1	(2009; Addenda A 2012, Addenda B 2013; R 2014) Manually Operated Gas Valves for Appliances, Appliance Connector Valves and Hose End Valves
ANSI Z21.18/CSA 6.3	(2007; Addenda A 2010; Addenda B 2012; R 2013) Gas Appliance Pressure Regulators
ANSI Z21.21/CSA 6.5	(2015) Automatic Valves for Gas Appliances

ASME INTERNATIONAL (ASME)

ASME A13.1	(2007; R 2013) Scheme for the Identification of Piping Systems
ASME B16.33	(2012) Manually Operated Metallic Gas Valves for Use in Gas Piping Systems Up to 125 psi, Sizes NPS 1/2 - NPS 2

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 54	(2015) National Fuel Gas Code

1.3 SYSTEM DESCRIPTION

The gas piping system includes natural gas piping and appurtenances from point of connection with supply system, as indicated, to gas operated equipment within the facility. Submit operation and maintenance data in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA, in three separate packages.

1.4 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data
Pipe and Fittings;
Gas Equipment Connectors;
Pressure Regulators;
Valves;

SD-06 Test Reports
Testing;
Pressure Tests;
Test with Gas;

1.5 QUALITY ASSURANCE

Submit manufacturer's descriptive data and installation instructions for approval for compression-type mechanical joints used in joining dissimilar materials and for insulating joints. Mark all valves, flanges and fittings in accordance with MSS SP-25.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

Provide materials and equipment which are the standard products of a manufacturer regularly engaged in the manufacture of the products and that essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. Asbestos or products containing asbestos are not allowed. Submit catalog data and installation instructions for pipe, valves, all related system components, pipe coating materials and application procedures. Conform to NFPA 54 and with requirements specified herein. Provide supply piping to appliances or equipment at least as large as the inlets thereof.

2.2 GAS PIPING SYSTEM AND FITTINGS2.2.1 Steel Pipe, Joints, and Fittings

Provide steel pipe conforming to ASTM A 53, Schedule 40.

2.2.2 Sealants for Steel Pipe Threaded Joints

Provide joint sealing compound as listed in UL FLAMMABLE & COMBUSTIBLE, Class 20 or less. For taping, use tetrafluoroethylene tape conforming to UL FLAMMABLE & COMBUSTIBLE.

2.3 VALVES

Provide shutoff or service isolation valves conforming to the following:

2.3.1 Valves 2 Inches and Smaller

Provide valves 2 inches and smaller conforming to ASME B16.33 of materials and manufacture compatible with system materials used. Provide manually operated household cooking gas appliance valves conforming to ANSI Z21.1 and ANSI Z21.15/CSA 9.1.

2.4 PIPE HANGERS AND SUPPORTS

Provide pipe hangers and supports conforming to MSS SP-58.

2.5 REGULATORS AND SHUTOFF VALVES

Provide regulators conforming to ANSI Z21.18/CSA 6.3 for appliances . Provide shutoff valves conforming to ANSI Z21.15/CSA 9.1 for manually controlled gas shutoff valves and ANSI Z21.21/CSA 6.5 for automatic shutoff valves for gas appliances.

2.6 IDENTIFICATION FOR ABOVEGROUND PIPING

For pipes 3/4 inch od and larger, provide printed legends to identify contents of pipes and arrows to show direction of flow. Color code label backgrounds to signify levels of hazard. Make labels of plastic sheet with pressure-sensitive adhesive suitable for the intended application. For pipes smaller than 3/4 inch od, provide brass identification tags 1 1/2 inches in diameter with legends in depressed black-filled characters.

PART 3 EXECUTION

3.1 EXAMINATION

After becoming familiar with all details of the work, verify all dimensions in the field, and advise the Mechanical Engineer of Record of any discrepancy or areas of conflict before performing the work.

3.2 GAS PIPING SYSTEM

Provide a gas piping system from the point of delivery, defined as the outlet of the shutoff valve, to the connections to each gas utilization device.

3.2.1 Protection and Cleaning of Materials and Components

Protect equipment, pipe, and tube openings by closing with caps or plugs during installation. At the completion of all work, thoroughly clean the entire system.

3.2.2 Workmanship and Defects

Piping, tubing and fittings shall be clear and free of cutting burrs and defects in structure or threading and shall be thoroughly brushed and chip-and scale-blown. Repair of defects in piping, tubing or fittings is not allowed; replace defective items when found.

3.3 PROTECTIVE COVERING

3.3.1 Aboveground Metallic Piping Systems

3.3.1.1 Ferrous Surfaces

Touch up shop primed surfaces with ferrous metal primer. Solvent clean surfaces that have not been shop primed . Mechanically clean surfaces that contain loose rust, loose mill scale and other foreign substances by power wire brushing and prime with ferrous metal primer or vinyl type wash coat. Finish primed surfaces with two coats of exterior oil paint or vinyl paint.

3.3.1.2 Nonferrous Surfaces

Except for aluminum alloy pipe, do not paint nonferrous surfaces. Paint surfaces of aluminum alloy pipe and fittings to protect against external corrosion where they contact masonry, plaster, insulation, or are subject to repeated wettings by such liquids as water, detergents or sewage. Solvent-clean the surfaces and treat with vinyl type wash coat. Apply a first coat of aluminum paint and a second coat of alkyd gloss enamel or silicone alkyd copolymer enamel.

3.4 INSTALLATION

Install the gas system in conformance with the manufacturer's recommendations and applicable provisions of , and as indicated. Perform all pipe cutting without damage to the pipe, with an approved type of mechanical cutter, unless otherwise authorized. Use wheel cutters where practicable.

3.4.1 Metallic Piping Installation

Make changes in direction of piping with fittings only; mitering or notching pipe to form elbows and tees or other similar type construction is not permitted. Branch connection may be made with either tees or forged branch outlet fittings. Provide branch outlet fittings which are forged, flared for improvement of flow where attached to the run, and reinforced against external strains. Do not use aluminum alloy pipe in exterior locations or underground.

3.4.2 Concealed Piping in Buildings

Do not use combinations of fittings (unions, tubing fittings, running threads, right- and left-hand couplings, bushings, and swing joints) to conceal piping within buildings.

3.4.2.1 Piping and Tubing in Partitions

Locate concealed piping and tubing in hollow, rather than solid, partitions. Protect tubing passing through walls or partitions against physical damage both during and after construction, and provide appropriate safety markings and labels. Provide protection of concealed pipe and tubing in accordance with ANSI LC 1/CSA 6.26.

3.4.3 Aboveground Piping

Run aboveground piping as straight as practicable along the alignment and elevation indicated, with a minimum of joints, and separately supported from other piping system and equipment. Install exposed horizontal piping no farther than 6 inches from nearest parallel wall and at an elevation which prevents standing, sitting, or placement of objects on the piping.

3.4.4 Final Gas Connections

Unless otherwise specified, make final connections with rigid metallic pipe and fittings. Flexible connectors may be used for final connections to gas utilization equipment. In addition to cautions listed in instructions required by ANSI standards for flexible connectors, insure that flexible connectors do not pass through equipment cabinet. Provide accessible gas shutoff valve and coupling for each gas equipment item.

3.5 PIPE JOINTS

Design and install pipe joints to effectively sustain the longitudinal pull-out forces caused by contraction of the piping or superimposed loads.

3.5.1 Threaded Metallic Joints

Provide threaded joints in metallic pipe with tapered threads evenly cut and made with UL approved graphite joint sealing compound for gas service or tetrafluoroethylene tape applied to the male threads only. Threaded joints up to 1-1/2 inches in diameter may be made with approved tetrafluoroethylene tape. Threaded joints up to 2 inches in diameter may be made with approved joint sealing compound. After cutting and before threading, ream pipe and remove all burrs. Caulking of threaded joints to stop or prevent leaks is not permitted.

3.6 PIPE SLEEVES

Provide pipes passing through concrete or masonry walls or concrete floors or roofs with pipe sleeves fitted into place at the time of construction. Do not install sleeves in structural members except where indicated or approved. Make all rectangular and square openings as detailed. Extend each sleeve through its respective wall, floor or roof, and cut flush with each surface, except in mechanical room floors not located on grade where clamping flanges or riser pipe clamps are used. Extend sleeves in mechanical room floors above grade at least 4 inches above finish floor. Unless otherwise indicated, use sleeves large enough to provide a minimum clearance of 1/4 inch all around the pipe. Provide steel pipe for sleeves in bearing walls, waterproofing membrane floors, and wet areas . Provide sleeves in nonbearing walls, floors, or ceilings of steel pipe, galvanized sheet metal with lock-type longitudinal seam, or moisture-resistant fiber or plastic. For penetrations of fire walls, fire partitions and floors which are not on grade, seal the annular space between the pipe and sleeve with fire-stopping material and sealant that meet the requirement of Section 07 84 00 FIRESTOPPINGG.

3.7 PIPES PENETRATING WATERPROOFING MEMBRANES

Install pipes penetrating waterproofing membranes as specified in Section 22 00 00 PLUMBING, GENERAL PURPOSE.

3.8 FIRE SEAL

Fire seal all penetrations of fire rated partitions, walls and floors in accordance with Section 07 84 00 FIRESTOPPING.

3.9 ESCUTCHEONS

Provide escutcheons for all finished surfaces where gas piping passes through floors, walls, or ceilings except in boiler, utility, or equipment rooms.

3.10 SPECIAL REQUIREMENTS

Provide drips, grading of the lines, freeze protection, and branch outlet locations as shown and conforming to the requirements of NFPA 54.

3.11 BUILDING STRUCTURE

Do not weaken any building structure by the installation of any gas piping. Do not cut or notch beams, joists or columns. Attach piping supports to metal decking. Do not attach supports to the underside of concrete filled floors or concrete roof decks unless approved by the Contracting Officer.

3.12 PIPING SYSTEM SUPPORTS

Support gas piping systems in buildings with pipe hooks, metal pipe straps, bands or hangers suitable for the size of piping or tubing. Do not support any gas piping system by other piping. Conform spacing of supports in gas piping and tubing installations to the requirements of NFPA 54. Conform the selection and application of supports in gas piping and tubing installations to the requirements of MSS SP-69. In the support of multiple pipe runs on a common base member, use a clip or clamp where each pipe crosses the base support member. Spacing of the base support members is not to exceed the hanger and support spacing required for any of the individual pipes in the multiple pipe run. Rigidly connect the clips or clamps to the common base member. Provide a clearance of 1/8 inch between the pipe and clip or clamp for all piping which may be subjected to thermal expansion.

3.13 ELECTRICAL BONDING AND GROUNDING

Provide a gas piping system within the building which is electrically continuous and bonded to a grounding electrode as required by NFPA 70.

3.14 SHUTOFF VALVE

Install the main gas shutoff valve controlling the gas piping system to be easily accessible for operation, as indicated, protected from physical damage, and marked with a metal tag to clearly identify the piping system controlled. Install valves approximately at locations indicated. Orient stems vertically, with operators on top, or horizontally. Provide stop valve on service branch at connection to main and shut-off valve on riser outside of building.

3.15 TESTING

Submit test procedures and reports in booklet form tabulating test and measurements performed; dated after award of this contract, and stating the Contractor's name and address, the project name and location, and a list of the specific requirements which are being certified. Test entire gas piping system to ensure that it is gastight prior to putting into service. Prior to testing, purge the system, clean, and clear all foreign material. Test each joint with an approved gas detector, soap and water, or an equivalent nonflammable solution. Inspect and test each valve in conformance with API Std 598 and API Std 607. Complete testing before any work is covered, enclosed, or concealed, and perform with due regard for the safety of employees and the public during the test. Install bulkheads, anchorage and bracing suitably designed to resist test pressures if necessary, and as directed and or approved by the Contracting Officer. Do not use oxygen as a testing medium.

3.15.1 Pressure Tests

Submit test procedures and reports in booklet form tabulating test and

measurements performed; dated after award of this contract, and stating the Contractor's name and address, the project name and location, and a list of the specific requirements which are being certified. Before appliances are connected, test by filling the piping systems with air or an inert gas to withstand a minimum pressure of 3 pounds gauge for a period of not less than 10 minutes as specified in NFPA 54 without showing any drop in pressure. Do not use Oxygen for test. Measure pressure with a mercury manometer, slope gauge, or an equivalent device calibrated to be read in increments of not greater than 0.1 pound. Isolate the source of pressure before the pressure tests are made.

3.15.2 Test With Gas

Before turning on gas under pressure into any piping, close all openings from which gas can escape. Immediately after turning on the gas, check the piping system for leakage by using a laboratory-certified gas meter, an appliance orifice, a manometer, or equivalent device. Conform all testing to the requirements of NFPA 54. If leakage is recorded, shut off the gas supply, repair the leak , and repeat the tests until all leaks have been stopped.

3.15.3 Purging

After testing is completed, and before connecting any appliances, fully purge all gas piping. Do not purge piping into the combustion chamber of an appliance. Do not purge the open end of piping systems into confined spaces or areas where there are ignition sources unless the safety precautions recommended in NFPA 54 are followed.

3.15.4 Labor, Materials and Equipment

Furnish all labor, materials and equipment necessary for conducting the testing and purging.

3.16 PIPE COLOR CODE MARKING

Provide color code marking of piping conforming to ASME A13.1.

-- End of Section --

SECTION 23 21 13.00 20

LOW TEMPERATURE WATER (LTW) HEATING SYSTEM

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASME INTERNATIONAL (ASME)

ASME B16.18	(2012) Cast Copper Alloy Solder Joint Pressure Fittings
ASME B16.22	(2013) Standard for Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
ASME B31.9	(2014) Building Services Piping

COPPER DEVELOPMENT ASSOCIATION (CDA)

CDA A4015	(2010) Copper Tube Handbook

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-110	(2010) Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends
MSS SP-58	(1993; Reaffirmed 2010) Pipe Hangers and Supports - Materials, Design and Manufacture, Selection, Application, and Installation

1.2 SYSTEM DESCRIPTION

Except as specified otherwise, equipment and piping components shall be suitable for use in low temperature water heating system. Except as modified herein, the pressure temperature limitations shall be as specified in the referenced standards and specifications. Pressures in this specification are pressures in pounds per square inch above atmospheric pressure, and temperatures are in degrees Fahrenheit (F).

1.2.1 Hot Water Heating System

Submit dimensions, capacities, and ratings. Include the following:

c. Finned tube radiators

d. Pumps

e. Valves

1.3 SUBMITTALS

Submit the following:

SD-03 Product Data

Finned tube radiators

Pumps

Hot water heating pipe

SD-06 Test Reports

Hydrostatic test of piping system

Finned tube radiators, Data Package 3;

1.4 QUALITY ASSURANCE

1.4.1 Standard Commercial Product for Terminal Units

Terminal units provided shall comply with features called out in this specification and shall be the manufacturer's standard commercial product. Additional or better features which are not prohibited by this specification but which are a part of the manufacturer's standard commercial product, shall be included in the terminal units being furnished. A standard commercial product is a product which has been sold or is currently being offered for sale, on the commercial market through advertisements or manufacturer's catalogs, or brochures. Provide Institute of Boiler and Radiator Manufacturer (IBR) or Steel Boiler Institute (SBI) rating for required capacity.

1.4.2 Brazing and Soldering

1.4.2.1 Brazing Procedure

ASME B31.9. Brazing procedure for joints shall be as outlined in CDA A4015.

1.4.2.2 Soldering, Soldering Preparation, and Procedures for Joints

ASME B31.9 and as outlined in CDA A4015.

1.5 SAFETY STANDARDS

1.5.1 Welding

Safety in welding and cutting of pipe shall conform to AWS Z49.1.

PART 2 PRODUCTS

2.1 PIPE AND FITTINGS

2.1.1 Hot Water Heating Pipe (Supply and Return)

ASTM A53/A53M electric resistance welded or seamless Schedule 40 steel pipe or ASTM B88 Type L hard drawn Copper tubing.

2.1.2 Fittings

Provide fittings compatible with the pipe being provided and shall conform to the following requirements.

2.1.2.1 Steel or Malleable Iron Pipe

Sizes 1/8 to 2 inches. ASME B16.11 steel socket welding or screwed type or ASME B16.3 for screwed type malleable iron fittings.

2.1.2.2 Fittings for Copper Tubing

ASME B16.18 cast bronze solder joint type or ASME B16.22 wrought copper solder joint type. Fittings may be flared or compression joint type.

2.1.3 Unions

2.1.3.1 Steel Pipe

Provide ASME B16.39, malleable iron unions, threaded connections.

2.1.3.2 Copper Tubing

Provide CID A-A-59617, bronze unions, solder joint end.

2.1.3.3 Dielectric Union

Provide insulated union with galvanized steel female pipe-threaded end and a copper solder joint end conforming with ASME B16.39, Class 1, dimensional, strength and pressure requirements. Union shall have a water-impervious insulation barrier capable of limiting galvanic current to one percent of the short-circuit current in a corresponding bimetallic joint. When dry, insulation barrier shall be able to withstand a 600-volt breakdown test.

2.1.4 Valves

2.1.4.1 Check Valves

a. Bronze Check Valves: MSS SP-80, 2 inches and smaller, regrinding swing check type, Class 200.

2.1.4.2 Temperature Regulating Valves

Provide ASSE 1017 copper alloy body with adjustable range thermostat.

2.1.4.3 Water Pressure-Reducing Valves

ASSE 1003.

2.1.4.4 Ball Valves

Flanged or butt-welding ends ball valve shall conform to MSS SP-72, bronze. Threaded, socket-welding, solder joint, grooved and flared ends shall conform to MSS SP-110.

2.1.4.5 Radiator Valves

Radiator valves shall be angle or straightway pattern, with packed or

packless bonnet shutoff globe type, designed especially for hot water heating system. Valve shall be constructed of brass or bronze or copper alloy conforming to ASTM specifications for materials with non-metallic renewable disc and plastic wheel handle for shutoff service.

2.1.4.6 Automatic Flow Control Balancing Valves

Brass or bronze Y-body with integral chrome plated brass-body ball valve.. Internal flow cartridge body shall have machined threads.

2.1.4.7 Relief Valves

Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labelled.

2.1.5 Miscellaneous Pipeline Components

2.1.5.1 Air Vent

Provide air vents at all high points in system.

2.1.5.2 Hangers and Supports

Design and fabrication of pipe hangers, supports, and welding attachments shall conform to MSS SP-58 and ASME B31.9. Hanger types and supports for bare and covered pipe shall conform to MSS SP-69 for the temperature range.

2.1.5.3 Pipe Sleeves

Sleeves in masonry and concrete walls, floors, and roof slabs shall be ASTM A53/A53M, Schedule 40 or Standard Weight, hot-dip galvanized steel ductile-iron or cast-iron pipe. Sleeves in partitions shall be zinc-coated sheet steel having a nominal weight of not less than 0.906 pound per square foot.

2.1.5.4 Escutcheon Plates

Provide one piece or split hinge metal plates for piping passing through floors, walls, and ceilings in exposed spaces. Provide polished stainless steel plates or chromium-plated finish on copper alloy plates in finished spaces and paint finish on metal plates in unfinished spaces.

2.2 PIPING SYSTEM EQUIPMENT

2.2.1 Pumps

Provide hot water circulating pumps as indicated on schedule Drawings M600 or M601.

2.3 TERMINAL UNITS

2.3.1 Finned Tube Radiators

. Copper tube and aluminum fin type CID A-A-50545.

2.4 CONTROLS

Provide controls as specified in Section 23 09 53.00 20 SPACE TEMPERATURE CONTROL SYSTEMS.

2.5 INSULATION

Provide shop and field applied insulation as specified in Section 23 07 00 THERMAL INSULATION FOR MECHANICAL SYSTEMS.

2.6 ASBESTOS PROHIBITION

Asbestos and asbestos containing products are prohibited.

PART 3 EXECUTION

3.1 PREPARATION

Provide storage for equipment and material at the project site. All parts shall be readily accessible for inspection, repair, and renewal. Protect material and equipment from the weather.

3.2 INSTALLATION

Piping fabrication, assembly, welding, soldering, and brazing shall conform to ASME B31.9. Piping shall follow the general arrangement shown. Route piping and equipment within buildings out of the way of lighting fixtures and doors, windows, and other openings. Run overhead piping in buildings in inconspicuous positions. Provide adequate clearances from walls, ceilings, and floors to permit welding of joints and application of insulation. Make provision for expansion and contraction of pipe lines. Make changes in size of water lines with reducing fittings. Do not bury, conceal, or insulate until piping has been inspected, tested, and approved. Do not run piping concealed in walls, partitions, underground, or under the floor except as otherwise indicated. Where pipe passes through building structure, locate pipe joints and expansion joints where they may be inspected. Provide flanged joints where necessary for normal maintenance and where required to match valves and equipment. Furnish gaskets, packing, and thread compounds suitable for the service. Provide long radius ells where possible to reduce pressure drops. Pipe bends in lieu of welding fittings may be used where space permits. Pipe bends shall have a uniform radius of at least five times the pipe diameter and shall be free from appreciable flattening, wrinkling, or thinning of the pipe. Do not use mitering of pipe to form elbows, notching straight runs to form full sized tees, or any similar construction. Make branch connections over 2 inches with welding tees except factory made forged welding branch outlets or nozzles having integral reinforcements conforming to ASME B31.9 may be used, provided the nominal diameter of the branch is at least one pipe size less than the nominal diameter of the run. Branch connections 2 inches and under can be threaded or welded. Run vertical piping plumb and straight and parallel to walls. Provide sleeves for lines passing through building structure. Provide a fire seal where pipes pass through fire wall, fire partitions, fire rated pipe chase walls, or floors above grade. Install piping connected to equipment with flexibility for thermal stresses and for vibration, and support and anchor so that strain from weight and thermal movement of piping is not imposed on the equipment.

3.2.1 Hangers and Supports

Unless otherwise indicated, horizontal and vertical piping attachments shall conform to MSS SP-58. Band and secure insulation protection shields without damaging pipe insulation. Continuous inserts and expansion bolts may be used.

3.2.2 Grading of Pipe Lines

Unless otherwise indicated, install horizontal lines of hot water piping to grade down in the direction of flow with a pitch of not less than one inch in 30 feet, except in loop mains and main headers where the flow may be in either direction.

3.2.3 Pipe Sleeves

Provide sleeves where pipes and tubing pass through masonry or concrete walls, floors, roof, and partitions. Annular space between pipe, tubing, or insulation and the sleeve shall not be less than 1/4 inch. Hold sleeves securely in proper position and location before and during construction. Sleeves shall be of sufficient length to pass through entire thickness of walls, partitions, or slabs. Sleeves in floor slabs shall extend 2 inches above finished floor. Firmly pack space between pipe or tubing and sleeve with oakum and caulk on both ends of the sleeve with plastic waterproof cement which will dry to a firm but pliable mass. Seal both ends of penetrations through fire walls and fire floors to maintain fire resistive integrity with UL listed fill, void, or cavity material.

3.2.4 Unions and Flanges

Provide unions and flanges to permit easy disconnection of piping and apparatus. Each connection having a screwed-end valve shall have a union. Place unions and flanges no farther apart than 100 feet. Install unions downstream of valves and at equipment or apparatus connections. Provide unions on piping under 2 inches in diameter, and provide flanges on piping 2 inches and over in diameter. Provide dielectric unions or flanges between ferrous and non-ferrous piping, equipment, and fittings; except that bronze valves and fittings may be used without dielectric couplings for ferrous-to-ferrous or non-ferrous-to-non-ferrous connections.

3.2.5 Changes in Pipe Size

Provide reducing fittings for changes in pipe size; reducing bushings are not permitted. In horizontal lines, provide eccentric reducing fittings to maintain the top of the lines in the same plane.

3.2.6 Cleaning of Pipe

Thoroughly clean each section of pipe, fittings, and valves free of foreign matter before erection. Prior to erection, hold each piece of pipe in an inclined position and tap along its full length to loosen sand, mill scale and other foreign matter. For pipe 2 inches and larger, draw wire brush, of a diameter larger than that of the inside of the pipe, several times through the entire length of pipe. Before making final connections to apparatus, wash out interior of piping thoroughly with water. Plug or cap open ends of mains during shutdown periods. Do not leave lines open where foreign matter might enter the pipe.

3.2.7 Valves

Install valves in conformance with ASME B31.9. Provide ball valves unless otherwise directed. Install valves in positions accessible for operation and repair.

3.2.7.1 Radiators Valves

Provide two-way valves on water inlet and balancing valves on water outlet of terminal heating units.

3.2.8 Cleaning of Systems

As installation of the various system components is completed, fill, start, and vent prior to cleaning. Place terminal control valves in open position. Add cleaner to closed system at concentration as recommended by manufacturer. Apply heat while circulating, slowly raising temperature to 160 degrees F and maintain for 12 hours minimum. Remove heat and circulate to 100 degrees F or less; drain systems as quickly as possible and refill with clean water. Circulate for 6 hours at design temperatures, then drain. Refill with clean water and repeat until system cleaner is removed. Use neutralizer agents on recommendation of system cleaner supplier and approval of Contracting Officer. Remove, clean, and replace strainer screens. Inspect, remove sludge, and flush low points with clean water after cleaning process is completed. Include disassembly of components as required. Preliminary or final tests are not permitted until cleaning is approved.

3.3 TESTING, ADJUSTING, AND BALANCING

Test, adjust, and balance the hydronic system in accordance with Section 23 05 93 TESTING, ADJUSTING AND BALANCING FOR HVAC.

-- End of Section --

SECTION 23 23 00

REFRIGERANT PIPING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ANSI/ASHRAE 15 & 34	(2013; Addenda A 2014; ERTA 1 2014; ERTA 2 2015; INT 1 2015; ERTA 3 2015) ANSI/ASHRAE Standard 15-Safety Standard for Refrigeration Systems and ANSI/ASHRAE Standard 34-Designation and Safety Classification of Refrigerants

AMERICAN WELDING SOCIETY (AWS)

AWS A5.8/A5.8M	(2011; Amendment 2012) Specification for Filler Metals for Brazing and Braze Welding

ASME INTERNATIONAL (ASME)

ASME B31.5	(2013) Refrigeration Piping and Heat Transfer Components

ASTM INTERNATIONAL (ASTM)

ASTM B280	(2013) Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service
ASTM B32	(2008; R 2014) Standard Specification for Solder Metal
ASTM B75/B75M	(2011) Standard Specification for Seamless Copper Tube
ASTM B813	(2010) Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube
ASTM E84	(2015b) Standard Test Method for Surface Burning Characteristics of Building Materials

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-58	(1993; Reaffirmed 2010) Pipe Hangers and

Supports - Materials, Design and Manufacture, Selection, Application, and Installation

1.2 SUBMITTALS

SD-03 Product Data

Refrigerant Piping System
Refrigerant Piping Tests

SD-06 Test Reports

Refrigerant Piping Tests

SD-10 Operation and Maintenance Data

Maintenance;
Operation and Maintenance Manuals;
Demonstrations;

1.3 QUALITY ASSURANCE

1.3.1 Contract Drawings

Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Carefully investigate the plumbing, fire protection, electrical, structural and finish conditions that would affect the work to be performed and arrange such work accordingly, furnishing required offsets, fittings, and accessories to meet such conditions.

1.4 DELIVERY, STORAGE, AND HANDLING

Protect stored items from the weather, humidity and temperature variations, dirt and dust, or other contaminants. Proper protection and care of all material both before and during installation is the Contractor's responsibility. Replace any materials found to be damaged at the Contractor's expense. During installation, cap piping and similar openings to keep out dirt and other foreign matter.

PART 2 PRODUCTS

2.1 STANDARD COMMERCIAL PRODUCTS

a. Provide materials and equipment which are standard products of a manufacturer regularly engaged in the manufacturing of such products, that are of a similar material, design and workmanship and that have been in satisfactory commercial or industrial use for 2 years prior to bid opening.

e. Manufacturer's standard catalog data, ator to the purchase or installation of a particular component, highlighted to show material, size, options, performance charts and curves, etc. in adequate detail to demonstrate compliance with contract requirements. Include in the data manufacturer's recommended installation instructions and procedures. Provide data for the following components as a minimum:

(1) Piping and Fittings
(2) Valves
(3) Piping Accessories
(4) Pipe Hangers, Inserts, and Supports

2.2 REFRIGERANT PIPING SYSTEM

Refrigerant piping, valves, fittings, and accessories shall be in accordance with ANSI/ASHRAE 15 & 34 and ASME B31.5, except as specified herein. Refrigerant piping, valves, fittings, and accessories shall be compatible with the fluids used and capable of withstanding the pressures and temperatures of the service. Refrigerant piping, valves, and accessories used for refrigerant service shall be cleaned, dehydrated, and sealed (capped or plugged) prior to shipment from the manufacturer's plant.

2.3 PIPE, FITTINGS AND END CONNECTIONS (JOINTS)

2.3.1 Copper Tubing

Copper tubing shall conform to ASTM B280 annealed or hard drawn as required. Copper tubing shall be soft annealed where bending is required and hard drawn where no bending is required. Soft annealed copper tubing shall not be used in sizes larger than 1-3/8 inches. Joints shall be brazed except that joints on lines 7/8 inchand smaller may be flared. Cast copper alloy fittings for flared copper tube shall conform to ASME B16.26 and ASTM B62. Wrought copper and bronze solder-joint pressure fittings shall conform to ASME B16.22 and ASTM B75/B75M. Joints and fittings for brazed joint shall be wrought-copper or forged-brass sweat fittings. Cast sweat-type joints and fittings shall not be allowed for brazed joints. Brass or bronze adapters for brazed tubing may be used for connecting tubing to flanges and to threaded ends of valves and equipment.

2.3.2 Solder

Solder shall conform to ASTM B32, grade Sb5, tin-antimony alloy for service pressures up to 150 psig. Solder flux shall be liquid or paste form, non-corrosive and conform to ASTM B813.

2.3.3 Brazing Filler Metal

Filler metal shall conform to AWS A5.8/A5.8M, Type BAg-5 with AWS Type 3 flux, except Type BCuP-5 or BCuP-6 may be used for brazing copper-to-copper joints.

2.4 VALVES

Valves shall be designed, manufactured, and tested specifically for refrigerant service. Valve bodies shall be of brass, bronze, steel, or ductile iron construction. Valves 1 inch and smaller shall have brazed or socket welded connections. Internal parts shall be removable for inspection or replacement without applying heat or breaking pipe connections. Valve stems exposed to the atmosphere shall be stainless steel or corrosion resistant metal plated carbon steel. Direction of flow shall be legibly and permanently indicated on the valve body. Control valve inlets shall be fitted with integral or adapted strainer or filter where recommended or required by the manufacturer. Purge, charge and receiver valves shall be of manufacturer's standard configuration.

2.4.1 Refrigerant Stop Valves

Valve shall be the globe or full-port ball type with a back-seating stem especially packed for refrigerant service. Valve packing shall be replaceable under line pressure. Valve shall be provided with a handwheel or wrench operator and a seal cap. Valve shall be the straight or angle pattern design as indicated.

2.5 PIPING ACCESSORIES

2.5.1 Pipe Hangers, Inserts, and Supports

Pipe hangers, inserts, guides, and supports shall conform to MSS SP-58.

2.6 FABRICATION

2.6.1 Factory Applied Insulation

Refrigerant suction lines between the cooler and each compressor shall be insulated with not less than 3/4 inch thick unicellular plastic foam. Insulationg exposed to UV (outdoors) must be protected with jacket or UV resistant coating/paint. Factory insulated items installed outdoors are not required to be fire-rated. As a minimum, factory insulated items installed indoors shall have a flame spread index no higher than 75 and a smoke developed index no higher than 150. Factory insulated items (no jacket) installed indoors and which are located in air plenums, in ceiling spaces, and in attic spaces shall have a flame spread index no higher than 25 and a smoke developed index no higher than 50. Flame spread and smoke developed indexes shall be determined by ASTM E84. Insulation shall be tested in the same density and installed thickness as the material to be used in the actual construction. Material supplied by a manufacturer with a jacket shall be tested as a composite material. Jackets, facings, and adhesives shall have a flame spread index no higher than 25 and a smoke developed index no higher than 50 when tested in accordance with ASTM E84.

PART 3 EXECUTION

3.1 EXAMINATION

After becoming familiar with all details of the work, perform a verification of dimensions in the field.

3.2 INSTALLATION

Pipe and fitting installation shall conform to the requirements of ASME B31.1. Cut pipe accurately to measurements established at the jobsite, and work into place without springing or forcing, completely clearing all windows, doors, and other openings. Cutting or other weakening of the building structure to facilitate piping installation are not permitted without written approval. Cut pipe or tubing square, removeremoved by reaming, and permit free expansion and contraction without causing damage to the building structure, pipe, joints, or hangers.

3.2.1 Directional Changes

Make changes in direction with fittings, except that bending of pipe 4 inches and smaller is permitted, provided a pipe bender is used and wide weep bends are formed. Mitering or notching pipe or other similar construction to form elbows or tees is not permitted. The centerline

radius of bends shall not be less than 6 diameters of the pipe. Bent pipe showing kinks, wrinkles, flattening, or other malformations will not be accepted.

3.2.2 Functional Requirements

Piping shall be installed 1/2 inch/10 feet of pipe in the direction of flow to ensure adequate oil drainage. Open ends of refrigerant lines or equipment shall be properly capped or plugged during installation to keep moisture, dirt, or other foreign material out of the system. Piping shall remain capped until installation. Equipment piping shall be in accordance with the equipment manufacturer's recommendations and the contract drawings. Equipment and piping arrangements shall fit into space allotted and allow adequate acceptable clearances for installation, replacement, entry, servicing, and maintenance.

3.2.3 Fittings and End Connections

3.2.3.1 Threaded Connections

Make threaded connections with tapered threads and make tight with PTFE tape complying with ASTM D3308 or equivalent thread-joint compound applied to the male threads only. Show not more than three threads after the joint is made.

3.2.3.2 Brazed Connections

Perform brazing in accordance with AWS BRH, except as modified herein. During brazing, fill the pipe and fittings with a pressure regulated inert gas, such as nitrogen, to prevent the formation of scale. Before brazing copper joints, clean both the outside of the tube and the inside of the fitting with a wire fitting brush until the entire joint surface is bright and clean. Do not use brazing flux. Remove surplus brazing material at all joints. Make steel tubing joints in accordance with the manufacturer's recommendations. Paint joints in steel tubing with the same material as the baked-on coating within 8 hours after joints are made. Protect tubing against oxidation during brazing by continuous purging of the inside of the piping using nitrogen. Support piping prior to brazing and do not spring or force.

3.2.3.3 Flared Connections

When flared connections are used, a suitable lubricant shall be used between the back of the flare and the nut in order to avoid tearing the flare while tightening the nut.

3.2.4 Valves

3.2.4.1 General

Refrigerant stop valves shall be installed on each side of each piece of equipment such as compressors condensers, evaporators, receivers, and other similar items in multiple-unit installation, to provide partial system isolation as required for maintenance or repair. Stop valves shall be installed with stems horizontal unless otherwise indicated. Ball valves shall be installed with stems positioned to facilitate operation and maintenance. Isolating valves for pressure gauges and switches shall be external to thermal insulation. Safety switches shall not be fitted with isolation valves. Filter dryers having access ports may be considered a

point of isolation. Purge valves shall be provided at all points of systems where accumulated noncondensable gases would prevent proper system operation. Valves shall be furnished to match line size, unless otherwise indicated or approved.

3.2.5 Pipe Hangers, Inserts, and Supports

Pipe hangers, inserts, and supports shall conform to MSS SP-58, except as modified herein. Pipe hanger types 5, 12, and 26 shall not be used. Hangers used to support piping 2 inches and larger shall be fabricated to permit adequate adjustment after erection while still supporting the load. Piping subjected to vertical movement, when operating temperatures exceed ambient temperatures, shall be supported by variable spring hangers and supports or by constant support hangers.

3.2.5.1 Hangers

Do not use Type 3 on insulated piping. Type 24 may be used only on trapeze hanger systems or on fabricated frames.

3.2.5.2 Inserts

Secure Type 18 inserts to concrete forms before concrete is placed. Continuous inserts which allow more adjustments may be used if they otherwise meet the requirements for Type 18 inserts.

3.2.5.3 C-Clamps

Torque Type 19 and 23 C-clamps in accordance with MSS SP-69 and have both locknuts and retaining devices, furnished by the manufacturer. Field-fabricated C-clamp bodies or retaining devices are not acceptable.

3.2.5.4 Angle Attachments

Type 20 attachments used on angles and channels shall be furnished with an added malleable-iron heel plate or adapter.

3.2.5.5 Saddles and Shields

Where Type 39 saddle or Type 40 shield are permitted for a particular pipe attachment application, the Type 39 saddle, connected to the pipe, shall be used on all pipe 4 inches and larger when the temperature of the medium is 60 degrees F or higher. Type 40 shields shall be used on all piping less than 4 inches and all piping 4 inches and larger carrying medium less than 60 degrees F. A high density insulation insert of cellular glass shall be used under the Type 40 shield for piping 2 inches and larger.

3.2.5.6 Horizontal Pipe Supports

Horizontal pipe supports shall be spaced as specified in MSS SP-69 and a support shall be installed not over 1 foot from the pipe fitting joint at each change in direction of the piping. Pipe supports shall be spaced not over 5 feet apart at valves. [Pipe hanger loads suspended from steel joist with hanger loads between panel points in excess of 50 pounds shall have the excess hanger loads suspended from panel points.]

3.2.5.7 Vertical Pipe Supports

Vertical pipe shall be supported at each floor, except at slab-on-grade,

and at intervals of not more than 15 feet not more than 8 feet from end of risers, and at vent terminations.

3.2.5.8 Multiple Pipe Runs

In the support of multiple pipe runs on a common base member, a clip or clamp shall be used where each pipe crosses the base support member. Spacing of the base support members shall not exceed the hanger and support spacing required for an individual pipe in the multiple pipe run.

3.2.6 Building Surface Penetrations

Sleeves shall not be installed in structural members except where indicated or approved. Sleeves in nonload bearing surfaces shall be galvanized sheet metal, conforming to ASTM A653/A653M, Coating Class G-90, 20 gauge. Sleeves in load bearing surfaces shall be uncoated carbon steel pipe, conforming to ASTM A53/A53M, [Schedule 30] [Schedule 20] [Standard weight]. Sealants shall be applied to moisture and oil-free surfaces and elastomers to not less than 1/2 inch depth. Sleeves shall not be installed in structural members.

3.2.6.1 Fire-Rated Penetrations

Penetration of fire-rated walls, partitions, and floors shall be sealed as specified in Section 07 84 00 FIRESTOPPING.

3.2.6.2 Escutcheons

Finished surfaces where exposed piping, bare or insulated, pass through floors, walls, or ceilings, except in boiler, utility, or equipment rooms, shall be provided with escutcheons. Where sleeves project slightly from floors, special deep-type escutcheons shall be used. Escutcheon shall be secured to pipe or pipe covering.

3.2.7 Access Panels

Access panels shall be provided for all concealed valves, vents, controls, and items requiring inspection or maintenance. Access panels shall be of sufficient size and located so that the concealed items may be serviced and maintained or completely removed and replaced. Access panels shall be as specified in Section 05 50 13 MISCELLANEOUS METAL FABRICATIONS.

3.2.8 Field Applied Insulation

Field installed insulation shall be as specified in Section 23 07 00 THERMAL INSULATION FOR MECHANICAL SYSTEMS, except as defined differently herein.

3.3 CLEANING AND ADJUSTING

Clean uncontaminated system(s) by evacuation and purging procedures currently recommended by refrigerant and refrigerant equipment manufacturers, and as specified herein, to remove small amounts of air and moisture. Systems containing moderate amounts of air, moisture, contaminated refrigerant, or any foreign matter shall be considered contaminated systems. Restoring contaminated systems to clean condition including disassembly, component replacement, evacuation, flushing, purging, and re-charging, shall be performed using currently approved refrigerant and refrigeration manufacturer's procedures. Restoring

contaminated systems shall be at no additional cost to the Government as determined by the Contracting Officer. Water shall not be used in any procedure or test.

3.4 REFRIGERANT PIPING TESTS

After all components of the refrigerant system have been installed and connected, subject the entire refrigeration system to pneumatic, evacuation, and startup tests as described herein. Submit copies of the tests report. The report shall include initial test summaries, all repairs/adjustments made, and the final test results.

3.4.1 Preliminary Procedures

Prior to pneumatic testing, equipment which has been factory tested and refrigerant charged as well as equipment which could be damaged or cause personnel injury by imposed test pressure, positive or negative, shall be isolated from the test pressure or removed from the system. Safety relief valves and rupture discs, where not part of factory sealed systems, shall be removed and openings capped or plugged.

3.4.2 Pneumatic Test

Pressure control and excess pressure protection shall be provided at the source of test pressure. Valves shall be wide open, except those leading to the atmosphere. Test gas shall be dry nitrogen, with minus 70 degree F dewpoint and less than 5 ppm oil. Test pressure shall be applied in two stages before any refrigerant pipe is insulated or covered. First stage test shall be at 10 psi with every joint being tested with a thick soap or color indicating solution. Second stage tests shall raise the system to the minimum refrigerant leakage test pressure specified in ANSI/ASHRAE 15 & 34 with a maximum test pressure 25 percent greater. Pressure above 100 psig shall be raised in 10 percent increments with a pressure acclimatizing period between increments. The initial test pressure shall be recorded along with the ambient temperature to which the system is exposed. Final test pressures of the second stage shall be maintained on the system for a minimum of 24 hours. At the end of the 24 hour period, the system pressure will be recorded along with the ambient temperature to which the system is exposed. A correction factor of 0.3 psi will be allowed for each degree F change between test space initial and final ambient temperature, plus for increase and minus for a decrease. If the corrected system pressure is not exactly equal to the initial system test pressure, then the system shall be investigated for leaking joints. To repair leaks, the joint shall be taken apart, thoroughly cleaned, and reconstructed as a new joint. Joints repaired by caulking, remelting, or back-welding/brazing shall not be acceptable. Following repair, the entire system shall be retested using the pneumatic tests described above. The entire system shall be reassembled once the pneumatic tests are satisfactorily completed.

3.4.3 Evacuation Test

Following satisfactory completion of the pneumatic tests, the pressure shall be relieved and the entire system shall be evacuated to an absolute pressure of 300 micrometers. During evacuation of the system, the ambient temperature shall be higher than 35 degrees F. No more than one system shall be evacuated at one time by one vacuum pump. Once the desired vacuum has been reached, the vacuum line shall be closed and the system shall stand for 1 hour. If the pressure rises over 500 micrometers after the 1

hour period, then the system shall be evacuated again down to 300 micrometers and let set for another 1 hour period. The system shall not be charged until a vacuum of at least 500 micrometers is maintained for a period of 1 hour without the assistance of a vacuum line. If during the testing the pressure continues to rise, check the system for leaks, repair as required, and repeat the evacuation procedure. During evacuation, pressures shall be recorded by a thermocouple-type, electronic-type, or a calibrated-micrometer type gauge.

3.4.4 System Charging and Startup Test

Following satisfactory completion of the evacuation tests, the system shall be charged with the required amount of refrigerant by raising pressure to normal operating pressure and in accordance with manufacturer's procedures. Following charging, the system shall operate with high-side and low-side pressures and corresponding refrigerant temperatures, at design or improved values. The entire system shall be tested for leaks. Fluorocarbon systems shall be tested with halide torch or electronic leak detectors.

3.4.5 Refrigerant Leakage

If a refrigerant leak is discovered after the system has been charged, the leaking portion of the system shall immediately be isolated from the remainder of the system and the refrigerant pumped into the system receiver or other suitable container. Under no circumstances shall the refrigerant be discharged into the atmosphere.

3.4.6 Contractor's Responsibility

At all times during the installation and testing of the refrigeration system, take steps to prevent the release of refrigerants into the atmosphere. The steps shall include, but not be limited to, procedures which will minimize the release of refrigerants to the atmosphere and the use of refrigerant recovery devices to remove refrigerant from the system and store the refrigerant for reuse or reclaim. At no time shall more than 3 ounces of refrigerant be released to the atmosphere in any one occurrence. Any system leaks within the first year shall be repaired in accordance with the requirements herein at no cost to the Government including material, labor, and refrigerant if the leak is the result of defective equipment, material, or installation.

-- End of Section --

SECTION 23 34 23.00 40

HVAC POWER VENTILATORS

PART 1 GENERAL

Provide power roof ventilators complete with all components and accessory equipment as specified in this section.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7	(2010; Errata 2011; Supp 1 2013) Minimum Design Loads for Buildings and Other Structures

UNDERWRITERS LABORATORIES (UL)

UL 705	(2004; Reprint Dec 2013) Standard for Power Ventilators

1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings
- Shop Drawings
- Installation Drawings

SD-03 Product Data
- Housing
- Fan
- Motor
- Bases
- Roof Curbs
- Dampers
- Screens

SD-06 Test Reports
- Final Test Reports

SD-11 Closeout Submittals
- Record Drawings

1.3 QUALITY ASSURANCE

Rate and label ventilators in accordance with the applicable standards of the Air Movement Control Association, and license to bear the AMCA seal for both air and sound.

PART 2 PRODUCTS

2.1 DESIGN REQUIREMENTS

Submit manufacturer's catalog data, including equipment and performance data for power roof ventilator(s).

Provide roof ventilators that comply with UL 705 and are furnished complete with bases, curbs, flashing flanges, noise baffles, dampers, damper controls, louvers, and screens as indicated.

Provide ventilators that are designed for windloads in accordance with ASCE 7. Provide structural bracing that is properly spaced to accommodate this loading and in accordance with the design requirements of the covering material. Provide ventilators that are adequately reinforced and well braced with joints properly formed. Provide edges that are wired or beaded where necessary to ensure rigidity. Prevent galvanic action between different metals in direct contact by nonconductive separators. Make all soldering even and smooth.

Provide corrosion-resistant steel bolts, rivets, and other fastenings used in connection with protected metal.

2.2 MATERIALS

Provide manufacturers' standard materials.

2.3 BASES

For bases provided with the ventilators, use factory formed, of the type indicated, of the same material as the hoods, and the thickness necessary to meet the design requirement for connection to the roof. Provide bases that are suitable for raised curb mounting where indicated. Form curb flanges of the base as cap flashing, extending at least 2 inches over roofing base. Where indicated or required, extend shafts of ventilators a sufficient distance through the supporting construction to permit attachment of vent ducts.

2.4 ROOF CURBS

Provide factory-formed metal ventilator curbs of the type and design required for the ventilator and suitable for roof configuration and flashing.

Provide job-built curbs that conform to the recommendations of the ventilator manufacturer, sized correctly for the ventilator, and suitable for type of supporting roof construction.

2.5 BACK-DRAFT DAMPERS

Provide gravity operated back-draft dampers with adjustable counterweight of the same material as fan housing.

2.6 SCREENS

Provide bird screens with frames of the same material as that used in the ventilators and securely attach in a manner that permits easy removal for access and cleaning.

PART 3 EXECUTION

3.1 INSTALLATION

Install power roof ventilators in accordance with manufacturer's installation instructions. Properly coordinate installation of ventilators with other work. Coordinate anchors, attachments, and other items to be built, for installation as the work progresses. Rigidly install ventilators in a weathertight and watertight manner free from vibration. Refer to Section 23 05 48.00 40 VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT for vibration isolation considerations.

Submit installation drawings for power roof ventilators.

3.2 FIELD QUALITY CONTROL

3.2.1 Tests

After installation, test each power roof ventilator to demonstrate proper operation at indicated and specified performance requirements including running, balance, noise, and proper direction of fan rotation.

3.2.2 Acceptance

Prior to final acceptance, use precision alignment devices to demonstrate that fan and motor are aligned as specified.

Prior to final acceptance, verify conformance to specifications with vibration analysis. Provide vibration levels that are not more than .075 in/sec at 1 times run speed and at fan/blade frequency, and .04 in/sec at other multiples of run speed.

3.2.3 Final Test Reports

Provide final test reports to the General Contractor

3.3 CLOSEOUT ACTIVITIES

Submit detailed record drawings upon completion of the installation.

-- End of Section --

SECTION 26 05 00 - GENERAL REQUIREMENTS FOR ELECTRICAL WORK

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. DEFINITION OF WORK

Conditions of the Contract, Specifications, Change Orders, Addenda and Drawings apply to work of this section.

B. PROVISIONS

As used in this section, "provide" means "furnish and install", "furnish" means "to purchase and deliver to the project site complete with every necessary appurtenance and support and to store in a secure area in accordance with manufacturers instructions", and "install" means "to unload at the delivery point at the site or retrieve from storage, move to point of installation and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project".

1.2 APPLICABLE CODES AND STANDARDS

A. WORK

All work shall be in accordance with the laws, rules, codes, and regulations set forth by Local, State, and Federal authorities having jurisdiction. All products and materials shall be manufactured, installed and tested as specified, but not limited to the latest accepted edition of the following codes, standards and regulations:

NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Act
NEC	National Electrical Code (NFPA 70)
UL	Underwriters Laboratory
NESC	National Electrical Safety Code
FM	Factory Mutual Association
MUBEC	Maine Uniform Building Code
Local AHJ	Local and State building, electrical, fire and health department and public safety codes agencies.

B. CODE CONFLICTS

When requirements cited in this paragraph conflict with each other or with Contract Documents, the most stringent requirements shall govern conduct of work. The Engineer may relax this requirement when such relaxation does not violate the ruling of authorities that have jurisdiction. Approval for such relaxation shall be obtained in writing. Should the Electrical Subcontractor perform any work that does not comply with the requirements of the applicable building codes, state laws, and industry standards, he shall bear all costs arising in correcting these deficiencies.

1.3 CONTRACT DOCUMENTS

A. WORK TO BE PROVIDED

Work to be provided under this division is shown on the electrical drawings listed in Division 1, General Requirements and in these Contract Specifications.

B. COORDINATION OF WORK

The listing of electrical drawings does not limit the responsibility of determining the full extent of work that is required by these contract documents. The Electrical Subcontractor shall refer to the drawings and other specification sections included in the complete Contract Package, that indicate types of construction with which work of this section must be coordinated. The General Contractor shall coordinate the work of all trades including that of the electrical contractor, with all other subcontractors to determine whether there will be any interference with the electrical work. If the Electrical Subcontractor fails to check with the General Contractor and the electrical work is later found to interfere with the work of other subcontractors, then he shall make necessary changes, without additional cost to the Owner, to eliminate such interference.

C. INTENT OF DESIGN

Drawings are diagrammatic and indicate the general arrangement of systems and work to be included in the Contract. Information and components shown on riser diagrams or called for in the specifications but not shown on plans, and vice versa, shall apply and shall be provided as though required expressly by both. The contract documents are not intended to indicate and specify each component required, but do require that the components and materials be provided for a complete and operational installation.

D. DISCREPANCIES IN DOCUMENTS

Each bidder shall be responsible for examining the drawings and specifications carefully before submitting his bid, with particular attention to errors, omissions, conflicts with provisions of laws and codes imposed by authorities having jurisdiction, conflicts between portions of drawings, or between drawings and specifications, and ambiguous definition of the extent of coverage in the contract. Any such discrepancy discovered shall be brought to the immediate attention of the Engineer for correction. Should any of the aforementioned errors, omissions, conflicts or ambiguities exist in either or both the drawings and specifications, the Electrical Subcontractor shall have the same explained and adjusted in writing before signing the contract or proceeding with work. Failure to notify the Engineer in writing of such irregularities prior to signing the Contract will cause the Engineer's interpretation of the Contract Documents to be final. No additional compensation will be approved because of discrepancies thus resolved.

E. CONFLICTS WITH CODES AND REGULATIONS

The drawings and these specifications are intended to comply with all the above mentioned Codes, Rules and Regulations. If discrepancies occur, the Electrical Subcontractor shall immediately notify the Engineer in writing of said discrepancies and apply for an interpretation and, unless and interpretation is offered in writing by the Engineer prior to the execution of the contract, the applicable rules and regulations shall be complied with as a part of the contract.

PART 2 - SCOPE OF WORK

2.1 GENERAL REQUIREMENTS

A. General Scope

The work to be accomplished under these specifications includes providing all labor, materials, equipment, consumable items, supervision, administrative tasks, tests and documentation required to install complete and fully operational electrical systems as described herein and shown on the Drawings.

B. Administrative Responsibilities

The Electrical Subcontractor shall file plans, obtain permits and licenses, pay fees and obtain necessary inspections and approvals from authorities that have jurisdiction, as required to perform work in accordance with all legal requirements.

2.2 WORK TO BE PROVIDED UNDER THIS DIVISION

A. General Scope

The Work shall be complete from point of service to each outlet or device with all accessory construction and materials required to make each item of equipment or system complete and ready for operation. The work shall include but not be limited to the following. The Electrical Subcontractor shall provide:

1. Service Entrance: The intent is to replace the existing overhead service with a new and upgraded overhead service and new metering and service entrance main breakers as shown on the plans.

2. Grounding System: The intent is to upgrade the existing grounding electrode system to accommodate the new service size and bonding all required systems to the new grounding electrode system as required by Code. New equipment grounding conductors for new circuits and equipment shall be furnished as part of this work.

3. Service Entrances for Other Utilities: Intent is to use existing services for telephone, CATV and Fire Alarm.

4. Power Distribution Systems: The existing distribution equipment is intended to remain and be supplemented with additional equipment as shown on the drawings. Provide power and lighting distribution systems including panelboards, overcurrent devices, raceway, cable and wire.

5. Feeder and Branch Circuit Wiring: Provide feeder and branch circuits and devices for power to equipment and convenience receptacles. This includes branch wiring to system control panels furnished under other sections.

6. Motor Circuit Wiring: Provide all motor wiring, safety disconnects, and motor starters unless integral with equipment.

7. Interior Lighting Systems: Provide complete interior and exterior lighting system including normal and emergency fixtures, exit signs, lamps, controls, trim and accessories.

8. Fire Alarm Systems: Provide notification and detection devices to existing system including pull stations, heat detectors, area smoke detectors, duct smoke detectors, water flow and tamper switch wiring, auxiliary contacts for equipment interlocking, magnetic door holders and other devices shown on the drawings. Notification devices to include all horn strobes, speaker strobes and strobe only units and all auxiliary equipment such as synchronization equipment as required for a complete installation.

9. Telephone and Data Systems: Provide complete voice/data system wiring back to the existing facility telephone backboard, conduits and wall boxes from location in wall to accessible ceiling space.

10. Cable Television: Furnish CATV wiring from the apartment back to the Cable TV service entrance location.

11. Control Wiring: Provide control wiring not provided by Division 25000.

12. Supports and Fittings: Provide all support material and hardware for raceway, cable tray and electrical equipment.

13. Terminations: Provide terminations of all cable and wire unless otherwise noted.

14. Penetrations: Provide all building wall, floor and roof penetrations for raceway and cable tray where not provided by the General Contractor.

15. Other Items Furnished By Others: Install the following equipment furnished by others:

    1.Motors

    2.Control Panels

2.3 WORK NOT INCLUDED UNDER THIS DIVISION

A. Related Work Included in Other Sections

The following work is not included in this Section and shall be performed under other sections:

1. Excavation and backfill.

2. Concrete work, including concrete housekeeping pads and other pads and blocks for vibrating and rotating equipment.

3. Cutting and patching of masonry, concrete, tile, and other parts of structure, with the exception of drilling for hangers and providing holes and openings in metal decks. The Electrical Subcontractor shall identify locations of penetrations, excavations, structural supports, etc. required for the completion of the Work of this Section to the General Contractor in a timely manner.

4. Installation of access panels in ceilings and wall construction.

5. Painting, except as specified herein.

6. Temporary water, heat, gas and sanitary facilities for use during construction and testing.

7. Outdoor air intake or exhaust louvers.

8. Control wiring specifically indicated as part of Division 25.

2.4 GENERAL EQUIPMENT AND MATERIALS REQUIREMENTS

A. General Requirements

All equipment and materials shall be new and of the quality specified. All materials shall be free from defects at the time of installation. Materials or equipment damaged in shipment or otherwise damaged during construction shall not be repaired at the jobsite, but shall be replaced with new materials.

B. Representation of Equipment

All equipment installed on this project shall have local representation, local factory authorized service and a local stock of repair parts.

C. Warranties

No equipment or material shall be installed in such a manner as to void a manufacturer’s warranty. The Electrical Subcontractor shall notify the Engineer of any discrepancies between the Contract Documents and manufacturer's recommendations prior to execution of the work. Refer to Division 1, General Requirements for Warranty Requirements.

2.5 SHOP DRAWINGS

A. General Requirements

After the Contract is awarded, but prior to proceeding with the Work, the Electrical Subcontractor shall obtain complete shop drawings, product data and samples from manufacturers, suppliers, vendors, and Subcontractors for all materials and equipment specified herein, and submit data and details of such materials and equipment for review by the Engineer. Submission of such items shall follow the guidelines set in the General Section of the Specification Document. Prior to submission of the shop drawings, product data and samples to the Engineer, the Electrical Subcontractor shall review and certify that the shop drawings, product data and samples are in compliance with the Contract Documents. Further, the Electrical Subcontractor shall check all materials and equipment after their arrival on the jobsite and verify their compliance with the Contract Documents. A minimum period of ten working days, exclusive of transmittal time will be required in the Engineer's office each time shop drawings, product data and/or samples are submitted or resubmitted for review. This time period shall be considered by the Electrical Subcontractor when scheduling his Work.

B. Information to be included in Submittal

The shop drawing submittal shall include all data necessary for interpretation as well as manufacturer's name and catalog number. Sizes, capacities, colors, etc., specified on the drawings shall be specifically noted or marked on the shop drawings.

C. Information Not to be included in Submittal

Submittals shall contain only information specific to systems, equipment and materials required by Contract Documents for this Project. Do not submit catalogs that describe products, models, options or accessories, other than those required, unless irrelevant information is marked out or unless relevant information is highlighted clearly. Marks on submittals, whether by Contractor, Subcontractor, manufacturer, etc., shall not be made in red ink. Red is reserved for review process.

D. Responsibility of Submitted Equipment

The Engineer's review of such drawings shall not relieve the Subcontractor of responsibility for deviations from the Contract, Drawings or Specifications, unless he has in writing called the attention of the Engineer to such deviations at the time of the submission. The Engineer's review shall not relieve the Electrical Subcontractor from responsibility for errors or omissions in such drawings.

E. Proposal of Other Equipment

If the Electrical Subcontractor proposes an item of equipment other than that specified or detailed on the drawings which requires any redesign of the wiring or any other part of the mechanical, electrical or architectural layout, the required changes shall be made at the expense of the trade furnishing the changed equipment at no cost to the Owner.

F. Substitution of Equipment of Equal Quality

Manufacturer's names are listed herein and on the drawings to establish a standard for quality and design. Where one manufacturer's name is mentioned, products of other manufacturers will be acceptable if, in the opinion of the Engineer the substitute material is of quality equal to or better than that of the material specified. Where two or more manufacturer's names are specified, material shall be by one of the named manufacturers only.

2.6 RECORD DRAWINGS

A. General Requirements

As work progresses, and for duration of the Contract, the Electrical Subcontractor shall maintain a complete and separate set of prints of Contract Drawings at job site at all times and record work completed and all changes from original Contract. Drawings shall clearly and accurately include work installed as a modification or added to the original design. At completion of work and prior to final request for payment, the Electrical Subcontractor shall submit a complete set of reproducible record drawings showing all systems as actually installed.

PART 3 - EXECUTION

3.1 WIRING METHOD

A. Requirements

Unless otherwise noted all wiring shall be installed in raceway as follows:

1. Power Distribution Outdoors: All conduits installed outdoors, all risers between floors and conduit exposed to physical damage shall be rigid steel, rigid aluminum or intermediate metal conduit.

2. Power Distribution Indoors: Unless otherwise noted, all other power distribution wiring including feeders and branch circuits shall be installed in electrical metallic tubing (EMT) when installed exposed. Where exposed to potential physical damage, conduits shall be rigid steel, rigid aluminum or intermediate metal conduit. Wiring concealed above ceilings and in walls chall be installed in EMT or MC cable assemblies. The use of type NM cable (Romex) shall be allowed only in the apartment for those circuits wired from the apartment panel within that unit.

3. Telephone & Data: Shall be installed in EMT where exposed and filled as not to exceed fill ratio requirements. In finished spaces furnish EMT, ¾" (minimum) in walls from the box to the accessible ceiling space.

4. Fire Alarm System: Fire alarm system wiring shall be installed in EMT where exposed or MC cable listed for use as fire alarm cable and designated for such by red finish where installed above ceilings and in walls.

5. Control Wiring: Shall be installed in EMT where exposed and on J-hooks above acoustic ceilings.

6. Under-slab Conduits: Conduit installed under floor slabs shall be rigid nonmetallic conduit with rigid steel stub-ups.

7. Corrosive Areas: All conduits in corrosive areas shall be PVC coated rigid steel.

3.2 EQUIPMENT ARRANGEMENT AND ACCESS

A. Location of Equipment

Locate all equipment which must be serviced, operated or maintained in fully accessible positions. Minor deviations from the drawings may be made to allow for better accessibility at no additional cost to the Owner, but changes shall not be made without review by the Engineer. Minimum clearances in front of or around equipment shall conform to the latest applicable code requirements.

B. Arrangement of Equipment

The size of equipment shown on the drawings is based on the dimensions of a particular manufacturer. Where other manufacturers are acceptable, it is the responsibility of the Electrical Subcontractor to determine if the equipment he proposed to furnish will fit the space available. Layout drawings shall be prepared by the Subcontractor when required by the Engineer or Owner to indicate a suitable arrangement.

3.4 EQUIPMENT LABELING

A. Panelboards

All panelboards, cabinets and other specified equipment shall be labeled with engraved laminated plastic plates, minimum 3/4" high with 3/8" engraved letters. Punch tapes with mastic backings are not acceptable.

B. Starters and Disconnect Switches

All starters, disconnect switches and other specified equipment shall be marked with engraved laminated plastic plates, minimum 1/2" high with 1/4" engraved letters. Where individual switches or circuit breakers in power or distribution panelboards do not have cardholders, they shall be marked with 1/2" high labels.

C. Empty Conduits

All empty conduits shall have labels tied to the pull string at each end of each empty conduit, marked as to identification of each end. Junction boxes with circuits provided for future use shall be labeled with appropriate circuit designation.

D. Panelboard Directories

Cardholders for panelboards shall be filled out with typewritten identification of each circuit, except that the word "spare" shall be written in soft pencil to identify all circuit breakers installed that are not used.

END OF SECTION 26 05 00

SECTION 26 05 19 - 600 VOLT WIRE

PART ONE - GENERAL

1.1 GENERAL REQUIREMENTS

A. Provisions

The provisions of Section 26 05 00, General Requirements for Electrical Work apply to the work of this section.

1.2 APPLICABLE CODES AND STANDARDS

A. Products

Products shall comply with the following codes and standards and shall be UL-listed and labeled:

ASTM B-3	Soft or Annealed Copper Wire
ASTM B-8	Concentric Lay Stranded Copper Conductors
NEMA WC-5	Thermoplastic Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
NEMA WC-7	Cross-Linked Thermosetting Polyethylene Insulated Wire for the Transmission and Distribution of Electrical Energy
UL 44	Rubber Insulated Wires and Cables
UL 62	Flexible Cord and Fixture Wire
UL 83	Thermoplastic Insulated Wires and Cables

1.3 SUBMITTALS REQUIRED

A. Manufacturer’s product data sheets.

1.4 MANUFACTURERS

A. Subject to compliance with the Specification Requirements:

- Anixter
- General Cable
- Rome Cable
- Approved Equal

PART TWO: PRODUCTS

2.1 GENERAL

A. Conductors

All conductors shall be annealed copper in accordance with ASTM B-3.

B. Jacket

The jacket of all wire shall be printed with the following information:

- Manufacturer
- Size
- Insulation type
- Maximum voltage
- UL label

C. Insulation

All insulation shall be 600 volt rated.

2.2 POWER WIRING

A. Service Lateral/Service Entrance Conductors

Service lateral and service entrance conductors shall be type XHHW in raceway. The electrical contractor may substitute conductors comprised of compact stranded aluminum alloy that is listed by UL Standard 486B, labeled “AL9CU” for 90°C rated circuits. Cable shall be as manufactured by Alcan Cable, Stabiloy Compact Stranded type. Cable sizes shall be adjusted to meet the same Ampacity levels as designed for copper cables. All aluminum connections shall be made using a listed Oxide Inhibiting Joint compound as recommended by the cable manufacturer.

B. Feeders and Motor Branch Circuits

Feeders and motor branch circuits shall be type XHHW or THHN/THWN in raceway or MC cable assembly.

C. Description

All power wiring shall be stranded, Class B strand in accordance with ASTM B-8, minimum size #12 AWG.

2.3 LIGHTING AND RECEPTACLE BRANCH CIRCUITS

A. Description

All lighting and convenience receptacle branch circuit wiring shall be type THHN/THWN, solid or stranded conductor, minimum size #12 AWG.

2.4 CONTROL WIRING

A. Description

Wiring for control circuits shall be THHN/THWN stranded, with Class B strand in accordance with ASTM B-8, minimum size #12 AWG unless otherwise noted on drawings.

2.5 FIXTURE WIRE

A. Description

Where high temperature fixture wire is required it shall be silicone rubber type SF-2.

PART THREE: EXECUTION

3.1 GENERAL

A. Installation

All wire shall be installed in accordance with manufacturer's instructions.

3.2 TESTING

A. Control and Instrument Wiring

Control and instrument field wiring shall be visually inspected and tested for continuity to insure that all field wiring is installed in accordance with Contract Drawings and/or equipment manufacturers drawings. Verify all field conductors are properly identified with wire numbers.

B. Low Voltage Power Wiring

All 208V power wiring shall be subjected to one minute 1000V megger test. Minimum insulation resistance shall be 50 megohms. Megger tests shall be performed between each phase (A-B, B-C, and C-A) and three phases tie together to ground.

END OF SECTION 26 05 19

SECTION 26 05 26 - GROUNDING EQUIPMENT

PART ONE: GENERAL

1.1 GENERAL REQUIREMENTS

A. Provisions

The provisions of Section 26 05 00, General Requirements for Electrical Work apply to the work of this section.

B. Installation Compliance

The Contractor shall provide a complete grounding system including grounding electrodes, electrode conductors, bonding jumpers, equipment grounding conductors, connections and other materials as may be required for a complete installation. The completed system provided shall meet the requirements of the National Electrical Code and the interpretation of the Local Authority Having Jurisdiction.

1.2 APPLICABLE CODES AND STANDARDS

A. Products

Products shall comply with the following codes and standards and shall be UL-listed and labeled:

NFPA 70	National Electrical Code
UL 467	Grounding and Bonding Equipment

1.3 SUBMITTALS REQUIRED

A. Equipment Data Sheets

Data sheets for chemical grounding systems, exothermal connection methods, and associated wiring.

1.4 MANUFACTURERS

A. Products shall be of firms regularly engaged in manufacture of grounding equipment.

PART TWO: PRODUCTS

2.1 GENERAL

A. Provide all equipment, components and parts required to for a complete and operable system.

2.2 GROUND RODS

A. Ground rods shall be ¾-inch copper clad steel construction furnished in 10 foot lengths.

2.3 CONDUCTORS

A. Bare Grounding Conductors: Bare grounding conductors shall be soft drawn stranded copper, sized in accordance with NEC Article 250 unless otherwise noted on the Drawings.

B. Insulated Grounding Conductors: Insulated grounding conductors shall be stranded copper with Type TW, THW or THHN/THWN insulation. Grounding conductor shall be provided with green insulation for identification purposes.

2.4 CONNECTIONS

A. Welded Connections: Welded connections shall be exothermic reaction type, as manufactured by Cadweld, or approved equal. The contractor shall provide all molds, crucibles, weld metal, and any necessary materials or equipment required to make connections using this process.

B. Compression Connections: Compression lugs shall be short barrel, one-hole compression type for conductors #2/0 AWG and smaller and long barrel, two-hole compression type for conductors #3/0 AWG and larger.

2.5 GROUNDING BAR

A. Provide a wall-mounted copper grounding bar, mounted 6 inches above finished floor. Grounding bar shall be connected directly to the grounding grid.

PART THREE: EXECUTION

3.1 GROUNDING ELECTRODE SYSTEM

A. Requirements: Grounding electrodes of the types shown on the Contract Drawings and as required by NEC shall be provided. Additional electrodes shall be provided if required by the local Authority Having Jurisdiction. All electrodes shall be bonded together to form the grounding electrode system.

B. Installation of Ground Rods: Ground rods shall be driven vertically with the upper end of the rod not less than 2-1/2 feet below finished grade. When conditions require, ground rods may be driven at an angle not to exceed 45 degrees from vertical, with the driven end facing outside of the grounding ring.

C. Installation of Grounding Ring Conductors: Grounding ring conductors shall be bare copper, sized as shown on the Contract Drawings and installed at a minimum depth of 2-1/2 feet below finished grade. Conductors encased in concrete footings, in or under floor slabs, and in duct banks shall be bare copper, sized as shown on the Contract Drawings. All connections made below grade or encased in concrete shall be exothermic weld type.

D. Connection to Structural Steel: Grounding grid conductors shall be connected to building structural steel as required by the NEC this shall include a connection to reinforcing steel in a minimum of one concrete footing. All connections to building steel shall be exothermic weld type.

E. Grounding Electrode Conductors: The electrical service and all separately derived systems shall be grounded in accordance with NEC Article 250. The grounding electrode conductor shall be copper, sized in accordance with Article 250 of the NEC or as shown on the Drawings.

3.2 EQUIPMENT GROUNDING SYSTEMS

A. Requirements: A separate, insulated copper conductor, with green colored insulation, shall be provided in all raceways and with every feeder, branch and control circuit, in addition to the grounded metallic conduit system. The equipment grounding conductor shall be grounded at both ends.

B. Connection of Equipment Grounding Conductors: Connections to equipment grounding busses shall use compression type termination lugs bolted to a clean, dry surface on the bus, free from any contaminates which may hinder the electrical continuity of the connection. The contractor shall provide any additional hardware and all drilling and tapping that may be required for this connection.

3.3 ADDITIONAL BONDING REQUIREMENTS

A. Grounding of Raceway Systems: All metallic raceways shall be electrically continuous and bonded to the grounding system.

B. Bonding of Electrical Equipment Busses

All switchgear, switchboard and motor control center grounding busses shall be connected to the grounding electrode system at both ends. Bonding conductor shall be equal to that sized for the feeder to the equipment as shown on the Contract Drawings.

C. Bonding of Other Systems

Interior metal water, gas and sprinkler piping shall be bonded as required by Article 250 of the NEC. The points of attachment of these bonding conductors shall be located in readily accessible locations.

END OF SECTION 26 05 26

SECTION 26 05 33 - RACEWAY AND FITTINGS

PART ONE: GENERAL

1.1 GENERAL REQUIREMENTS

A. Provisions

Provisions of Section 26 05 00, General Requirements for Electrical Work apply to the work of this Section.

1.2 APPLICABLE CODES AND STANDARDS

A. Products

Products shall comply with the following codes and standards and shall be UL-listed and labeled:

ANSI C80.1	Standard for Rigid Steel Conduit
ANSI C80.3	Standard for Electrical Metallic Tubing
ANSI C80.6	Standard for Intermediate Metal Conduit
UL 1	Flexible Metal Conduit
UL 6	Rigid Metal Conduit
UL 360	Liquid Tight Flexible Steel Conduit
UL 514B	Fittings for Conduit and Outlet Boxes
UL797	Electrical Metallic Tubing
UL870	Wireways, Auxilliary Gutters and Associated Fittings
UL1242	Intermediate Metal Conduit

1.3 SUBMITTALS REQUIRED

A. Manufacturers' product data sheets

1.4 MANUFACTURERS

A. In compliance with the Specification Requirements:
- Allied Tube and Conduit (Conduit)
- Wheatland (Conduit)
- Thomas and Betts (Fittings)
- Appleton (Fittings)
- Crouse Hindes/Cooper (Fittings)
- OZ Gedney (Fittings)
- Killark (Fittings)
- AFC Cable Systems (MC/LFMC)
- Southwire (MC/LFMC)
- Other manufacturers listed in the specification descriptions
- Approved equals

PART TWO: PRODUCTS

2.1 CONDUIT

A. Galvanized Rigid Steel Conduit (GRS)

Rigid steel conduit shall be manufactured from mild steel tube with a uniform protective coating of hot dipped zinc galvanizing inside and outside, including all threads. The conduit shall be furnished in nominal 10-foot lengths, with both ends threaded and furnished with a galvanized coupling on one end and a plastic thread protector on the other end.

B. Rigid Aluminium Conduit

Rigid aluminum conduit, couplings and elbows shall be manufactured of a suitable copper-free aluminum alloy. Conduit lengths shall be seamless throughout and shall have hard, smooth and gum-free interior coatings to facilitate the pulling-in of conductors. It shall be furnished in nominal 10-foot lengths, with both ends threaded and a coupling applied to one end of each length. Threads on the coupling end shall be coated with a special lubricant so that the coupling may be removed without difficulty. Threads on the end opposite the coupling shall be protected from damaged by a plastic cap.

C. Intermediate Metal Conduit (IMC)

Intermediate metal conduit shall be of steel piping with a uniform protective coating of hot dipped zinc galvanizing on the outside of the conduit, including all threads. The conduit shall be furnished in nominal 10-foot lengths, both ends threaded furnished with a galvanized coupling on one end and a plastic thread protector on the other end.

D. Electrical Metallic Tubing (EMT)

Electrical metallic tubing shall be constructed of zinc coated steel with an interior coating of lacquer or enamel to permit easier wire pulling.

E. Liquid Tight Flexible Metal Conduit (LFMC)

Liquid tight flexible conduit shall be constructed with a flexible core of galvanized steel and an oil and sunlight resistant PVC jacket to form a liquid tight raceway. The overall jacket shall be wrinklefree and suitable for use in temperatures from -25°C to +80°C.

F. Flexible Metal Conduit (MC)

Flexible metal conduit shall have an outer armor constructed of be hot dipped galvanized interlocked strip steel.

2.2 CONDUIT FITTINGS

A. Bushings

1. Insulated Bushings

Insulated bushings for conduit sizes 1-1/4 inches and larger shall have metal bodies and threads, with molded-on high impact phenolic thermosetting insulation to prevent conductor insulation damage. Bushings shall be Type “IBC” insulated bushings as manufactured by OZ Gedney or an approved equal. Insulated bushings for conduit sizes 1 inch and smaller may be of plastic, OZ Gedney Type "A", or an approved equal.

2. Insulated Grounding Bushings

Insulated grounding bushings shall be similar to the insulated bushings described above, except they shall have set screws to lock the bushings on the conduits and shall have mechanical type lugs attached. The lugs shall be sized to accept the ground wire sizes as set forth in the latest edition of the National Electrical Code, but in no case smaller than No. 8 AWG wire. Grounding bushings shall be Type “BLG” as manufactured by OZ Gedney or an approved equal.

3. Male Bushings

Male bushings shall be Thomas and Betts Corporation insulated throat chase nipples, or a product of equal construction. Bushings used only to pass conductors through metal partitions, etc. shall be OZ Gedney, Type "ABB".

4. Male Bushings

Bushings for use with EMT shall be OZ Gedney type “SBT” or approved equals.

B. Conduit Bodies

Conduit bodies for use with aluminum conduit shall be of copper free aluminum alloy. Those for use with steel conduit may be of galvanized, or cadmium plated cast iron, or of copper free aluminum alloy. All conduit fittings shall be provided with neoprene gaskets and sheet metal covers, except that cast covers shall be used for sized 1-1/2 inches and larger. Rigid conduit connections shall be threaded and EMT connections shall be set screw type. Cover screws shall be captive. All conduit fittings shall be as manufactured by Crouse Hinds, Appleton, Killark or approved equal.

C. Hubs

Water-tight conduit connections are required on all NEMA 3R, 4, and 4X enclosures and all electrical equipment located outdoors or in damp or wet areas. Where hubs or water-tight threaded connections are not provided as part of the enclosure, water-tight hubs shall be Myers "Scrutite", or approved equal. All other terminations shall be double locknut and bushing.

D. Fittings

Fittings for use with liquid-tight flexible conduit shall be zinc plated malleable iron Crouse Hinds type “CGB” or approved equal.

E. Locknuts

Locknuts shall be hot dipped galvanized steel or malleable iron. Standard locknuts shall be used for connections to NEMA 1 enclosures. Sealing locknuts with integral gasket shall be used for connections to NEMA 12 enclosures.

2.3 JUNCTION BOXES

A. Pull and Junction Boxes

Pull and junction boxes shall be of code gauge metal with continuously welded joints or of cast metal if called for on the Drawings. All junction boxes shall have gasketed screw covers. Boxes for use with aluminum conduits shall be of aluminum. Sheet steel boxes shall be galvanized after fabrications. Screws for galvanized steel box covers shall be made of brass. Screws for aluminum box cover shall be stainless steel.

B. Boxes Installed in Concrete

Boxes installed in concrete shall be cast iron alloy or copper free aluminum.

C. Rating of Boxes

Unless otherwise shown on drawings, all boxes installed indoors shall be rated NEMA 1 and all boxes installed outdoors shall be rated NEMA 3R. Boxes located in fire walls, exterior walls, and at the ceiling of the top floor shall be sealed with UL approved fire sealant material to maintain the rating of the separation as well as providing air sealing to maintain the buildings thermal envelope. Boxes located on opposing sides of rated walls i.e. unit separations, must be at least 24” apart or treated with putty pads per IBC.

2.4 OUTLET BOXES

A. Outlet Boxes for Concealed Work

Outlet boxes for concealed work shall be pressed steel boxes, galvanized and not less than #12 gauge. Each ceiling outlet designated for a lighting fixture shall have a fixture support secured in place with bolts and nuts. Ceiling boxes shall be octagonal with lugs and screws for back plates.

B. Outlet Boxes Installed Outdoors

Outlet boxes installed outdoors, in concrete or exposed, shall be cast iron alloy or copper free aluminum with gasketed covers.

C. Outlet Box Accessories

Provide outlet box accessories as required for each installation, including box supports, mounting ears and brackets, wallboard hangers, box extension rings, fixture studs, cable

clamps and metal straps for supporting outlet boxes, which are compatible with outlet boxes being used and to fulfill installation requirements for individual wiring situations.

2.5 WIREWAY

A. Wireway

Wireway shall be lay-in type, code gauge steel with dark gray epoxy paint finish inside and out.

B. Covers

Covers shall be hinged with captive screw fasteners for NEMA 1 & NEMA 3R wireway and gasketed quick release latch covers for NEMA 12 wireway.

2.6 SUPPORTS

A. Sizing

The Electrical Subcontractor shall size and provide all supports necessary for the installation of all raceway.

B. Channel Framing

Channel framing shall be manufactured by Unistrut, Kindort, B-Line or approved equal.

C. Indoor Locations

In dry, non-corrosive areas, channel framing and angle shall be galvanized steel or aluminum and all nuts, bolts and hardware shall be carbon steel, cadmium plated or hot dipped galvanized. Ream clamps shall be galvanized steel or malleable iron.

D. Outdoor, Wet or Damp Locations

In outdoor, wet or damp areas channel framing and angle shall be aluminum or 304 stainless steel and nuts, bolts and hardware shall be 304 stainless steel. Beam clamps shall be hot dipped galvanized steel or malleable iron.

E. Corrosive Locations

In corrosive areas, channel framing shall be 316 stainless steel, PVC coated steel or PVC coated aluminum. Nuts, bolts and hardware shall be 316 stainless steel. Beam clamps shall be PVC coated.

F. Supports

Supports shall be sized with a minimum safety factor of four or 200 lbs. whichever is greater.

PART THREE: EXECUTION

3.1 GENERAL

A. Requirements

See Specification Section 26.05.00 Subsection 3.1 for Wiring Methods.

3.2 INSTALLATION

A. Conduit, EMT, Boxes and Enclosures

Conduit, EMT, boxes & enclosures shall be installed so that they are mechanically secure, electrically continuous and neat in appearance.

B. Exposed Runs

Exposed runs shall be installed to conform to the shape of the surface over which they are run. Where they are run over a plane surface, they shall be straight and true. All exposed conduits shall be run parallel and perpendicular to building column lines and walls. Diagonal runs will not be permitted. Conduit runs in groups shall be supported by means of common members made of channel framing. Group mounting is not required where the group consists of only two conduits. Machine bolts with expansion shields shall be used when fastening to solid masonry or concrete. Toggle bolts shall be used to fasten to hollow masonry.

C. Spacing

Unless otherwise approved, spacing between conduit supports shall not exceed ten feet. Conduits shall not be supported from structural members marked “Removable” on the structural drawings. Conduit hangers and supports shall be fastened to buildings and structural members only and not to any equipment or piping. Separate conduits a minimum of 6” from flues, steam and hot water lines. Install conduit above mechanical piping wherever possible.

D. Conduit Supports

All conduit supports other than structural members shall be galvanized. The use of perforated strap or plumber straps will not be permitted.

Conduit up to 1-1/2 inches may be supported by one-hole malleable iron straps with clamp backs.

Conduit 2 inches and larger shall be supported by two-hole straps.

E. Conduit Run Lengths

Conduit runs shall not exceed 100 feet between boxes, fittings or devices.

PVC conduits run above grade shall be sufficiently supported to prevent sagging.

MC cables shall be neatly bundled and tie wrapped and sufficiently supported.

F. Use of Expansion Joints

All conduit crossing building or structure expansion joints shall be provided with approved expansion fittings.

3.3 BENDS

A. Field Bends

Field bends shall be made with approved bending tools. All field-formed bends shall be of maximum radius permitted by the design and construction conditions.

B. Exposed Conduit Changing Direction

Where a group of exposed conduits change direction, the bends shall have a common center in order to maintain the uniformity and neat appearance of the group, having regard for the minimum bending radius of the largest conduit in the group.

C. General

Bends shall be uniform radius and free from cracks, crimps or other damage to the conduit or its coating and shall not unduly flatten the conduit section.

3.4 JOINTS AND TERMINATIONS

A. Joints in Rigid Conduit

All joints in rigid conduit shall be threaded, using standard couplings. The use of running threads, threadless or split couplings is prohibited. When reaming out of conduit ends to remove burrs and rough edges, care shall be exercised to avoid excessive reaming which results in the weakening of the conduit wall at the end.

B. Tightening of Joints

All joints shall be made up wrench tight and with a minimum of wrench work in order to avoid wrench cuts.

C. Cut Threads

All cut threads shall be thoroughly painted with a coating of a rust inhibiting primer.

D. EMT Couplings and Fittings

EMT couplings and fittings shall be compression type on conduits up to 1–1/4 inch and double set screw type for conduits 1-1/2 inch and larger.

E. Conduit Terminations

All conduit terminations in panels, enclosures, outlet boxes and equipment shall be provided with bushings.

3.5 FLEXIBLE CONDUIT

A. Terminations

Flexible conduit shall be use to terminate all, lighting, motors, unit lanterns, transformers, pilot devices and vibrating equipment.

B. Liquitite Flexible Conduit

Liquitite flexible conduit and fitting shall be used outdoors and in all damp or wet areas, or where exposed to grease or oil.

C. Connections to Lighting Fixtures

Connections to lighting fixtures (lighting whips) shall be maximum length of 6 feet. All other flexible connections shall be maximum 24 inches.

3.6 PENETRATIONS

A. Penetrations through Slabs, Walls, Roofs

All penetrations through concrete slabs, masonry walls or roofs shall be provided with sleeves.

B. Sleeves

All sleeves shall be sealed to maintain the integrity of the structure. Fire resistant walls and floors shall be sealed with approved material, and shall maintain the original fire rating. All seals below grade shall be watertight, O.Z./Gedney type WSK or approved equal.

END OF SECTION 26 05 33

SECTION 26 24 16 - PANELBOARDS

PART ONE: GENERAL

1.1 GENERAL REQUIREMENTS

A. Provisions

The provisions of Section 26 05 00, General Requirements for Electrical Work apply to the work of this section.

1.2 APPLICABLE CODES AND STANDARDS

A. Products

Products shall comply with the following codes and standards and shall be UL-listed and labeled:

NEMA 250	Enclosures for Electrical Equipment
NEMA AB-1	Molded Case Circuit Breakers
NEMA KS-1	Enclosed Switches
NEMA PB-1	Panelboards
UL 50	Enclosures for Electrical Equipment
UL 67	Panelboards
UL 98	Enclosed and Deadfront Switches
UL 489	Molded Case Circuit Breakers and Circuit Breaker Enclosures
UL 943	Ground Fault Circuit Interrupters

1.3 SUBMITTALS REQUIRED

A. Manufacturer’s product data sheets.

B. Circuit breaker schedules.

1.4 MANUFACTURERS

A. Subject to compliance with the specification requirements:

- Square D
- Cutler Hammer
- General Electric

PART TWO: PRODUCTS

2.1 GENERAL

A. Panelboards: Panelboards, including lighting and appliance panelboards and power distribution panelboards, shall be of the sizes, rating and arrangement shown on the drawings.

B. Overcurrent Devices: Panelboards shall be provided complete with all overcurrent devices, accessories and trim.

C. Safety Barriers: All panelboards shall be provided with safety barriers for dead front construction.

D. Short Circuit Ratings: The required short circuit ratings of assembled panelboards are shown on the Drawings. The short circuit rating of every overcurrent device in the panel shall meet or exceed the panel rating. Unless otherwise noted on the Drawings, series rated combinations will not be permitted.

2.2 CABINETS

A. Boxes: Boxes shall be code gauge galvanized sheet steel.

B. Trim: Trim shall be code gauge steel, ANSI-61 gray finish with stainless steel flush type lock/latch handle. All locks shall be keyed alike.

C. Surface Mounted Panels: Trim for surface mounted panels shall be door-in-door construction such that the gutter space may be exposed by a hinged door.

D. Frames: Directory frames shall be metal frame with plastic covers.

2.3 BUS

A. Bus Work: All bus work shall be 750 amp/sq.in. aluminum.

B. Neutral Buses: Unless otherwise noted on the drawings, neutral busses shall be 100% rated with adequate connections for all outgoing neutral conductors.

C. Panelboards: Panelboards shall be provided with aluminum ground busses.

D. Connection: Bus shall be designed for sequence phase connection to allow the installation of one, two or three pole branch circuit breakers in any position.

2.4 OVERCURRENT DEVICES

A. Device Type: Overcurrent devices shall be trip-free molded case, bolt-on, thermal magnetic circuit breakers.

B. Main Circuit Breakers: Main circuit breakers shall be individually mounted and bolted to bus assembly. Back-fed branch mounted circuit breakers are prohibited.

C. Circuit Breakers Frontfaces: Front faces of all circuit breakers shall be flush. Trip indication shall be clearly shown by the handle position between the ON and OFF positions.

D. Ground Fault Circuit Breakers: Ground fault circuit breakers shall be provided as required on the Contract Drawings and shall require no more panel space than standard breakers.

E. Switching Lighting Circuit Breakers: Where circuit breakers are used for switching of lighting, circuits type "SWD" circuit breakers shall be provided.

F. Connections: All connections shall be rated for 75ºC copper conductors.

PART THREE: EXECUTION

3.1 GENERAL

A. Installation

Panelboards shall be installed in accordance with Manufacturer’s Instructions. Panelboard mounting heights shall be mounted so the highest breaker switch device does not exceed 48” of the finished floor.

END OF SECTION 26 24 16

SECTION 26 28 16 - SAFETY SWITCHES

PART ONE: GENERAL

1.1 GENERAL REQUIREMENTS

A. Provisions

The provisions of Section 26 05 00, General Requirements for Electrical Work apply to the work of this section.

1.2 APPLICABLE CODES AND STANDARDS

A. Products

Products shall comply with the following codes and standards and shall be UL-listed and labeled:

NEMA KS-1	Enclosed Switches
UL 98	Enclosed and Deadfront Switches

1.3 SUBMITTALS REQUIRED

A. Manufacturer's product data sheets.

1.4 MANUFACTURERS

A. Subject to compliance with the specification requirements:

- General Electric
- Square D
- Siemens
- Cutler Hammer

PART TWO: PRODUCTS

2.1 GENERAL

A. Description

Safety switches shall be 240 VAC, NEMA heavy duty, horsepower rated visible blade type. Switches shall be non-fused or fused as indicated on the drawings. Lugs shall be front removable and UL listed for copper conductors. All current carrying parts shall be plated to resist corrosion.

B. Switch Operating Mechanism

The switch operating mechanism shall be spring activated quick make - quick break, such that during the normal operation of the switch, the operation of the contacts shall not be

capable of being restrained by the operating handle after the closing or opening operation of the contacts has been started.

C. External Operating Handle

The external operating handle shall be an integral part of the box and not the cover. The operating handle shall also indicate the switch position, ON in the up position, OFF in the down position and be capable of being padlocked in the OFF position. An interlock shall be provided to prevent opening the cover when the switch is ON and prevent closing the switch contacts when the cover is opened. This interlock mechanism shall be provided with an externally operated override.

D. Arc Suppressors and Line Terminal Shields

Switches shall be provided with arc suppressors and line terminal shields. Arc suppressors shall be removable if necessary to facilitate access to line side lugs.

E. Number of Switched Poles

Single speed motors shall be provided with three pole switches. Two speed motors shall be provided with six pole switches.

F. Ground Kit

Switches shall be provided with a factory supplied ground kit.

G. Fused Switches

Fused switches shall be provided with class H or K fuses.

H. Short Circuit Rating

The UL Listed short circuit current rating of the switches shall be 10KAIC when used with Class H or K fuses.

I. Enclosures

Safety switches installed indoors shall be provided with NEMA 1 enclosures. Safety switches installed outdoors or in wet areas shall be provided with NEMA 3R enclosures.

PART THREE: EXECUTION

3.1 GENERAL

A. Installation

Safety Switches shall be installed in accordance with Manufacturer’s Instructions.

END OF SECTION 26 28 16

SECTION 26 29 13 - MOTOR CONTROLLERS

PART ONE: GENERAL

1.1 GENERAL REQUIREMENTS

A. Provisions

The provisions of Section 26 05 00, General Requirements for Electrical Work apply to the work of this section.

B. The work of this section includes locally installed, enclosed combination magnetic motor starters and manual motor starters.

1.2 APPLICABLE CODES AND STANDARDS

A. Products

Products shall comply with the following codes and standards and shall be UL-listed and labeled:

NEMA ICS-2	Industrial Control Devices, Controllers and Assemblies.
NEMA ICS-6	Enclosures for Industrial Controls and Systems
UL 508	Industrial Control Equipment.

1.3 SUBMITTALS REQUIRED

A. Manufacturer’s product data sheets.

B. Dimensioned Outline Drawings.

C. Control wiring diagrams.

1.4 MANUFACTURERS

A. Subject to compliance with the specification requirements:

- Square D
- Cutler Hammer
- General Electric
- Siemens

PART TWO: PRODUCTS

2.1 MANUAL MOTOR STARTERS

A. Single Phase Fractional HP Manual Motor Starters

Single phase fractional HP manual motor starters shall be toggle operated, enclosed, one or two pole switches as required by the installation.

B. Enclosure

The enclosure shall be NEMA 1 for indoor locations and NEMA 3R for outdoor, wet and damp locations. A handle guard shall be provided to allow the toggle operator to be padlocked in the OFF position.

C. Overloads

Starters shall be provided with trip free melting alloy thermal overloads.

PART THREE: EXECUTION

3.1 GENERAL

A. Installation: Equipment shall be installed in accordance with manufacturer's instructions.

B. Overload Heater Elements

The Contractor shall verify motor nameplate amperes and motor service factors and shall provide all overload heater elements and fuses. Overload heater elements shall be sized in accordance with motor nameplate characteristics.

C. Auxiliary Contacts

The Contractor shall verify and provide the proper number of auxiliary contacts required by equipment provided by others, for control and interlocking of equipment specified in other Divisions of this Specification. Coordinate these requirements with Division 15 Controls Contractor.

END OF SECTION 26 29 13

SECTION 26 31 00 - FIRE ALARM SYSTEM

PART ONE: GENERAL

1.1 GENERAL REQUIREMENTS

A. Definition of Work :

This section of the specification includes the furnishing, installation, connection and testing of new devices to the existing fire alarm system (Firelite Model MS-9200UDLS). It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, auxiliary control devices, and wiring as shown on the drawings and specified herein. Additionally it shall also include the addition of a voice evacuation subpanel to this equipment for the gym and new stage area only, and all replacement devices and wiring to accommodate his system.

1.2 APPLICABLE CODES AND STANDARDS

A. Compliance:

All work shall be in accordance with the laws, rules, codes, and regulations set forth by Local, State, and Federal authorities having jurisdiction. All products and materials shall be manufactured, installed and tested as specified, but not limited to the latest accepted edition of the following codes, standards and regulations:

NFPA 13	Sprinkler Systems
NFPA 70	National Electrical Code
NFPA 72	National Fire Alarm Code
NFPA 101	Life Safety Code
UL 38	Manually Actuated Signaling Boxes
UL 268	Smoke Detectors for Fire Protective Signaling Systems
UL 346	Water-flow Indicators for Fire Protective Signaling Systems
UL 464	Audible Signaling Appliances
UL 521	Heat Detectors for Fire Protective Signaling Systems
UL 864	Control Units for Fire Protective Signaling Systems
UL 1971	Visual Notification Appliances

B. Electrically Supervised System

The fire alarm system shall comply with requirements of NFPA Standard 72 for Protected Premises Signaling Systems except as modified and supplemented by this specification. The system shall be electrically supervised and monitor the integrity of all conductors.

C. UL Listing

The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and the installation shall be in compliance with the UL listing.

D. Authority Having Jurisdiction

1. The system and its components shall meet all requirements of the Local Authority Having Jurisdiction and Portland Fire Department.

1.3 SUBMITTALS REQUIRED

A. Shop Drawings

Shop Drawings shall include but not be limited to the following:

- Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
- Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.
- Show annunciator layout, configurations, and terminations.

B. Wiring Diagrams

Wiring diagrams shall indicate internal wiring for each device and the interconnections between the items of equipment.

C. Battery Calculation

Provide a complete battery calculation showing that the battery system provided meets the operational requirements as defined by NFPA.

1.4 MANUFACTURERS

A. Subject to compliance with the existing equipment: **Firelite Model MS-9200UDLS.**

B. Coordinate equipment specification and installation with Melissa Peters of Norris Incorporated, email: melissap@norrisinc.com Phone: 1-800-370-347.

PART TWO: PRODUCTS

2.1 SYSTEM CONDUITS, WIRING AND GROUNDING

A. Conduits

Conduits shall be in accordance with other sections of this specification and The National Electrical Code (NEC), local and state requirements.

B. Wiring

Wiring shall be UL listed and in accordance with local, state and national codes and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG for Initiating Device Circuits and Signaling Line Circuits, and 14 AWG for Notification Appliance Circuits. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NFPA 70 (e.g., FPLR).

C. Terminal Boxes, Junction Boxes and Cabinets

All boxes and cabinets shall be UL listed for their use and purpose.

2.2 POWER SUPPLY

Additional power supplies shall be added to the fire alarm system as required accommodating the new and existing equipment. Power supplies shall include integral battery charger Firelite Model FCPS-24FSX

2.3 VISUAL STROBE NOTIFICATION DEVICES

Notification strobes shall be 24V xenon type, meet the requirements of the ADA, UL Standard 1971, and be fully synchronized with all strobes in the existing system. Minimum intensity is 15/75cd unless otherwise shown on the Drawings. As manufactured by Firelite, Model P2R.

2.4 COMBINATION HORN/STROBE DEVICES

Electronic horns shall be 24V, field programmable without the use of special tools, at a sound level of at least 90dBA measured at 10 feet from the device. Strobes shall meet the requirements for Visual Strobe Notification Devices. As manufactured by Firelite, Model P2R.

2.5 MANUAL PULL STATIONS

Manual fire alarm stations shall be analog addressable type, non-breakglass type, equipped with key lock so that they may be tested without operating the handle. Stations must be designed such that after an actual activation, they cannot be restored to normal except by key reset. An operated station shall be visually detected as operated at a minimum distance of 100 feet front or side. Manual stations shall be constructed of high impact Lexan, with operating instructions provided on the cover. The word FIRE shall appear on the manual station in letters ½-inch in size or larger. As manufactured by Firelite, Model BG-12LX.

2.6 PHOTOELECTRIC AREA SMOKE DETECTORS

Photoelectric smoke detectors shall be a 24 VDC, two wire, analog addressable type, ceiling-mounted, light scattering type using an LED light source. Each detector shall contain a remote LED output and a built-in test switch. Detector shall be provided on a twist-lock base. It shall be possible to perform a calibrated sensitivity and performance test on the detector without the need for the generation of smoke. The test method shall test all detector circuits. A visual indication of an alarm shall be provided by dual latching Light Emitting Diodes (LEDs), on the detector, which may be seen from ground level over 360 degrees. These LEDs shall flash at least every 10 seconds, indicating that power is applied to the detector. The detector shall not go into alarm when exposed to air velocities of up to 3000 feet (914.4 m) per minute. The detector screen and cover assembly shall be easily removable for field cleaning of the detector chamber. All field wire connections shall be made to the base through the use of a clamping plate and screw. As manufactured by Firelite, Model SD355.

2.7 DUCT SMOKE DETECTORS

Duct smoke detectors shall be furnished as shown on the drawings. Detectors shall be furnished with relay contacts to be wired into the motor starter controls and stop the fan upon

sensing smoke. Additionally the duct smoke shall send a supervisory alarm to the FACP. Duct smoke detectors shall be furnished with a remote test indicator device to be installed in the kitchen in the vicinity of the HRV. Devices shall be furnished by electrical, installed by mechanical and wired by electrical.

2.8 WATERFLOW INDICATORS

Waterflow Switches shall be an integral, mechanical, non-coded, non-accumulative retard type, with alarm transmission delay time adjustable from 0 to 60 seconds. Initial settings shall be 30-45 seconds.

A. Installation Requirements

Waterflow switches shall be provided and connected under this section but installed by the mechanical contractor. Where possible, locate waterflow switches a minimum of one (1) foot from a fitting which changes the direction of the flow and a minimum of three (3) feet from a valve.

2.8 SPRINKLER AND STANDPIPE VALVE SUPERVISORY SWITCHES

A. Where Used:

Each sprinkler system water supply control valve riser, zone control valve, and standpipe system riser control valve shall be equipped with a supervisory switch. Standpipe hose valves, and test and drain valves shall not be equipped with supervisory switches.

B. Valve Supervisory Switches

Valve supervisory switches shall be provided and connected under this section and installed by mechanical contractor. This unit shall provide for each zone: alarm indications using red LED for alarm and yellow LED for trouble and control switches for the control of fire alarm control panel functions. The annunciator will also have an ON-LINE LED, local electric alarm signal, local acknowledge/lamp test switch, and custom slide-in zone/function identification labels. Switches shall be available for remote annunciation and control of output points in the system, system acknowledge, telephone zone select, speaker select, global signal silence, and global system reset within the confines of all applicable standards.

2.9 APARTMENT UNIT DEVICES

A. SMOKE DETECTORS

120V Smoke detectors shall be installed in each sleeping chamber and directly outside of each sleeping chamber. Smoke detector units shall be combination smoke and strobe type. Activation of the smoke detector shall initiate the horn/strobes in that unit only. It shall also activate the strobe in handicap accessible bathrooms. Strobe units shall be interconnected be capable of separate flash patterns for interconnected CO detector. Smoke detector units shall be as manufactured by BRK Model 7010BSL.

B. CARBON MONOXIDE DETECTORS

120V Carbon monoxide detectors shall be installed outside of (within 17 feet of) each sleeping chamber. Activation of Carbon Monoxide detector shall initiate the fire alarm system notification devices (horn strobes) in that unit only. CO detector units

shall be as manufactured by BRK Model CO5120BN.

C. SYSTEM HORN STROBE UNITS

A system horn strobe unit shall be furnished in each apartment to provide notification from the building fire alarm system.

PART THREE: EXECUTION

3.01 INSTALLATION

A. Installation Requirements

1. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

2. Prior to installation, the fire alarm contractor shall complete an Application for Installation of Fire Protection Systems.

3. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

4. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas.

5. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

5. Smoke detectors shall be provided with dust covers to remain in place during construction to protect smoke detectors from contamination and physical damage. Dust covers shall be removed prior to final acceptance.

6. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

7. Manual fire alarm boxes shall be suitable for surface mounting or semi-flush mounting as shown on the plans, and shall be installed not less than 42 inches (1067 mm), nor more than 48 inches (122 mm) above the finished floor.

3.02 TESTING

The service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment shall be provided to technically supervise and participate during all of the adjustments and tests for the system.

A. Testing Requirements

1. Before energizing the cables and wires, check for correct connections and test for

short circuits, ground faults, continuity, and insulation.

2. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.

3. Verify activation of all waterflow switches.

4. Open initiating device circuits and verify that the trouble signal actuates.

5. Open and short signaling line circuits and verify that the trouble signal actuates.

6. Open and short notification appliance circuits and verify that trouble signal actuates.

7. Ground all circuits and verify response of trouble signals.

8. Check presence and audibility of tone at all alarm notification devices and verify intelligibility and content of voice messages.

9. Check installation, supervision, and operation of all intelligent smoke detectors using the walk test.

10. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.

11. When the system is equipped with optional features, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

3.03 FINAL INSPECTION AND CERTIFICATION

At the final inspection, a factory-trained representative of the manufacturer of the major equipment shall demonstrate that the system functions properly in every respect. Upon completion of testing submit a certification from the major equipment manufacturer indicating that the supervisor of the installation and the proposed performer of contract maintenance is an authorized representative of the major equipment manufacturer. Include names and addresses in the certification.

3.04 INSTRUCTION

Instruction shall be provided as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided. The contractor and/or the systems manufacturer's representatives shall provide a typewritten "Sequence of Operation."

3.05 GUARANTEE

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. 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.

END OF SECTION 26 31 00

SECTION 26 31 15 - LIGHTING FIXTURES

PART ONE: GENERAL

1.1 GENERAL REQUIREMENTS

A. Provisions

The provisions of Section 26 05 00, General Requirements for Electrical Work, and section 26 05 33, Raceway and Fittings, apply to the work of this section.

1.2 APPLICABLE CODES AND STANDARDS

A. Products

Products shall comply with the following codes and standards and shall be UL-listed and labeled:

CBM Labels	Certified Ballast Manufacturers Assoc.
NEC Art. 410	National Electrical Code
FCC, Part 18	RFI and EMI
ANSI C62.41	Line Transient Protection
UL 924	Emergency Lighting and Power Equipment
UL 1088	Temporary Lighting

1.3 SUBMITTALS REQUIRED

A. Data Sheets, Photometrics and Installation Instructions

Submit manufacturer's product data, photometrics, and installation instructions for each type of light fixture specified. Fixture submittals will be in booklet form with separate sheet for each fixture assembled in "luminaire type" alphabetical order, with proposed fixture and accessories clearly indicated on each sheet.

1.4 MANUFACTURERS

A. General

The fixture types, manufacturers and model number s are shown on the lighting schedule in the Contract Drawings. These fixtures and manufacturers are listed to establish a baseline type, style and quality of fixture to be provided. Although one manufacturer may be listed on this lighting schedule, other manufacturers' representatives may submit fixtures for consideration as "equal" fixtures to facilitate the "packaging" of the lighting fixtures within the representative's product lines. The architect and engineer however reserve the right to require certain individual fixtures be provided of the model and manufacturer specified in order to meet specific design intent by the architect or engineer.

B. Exterior Fixtures

The Architect and Engineer reserve the right to require that the specified model and manufacturer of some or all of the exterior lighting fixtures be furnished by this contractor, due to approvals of local authorities required prior to Issue of Project Documents. No additional compensation will be furnished to the contractor for “assumptions” that alternate fixtures could be substituted for those specified.

PART TWO: PRODUCTS

2.1 GENERAL

A. Efficiency Maine

The Electrical Contractor shall be responsible for all submissions to Efficiency Maine for the purpose of securing any potential lighting rebates for the Owner. All lighting fixtures shall meet the current Efficiency Maine requirements for rebate and be listed by Design Light Consortium (DLC) or Energy Star for that purpose.

B. Light Fixtures

Light fixtures shall be provided with housings, trims, ballasts, lamp holders, sockets, reflectors, wiring and other components required, as a factory-assembled unit for a complete installation.

C. Electrical Wiring

Provide electrical wiring within light fixtures suitable for connecting to branch circuit wiring in accordance with N.E.C. Article 410, Paragraph 25.

D. Packaging

Deliver interior lighting fixtures shall be delivered in factory fabricated containers and wrapping, in order to properly protect fixtures from damage.

E. Storage

Interior lighting fixtures shall be stored in original packaging. Store inside well-ventilated area protected from weather, moisture, soiling, humidity, extreme temperatures, laid flat and on skids to keep off floors and ground.

F. Ceiling Fixtures

Fixtures installed in ceilings, suspended from ceilings or on walls shall be installed with a plastic film covering protecting the lens, louver and lamps from dust, dirt and debris during construction. Plastic film shall be removed upon the completion of construction.

2.2 LED FIXTURES

A. General

Provide LED fixtures of sizes, types and ratings indicated and specified in the Lighting Fixture Schedule on the Contract Drawings. All assembly combinations shall be listed by DLC or Energy Star, and approvable by Efficiency Maine for rebate purposes.

2.3 LAMPS

A. Lamp Requirements

Provide LED, fluorescent and incandescent lamps of types as indicated on the contract drawings. Acceptable lamp manufacturers are Osram Sylvania, Inc. and Philips Lighting Co.

2.4 OCCUPANCY SENSORS

A. General

Occupancy sensors of the type and model specified on the drawings shall be provided, installed and wired into the local lighting circuit in the area that the sensors are installed. The engineer will consider equipment of another equal manufacturer, where suitable coverage can be documented.

B. Passive Infrared Wall-Mount Fixtures

Wall mounted occupancy sensors shall be suitable for dual circuit operation as specified on the contract drawings.

C. Ultrasonic/Infrared Ceiling-Mounted Sensors

Ceiling mounted occupancy sensors shall be self-calibrating type as specified on the contract drawings.

D. Power Packs

Power packs shall be provided as required for each room provided with occupancy sensors as needed.

E. Slave Relay Packs

Slave relay packs shall be provided in rooms with more than one lighting circuit controlled by the occupancy sensor.

F. Installation Requirements

Provide all miscellaneous equipment and wiring for a complete installation.

2.6 LIGHTING CONTROLS

A. General

Operation of exterior lighting is to be provided with a combination of photocell (ON), time clock (ON or OFF), and automatic control override switch (ON) through a UL listed

lighting contactor. These controls shall be provided with all components required for a fully-operable system.

B. Lighting Contactors

Lighting contactors shall be provided in a NEMA 1 enclosure sufficiently sized to also house the time clock. Lighting contactors shall be listed for operation with the voltages shown on the Contract Drawings. Lighting contactors shall be multi-pole type sized sufficiently for the number of circuits shown on the contract drawings and a minimum of one spare circuit. Contactors shall be mechanically held with Normally Open (N.O.) contacts which are convertible to Normally Closed (N.C.) type.

C. Photocells

Photocells shall be provided as shown on the Contract Drawings. Mounting location and height shall be as shown on the Drawings and further coordinated with the architect and engineer prior to installation for exact location of box. Photocell shall be provided with NEMA 4 enclosure to be mounted on standard 2”x4” exterior junction box.

PART THREE: EXECUTION

3.1 GENERAL

A. Prior Examination

Examine all areas and conditions under which lighting fixtures are to be installed and structure which will support lighting fixtures. Notify the Contractor in writing of any conditions detrimental to proper installation and completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

B. Coordinate Installation

Coordinate light fixture installations with other trades. Fluorescent light fixtures should be installed at least two feet away from smoke detectors. Coordinate all lighting fixtures with mechanical piping and ductwork to allow for proper clearance.

3.2 INSTALLATION

A. Locations and Heights

Install all lighting fixtures at locations and heights indicated, in accordance with the architectural reflected ceiling plans.

B. Recessed Lighting Fixtures

All recessed lighting fixtures installed in ceiling which require a fire resistance rating shall be installed in accordance with the 1996 BOCA National Building Code Section 713.

C. Fastening and Supporting Fixtures

Provide fixtures and/or fixture outlet boxes with hangers, channel or other method of fastening and supporting fixtures required for proper installation.

D. Pendant Mounted Fixtures

All pendant mounted fixtures shall be installed plumb and level or as detailed on the Contract Drawings. Pendant mounted fixtures longer than 18" shall have twin hangers of type specified.

E. Tightening Values

Tighten connectors and terminals, including screws and bolts in accordance with equipment manufacturer's published torque tightening values for equipment connectors. All screws and bolts shall have washers.

3.3 SPLICES AND TERMINATIONS

A. General

Twist on wire connectors shall be installed which utilize square-wire spring grips and thermo plastic shells. Install connectors to meet the manufacturer's torquing requirements. Install wire connectors of size required as not to exceed the manufacturers UL-listed CSA recognized wire combinations

3.4 FIELD QUALITY CONTROL

A. Replacement of Lamps

At date of substantial completion, all lamps that are not functioning, have color deficiencies, or are noticeably dimmed shall be replaced with new lamps as determined by the Engineer.

B. Cleaning Light Fixtures

All light fixtures shall be cleaned of dirt and debris upon completion of construction. All finger prints and smudges shall be cleaned.

C. Protection During Construction

All installed fixtures during remainder of construction shall be protected in accordance with section 2.1.5 of this specification section.

D. Grounded

All light fixtures shall be grounded in accordance with article 250 and 410 of the NEC. Tighten connections to comply with tightening torques specified in UL 486A to assure permanent and effective grounds.

E. Damaged Light Fixtures

All light fixtures damaged in shipping or during installation shall be replaced with new fixtures at no cost to the owner.

END OF SECTION 26 31 15

SECTION 28 23 00 – VIDEO SURVEILLANCE

PART ONE: GENERAL

1.1 GENERAL REQUIREMENTS

A. Provisions

The provisions of Section 26 05 00, General Requirements for Electrical Work apply to the work of this section.

B. The work of this section includes locally installed, IP-based cameras.

1.2 APPLICABLE CODES AND STANDARDS

A. Products

Products shall comply with the following codes and standards and shall be UL-listed and labeled:

ONVIF	Open Network Video Interface Forum
HDMI 1080	High-Definition Multimedia Interface

1.3 SUBMITTALS REQUIRED

A. Manufacturer’s product data sheets.

B. Dimensioned Outline Drawings.

C. System wiring diagrams.

1.4 MANUFACTURERS

A. Suggested manufacturers, subject to compliance with the specification requirements:

- Hikvision
- Panasonic
- Axis
- Sony
- Pelco
- Milestone
- Exacq

PART TWO: PRODUCTS

2.1 INDOOR CAMERAS

IP-based camera with the following requirements:

- Wide Dynamic Range greater than 110 Decibels.
- Vandal-proof enclosure.
- HD video resolution of 2MP/1080, or greater where required.
- Varifocal and/or fixed IR corrected lenses that are sized according to scene at mounting locations.
- ONVIF compliant.
- Camera firmware shall support gain, exposure, shutter speed control, WDR and variable bit rate with a maximum bandwidth cap.
- Product Warranty duration of 3 years.

2.2 OUTDOOR CAMERAS

IP-based camera with same requirements as the Indoor cameras, with the following additional requirements:

- Operating temperature range down to minus 40 degrees C/40 degrees F.
- Weatherproof-rated enclosure.
- Vandal-proof dome-style enclosure.
- Pendant-mount hardware.
- Auto-iris lens.
- Remote focus and zoom.
- Ultra low-light operation.

2.3 HEADEND COMPUTER

Network Video Recorder (NVR) shall have ample storage and capacity to accommodate the addition of 50% more cameras in the future. Only device licenses for the cameras installed need to be provided.

- Windows OS-based. Linux-based also acceptable if it is the proposed operating system solution.
- Rack-mountable computer
- Sufficient storage for 30 days of continuous recording for all cameras.
- Estimated system settings of 15 frames per second maximum resolution per camera, with medium H.264 compression.

- Provide Layer 2 POE Smart Switches which can accommodate all camera ports and camera power budget plus provision for 50% more cameras in the future. Rack mountable. Netgear FS728TP or equivalent.
- Network shall include 24-port CAT6 patch panel with dual Gigabit Ethernet network interfaces.
- Free Windows-based client software (thick client) available at no cost for per client connection.
- Free Mobile App software (iOS and Android)
- Rack mountable UPS to support NVR and POE switches for a minimum of 15 minutes.
- Shall support ONVIF open protocol IP cameras.
- Certification of the completed CAT6 installation.
- Client computer shall be provided by Owner and shall be adequate to host this surveillance system software.

PART THREE: EXECUTION

3.1 GENERAL

A. Installation: Equipment shall be installed in accordance with manufacturer's instructions.

B. Electrical boxes and conduits shall be by Division 26. Surveillance system wiring and devices shall be furnished with this Specification.

C. All CAT6 wiring shall be plenum-rated.

END OF SECTION 28 23 00

SECTION 31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Description of work: Provide labor, materials, equipment, and services necessary for proper and complete site clearing as indicated on the Drawings and as herein specified including the following items:

1. Removing existing vegetation
2. Clearing and grubbing
3. Stripping and stockpiling topsoil
4. Removing above- and below-grade site improvements
5. Disconnecting, capping or sealing, and abandoning site utilities in place, or removing site utilities, where directed
6. Temporary erosion and sedimentation control measures

1.3 DEFINITIONS

A. Subsoil: All soil beneath the topsoil layer of the soil profile and typified by the lack of organic matter and soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in- place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 1 inch (25 mm) in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.

D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

A. Cleared materials shall become Contractor's property and shall be removed from project site, except for stripped topsoil, and other materials that are indicated to be stockpiled and re-used, or otherwise remain the Owner's property.

1.5 SUBMITTALS

A. Product Data: For each type of product

B. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.

1. Use sufficiently detailed photographs or videotape.

2. Include plans and notations to indicate specific wounds and damage conditions of each item designated to remain.

C. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

A. Pre-installation Conference: Conduct conference at Project site with Owner’s representative.

1.7 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Coordinate work with the City of Portland for all work within Alder Street, Preble Street, and Lancaster Street.

2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where directed.

C. Utility Locator Service: The Contractor shall notify utility locator service for area where Project is located and perform the following actions prior to site clearing.

1. Pre-mark the boundaries of your planned excavation with white paint, flags or stakes, so utility crews know where to mark their lines.

2. Call Dig Safe, at 1-888-DIGSAFE, at least three business days, but no more than

60 calendar days, before starting work.

3. If blasting, notify Dig Safe at least one business day in advance.
4. Wait three business days for lines to be located and marked with color-coded paint, flags or stakes. Note the color of the marks and the type of utilities they indicate. Transfer these marks to the As-Built drawings.
5. Contact the landowner and other non-member utilities (water, sewer, gas, etc.), for them to mark the locations of their underground facilities. Transfer these marks to the As-Built drawings.
6. Re-notify Dig Safe and the non-member utilities if the digging, drilling or blasting does not occur within 60 calendar days, or if the marks are lost due to weather conditions, site work activity or any other reason.
7. Hand dig within 18 inches in any direction of any underground line until the line is exposed. Mechanical methods may be used for initial site penetration, such as removal of pavement or rock.
8. Dig Safe requirements are in addition to town, city and/or state DOT street opening permit requirements.
9. For complete Dig Safe requirements, call the PUC or visit their website.
10. If damage, dislocation, or disturbance of any underground utility line is observed, immediately notify the affected utility. If damage creates safety concerns, call the fire department and take immediate steps to safeguard health and property.
11. Any time an underground line is damaged or disturbed, or if lines are improperly marked, the Contractor must file an Incident Report with the PUC. For an Incident Report form visit www.state_me.us/mpuc or call the PUC at 800-452-4699.

D. Do not commence site clearing operations until temporary erosion and sedimentation control and plant protection measures are in place.

E. Soil Stripping, Handling, and Stockpiling: Perform when the topsoil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Erosion and sedimentation control materials and methods are described on Sheet C400 of the Contract Drawings.

B. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Division 31 Section "Earth Moving".

1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction

B. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion-and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction. The Contractor shall conduct his operations in conformity with all Federal and State permit requirements concerning water, air, and noise pollution, and the disposal of contaminated or hazardous materials. Erosion control measures shown on the Drawings are minimum only and are not intended to be complete. Satisfy the current requirements of the regulatory agencies. Comply with materials and procedures listed on Sheet C400 of the Contract Drawings.

B. Inspect, maintain, and repair erosion and sedimentation control measures during construction until permanent vegetation has been established.

C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal once 85% rigorous vegetative grown has been achieved.

3.3 EXISTING UTILITIES

A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed, or abandoned in place.

1. Arrange with utility companies to shut off indicated utilities.

2. Owner will arrange to shut off indicated utilities within his control, when requested by Contractor.

B. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owners Representative not less than two days in advance of proposed utility interruptions

2. Do not proceed with utility interruptions without Engineer’s or Owner's written permission.

C. Excavate for and remove underground utilities indicated to be removed.

D. Removal of underground utilities is included in Division 33 Sections

3.4 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Recycle wood and wood debris either on-site or off-site, and do not bury or burn wood material. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches (450 mm) below exposed subgrade.

2. Chip removed tree branches and recycle the material either on-site or off-site.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.5 TOPSOIL STRIPPING

A. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, stones and other objects more than 2 inches in diameter; trash, debris, weeds, roots, stumps, and other waste materials.

B. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover with temporary seed and mulch to prevent windblown dust and erosion.

1. Dispose of surplus topsoil in same manner specified for surplus soil. Surplus topsoil is that which exceeds quantity required for reuse.

3.6 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

B. Remove buildings, walls, concrete, metal, glass, slabs, foundations, retaining walls, paving, curbs, gutters, and aggregate base as indicated

1. Unless existing full-depth joints coincide with line of demolition, neatly sawcut along line of existing pavement to remain before removing adjacent existing pavement. Sawcut faces vertically. Remove existing pavement where indicated on the Plans. Properly dispose of removed pavement off-site.

3.7 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, brick, concrete, metal, and waste materials including trash and debris, and legally dispose of them off-site.

1. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 31 10 00

SECTION 31 20 00 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Provide all labor, material, equipment, and services required to complete the work specified in this section, and as shown on the drawings.

B. The work of this section includes but is not necessarily limited to:

1. Excavation, trenching, filling, and backfilling for foundations, driveway/parking areas, site structures, utilities, site drainage, landscaping, and compaction.
2. Excavation and off-site disposal of all unsuitable or excess materials. Excavation shall include removal and satisfactory disposal of all unclassified material encountered throughout the site. Excavated soil is assumed to be “special waste” and shall be characterized by the Contractor prior to offsite disposal.
3. Compaction of undisturbed original soil or existing fill as appropriate and as specified, prior to construction and placement of new fill and backfill.
4. Provide all necessary sheeting, shoring, and bracing to protect the Work and assure safety of workers, adjacent property and the public.
5. Maintenance of all excavations free from water.
6. Coordinate field density test as required herein and as directed by the Engineer.
7. Compacted fill from top of utility bedding to subgrade elevations.
8. Rough grading and final grading, including placement, moisture conditioning and compaction of fills and backfill.
9. The removal, hauling and stockpiling of suitable excavated materials for subsequent use in the work. Stockpiling shall include protection to maintain materials in a workable condition.
10. Re-handling, hauling and placing of stockpiled materials for use in refilling, filling, backfilling, grading, and other such operations.
11. Providing products in sufficient quantities to meet the project requirements.
12. Obtain all required permits, licenses, and approvals of appropriate municipal and utility authorities, prior to commencing the work of this Section, and pay costs incurred therefrom.

C. A Geotechnical Report may have been prepared in relation to the project, and if so, it is

made available to the Contractor for informational purposes and is not considered part of the Contract Documents unless specifically identified as such in the General and Supplemental Conditions. If a potential conflict exists between the Geotechnical Report and these technical specifications, the Contractor shall, immediately upon its discovery, request clarification from the Owner's Representative.

1.3 SUBMITTALS

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

B. Comply with Section 01 40 00 – Quality Requirements.

C. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.

D. Test Reports: Submit the following reports:

1. Reports on material gradations (ASTM D422).
2. Field density test reports (ASTM D2922).
3. One optimum moisture-maximum density curve for each type of material used in the Work (ASTM D-1557 modified).

E. Materials Source: Submit name of imported materials source.

F. Material Certifications: Submit materials certificate signed by the material supplier and Contractor, certifying that materials comply with, or exceed, the requirements herein.

G. Product Data: Submit data for geotextile fabric indicating fabric and construction.

1.4 CLOSEOUT SUBMITTALS

A. Comply with:

1. Section 01 33 00 – Submittal procedures
2. Section 01 73 00 – Execution
3. Section 01 77 00 – Closeout procedures

B. Project Record Documents: Accurately record actual locations of all utilities by horizontal dimensions, elevations or inverts, and slope gradients.

1.5 COORDINATION

A. Comply with Section 01 31 00 – Project Management and Coordination.

B. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

1.6 QUALITY ASSURANCE

A. Comply with the requirements of Section 01 40 00 – Quality Requirements.

B. Documents affecting Work of this Section include, but are not necessarily limited to; the Conditions of the Contract, General Conditions, Supplementary Conditions, Addenda, and all Sections of Division 01 are hereby made a part of this Section.

C. Coordinate Work with that of other trades affecting or affected by Work of this Section. Cooperate with such trades to assure the steady progress of the Work.

D. All Work shall comply with the requirements of the Maine Department of Environmental Protection, the Cumberland County Soil & Conservation District Standards, and City of Bangor, Maine Standards to minimize adverse environmental impacts. Reference is made to the Erosion and Sedimentation Control Plan included in the Plan set for this project. Strict adherence to the Specifications and Plans is required in order to prevent adverse downstream impacts.

E. All Work shall comply with the conditions of the enclosed permits.

F. Work shall be accomplished in accordance with regulations of local, county and state agencies and national or utility company standards as they apply.

G. The Contractor shall protect structures, utilities, sidewalks, pavements, property monuments, monitoring wells, and other facilities from damages caused by settlement, lateral movement, undermining, washout, and other hazards created from earthwork operation.

H. The Contractor shall bear all cost associated with correcting any Work that does not meet the requirements of this Section or any damaged items due to construction activities. These costs include any professional services required for inspection of repairs or replacements.

I. Costs related to retesting due to unacceptable qualities of work and failures discovered by testing shall be paid for by the Contractor at no additional expense to Owner, and the costs thereof will be deducted by the Owner from the Contract Sum.

J. Paved surfaces: Do not operate equipment on paved surfaces. Paved surfaces outside the limits of Work which become damaged shall be repaved by the Contractor.

K. Contractor shall be responsible for notifying all affected utility companies and Dig Safe before starting work.

L. Field Measurements:

1. Verify that survey horizontal and vertical control reference points are present and correct as indicated. Protect these points from disturbance during the course of the Work, or correctly re-establish as necessary.

2. During construction, provide all necessary line and grade staking to properly control the Work.

1.7 SAFETY

A. Maintain excavations with approved barricades, lights, and signs to project life and property until excavation is filled and graded to a condition acceptable to the Engineer.

B. Provide all necessary sheeting and shoring for trench excavation in accordance with OSHA standards.

PART 2 - PRODUCTS

2.1 SOURCE QUALITY CONTROL

A. Comply with Section 01 40 00 - Quality Requirements.

B. When tests indicate materials do not meet specified requirements, change material and retest.

C. Furnish materials of each type from same source throughout the Work.

2.2 MATERIALS

A. Common Borrow (MDOT 703.18): Shall consist of earth, suitable for embankment construction. It shall be free from frozen material, perishable rubbish, peat, and other unsuitable material. The moisture content shall be sufficient to provide the required compaction and stable embankment. In no case shall the moisture content exceed 4% above optimum, which shall be determined in accordance with AASHTO T180, Method C or D.

B. Unsuitable Materials: Materials that cannot be compacted to required density or contain frozen material, organic material, peat, muck, coal, ash, debris, pavement, construction waste, or boulders greater than 6 inches in any dimension, and any material that, in the opinion of the Engineer, is not suitable for its use.

C. Excavated rock may not be used as fill material, except as general site fill outside of pavement and structure limits with approval of the Engineer.

D. Gravel Borrow (MDOT 703.20): Shall consist of well graded granular material having no rocks with a maximum dimension over 6 inches. The gradation of that portion passing the 3 inch sieve shall meet the gradation requirements of the following table:

Sieve Size	Percent Finer by Weight
¼ inch	0 to 70
No. 200	0 to 10

A. Granular Borrow (MDOT 703.19): Shall consist of sand or gravel of hard durable particles free from vegetative matter, lumps, or balls of clay, frozen material and other deleterious substances. The gradation of that portion passing the 3 inch sieve shall

meet the gradation requirements of the following table:

Sieve Size	Percent Finer by Weight
No. 40	0 to 70
No. 200	0 to 20

B. Structural Fill: Structural granular fill shall be used below and adjacent to the building entrance/canopy supports and where indicated in Contract Documents. Compacted structural fill shall consist of sand and gravel of hard durable particles, free of organic material, loam, lumps or balls of clay, trash, snow, ice, frozen soil, stones over 4-inch diameter, or other objectionable material. The gradation of that portion of the material passing a 3-inch sieve shall meet the following limits:

Sieve Size	Percent Finer by Weight
3 inch	100
¼ inch	25 to 70
No. 40	0 to 30
No. 200	0 to 5

C. Crushed Stone: in conformance with Maine DOT Standard Specification 703.22 “Underdrain Backfill Type C”:

Sieve Size	Percent Finer by Weight
1 inch	100
¾ inch	90 to 100
3/8 inch	0 to 75
No. 4	0 to 25
No. 200	0 to 5

D. Leveling Sand: Aggregate for sand leveling shall be sand of hard durable particles free from vegetable matter, lumps or balls of clay and other deleterious substances in conformance with Maine DOT Standard Specification 703.05 “Aggregate for Sand Leveling”. The gradation shall meet the grading requirements of the following table.

Sieve Size	Percent Passing
3/8”	85 - 100
No. 200	0-5.0

E. Sand: Clean granular material, free from lumps, balls of clay, and organic material and shall be Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, and organic matter and conforming to the following gradation:

Sieve Size	Percent Passing
1 inch	100

½ inch	75 to 100
No. 4	50 to 100
No. 20	15 to 80
No. 50	0 to 15
No. 200	0-5

PART 3 - EXECUTION

3.1 EXAMINATION

A. Comply with:

1. Section 01 73 00 - Execution Requirements: Verification of existing conditions before starting work.

B. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.

C. Verify structural ability of unsupported walls to support loads imposed by fill.

D. Verify survey bench mark and intended elevations for the Work are as indicated on Drawings.

3.2 PREPARATION

A. Locate and mark any and all existing underground and aboveground utilities before beginning any earthwork. Notify Dig Safe at 1-888-344-7233 not less than three working days before performing Work.

B. All earthworks shall be in accordance with the Drawings and any supplemental documents.

C. Ensure that erosion controls are in place and properly functioning prior to any earthwork.

D. Topsoil Excavation:

1. Excavate topsoil from all areas to be further excavated, raised in grade, relandscaped, or regraded, without mixing with foreign materials for use in finish grading.

2. Do not excavate wet topsoil.

3. Stockpile on Site in area approved by the Engineer and protect from erosion.

4. Remove excess topsoil not intended for reuse, from site.

E. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of materials. Plow, strip, or break up sloped surfaces steeper than 1 vertical to 4

horizontal so that fill material will bond with existing surface.

F. Remove and properly dispose of any pavement, structures, fences, debris, etc. scheduled for removal. Save and store any material scheduled for re-use.

G. Identify required lines, levels, contours, and datum locations.

H. Notify utility company to remove and relocate utilities.

I. Maintain and protect above and below grade utilities indicated to remain.

J. Protect plant life, lawns, rock outcroppings, and other features remaining as portion of final landscaping.

K. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

L. Establish temporary traffic control and detours when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

M. Compact subgrades to density requirements for subsequent backfill materials. If compaction is insufficient, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.

N. All foundation subgrades shall be densified using a walk behind compactor capable of imposing a dynamic load of 5 kips.

O. Existing surficial fill encountered beneath the proposed building footprint and paved areas shall be proof-rolled using a vibrator roller-compactor capable of imposing a dynamic load of 15 kips.

P. Any areas that continue to yield after 3 to 5 passes of the compaction equipment should be over-excavated and replaced with Granular Borrow.

Q. Cut out soft areas of subgrade not capable of compaction in place. Backfill with Fill as required in the Fill Schedule of this Section and compact to density equal to or greater than requirements for subsequent fill material.

R. Proof roll to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.

3.3 FIELD QUALITY CONTROL

A. Comply with Section 01 40 00 - Quality Requirements.

B. Comply with Section 01 73 00 - Execution Requirements.

C. Testing and Field Observations:

1. The Contractor shall retain and pay for the services of an independent testing and inspection firm and/or a Geotechnical Consultant to perform on-site observation and testing during the various phases of the construction operations. The Owner reserves the right to modify or waive the services of the independent testing and inspection firm and/or the Geotechnical Consultant. The services of a Geotechnical Consultant/Inspection and testing firm may include, but not necessarily be limited to, the following:

    a. Observation during excavation and dewatering of building and controlled fill areas.

    b. Observation during backfilling and compacting operations within that area defined as building area or controlled fill area and other areas as appropriate.

    c. Laboratory testing and analysis of fill materials as specified herein and proposed by the Contractor for incorporation into the Work.

    d. Observation of construction and performance of water content, gradation and compaction tests at a frequency and locations that he shall select. The results of these tests will be submitted to the Owner, Engineer, and Contractor on a timely basis so that action can be taken to remedy indicated deficiencies. During the course of construction, the Geotechnical Consultant will advise the Owner in writing if at any time in his opinion the Work hereunder is of unacceptable quality. Failure of Geotechnical Consultant to give notice, shall not excuse the Contractor from latent defects discovered in his work.

2. The Contractor shall make provisions for allowing observations and testing of Contractor's Work by the independent testing and inspection firm and/or the Geotechnical Consultant. The Contractor shall assist the testing agency as required and shall deliver samples of all materials required to the testing agency at the Contractor's expense.

3. The presence of the independent testing and inspection firm and/or the Geotechnical Consultant does not include supervision or direction of the actual work of the Contractor, his employees or agents. Neither the presence of the independent testing and inspection firm and /or the Geotechnical Consultant, nor any observations and testing performed by them, nor failure to give notice of defects shall excuse the Contractor from defects discovered in his work.

4. Costs related to retesting due to unacceptable qualities of work and failures discovered by testing shall be paid for by the Contractor at no additional expense to Owner, and the costs thereof will be deducted by the Owner from the Contract Sum.

D. Contractor will pay for all proposed material gradation testing and field compaction testing.

E. Minimum Number of Tests:

1. Footing Subgrade: For each strata of soil on which footings will be placed, conduct

at least one test per 50 linear feet of footing to verify required design bearing capacities.

2. Paved Areas and Slab Subgrades: Make at least one field density test of subgrade for every 2,000 square feet of paved area or building slab, but in no case less than three tests for each. In each compacted fill layer, make one field density test for every 2,000 square feet of overlaying slab or paved area, but in no case less than 3 tests for each.

3. Foundation Wall Backfill Outside of Structure: Make at least two field density tests at locations and elevations directed by the Engineer.

F. Proof roll compacted fill surfaces under slabs-on-grade, pavers, and paving.

G. Request visual inspection of subgrades and bearing surfaces by Engineer before installing subsequent work.

H. Slope sides of excavations to comply with OSHA regulations and local codes. Shore and brace where sloping is not possible.

3.4 EXCAVATION

A. Do not excavate wet subsoil or excavate and process wet material to obtain optimum moisture content.

B. Do not excavate or leave soils open for foundations or trenches to freezing conditions.

C. When excavating through roots, perform work by hand and cut roots with sharp axe.

D. Underpin adjacent structures which may be damaged by excavation work.

E. Excavate subsoil to accommodate building foundations, slabs-on-grade paving, site structures, and construction operations.

F. Compact disturbed load bearing soil in direct contact with foundations to original bearing capacity; perform compaction in accordance with this Section.

G. Slope banks with machine to angle of repose or less until shored.

H. Do not interfere with 45 degree bearing splay of foundations.

I. Grade top perimeter of excavation to prevent surface water from draining into excavation.

J. Remove lumped subsoil, boulders, and rock up to 1/3 cy measured by volume.

K. Notify Engineer of unexpected subsurface conditions.

L. Correct areas over-excavated with Crushed Stone.

M. Stockpile subsoil intended for reuse on Site in area approved by the Architect/Engineer

and protect from erosion.

N. Remove and dispose of excess and unsuitable material from site.

O. Remove excess subsoil not intended for reuse, from site.

P. Repair or replace items indicated to remain damaged by excavation.

Q. Prepare subgrade for lawn areas 6” below finished grade.

3.5 FILLING, BACKFILLING AND GRADING

A. Fill areas to contours and elevations with appropriate fill material. Frozen materials shall not be used.

B. Backfill excavations as promptly as work permits, but not before completion of the following:

1. Acceptance of construction below finish grade, including dampening, waterproofing, and perimeter insulation.
2. Removal of concrete formwork.
3. Removal of trash and debris.
4. Removal of shoring, bracing, and backfilling of the remaining voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in a manner to prevent settlement of the structure or utilities or leave in place if required.
5. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

C. Use care in backfilling utility trenches to avoid damage or displacement of the utilities.

D. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

E. Place fill material in continuous layers and compact in accordance with the Fill schedule in this section.

F. Employ placement method that does not disturb or damage other work.

G. Maintain optimum moisture content of backfill materials to attain required compaction density.

H. Do not backfill against unsupported foundation walls.

1. Backfill concrete structures only after the concrete has developed adequate strength. Do not allow heavy machinery within 5 feet of structures during backfilling and compacting.
2. Backfill simultaneously on each side of unsupported foundation walls until

supports are in place.

I. Slope grade away from building minimum 2 percent slope for minimum distance of 10 ft, unless noted otherwise.

J. Make gradual grade changes. Blend slope into level areas.

K. Remove surplus backfill materials from site.

L. Leave fill material stockpile areas free of excess fill materials.

M. Repair or replace items indicated to remain damaged by excavation or filling.

N. Subgrade Preparation for Pavements and Walks:

1. Excavate, form, shape and roll subgrade to conform to cross-section of finished pavement. Roller shall be 10-ton minimum weight.
2. Remove stones greater than 5” measured in any dimension from subgrade to a 12” depth. Fill depressions with suitable fill as required Fill schedule of the section.
3. When areas become impervious due to concentrations of fines and over-compaction, lightly scarify and re-compact. In severe cases, remove such material and replace with suitable soil as directed.
4. Subgrades shall positively grade and drain in order to keep roadway base and subbase free from water.

O. Any settlement or erosion that occurs prior to acceptance of the Work shall be repaired, and re-graded to the required elevations and slopes.

3.6 TRENCHING

A. Remove lumped subsoil, boulders, and rock up of 1/6 cubic yard, measured by volume.

B. Do not advance open trench more than 200 feet ahead of installed pipe unless approved by the Engineer.

C. Remove water or materials that interfere with Work.

D. Excavate bottom of trenches maximum 2 feet wider than outside diameter of pipe, or as required to meet OSHA safety requirements.

E. Excavate trenches to lines depths indicated on Drawings with sufficient width to enable installation and inspection of the utility.

F. Owner reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.

G. Use laser-beam instrument with qualified operator to establish lines and grades.

H. Provide uniform and continuous bearing and support for bedding material and utilities.

I. Do not interfere with 45 degree bearing splay of foundations.

J. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth as directed by Engineer until suitable material is encountered. Notify Engineer, and request instructions.

K. Cut out soft areas of subgrade not capable of compaction in place. Backfill with Structural Fill and compact to density equal to or greater than requirements for subsequent backfill material.

L. Trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.

M. Correct areas over-excavated with compacted backfill as specified for authorized excavation or replace with flow-able fill concrete as directed by Engineer.

N. Remove excess subsoil not intended for reuse from site.

O. Stockpile excavated material in area designated on site in accordance with this Section.

3.7 SHEETING AND SHORING

A. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation to comply with OSHA regulations and local codes.

B. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.

C. Design sheeting and shoring to be removed at completion of excavation work. Sheeting and shoring shall not be left in place.

D. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.

E. Repair damage to new and existing Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

3.8 DEWATERING

A. Perform all work in dry weather conditions whenever possible.

B. Dewater soils and excavations as necessary to adequately compact, excavate, and work existing soils.

C. Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surround areas.

D. Do not allow water to accumulate in excavations. Provide and maintain pumps and dewatering system components necessary to convey water away from excavations.

E. Convey water removed from excavations adequately to prevent soil erosion and downstream sedimentation. Filter pumped water prior to discharge and do not discharge directly to storm drains.

F. Do not use trench excavations as temporary drainage ditches.

3.9 FROST

A. No fill materials shall be placed when the subgrade, the fill material, or the previous lift on which fill is to be placed is frozen. In the event the subgrade or any fill which already has been placed becomes frozen, it shall be thawed, scarified and then re-compacted, or else removed, to meet the compaction requirements of the specifications before the next lift is placed. Any soft spots resulting from frost shall be removed or re-compacted to meet the requirements of compaction specified herein before new fill material is placed.

3.10 ROCK REMOVAL

A. Rock excavation may be encountered as part of the project. Rock excavation shall be defined as: All rock, ledge, or boulders in undisturbed soil that cannot be removed by a mechanical scarifier and power shovel of 1.0 cubic yards capacity, and/or D-8 bulldozer with ripper, without use of line drilling or explosives. Boulders 2 cubic yards or smaller shall be considered to be unclassified material regardless of location. During excavations if stone in excess of 2 cubic yards is encountered and cannot be moved it will be considered as "rock" as herein defined.

B. Refer to Section 31 23 16 – Rock Removal.

3.11 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Moisture content of fill material as it is being placed shall be within two percent of the optimum moisture content of the material as determined by ASTM D1557 modified.

C. Top Surface of Backfilling around Building Areas: Plus or minus 1 inch from required elevations.

D. Top Surface under Paved Areas and Pavers: Plus or minus 0.5 inches from required elevations.

E. Top Surface of Landscaped and Lawn Areas: Plus or minus 0.10 feet from required elevations.

F. Structural Fill under Slabs:

1. Maximum Variation From Flat Surface: 1/2 inch measured with 10 foot straight edge.

2. Maximum Variation From Elevation: 3/8 inch.

G. Footing Excavations:

1. Maximum Variation From Elevation: 0.10 feet.

3.12 STOCKPILING

A. Stockpile materials on site at locations approved by Engineer.

B. Stockpile in sufficient quantities to meet Project schedule and requirements.

C. Separate differing materials with dividers or stockpile apart to prevent mixing.

D. Prevent intermixing of soil types or contamination.

E. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

F. Unsuitable materials delivered to the Site and materials that become unsuitable during the course of the project shall be stockpiled in a manner to prevent erosion and spreading of this material until it is removed and disposed of off-Site.

3.13 STOCKPILE CLEANUP

A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

B. When borrow area is indicated, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

3.14 FILL SCHEDULE

A. All fill shall be place in accordance with the drawings and any supplements.

B. The degree of compaction is expressed as a percentage of the maximum dry density at optimum moisture content as determined by ASTM Test D1557, Method C.

C. Footings shall rest on undisturbed native soils, or 6 inches of crushed stone overlying bedrock.

D. Fill shall be place in layers between 6 and 12 inches depending upon size and type of compaction equipment such that the desired density is achieved throughout the lift thickness with 3 to 5 passes of the compaction equipment.

E. Fill shall be placed at the approximate optimum moisture content.

F. Below Foundations and Floor Slabs:

1. Fill Type: Structural Fill and Crushed Stone.
2. Structural Fill shall be placed in horizontal lifts and be compacted. Lift thickness should be such that desired density is achieved throughout the lift thickness with 3 to 5 passes of the compaction equipment.
3. In confined areas, the Structural Fill should be compacted to the same standard except that the maximum particle size should be reduced to 3 inches and loose layer thickness should be reduced to 6 inches, and compaction performed by hand-guided equipment to the same percentage of compaction.
4. Compaction: 95 percent of the maximum dry density, as determined in accordance with ASTM Test Designation D1557 or 100 percent if crushed stone is used as determined by ASTM C-29.
5. Where fill is required below footing grade, the zone of 95 percent compaction shall extend laterally beyond the edge of foundations at least 1 foot for each foot of depth below foundation grade.
6. Where Crushed Stone is used, it should be compacted to 100 percent of its dry rodded unit weight per ASTM C-25.
7. If proper compaction and placement of Structural Fill or Crushed Stone is difficult due to space constraints or other limitations, use of flowable fill for foundation backfill should be considered as recommended by the geotechnical engineer.

G. Entrances and Approaching Sidewalks

1. Fill Type: Gravel Borrow
2. Gravel Borrow shall be placed in horizontal lifts and be compacted. Lift thickness should be such that desired density is achieved throughout the lift thickness with 3 to 5 passes of the compaction equipment.
3. For slab/sidewalk entrances: Gravel Borrow shall be placed to a depth of 4.0 feet below the top of slab/sidewalk, or to the top of bedrock. This thickness of Gravel Borrow should extend horizontally from the building outward to the entire width of the entrance slabs/sidewalks.
4. Gravel Borrow below entrance slab/sidewalks, including those supported on frost walls, shall have a gradual transition up to the bottom of the sidewalk and pavement subbase at a 1V to 3H slope or flatter.
5. Compaction: 95 percent of the maximum dry density, as determined in accordance with ASTM Test Designation D1557.

H. Foundation Backfill (interior and exterior):

1. Fill Type: Structural Fill.
2. Structural Fill shall be placed in horizontal lifts and be compacted. Lift thickness should be such that desired density is achieved throughout the lift thickness with 3 to 5 passes of the compaction equipment.
3. Structural Fill shall extend laterally a minimum of 2 feet from the wall.
4. Compaction: 95 percent of the maximum dry density, as determined in accordance with ASTM Test Designation D1557.

5. Backfill beyond this limit may consist of Gravel Borrow.

I. Driveway and Parking Area Subgrade:

1. Fill Type: Gravel Borrow.

2. Compaction: 92 percent of maximum dry density, as determined in accordance with ASTM Test Designation D1557.

J. Fill Under Lawn and Landscaped Areas:

1. Fill Type: Common Borrow.

2. Compaction: 90 percent of maximum dry density as determined in accordance with D1557.

K. Trench Bedding and Backfill

1. Storm drainage pipe and sanitary sewer pipe bedding:

a. Pipe Bedding: 3/4” Crushed Stone compacted to 100 percent if crushed stone is used as determined by ASTM C-29.

b. Fill Above Bedding: Gravel Borrow compacted to 92 percent of the maximum dry density, as determined in accordance with ASTM Test Designation D1557.

2. Water distribution pipe, electric, telephone, and cable utilities:

a. Pipe Bedding: Sand.

b. Fill Above Bedding: Gravel Borrow

3. Pipe Bedding, Footing Drains, Drip Edge Drains, and Underdrains:

a. Pipe Bedding: 3/4” Crushed Stone compacted to 100 percent if crushed stone is used as determined by ASTM C-29.

4. Fill to Correct Over-excavation:

a. Fill Type: Crushed Stone flush to required elevation, compacted to 100 percent as determined by ASTM C-29.

3.15 PROTECTION OF WORK

A. Section 01 73 00 - Execution Requirements: Protection of installed construction.

B. Reshape and re-compact fills subjected to vehicular traffic.

C. Prevent displacement or loose soil from falling into excavation; maintain soil stability.

D. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

E. Protect structures, utilities and other facilities from damage caused by settlement, lateral

movement, undermining, washout, and other hazards created by earth operations.

END OF SECTION 31 20 00

SECTION 31 23 16 - ROCK REMOVAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

A. Provide labor, equipment, materials and services necessary for the complete removal of ledge located in proposed locations of driveways, parking areas, walkways, utility trenches, building foundations and/or areas of other site improvements as indicated on the drawings and specified herein:

1. Rock Removal:

a. Surface boulders/rocks. Removal of surface boulders from all areas within the developed area.

b. Removal of open and trench ledge necessary for all utilities, piping, structures, parcel areas, lawn areas, sidewalks and general grading as required to complete the work of the drawings.

c. Provide all necessary shielding, covering, matting and undertake all measures necessary to protect the work and assure the safety of workers, adjacent property, utilities and the public.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Explosives: As recommended by the blasting Contractor based on seismic survey, and as permitted by NFPA 495 and the Maine State Fire Marshall.

B. Delay Device: As recommended by the blasting Contractor and as permitted by NFPA 495, and the Maine State Fire Marshall.

C. Blast Mat Materials: As recommended by the blasting Contractor.

PART 3 - EXECUTION

3.1 PREPARATION

A. Notify "Dig-Safe" (1-888-344-7233) at least 3 days prior to beginning any excavation or blasting work.

B. Verify site conditions and excavate exploratory test pits, note any subsurface irregularities affecting Work of this Section.

C. Identify required lines, levels, contours, and datum.

D. Accurately locate any existing utilities before beginning drilling or blasting; contact local utility companies.

E. Check for conflict with underground utilities or structures. The Blasting Contractor shall notify the General Contractor of any and all possible conflicts or potentially hazardous conditions before proceeding with the Work.

F. Conduct a pre-blast survey of all structures within 600-ft of the blasting.

3.2 ROCK EXCAVATION (Blasting Method)

A. Rock excavation may be encountered at this site. Rock excavation shall be defined as: All rock, ledge, or boulders in undisturbed soil that cannot be removed by a mechanical scarifier and power shovel of 1.0 cubic yard capacity, and/or D-8 Bulldozer with ripper, without use of line drilling or explosives. Boulders 2 cubic yards or smaller shall be considered to be unclassified material regardless of location. Cut stone encountered in excavations in excess of 2 cubic yards will be considered as "rock" as herein defined, concrete will not.

1. Uncovering of Rock: When, during the process of excavation, rock is encountered, the Contractor shall notify the Architect/Engineer before proceeding further. The Contractor shall not proceed with the excavation of material claimed as rock until such material has been classified by the Architect/Engineer. Failure on the part of the Contractor to notify the Architect/Engineer for the purpose of taking Cross-Sections, etc., will forfeit the Contractor's right-of-claim to any credits or allowance for Rock Excavation.

2. Cross-Sections: The Contractor shall employ and pay for a professional Civil Engineer or professional Land Surveyor, acceptable to the Architect/Engineer, to take cross sections of rock/ledge and to provide computations of quantities within the limit of excavation lines. No material claimed as rock shall be drilled, blasted or removed until the following procedures have been performed:

a. The Contractor shall, by independent party as described above, quantify all rock excavation based on the design grades shown on the Drawings and shall provide the Architect/Engineer with quantities, Sections and Profiles for review, prior to excavation.

b. The Architect/Engineer shall review Cross Sections and/or Profiles, and shall either approve quantities or propose revisions to design of footings, trenches, layout and general grading, to minimize rock excavation if possible or necessary.

c. The Contractor shall confirm any proposed revisions and resultant rock quantity changes.

d. The Architect/Engineer shall provide to the Contractor a letter of authorization to proceed with excavation of material claimed as rock, which shall indicate the agreed upon quantity and price for the entire process of blasting, excavation, hauling and disposal.

B. Blasting:

1. The Blasting Contractor shall conduct a Pre-Blast Survey, including photographs, of all structures within the Blasting Area, and shall provide the Architect/Engineer with a written report of the Survey. A Pre-Blast Survey shall be performed for all structures within 600 feet of any blast site. The Pre-Blast Survey shall encompass and reflect the U.S. Department of Interior, "Rules for Pre-Blast Surveys", cited in the Site Location of Development Law of the State of Maine.

2. All drilling equipment will be equipped with suitable dust control apparatus, which must be kept in operation and used during all drilling operations.

3. All blasting operations, including the transport, handling, and storage of explosives, shall be conducted in full compliance with all Federal and State laws and regulations and all local ordinances, and with all possible care so as to avoid injury to persons and property.

a. Contractor shall limit ground vibrations to less than l.9 in. per sec. peak particle velocity, and peak air over pressures to less than 0.0l8 psi, measured at the location of the nearest structure.

b. Contractor shall provide protection against flying rock; the rock shall be well covered, and sufficient warning shall be given to all persons in the vicinity of the Work before blasting. Care shall be taken to avoid injury to all utilities, above and below ground, to other buildings (including foundations) and structures, and to private property.

c. The Contractor, in addition to observing all state and municipal ordinances relating to the storage and handling of explosives, shall also conform to any further regulations which the Owner or Architect/Engineer shall deem necessary.

d. Responsibility for all damages to persons or property shall rest with the Contractor. Only personnel qualified in the use of explosives shall be

employed for blasting.

4. Blasting shall be performed only after approval has been given by the Owner for such operation.

5. All transportation, storage and handling of explosives, and all drilling and blasting operations shall be performed in accordance with M.R.S.A. Title 25, Section 2442, and all pertinent provisions of: the "Manual of Accident Prevention in Construction", issued by the Associated General Contractors of America, Inc.; the "Construction Safety Rules and Regulations", as adopted by the State Board of Construction Safety, Augusta, Maine; the Maine Department of Transportation "Safety Specifications", Section 107.12, "Use of Explosives"; and the U.S. Dept. of Interior "Blasting Guidance Manual."

6. Any site where electric blasting caps are located, or where explosive charges are being placed or have been placed, shall be designated as a "Blasting Area."

7. Bring explosives to the Work site only as needed and in small quantities.

8. A "Blasting Area" within three hundred (300) feet of any traveled way shall be marked in both directions by approved signs, with information similar to the following:

"BLASTING AREA. TURN OFF TRANSMITTERS"

and on the reverse side:

"END OF BLASTING AREA"

9. Notify each public utility company having structures in proximity to the site of the Work of the impending use of explosives, and give such notice sufficiently in advance to enable each company to take such steps as it may deem necessary to protect their property from injury. Such notice shall not relieve the Contractor of responsibility for any damage resulting from his blasting operations.

10. The Contractor shall be liable for all damages to persons or property caused by blasting or explosions, or arising from neglect to properly guard and protect the excavations and all portions of the Work, and the Contractor shall wholly indemnify the Owner against claims on such account.

11. No compensation will be allowed the Contractor in any event, or under any circumstances, for loss incurred by the Contractor or arising from the Contractor's neglect to fully comply with these or other applicable requirements.

12. Provide the Architect/Engineer with a Blasting Log for the Work, containing the following information:

    a. Location

    b. Time and date

    c. Number of holes

    d. Amount and type of explosives used per hole

e. Measurement of peak particle velocity and frequency, at nearest structure.

f. Air-blast monitoring results.

g. The names of persons, companies, corporations, or public utilities contracting, owning, leasing or occupying property or structures in proximity to the site of the blasting Work.

13. Copies of blasting records, together with an explanatory narrative of the blasting, shall be submitted to the Architect/Engineer, with a copy for submission to the Department of Environmental Protection.

C. Excavation:

1. All disturbed, broken or shattered rock fragments shall be excavated and removed from the final subgrade prior to placement of structural fill or foundations. Under footings, foundation bases, stairs or walls, fill over-excavated areas by extending indicated bottom elevation of footing or base to clean excavation bottom. When acceptable to the Architect/Engineer, concrete fill may be used to bring elevations to proper position.

2. Use of Excavated Materials: Excavated rock suitable for use as embankment fill, rip-rap, or other use, as shown on the Drawings or as directed by the Architect/Engineer, shall be immediately utilized for such use where possible. Where excess quantities or scheduling conflicts make such immediate use impossible, the materials shall be removed from the area and properly disposed of off-site, or stored for later use at a location as directed by the Architect/Engineer.

3. Unsuitable Excavated Materials: All non-salvageable rock, unsuitable subsurface material, refuse, and debris which accumulates as a result of Work under this Section shall become the property of the Contractor and shall be removed from the site. No refuse or debris of any nature shall be allowed to accumulate to the detriment of the Work or to the good appearance of the site. All such materials shall be gathered and disposed of at frequent, regular intervals in a legal manner.

D. Basis of Payment:

1. The total amount of rock excavation will be based upon the in-place volume of rock excavated below the cross-sectioned ledge surface and within and/or above the lines referred to below as “payment lines.” Limits of excavation are as shown on the drawings and/or otherwise specified herein.

2. The payment lines are only to be used as a basis of payment for any requested work, and are not necessarily to be used as limits of excavation. Limits of excavation are as shown on the Drawings and/or as otherwise specified herein.

E. Payment Lines for Rock Excavation:

1. Open Rock:

a. Payment lines for structures, footings and grade beams, including foundation drains, shall be a vertical line 18 inches from the toe of the structure, or 18 inches outside of structure. The depth shall be measured at

6 inches below the bottom elevations shown on the Drawings for foundations that do not bear directly on ledge, or at the pressured rock face for foundations bearing directly on ledge. Payment lines for structures to be damp-proofed shall be a vertical line 2 feet outside the walls of the structure.

b. Payment lines for rock excavation under slabs on grade shall be the specified subgrade elevation beneath gravel base material.

c. Payment lines for rock excavation at paved areas and lawns shall be 6 inches below respective subgrade materials, as detailed and specified.

d. Payment for rock excavation at tree and shrub beds shall be full depth of required excavation for bed, or a minimum of 4 feet, whichever is greater, and 6 inches beyond vertical edge of beds.

2. Trench Rock:

a. Payment lines for manholes and catch basins shall be one foot outside each of the outer walls, and 6 inches beneath the structure (subgrade elevation).

b. Payment lines for rock excavation under pipes and for utility trenches outside the building lines shall in no case be calculated as greater in width than the outside diameter of the pipe plus 2 feet for pipes up to l8 inches. For pipes l8 inches and larger, payment lines shall in no case be calculated as greater in width than the outside diameter of the pipe plus 3 feet. Payment lines at bottom of all pipe and utility trenches shall be 6 inches below the pipe bearing elevation.

c. Payment lines for spot ledge excavation for small structures such as bollards, light pole bases, transformer pads, etc., shall be 6 inches below the bottom of the structure, and 12 inches outside the exterior vertical face of the structure.

d. Payment lines for communication and electrical conduit trench shall be according to the payment lines indicated in 3.2, F.2.b. above.

e. Payment lines for rock excavation for communication vault/manhole shall be one foot outside each of the outer walls of the vault/manhole and 6 inches below the structure and bottom.

3.3 PAYMENT:

A. The Contractor agrees to the payment of rock and ledge removal according to the following:

1. Surface Boulders/Rocks: Payment shall be made on a lump sum basis and included as part of the Base Bid.

2. The Bidder/Contractor agrees to include Unit Prices (see Unit Price No. 5 – Open Rock and 6 – Trench Rock, Section 01 22 00 Unit Prices) for each rock type, open or trench. Final payment will be made on the quantified, in place rock

quantity removed based on the stated Unit Price, whether added or deducted from the bid quantity.

END OF SECTION 31 23 16

SECTION 31 25 00 – EROSION CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. See Sheet C400 for detailed erosion and sedimentation control notes.

1.2 SUMMARY

A. Provide all labor, material, equipment, and services required to complete the work specified in this section, and as shown on the drawings.

B. The work of this section includes but is not necessarily limited to:

1. Provide and install erosion and sedimentation controls as shown on the Drawings, as specified herein, and as required to minimize erosion at the Site.
2. Provide work to control erosion and sedimentation as required by the Maine Department of Environmental Protection standards, the Cumberland County Soil & Water Conservation District Standards, the U.S. Environmental Protection Agency, and the City of Portland, Maine standards.
3. Temporary seeding and mulching as required for disturbed areas including stockpiles.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit product data for the following items:

1. Silt fence
2. Catch basin inlet protection

1.4 QUALITY ASSURANCE

A. Comply with the requirements of Section 01 40 00 – Quality Requirements.

B. Documents affecting Work of this Section include, but are not necessarily limited to; the Conditions of the Contract, General Conditions, Supplementary Conditions, Addenda, and all Sections of Division 1 are hereby made a part of this Section.

C. Coordinate Work with that of other trades affecting or affected by Work of this Section.

Cooperate with such trades to assure the steady progress of the Work.

D. All Work shall comply with the requirements of the applicable Maine Department of Environmental Protection standards, the Cumberland County Soil & Water Conservation District Standards, the City of Portland, Maine Standards, to minimize adverse environmental impacts. Strict adherence to the Specifications and Plans is required in order to prevent adverse downstream impacts.

E. All Work shall be in conformance with the requirements of the Cumberland County Soil and Water Conservation District and the Maine Department of Environmental Protection Erosion and Sediment Control Best Management Practices (BMPs).

F. All Work shall comply with the conditions of the enclosed permits.

G. Work shall be accomplished in accordance with regulations of local, county and state agencies and national or utility company standards as they apply.

H. The Contractor shall protect structures, utilities, sidewalks, pavements, property monuments, monitoring wells, and other facilities from damages caused by settlement, lateral movement, undermining, washout, and other hazards created from earthwork operation.

I. The Contractor shall bear all cost associated with correcting any Work that does not meet the requirements of this Section or any damaged items due to construction activities. These costs include any professional services required for inspection of repairs or replacements.

J. Paved surfaces: Do not operate equipment on paved surfaces. Paved surfaces outside the limits of Work which become damaged shall be repaved by the Contractor.

K. Contractor shall be responsible for notifying all affected utility companies and Dig Safe before starting work.

L. The Contractor shall pay all fines issued to the Owner as a result of poor erosion control practices by the Contractor.

M. Requirements of Regulatory Agencies: The Contractor shall be familiar and comply with the requirements of all regulatory permits and applications, including the following:

1. Cumberland County Soil and Water Conservation District
2. Maine Department of Environmental Protection
    a. Current edition of Erosion and Sediment Control Best Management Practices (BMPs)

1.5 PRE-INSTALLATION MEETINGS

A. Section 01 31 00 – Project Management and Coordination: Pre-installation conferences.

B. Convene minimum one week prior to commencing work of this section.

PART 2 - PRODUCTS

2.1 EROSION AND SEDIMENTATION CONTROLS

A. Silt Fence: Material shall comply with MDOT 656..3.5 and shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a temperature range of 0 to 120 degrees F. Post spacing shall not exceed 8 feet.

B. Catch basin inlet protection: Pre-fabricated non-woven polypropylene geotextile unit designed to insert into catch basin and be held in place by catch basin grate. The material shall have the following minimum specifications:

1. Tensile strength: 200 lbs.
2. Puncture strength: 500 lbs.
3. Ultraviolet stability @ 500 hours: 70%
4. Flow through: 80 gpm/ft^2

C. Mulch: Hay or straw mulches that are dry and free from undesirable seeds and course materials. Application rate must be 2 bales (70-90 lbs.) per 1,000 square feet or 1.5 to 2 tons (90-100 bales) per acre to cover 75 to 90% of the ground surface.

D. Mulch Binder: May be emulsified asphalt, or approved equivalent.

E. Temporary Seeding: Conservation Mix of 100% perennial rye grass.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

3.2 SITE STABILIZATION

A. Install all erosion and sedimentation controls in conformance with Erosion & Sedimentation Control Plan.

B. Incorporate erosion control devices indicated on the Drawings into the Project at the earliest practicable time prior to grubbing, stripping, or other construction operations.

C. Construct, stabilize and activate erosion controls before site disturbance within tributary

areas of those controls.

D. Stockpile and waste pile heights shall not exceed 35 feet. Slope stockpile sides at 2:1 or flatter.

E. Stabilize diversion channels, sediment traps, and stockpiles immediately.

3.3 FIELD QUALITY CONTROL

A. Comply with Section 01 40 00 - Quality Requirements.

B. Comply with Section 01 73 00 - Execution Requirements.

C. Inspect erosion control devices on a weekly basis and after each rain event. Make necessary repairs to ensure erosion and sediment controls are in good working order.

3.4 MAINTENANCE AND CLEANING

A. Comply with Section 01 73 00 - Execution Requirements: Requirements for cleaning.

B. Comply with Erosion and Sedimentation Control Plan.

C. When sediment accumulation in sedimentation structures has reached a point one-third depth of sediment structure or device, remove and dispose of sediment.

D. Do not damage structure or device during cleaning operations.

E. Do not permit sediment to erode into construction or site areas or natural waterways.

F. Clean channels when depth of sediment reaches approximately one half channel depth.

3.5 PROTECTION

A. Section 01 73 00 - Execution Requirements: Requirements for protecting finished Work.

END OF SECTION 31 25 00

SECTION 32 11 23 - AGGREGATE BASE COURSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Provide all labor, material, equipment, and services required to complete the work specified in this section, and as shown on the drawings.

B. The work of this section includes but is not necessarily limited to:

1. Preparation of subgrade.
2. Construction of base and subbase course materials under, pavements, curbs, walks including pavers, and exterior slabs.
3. Geotextile installation as necessary.
4. Material testing and compaction retesting as required.

1.3 SUBMITTALS

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

B. Comply with Section 01 40 00 – Quality Requirements.

C. Test Reports: Submit the following reports:

1. Reports on material gradations (ASTM D422).
2. Field density test reports (ASTM D2922) for retesting.
3. One optimum moisture-maximum density curve for each type of material used in the Work (ASTM D-1557 modified).

D. Materials Source: Submit name of imported materials source.

E. Material Certifications: Submit materials certificate signed by the material supplier and Contractor, certifying that materials comply with, or exceed, the requirements herein.

F. Product Data: Submit data for geotextile fabric indicating fabric and construction.

G. A mechanical analysis test and moisture-density curve test shall be submitted and approved by the Engineer for all materials used in this section prior to placement of the material.

H. Product Data: Submit manufacturer's data for geotextile fabric.

1.4 QUALITY ASSURANCE

A. Comply with the requirements of Section 01 40 00 – Quality Requirements.

B. Furnish each aggregate material from single source throughout the Work.

C. All materials used for the Work in this Section must be reviewed and approved by the Engineer prior to delivery to the Site.

D. Documents affecting Work of this Section include, but are not necessarily limited to; the Conditions of the Contract, General Conditions, Supplementary Conditions, Addenda, and all Sections of Division 1 are hereby made a part of this Section.

E. Coordinate Work with that of other trades affecting or affected by Work of this Section. Cooperate with such trades to assure the steady progress of the Work.

F. All Work shall comply with the requirements of the Maine Department of Environmental Protection, the Cumberland County Soil & Water Conservation District Standards, and the City of Portland, Maine, to minimize adverse environmental impacts. Strict adherence to the Specifications and Plans is required in order to prevent adverse downstream impacts.

G. All Work shall comply with the conditions of any and all site permits including the town Site Plan Approval.

H. Work shall be accomplished in accordance with regulations of local, county and state agencies, and national or utility company standards as they apply.

I. The Contractor shall protect structures, utilities, sidewalks, pavements, property monuments, monitoring wells, and other facilities from damages caused by settlement, lateral movement, undermining, washout, and other hazards created from earthwork operation.

J. The Contractor shall bear all cost associated with correcting any Work that does not meet the requirements of this Section or any damaged items due to construction activities. These costs include any professional services required for inspection of repairs or replacements.

K. Costs related to retesting due to unacceptable qualities of work and failures discovered by testing shall be paid for by the Contractor at no additional expense to Owner, and the costs thereof will be deducted by the Owner from the Contract Sum.

L. Paved surfaces: Do not operate equipment on paved surfaces. Paved surfaces outside the limits of Work which become damaged shall be repaved by the Contractor.

M. Contractor shall be responsible for notifying all affected utility companies and Dig Safe before starting work.

N. Field Measurements:

1. Verify that survey horizontal and vertical control reference points are present and correct as indicated. Protect these points from disturbance during the course of the Work, or correctly re-establish as necessary.

2. During construction, provide all necessary line and grade staking to properly control the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pavement Base Aggregate (MDOT 703.06.a. ‘Type A): Material shall be screened or crushed gravel of hard durable particles free from vegetable matter, lumps or balls of clay and other deleterious substances meeting Maine DOT Standard Specification 703.06.a. 'Type A’. The portion of the gradation passing the 3-inch sieve shall conform to the following gradation:

Sieve Size	Percent Finer by Weight
½ Inch	45 to 70
¼ Inch	30 to 55
No. 40	0 to 20
No. 200	0 to 6.0

B. Pavement Subbase Aggregate (MDOT 703.06c. ‘Type D’): Material shall be screened or crushed gravel of hard durable particles free from vegetable matter, lumps or balls of clay and other deleterious substances meeting Maine DOT Standard Specification 703.06.c. 'Type D’. The portion of the gradation passing the 3-inch sieve shall conform to the following gradation:

Sieve Size	Percent Finer by Weight
½ Inch	35-80
¼ Inch	25-65
No. 40	0-30
No. 200	0-7.0

2.2 EXAMINATION

A. Section 01 73 00 - Execution: Verification of existing conditions before starting work.

B. Verify substrate has been inspected, gradients and elevations are correct, and are dry.

2.3 PREPARATION

A. Verify subgrade has been inspected, gradients and elevations are correct, and is dry.

B. Prior to placement of subbase, the Engineer shall review subgrade conditions.

C. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

D. Do not place fill on soft, muddy, or frozen surfaces.

E. Verify that subgrade has been prepared according to Section 31 20 00.

F. Refer to Section 31 20 00 for testing requirements.

2.4 FIELD QUALITY CONTROL

A. Comply with Section 01 40 00 - Quality Requirements.

B. Comply with Section 01 73 00 - Execution Requirements.

C. Testing and Field Observations:

1. The Contractor shall retain and pay for the services of an independent testing and inspection firm and/or a Geotechnical Consultant to perform on-site observation and testing during the various phases of the construction operations. The Owner reserves the right to modify or waive the services of the independent testing and inspection firm and/or the Geotechnical Consultant. The services of a Geotechnical Consultant/Inspection and testing firm may include, but not necessarily be limited to, the following:

    a. Observation during backfilling and compacting operations.

    b. Laboratory testing and analysis of fill materials as specified herein and proposed by the Contractor for incorporation into the Work.

    c. Observation of construction and performance of water content, gradation and compaction tests at a frequency and locations that he shall select. The results of these tests will be submitted to the Owner, Engineer, and Contractor on a timely basis so that action can be taken to remedy indicated deficiencies. During the course of construction, the Geotechnical Consultant will advise the Owner in writing if at any time in his opinion the Work hereunder is of unacceptable quality. Failure of Geotechnical Consultant to give notice, shall not excuse the Contractor from latent defects discovered in his work.

2. The Contractor shall make provisions for allowing observations and testing of Contractor’s Work by the independent testing and inspection firm and/or the Geotechnical Consultant. The Contractor shall assist the testing agency as required and shall deliver samples of all materials required to the testing agency at the Contractor’s expense.

3. The presence of the independent testing and inspection firm and/or the Geotechnical Consultant does not include supervision or direction of the actual work of the Contractor, his employees or agents. Neither the presence of the independent testing and inspection firm and /or the Geotechnical Consultant, nor

any observations and testing performed by them, nor failure to give notice of defects shall excuse the Contractor from defects discovered in his work.

4. Costs related to retesting due to unacceptable qualities of work and failures discovered by testing shall be paid for by the Contractor at no additional expense to Owner, and the costs thereof will be deducted by the Owner from the Contract Sum.

D. Contractor will pay for all proposed material gradation testing and field compaction tests.

E. Minimum Number of Tests:

1. Paved areas and Precast paver areas: In each compacted fill layer, make one field density test for every 2,000 square feet of overlaying slab or paved area, but in no case less than 3 tests for each.

2.5 AGGREGATE PLACEMENT

A. Place aggregate in maximum 8 inch layers and compact each course to 95 percent of the maximum dry density as determined by ASTM D-1557 with self-propelled vibratory compaction equipment.

B. Course thicknesses shown on the Drawings are compacted thicknesses.

C. Construction methods shall conform to MDOT Standard Specifications, Section 304.03 and 304.04.

D. Coordinate aggregate placement with curb installation.

E. Level and contour surfaces to elevations and gradients indicated.

F. Maintain optimum moisture content of fill materials to attain required compaction density.

G. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

2.6 TOLERANCES

A. Maximum Variation From Flat Surface: 1/2 inch measured with 10 foot straight edge.

B. Maximum Variation From Thickness: 1/4 inch.

C. Maximum Variation From Elevation: 1/2 inch.

END OF SECTION 32 11 23

SECTION 32 12 16 - ASPHALT PAVEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Description of Work: Provide labor, materials, equipment, and services necessary for proper and complete installation of all paving and related items as indicated on the drawings and as herein specified including the following items:

1. Bituminous concrete paving, base and top course.
2. Testing.
3. Pavement repair.
4. Accessible curb cuts/ramps.

1.3 REFERENCES

A. Comply with applicable requirements of the following standards.

1. State of Maine, Department of Transportation Standard Specifications latest edition. Substitute all references to the “Department” with “Owner” and all references to “Resident” with “Engineer”.
2. American Society for Testing Materials (ASTM):

a. C 131: Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

1.4 SUBMITTALS

A. Comply with the requirements of Section 01 33 00 - Submittal Procedures.

B. Perform Work in accordance with the following, unless otherwise noted herein:

1. American Society for Testing and Materials (ASTM), Standard Specifications and Methods of Testing.
2. State of Maine, Department of Transportation, Standard Specifications, Highways and Bridges, Latest Edition.

C. Product Data: Before any paving is constructed, submit actual design mix to the Engineer for review and approval.

D. Manufacturer's Certificate: Submit materials certificate signed by the material producer and Contractor, to the independent testing laboratory certifying that materials comply with, or exceed, the requirements herein.

E. Test Reports: Submit test reports as required according to the following standards:

1. Mechanical analysis ASTM D421
2. Asphalt content ASTM D2172
3. In-place density ASTM D2041 and ASTM D2726

1.5 QUALITY ASSURANCE

A. Comply with the requirements of Section 01 40 00 – Quality Requirements.

B. Perform Work in accordance with the following, unless otherwise noted herein:

1. American Society for Testing and Materials (ASTM), Standard Specifications and Methods of Testing.
2. State of Maine, Department of Transportation, Standard Specifications, Highways and Bridges, Latest Edition.

C. Obtain materials from same source throughout.

D. Documents affecting Work of this Section include, but are not necessarily limited to; the Conditions of the Contract, General Conditions, Supplementary Conditions, Addenda, and all Sections of Division 1 are hereby made a part of this Section.

E. Coordinate Work with that of other trades affecting or affected by Work of this Section. Cooperate with such trades to assure the steady progress of the Work.

F. The Contractor shall coordinate paving with all other work, especially underground utility construction, to prevent covering up unfinished or uninspected work and loss of time or labor by improper scheduling. Any repaving required shall be done at no cost to Owner.

G. All Work shall comply with the requirements of the Maine Department of Environmental Protection standards, the Cumberland County Soil & Water Conservation District Standards, and City of Portland, Maine requirements, to minimize adverse environmental impacts. Strict adherence to the Specifications and Plans is required in order to prevent adverse downstream impacts

H. Work shall be accomplished in accordance with regulations of local, county and state agencies and national or utility company standards as they apply.

I. Maintain one copy of the Construction Documents on Site including the Drawings and Specifications.

J. The Contractor shall bear all cost associated with correcting any work that does not meet the requirements of this Section or any damages to property outside the limits of Work.

1.6 QUALIFICATIONS

A. Installer: Company specializing in performing work of this section.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

B. All asphalt materials and mixes shall be applied at temperatures within their optimum range as defined by MDOT Standard Specifications.

C. Weather Limitations for Bituminous Placement: Apply asphalt prime and tack coats when ambient temperature is above 50 degrees F (10 degrees C), and when temperature has not been below 40 degrees F (1 degree C) for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess of moisture.

D. Construct asphalt concrete surface course or leveling course when atmospheric temperature is above 50 degrees F (4 degrees C) and when base is dry. Base course may be placed when air temperature is above 40 degrees F (1 degrees C) and rising. Do not place pavement on frozen gravel base.

1.8 TRAFFIC CONTROL

A. Maintain access for vehicular and pedestrian traffic as required for normal activities and other construction activities.

B. Utilize flagmen, barricades, warning signs and warning lights as may be required. Two uniformed flaggers required when working in Main Street.

C. The construction of all pavements within public rights-of-way shall be in accordance with the rules, regulations and requirements of the Public Agency having control and ownership of such rights-of-way.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Asphalt Cement for Base Course, Top Course, and Sidewalks: Bituminous material conforming to Maine DOT Specifications, Section 702.01, Viscosity Grade AC-20.

B. Aggregate for Base Course Mix: In accordance with MDOT Specifications, 19.0mm Superpave HMA.

C. Aggregate for Top Course Mix (Roads): In conformance with MDOT Specifications, 12.5mm Superpave HMA.

D. Aggregate for Top Course Mix (Driveway and Walkways): In conformance with MDOT Specifications, 9.5mm Superpave HMA.

E. Mineral Filler: Shall conform to the requirements of AASHTO M17.

F. Tack Coat: Shall conform to MDOT Specifications Section 702.04, AE-90.

2.2 ASPHALT PAVING MIX

A. Use dry material to avoid foaming. Mix uniformly.

B. Nominal Asphalt content shall be 6% for base course, top course, curbing, and sidewalk courses.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 – Execution Requirements: Verification of existing conditions before starting work.

B. Verify compacted subgrade, Subbase, and base is dry and ready to support paving and imposed loads.

C. Verify gradients and elevations of base are correct.

D. Verify gutter drainage grilles and frames, manhole frames and water valve boxes are installed in correct position and elevation.

3.2 Traffic Plan

A. Prior to any work in any street, contractor shall prepare and submit a vehicular and pedestrian traffic plan that complies with the Manual of Uniform Traffic Control Devices, (MUTCD) standards and the City of Portland standards.

B. Plan shall be approved by the city’s Public Works Department.

3.3 SUBBASE

A. Aggregate Base and Subbase: Install as specified in Section 32 11 23 – Aggregate Base Courses.

3.4 PLACING ASPHALT PAVEMENT

A. Install Work in accordance with MDOT Specifications, Section 401.16, 401.17, 401.18,

and 401.20.

B. Construct pavement to lines, grades, sections, compacted thicknesses as shown on the Drawings.

C. Edge of pavement shall be clean and true. Raveled edges are not acceptable. Hand tamp edged and bevel if forms or screed strips are not used.

D. Spread and strike-off asphalt concrete mix with a self-propelled finishing machine. At inaccessible or irregular areas, pavement may be placed by hand methods. If hand methods are used, the hot mixture shall be spread uniformly to the required depth with hot shovels and rakes. After spreading, the hot mixture shall be carefully smoothed to remove all segregated coarse aggregate and rake marks. Rakes and lutes used for hand spreading shall be of the type designed for this use. Material loads shall not be dumped faster that they can be properly spread. Workers shall not stand on the loose mixture while spreading.

E. Paving Machine Placement: In the larger parking fields, the binder course shall be placed in a transverse direction to the top course. The top course shall be placed in the direction of surface-water flow. Place in typical strips not less than 10 feet wide.

F. Spread mixture at Minimum temperature of 225 degrees F (107 degrees C).

G. Joints: Make joints between old and new pavements, and between successive days' work, to ensure continuous bond between adjoining works. Construction joints shall have same texture, density, and smoothness as other sections of paving. Clean contact surfaces and apply tack coat.

H. Place top course within 24 hours of placing and compacting the base course. When base course is placed more than 24 hours before placing wearing course, clean surface and apply tack coat before placing top course.

I. If a tack coat is required, place top course within 24 hours of applying tack coat.

3.5 ROLLING

A. After the pavement has been spread as described in 3.4 of this Section, it shall be thoroughly compacted by rolling with a powered steel wheel tandem roller weighing not less than 2 or more than 10 tons. Begin rolling as soon as mixture will bear roller weight without excessive displacement.

B. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

C. Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced areas by loosening and filling, if required, with hot material.

D. Follow breakdown rolling as soon as possible, while mixture is hot. Continue second

rolling until mixture has been thoroughly compacted.

E. Any displacement or irregularities occurring as the result of the reversing of the direction of a roller, or from other causes, shall be corrected once by the use of rakes or lutes and addition of fresh mixture when required. Care shall be exercised in rolling not to displace the line and grade of the edges of the bituminous mixture.

F. Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained maximum density.

G. Compaction Tests: After construction, the Project Representative will designate locations for in-place nuclear density tests.

H. Remove and replace paving areas mixed with foreign materials and defective areas and fill with fresh, hot top or binder course material. Compact by rolling to maximum surface density and smoothness.

I. Protect the asphaltic concrete paved areas from traffic until the sealer is set and cured and does not pick up under foot or wheeled traffic.

3.6 TOLERANCES

A. Smoothness:

1. Top Course: maximum variation of 1/4inch measured with 10 foot straight edge.
2. Base Course: maximum variation of 3/8inch measured with 10 foot straight edge.

B. Scheduled Compacted Thickness: Within 1/8 inch.

C. Variation from Indicated Elevation: Within 1/2 inch.

3.7 FIELD QUALITY CONTROL

A. Comply with Section 01 40 00 - Quality Requirements.

B. Comply with Section 01 73 00 - Execution Requirements.

C. See item 1.4 - Submittals of this Section for required tests and reports.

D. Test in-place bituminous concrete courses for compliance with requirements of this Section.

E. After Construction, the Contractor shall initiate and pay for in-place nuclear density tests to be performed by an independent testing agency.

F. Contractor will pay for all proposed material gradation testing and compaction tests.

G. In-place compacted thickness shall not be less than thickness specified on the drawings

within a tolerance of 1/8 inch as determined by ASTM D-3549. Areas of deficient paving thickness shall be cleaned and receive a tack coat a minimum 1 inch compacted thickness overlay; or shall be removed and replaced to the proper thickness, at the discretion of the Engineer, until specified thickness of the course is met or exceeded, at no additional cost to the Owner.

H. Field density test for in-place materials shall be performed by nuclear density tests and shall have a compacted density of between 95% and 97% of the theoretical maximum density as determined by ASTM D-2041.

I. Areas of insufficient compaction shall be delineated, removed, and replaced in compliance with the specifications.

J. Check all finished surfaces of each asphalt concrete course for smoothness using 10-foot straightedge applied parallel with, and at right angles to centerline of paved area. The results of these tests shall be made available to the Owner upon request. Surfaces will not be acceptable if they exceed the tolerances listed in 3.6 - Tolerances of this Section. Remove and replace unacceptable paving as directed by Engineer.

K. Check surface areas at intervals necessary to eliminate ponding areas. Remove and replace unacceptable paving as directed by Engineer.

L. If, at any time before the final acceptance of the Work, any damaged, soft, or imperfect places, or spots shall develop in the surface, all such places shall be removed and replaced with new materials and then compacted until the edges at which the new Work connects with the old become invisible.

3.8 PROTECTION OF FINISHED WORK

A. Section 01 73 00 - Execution Requirements: Protecting finished work.

B. Protect all pavement areas including curbs from damage during construction operations.

3.9 MEETING EXISTING PAVEMENTS

A. Full-Depth Pavement: Sawcut by approved method to the full depth of the pavement prior to placement of any new pavement. Mill 12-inch wide strip of top course of existing pavement to depth of proposed top course. The sawcut surfaces shall be a neat true line with straight vertical edges free from irregularities. The sawcut and milled surfaces shall be tack coated immediately prior to the installation of the new abutting bituminous concrete material to provide a bond between the old and new pavement. The new compacted pavement surface shall be finished flush with the abutting pavement.

B. Bituminous Concrete Overlays: The existing bituminous pavement shall be sawcut to a neat true line with straight vertical edges free of irregularities for a minimum depth of one and one half inches. Prior to completing overlays, existing pavements shall be tapered by grinding. The taper, along the entire length of the joint, shall be one and one-half inches deep at the sawcut face and shall taper to zero inches deep at a distance of two

feet from the sawcut face in driveways and at a distance of six feet in roadways and parking areas. The taper shall be cleaned and shall receive an asphalt emulsion tack coat immediately prior to placement of the overlay. The new compacted surface at the joint shall be flush with the abutting existing pavement.

C. Immediately prior to the placement of the bituminous concrete overlay, the sawcut edges of the existing pavement shall be tack coated to bond the new pavement to the old pavement. The new pavement surface shall be finished flush with the abutting pavement. The surface seam of the pavement joint shall be sealed with tack coat and back sanded.

END OF SECTION 32 12 16

SECTION 32 13 13 - CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:

1. Sidewalks
2. Landings
3. Slabs

1.2 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, expansive hydraulic cement, fly ash, and other pozzolans, ground granulated blast-furnace slag.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete pavement mixture. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Experienced installer who has completed pavement work similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.

B. Manufacturer Qualifications:

1. Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.
2. Manufacturer certified in according to the National Ready Mix Concrete Association’s Plant Certification Program.

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated as documented according to ADTM E 548.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer’s plant and each aggregate from one source.

E. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.

F. Mockups: Cast mockups of full-size sections of concrete pavement to demonstrate typical joints, surface finish, texture, color, and standard of workmanship.

1. Build a 5’ x 5’ mockup on site. If location not indicated, as directed by Owner’s representative.

2. Notify Owner’s representative seven days in advance of dates and times when mockups will be constructed.

3. Obtain approval from Owner’s representative before starting mockup construction.

4. Maintain approved mockups during construction in an undisturbed condition as a standard for judging the completed pavement.

5. Demolish and remove approved mockups from the site when directed by Owner’s representative.

G. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section, “Project Meetings”.

1. Before submitting design mixes, review concrete pavement mix design and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with concrete pavement to attend, including the following:

a. Contractor’s superintendent.

b. Independent testing agency responsible for concrete design mixes.

c. Ready-mix concrete producer.

d. Concrete subcontractor.

1.5 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth, exposed surface

1. Use flexible or curved forms for curves of a radius 100 feet or less.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond

with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed. Except bars specified to be field_bent, stirups, and ties which shall be Grade 40.

B. 6”x6” welded wire mesh consistent wth ASTM 185 standards.

C. Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615 M, Grade 60 (Grade 420). Cut bars true to length with ends square and free of burrs.

D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:

1. 1/2 inch steel bars 15 inch center.

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout the Project:

1. Concrete for exposed aggregate paving shall be Portland Cement ASTM C150, Type I, Gray as required to match color of concrete used on standard sidewalks.

2.4 CURING MATERIALS

A. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

B. Water: Potable

2.5 RELATED MATERIALS

A. Board Filler: #1 treated #1 Southern Yellow Pine.

1. Board filler shall be free of defects which will impair their usefulness as expansion joint fillers.

B. Acid: Acid for acid wash shall be 5-10 percent solution of muriatic acid. Acid solution shall be tested on aggregate to ensure that aggregate does not dissolve or discolor.

C. Sealer: Methyl methacrylate acrylic resin suitable for sealing of exposed aggregate horizontal concrete surfaces. Sealer shall be subject to approval.

2.6 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, with the following properties:

1. Exposed Aggregate Surface: Concrete to receive an exposed aggregate surface shall contain a minimum of 560 lb. of ASTM C 150 Type II Portland cement per cubic yard of concrete.
2. Compressive Strength (28 Days): 4000 psi.
3. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.53.
4. Slump Limit: 4 inches, plus or minus 1 inch.
5. Air Content: 6 percent plus or minus 1 percent.
6. Aggregates used in base mix shall not be limestone.
7. Aggregate size shall be a minimum of 3/8 inch and a maximum of 3/4 inch.

B. Synthetic Fiber: Uniformly disperse in concrete mix at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd..

C. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions.

2.7 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116. Furnish batch certificates for each batch discharged and used in the Work.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Proof-roll prepared sub-base surface to check for unstable areas and verify need for additional compaction. Proceed with pavement only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

B. Remove loose material from compacted sub-base surface immediately before placing concrete.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.3 STEEL REINFORCEMEN

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

3.4 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.

1. When joining existing pavement, place transverse joints to align with previously placed joints unless otherwise indicated.

C. Install dowel bars and support assemblies at joints where indicated.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool. Repeat grooving of contraction joints after applying surface finishes to a 1/4-inch (6 mm) radius. Eliminate grooving marks on concrete surfaces.

E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.5 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete form-work installation, reinforcement steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from sub-base surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten sub-base to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.

D. Comply with requirements and with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery, at Project site, or during placement.

F. Deposit and spread concrete in a continuous between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away form joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

H. Screed pavement surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading dry-shake surface treatments.

3.6 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection and ACI 305 R for hot-weather protection during curing.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing. Begin curing after finishing concrete but not before free water has disappeared from concrete surface. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound or a combination of these methods.

3.7 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch.
4. Lateral Alignment and spacing of Tie Bars and Dowels: 1 inch.
5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch (6 mm).
6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: length of dowel 1/4 inch per 12 inches.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: The contractor shall engage a qualified independent testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement.

1. Compressive-strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cubic yards, but less than 25 cubic yards plus one set for each additional 50 cubic yards.
2. One specimen shall be tested at 7 days and two specimens at 28 days. One specimen shall be retained in reserve for later testing if required.

B. Test results shall be reported in writing to Owner's representative, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests shall contain:

1. Project identification name and number.
2. Date of concrete batch in pavement.
3. Design compressive strength at 28 days.
4. Concrete mix proportions and materials.
5. Compressive breaking strength.
6. Type of break for both 7 and 28 day tests.

3.9 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.

B. Drill test cores where directed by Owner's representative when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 32 13 13

SECTION 32 14 13 – BRICK UNIT PAVING AND DETECTABLE WARNINGS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Brick sidewalks
2. ADA Detectable Warning Panels

1.3 ACTION SUBMITTALS

A. Product Data: For materials other than water and aggregates, including the following:

1. Brick sidewalks
2. ADA Detectable Warning Panels

B. Samples:

1. Full-size units of each type of unit paver indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and installer.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of unit paver from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

B. Preinstallation Conference: Conduct conference at Project site in accordance with requirements of Division 01 Section "Project Management and Coordination". Notify Architect at least two weeks before paving unit installation begins. Schedule a meeting on-site with paver installation crew, contractor, Architect, and Owner, after the Mock-Up section (See Article 1.3.C) of pavers is installed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.

1.7 PROJECT CONDITIONS

A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

PART 2 - PRODUCTS

2.1 BRICK PAVERS

A. Repair and Maintenance to Pedestrian Walks (Preble Street):

1. Vermont Backer Brick, Item Number VBBB, Supplied by Gagne & Sons of Westbrook, Maine. (800-339-9184)

B. New Construction of Pedestrian Walks (Lancaster Street)

1. 4” x 8” Pine Hall Pathway Paver Brick, as manufactured by Pine Hall Brick Co., Madison, NC. Lachance item #193623. (800-334-8689)

2.2 DETECTABLE WARNING PANELS

A. Panels shall be 24” x 48” truncated dome panels, Federal Yellow, as manufactured by ADA Solutions, Inc. (www.adatile.com), or approved equal.

2.3 AGGREGATE SETTING BED MATERIALS AND JOINT SAND

A. Bedding and joint sand shall be clean, non-plastic, free from deleterious or foreign matter. The sand shall be natural or manufactured from crushed rock. Limestone screenings or stone dust that does not conform to the grading requirements in Table 1 shall not be used.

B. Grading of sand samples for the bedding course and joints shall be done according to ASTM C 136. The bedding sand shall conform to the grading requirements of ASTM C 33 as shown in Table 1.

Table 1
Grading Requirements for Bedding Sand - ASTM C 33

Sieve Size	Percent Passing
3/8 in. (9.5 mm)	100

No. 4 (4.75 mm)	95 to 100
No. 8 (2.36 mm)	85 to 100
No. 16 (1.18 mm)	50 to 85
No. 30 (0.600 mm)	25 to 60
No. 50 (0.300 mm)	10 to 30
No. 100 (0.150 mm)	2 to 10

Note: Bedding sand may be used for joint sand. However, extra effort in sweeping and compacting the pavers may be required in order to completely fill the joints. If joint sand other than bedding sand is used, the gradations shown in Table 2 are recommended. Joint sand should never be used for bedding sand.

C. The joint sand shall conform to the grading requirements of ASTM C 144 as shown in Table 2 below:

Table 2

Grading Requirements for Joint Sand - ASTM C 144

Sieve Size	Natural Sand	Manufactured Sand
	Percent Passing	Percent Passing
No. 4 (4.75 mm)	100	100
No. 8 (2.36 mm)	95 to 100	95 to 100
No. 16 (1.18 mm)	70 to 100	70 to 100
No. 30 (0.600 mm)	40 to 75	40 to 100
No. 50 (0.300 mm)	10 to 35	20 to 40
No. 100 (0.150 mm)	2 to 15	10 to 25
No.200 (0.075 mm)	0	0 to 10

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas indicated to receive paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

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

3.2 PREPARATION

A. Proof-roll prepared subgrade according to requirements in Section 31 20 00 "Earth Moving" to identify soft pockets and areas of excess yielding. Proceed with unit paver installation only after deficient subgrades have been corrected and are ready to receive subbase and base course for unit pavers.

3.3 INSTALLATION

A. Do not use unit pavers with chips, cracks, voids, discolorations, or other defects that might be visible or cause staining in finished work.

1. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.
2. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.
3. For concrete pavers, a block splitter may be used.
4. Joint Pattern: As shown
5. Joint Tolerances: Joints between the pavers on average shall be between 1/16 in. and 1/8 in. (2 mm to 4 mm) wide.
6. Surface Elevation Tolerances: The final surface elevations shall not deviate more than 3/8 in. (10 mm) under a 10 ft. (3 m) long straightedge.

B. Compact soil subgrade uniformly to at least 95 percent of ASTM D 1557 laboratory density. Proof-roll prepared subgrade to identify soft pockets and areas of excess yielding. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rotting, as determined by Architect, and replace with compacted backfill or fill as directed.

C. Place aggregate sub base and base, compact to 95 percent of ASTM D 1557 maximum laboratory density, and screed to depth indicated.

D. Place leveling course and screed to a thickness of 1 to 1 ½ inches, taking care that moisture content remains constant and density is loose and uniform until pavers are set and compacted.

E. Set pavers with a minimum joint width of 1/16 and a maximum of l/8 inch being careful not to disturb leveling base. If pavers have spacer bars, place pavers hand tight against spacer bars. Use string lines to keep straight lines. Fill gaps between units that exceed inch with pieces cut to fit from full-size unit pavers.

F. Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf to compaction force at 80 to 90Hz. Use vibrator with neoprene mat on face of plate or other means as needed to prevent cracking and chipping of pavers. Perform at least three passes across paving with vibrator.

1. Before ending each day's work, compact installed concrete pavers except for 36-inch width of uncompacted pavers adjacent to temporary edges (laying faces).

2. As work progresses to perimeter of installation, compact installed pavers that are adjacent to permanent edges unless they are within 36-inch width of laying face.

3. Before ending each day's work and when rain interrupts work, cover pavers that have not been compacted and cover leveling course on which pavers have not been placed with non-staining plastic sheets to protect them from rain.

G. Spread dry sand and fill joints immediately after vibrating pavers into leveling course. Vibrate pavers and add sand until joints are completely filled, then remove excess sand. Leave a slight surplus of sand on the surface for joint filling.

1. Do not allow traffic on installed pavers until sand has been vibrated into joints.

2. Repeat joint-filling process 30 days later.

END SECTION 32 14 13

SECTION 32 16 13 - GRANITE CURB

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Description of Work: Provide labor, materials, equipment, and services necessary for proper and complete installation of all curbing and related items as indicated on the drawings and as herein specified including the following items:

1. Granite curbing.
2. Accessible curb cuts/ramps.

1.3 REFERENCES

A. Comply with applicable requirements of the following standards.

1. State of Maine, Department of Transportation Standard Specifications latest edition. Substitute all references to the “Department” with “Owner” and all references to “Resident” with “Engineer”.
2. American Society for Testing Materials (ASTM):

a. C 131: Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Loa Angeles Machine.

b. C 615 Structural Granite

1.4 SUBMITTALS

A. Comply with the requirements of Section 01 33 00 - Submittal Procedures.

B. Perform Work in accordance with the following, unless otherwise noted herein:

1. American Society for Testing and Materials (ASTM), Standard Specifications and Methods of Testing.
2. State of Maine, Department of Transportation, Standard Specifications, Highways and Bridges, Latest Edition.

C. Deliver granite curbing to job adequately protected from damage during transit.

D. Protect granite curbing against staining, chipping and other damage. Cracked, badly chipped, or stained units will be rejected and not employed in the Work.

E. Product Data: For granite curb and accessory materials, submit product data including certificate of compliance.

F. Manufacturer's Certificate: Submit materials certificate signed by the material producer and Contractor, to the independent testing laboratory certifying that materials comply with, or exceed, the requirements herein.

1.5 QUALITY ASSURANCE

A. Comply with the requirements of Section 01 40 00 – Quality Requirements.

B. Perform Work in accordance with the following, unless otherwise noted herein:

1. American Society for Testing and Materials (ASTM), Standard Specifications and Methods of Testing.
2. State of Maine, Department of Transportation, Standard Specifications, Highways and Bridges, Latest Edition.

C. Obtain materials from same source for all granite curbing to be used on the project.

D. Documents affecting Work of this Section include, but are not necessarily limited to; the Conditions of the Contract, General Conditions, Supplementary Conditions, Addenda, and all Sections of Division 1 are hereby made a part of this Section.

E. Coordinate Work with that of other trades affecting or affected by Work of this Section. Cooperate with such trades to assure the steady progress of the Work.

F. All Work shall comply with the requirements of the Maine Department of Environmental Protection standards, the Cumberland County Soil & Water Conservation District Standards, and City of Portland, Maine requirements, to minimize adverse environmental impacts. Strict adherence to the Specifications and Plans is required in order to prevent adverse downstream impacts.

G. Work shall be accomplished in accordance with regulations of local, county and state agencies and national or utility company standards as they apply.

H. Maintain one copy of the Construction Documents on Site including the Drawings and Specifications.

I. The Contractor shall bear all cost associated with correcting any work that does not meet the requirements of this Section or any damages to property outside the limits of Work.

1.6 QUALIFICATIONS

A. Installer: Company specializing in performing work of this section.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products

on site.

B. Store materials properly to prevent damage, deterioration and inclusion of foreign matter. Aggregates shall be stockpiled in a well-drained location.

1.8 TRAFFIC CONTROL

A. Maintain access for vehicular and pedestrian traffic as required for normal activities and other construction activities.

B. Utilize flagmen, barricades, warning signs and warning lights as may be required. Two uniformed flaggers required when working in Main Street.

C. The construction of all pavements within public rights-of-way shall be in accordance with the rules, regulations and requirements of the Public Agency having control and ownership of such rights-of-way.

PART 2 - PRODUCTS

2.1 MATERIALS

A. GRANITE CURBING

1. Granite: Provide structural granite conforming to ASTM C 615, Class I Engineering Grade, suitable for curbstone use.

    a. Provide material that is light gray, free from seams which impair structural integrity and with percentage of wear less than 32 percent as determined by ASTM C 131.

    b. Product: Swenson Granite or approved equivalent.

2. Curbing: Provide curbing complying with MDOT Specifications Section 712.04, Vertical Curb, Type 1 complying with MDOT Material Specifications 712.04.

    a. Provide radius curbing wherever sections are not straight. No short pieces (less than 3-ft.) shall be permitted.

    b. Provide with split-face and sawn top.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 73 00 – Execution Requirements: Verification of existing conditions before starting work.

3.2 SETTING GRANITE CURBING

A. Install as indicated on Drawings and except as otherwise specified or indicated in compliance with MDOT 609.03.

B. Set curbing in 18-inch wide trench, with trench bottoms at 6 inches below bottom of curb. Fill excavation to required level with subbase course material conforming to requirements of Section 32 11 23 – Aggregate Base Courses.

C. Set curb with vertical face plumb, curb top parallel to adjacent surface.

D. Set curb accurately to line and grade. Fit units as closely together as possible. Do not field cut curbing.

1. Do not exceed 1/2 inch width for expansion joints.

E. Backfill material on each side of curb as specified for adjacent surface, thorough compacted by power tampers. Exercise extreme care not to destroy alignment.

1. Reset any curb section disturbed during backfilling or otherwise reset to proper line and grade and properly backfill.

3.3 TOLERANCES

A. Variation from Indicated Elevation: Within 1/2 inch.

3.4 FIELD QUALITY CONTROL

A. Comply with Section 01 40 00 - Quality Requirements.

B. Comply with Section 01 73 00 - Execution Requirements.

C. See item 1.4- Submittals of this Section for required tests and reports.

D. Areas of insufficient installation shall be delineated, removed, and replaced in compliance with the specifications.

3.5 PROTECTION OF FINISHED WORK

A. Section 01 73 00 - Execution Requirements: Protecting finished work.

B. Protect all curbs from damage during construction operations.

C. Clean all pavement splatter and smears from top and faces of all curb following paving activities.

END OF SECTION 32 16 13

SECTION 32 17 23 - PAVEMENT MARKINGS

PART 1 - PART 1- GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Description of work: Provide labor, materials, equipment, and services necessary for proper and complete pavement marking as indicated on the Drawings and as herein specified including the following items:

1. Parking stalls
2. A.D.A. symbols

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include technical data and tested physical and performance properties.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and installer.

B. Material Certificates: For each pavement marking material.

C. Field quality-control reports.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Do not apply pavement markings if pavement is wet or excessively damp, if rain is imminent or expected before time required for adequate drying.

PART 2 - -PRODUCTS

2.1 PAVEMENT MARKING MATERIALS

A. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than 45 minutes Color: White

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following: Sherwin-Williams Waterborne Traffic Paint, or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that pavement is dry and in suitable condition to begin painting.

3.2 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Engineer.

B. Allow paving to age for at least 30 days before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust prior to painting.

D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges.

E. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils. Apply sufficient thickness to completely cover the underlying pavement with solid white lines, such that no pavement color shows through.

3.3 FIELD QUALITY CONTROL

A. Inspection Agency: Owner may engage a qualified agency to perform material and layout inspections. This will not relieve the Contractor of his quality control responsibilities

END OF SECTION 32 17 23

Section 32 31 19 – Metal Fences and Gates

PART 1 - GENERAL:

1.1 SECTION INCLUDES

A. Aluminum fencing, gates, and accessories

1.2 SYSTEM DESCRIPTION

A. The manufacturer shall supply a total ornamental aluminum fence system of the style, strength, size, and color defined herein. The system shall include all components (pickets, posts, rails, gates, hardware, and accessories) as required, and shall be fabricated, coated, and assembled in the United States.

1.3 QUALITY ASSURANCE

A. The contractor shall provide laborers and supervisors who are familiar with the type of construction involved, and the materials and techniques specified.

B. Manufacturer of fence system must have ten (10) years of documented experience in manufacturing the products specified in this section.

1.4 REFERENCES

A. AAMA 2604 – Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels

B. AAMA 2603 – Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels

C. ASTM B117 – Practice for Operating Salt Spray (Fog) Apparatus

D. ASTM D2247 – Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity

E. ASTM B221 – Specification for Aluminum Alloy Extruded Bars, Shapes, and Tubes

F. ASTM B85 – Standard Specification for Aluminum-Alloy Die Castings

1.5 SUBMITTALS

A. Manufacturer’s submittal package shall be provided prior to installation.

B. Changes in specification may not be made after the bid date.

C. Samples – if requested, samples of assembled materials, components, hardware, accessories, and/or color samples.

1.6 1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Upon receipt, materials should be checked for damage that may have occurred in shipping to the job site.

B. Each package shall bear the name of the manufacturer.

C. Store products in manufacturer's unopened packaging.

D. Store materials in a secure and dry area to protect against damage, weather, vandalism, and theft.

E. Transport, handle and store products with care to protect against damage before installation.

PART 2 - PRODUCTS:

2.1 MANUFACTURER

A. The fencing system shall be Industrial Strength Aluminum Ornamental Fence as manufactured by Jerith Manufacturing Co., Inc., 14400 McNulty Road, Philadelphia, PA 19154. Telephone: 800-344-2242; Fax: 215-676-9756; email: sales@jerith.com.

B. Fencing system shall be Jerith Style CP-1, industrial grade.

C. Fence height shall be 72".

D. Color shall be black.

2.2 MATERIALS

A. Aluminum Extrusions: All posts and rails used in the fence system shall be extruded from HS-35™ aluminum alloy having a minimum yield strength of 35,000 psi. All pickets shall have a minimum yield strength of 25,000 psi. 6063-T5 and 6063-T52 Alloys (in accordance with ASTM B221) are not acceptable for any components.

B. Fasteners: All fasteners shall be stainless steel. Square drive screws shall be used to connect the pickets to the horizontal rails. Rail to post connections shall be made using self-drilling hex-head screws.

C. Accessories: Aluminum sand and die castings shall be used for all scrolls, post caps, finials, and miscellaneous hardware. Die castings shall be made from Alloy A360.0 as

per ASTM B85 for superior corrosion resistance. Alloy A380.0 is not acceptable.

2.3 FINISH

A. Pretreatment: A three stage non-chrome pretreatment shall be applied. The first step shall be a chemical cleaning, followed by a water rinse. The final stage shall be a dry-in-place activator which produces a uniform chemical conversion coating for superior adhesion.

B. Coating: Fence materials shall be coated with FencCoat™, a Super-Durable TGIC polyester powder-coat finish system applied by Jerith Manufacturing Company. Epoxy powder coatings, baked enamel or acrylic paint finishes are not acceptable. The FencCoat finish shall have a cured film thickness of at least 2.0 mils. In addition, any screw heads shall be painted to match the color of the fence.

C. Tests: The cured FencCoat finish shall meet or exceed AAMA 2604, which includes the following requirements:

1. Humidity resistance of 3,000 hours using ASTM D2247.
2. Salt-spray resistance of 3,000 hours using ASTM B117.
3. Outdoor weathering shall show no adhesion loss, checking or crazing, with only slight fade and chalk when exposed for 5 years in Florida facing south at a 45 degree angle.

D. Finishes which only meet AAMA 2603 (or the previous version - AAMA 603) are not acceptable.

2.4 FABRICATION

A. Horizontal rails shall be $1^{5}/_{8}$” channels formed in a modified “U” shape. Pickets shall pass through holes punched in the top of the rail. The top wall shall be .070” thick and the side walls .100” thick for superior vertical load strength. There shall be 3 horizontal rails (4 rails for 8' high fence) in each section.

B. Pickets shall be fastened to the rails using painted stainless steel screws. Screws shall be used on only one side of the rail, leaving the other side with a clean appearance. Pickets shall be 1” square and have a wall thickness of .062”. Welding the pickets to the rails is not permitted.

C. Posts shall be 2½” square extrusions with pre-punched holes which allow the fence section rails to slide in. Posts shall be spaced 71½” on center and have .075” walls. Gate posts shall be [4” or 6”] square with .125” walls and used on both sides of a gate. Die cast aluminum caps shall be provided with all posts.

D. Cantilever slide gates shall be fabricated according to manufacturer's standard methods. Swing gates shall have welded frames and shall support a 300 lb. vertical load on the latch side of the gate without collapsing. Walk gates shall be self-closing

and self-latching.

E. Assembled sections shall support a 1,000 lb. vertical load at the midpoint of any horizontal rail.

F. The Jerith logo shall appear on all post caps, gates, and horizontal rails of the fencing system.

2.5 WARRANTY

A. The entire fence system shall have a written Limited Lifetime Warranty against rust and defects in workmanship and materials. In addition, the FencCoat finish shall be warranted not to crack, chip, peel, or blister for the same period.

PART 3 - EXECUTION:

3.1 PREPARATION

A. Verify areas to receive fencing are completed to final grades and elevations.

B. Ensure property lines and legal boundaries are clearly established.

C. Prepare the grade and remove any surface irregularities which may cause interference with the installation of the aluminum fence.

3.2 FENCE INSTALLATION

A. Install fence in accordance with the manufacturer’s instructions.

B. Excavate post holes to proper depth to suit local conditions for stability and support of the fence system without disturbing the underlying materials. Excavate deeper as required for adequate support in soft and loose soils.

C. Set fence posts in concrete footers at 71-1/2” on center maximum. For installations on a slope, the post spacing must be measured along the grade.

D. Insert notched horizontal rails in pre-punched holes in post and fasten in place.

E. Center and align posts in holes to required depth. Place concrete around posts and tamp for consolidation. After tamping, check alignment of posts, and make necessary corrections before the concrete hardens.

3.3 GATE INSTALLATION

A. Set gate posts plumb and level for gate openings specified in construction drawings.

B. Install gates to allow full opening without interference after concrete has hardened around gate posts. Adjust hardware for smooth operation. Install one drop rod for double gates.

3.4 ACCESSORIES

A. Install post caps and other accessories to complete fence.

3.5 CLEANING

A. Contractor shall clean site of debris and excess materials. Post hole excavations shall be scattered uniformly away from posts.

B. If necessary, clean fence system with mild household detergent and clean water. Excess concrete must be removed from posts and other fencing material before it hardens.

END OF SECTION 32 39 13

SECTION 32 39 13 - BOLLARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Stainless Steel Bollards

1.3 SUBMITTALS

A. Product Data: For each type of product.

1. Steel pipe
2. Paint material
3. HDPE bollard covers

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the site in an undamaged condition.

B. Carefully store materials off the ground to provide proper protection against oxidation, and other damage caused by ground contact.

PART 2 - PRODUCTS

2.1 Stainless Steel Bollard: Heavy duty 4.5” OD schedule 40 hot dipped galvanized, painted black.

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include:

1. TrafficProtectors.com – 877-392-5766
2. Approved Equal

2.2 Bollard Cover: Constructed of ¼” thick HDPE with an inside diameter of 4.875”, or as sufficient to slip over bollard. Height shall be 52” or sufficient to cover entire bollard.

Color and style shall be coordinated with the Architect.

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include:

1. TrafficProtectors.com – 877-392-5766
2. Approved Equal

PART 3 - EXECUTION

3.1 Locate where shown on Drawings. Assemble as per manufacturer's instructions, and as shown on Drawings

END OF SECTION 32 39 13

SECTION 32 92 00 TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Preparing sub-grade for turf areas
2. Soil Preparation
3. Seeding
4. Hydro-seeding

B. Related Sections include the following:
1. Division 31 Section "Earth Moving" for soil materials, excavating, backfilling, and site grading.
2. Division 31 Section "Erosion & Sedimentation Control" for erosion and sedimentation control measures.
3. Division 31 Section "Site Clearing" for clearing and grubbing and stockpiling stripped materials

C. References Included in this Section:
1. USDA – United States Department of Agriculture
2. TPI – Turfgrass Producers International
3. ASTM- American Society for Testing & Materials.
4. AOSA – Association of Official Seed Analysis

1.3 DEFINITIONS

A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

B. Finish Grade: Elevation of finished surface of planting soil.

C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

D. Topsoil (Loam): The uppermost layer of soil characterized by high concentrations of organic matter. When found in its natural state it has a minimum depth of 4 inches. For the purpose of these specifications it can be natural or cultivated surface-soil layer containing organic matter and friable sand, silt, and clay particles; free of subsoil, clay lumps, gravel, and other objects more than 1 inch (50 mm) in diameter; weeds, roots, toxic materials, and other nonsoil materials.

E. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

F. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill that will meet the specified compaction requirements.

G. Subgrade: Surface or elevation of subsoil remaining after excavation is completed, or top surface of a fill or backfill before planting soil is placed.

H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

I. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

A. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture for turfgrass. Include identification of source and name and telephone number of supplier.
2. For topsoil, submit topsoil analysis done by a plant and soil testing agency such as the Maine Soil Testing and Analytical Lab (207-581-2934) for review by the Owner’s Representative. State recommended quantities for amendments necessary to produce satisfactory topsoil as stated in the specifications herein.

B. Product Certificates: For soil, soil amendments and fertilizers, from manufacturer.

1.5 QUALITY ASSURANCE

A. Soil-Testing Laboratory Qualifications: An independent laboratory with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

B. Soil Analysis: For topsoil Contractor to furnish soil analysis and recommendation for lawn supporting topsoil written by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
2. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
3. Report suitability of tested soil for turf growth.

a. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. (92.9 sq. m) or volume per cu. yd. (0.76 cu. m) for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

C. Use all means necessary to protect seed from moisture and other contaminants which may adversely effect proper germination.

D. Use all means necessary to protect fertilizers, amendments and other materials from moisture and other contaminants which may adversely effect their efficacy.

1.7 PROJECT CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of planting completion.

1. Spring Planting: April 15 to June 1.
2. Fall Planting: September 1 to October 15.
3. The Contractor may seed at times other than those specified, only upon authorization by the Owner's Representative.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.8 MAINTENANCE SERVICE

A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:

1. Seeded Turf: 60 days from date of planting completion.

a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

PART 2 - PRODUCTS

2.1 TOPSOIL

A. Topsoil (Loam):
1. Natural, fertile loam typical of cultivated topsoil of the locality, containing not less than 3.5 percent or more than 8 percent by weight, of decayed organic matter (humus) as determined by ASTM F1647.
2. Obtain from a well drained arable site, free of subsoil, earth clods, large stones, sticks, stumps, clay lumps, roots, or other objectionable, extraneous matter or debris. Screen topsoil to a maximum stone size of 3/4 inch.
3. Topsoil shall be free of Quack-grass rhizones, *Agropyron Repens*, and the nut-like tubers of Nutgrass, *Cyperus Esculentus*, and all other primary noxious weeds.
4. Topsoil shall have a pH of not less than 6.0 or greater than 6.8.
5. Topsoil shall have a **loam texture classification** and do not deliver or use while in a frozen or muddy condition.

6. Topsoil shall conform to the following particle size distribution, as determined by pipette method in compliance with ASTM F1632.

    a. Sand: 40-60 percent.
    b. Silt: 30-40 percent.
    c. Clay: 5-20 percent.

B. Existing topsoil stockpiled from on-site stripping may be utilized if in compliance with the requirements for topsoil. Clean existing soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth. If determined by a soil test the existing topsoil that was stripped does not meet said requirements, the topsoil may be amended to provide and acceptable topsoil for use.
    1. Supplement existing topsoil with suitable off site topsoil when quantities are insufficient.
    2. If determined by a soil test the existing topsoil does not meet these specifications, the topsoil may be amended to provide acceptable topsoil. Once amendments are made the soil shall be retested for compliance with topsoil specifications.

2.2 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

B. Seed Species: Seed of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:

C. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

    1. Class: O, with a minimum of 98 percent passing through No. 20 sieve and a minimum of 55 percent passing through No. 60 sieve.
    2. Provide lime in form of ground dolomitic limestone.

2.3 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 6.1 to 7.8; moisture content 40 to 60 percent by weight; 100 percent passing through 1/2-inch (12.5-mm) sieve; soluble salt content of less than 2mnho/cm in final topsoil mix; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

    1. Organic Matter Content: 30 to 60 percent of dry weight.
    2. Nutrients: Provide NPK level information.
    3. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture, with a pH range of 3.4 to 4.8 and an ash content not exceeding 15 percent as determined by ASTM D2974.

2.4 FERTILIZERS

A. Slow-Release Fertilizer: Granular or pellet fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 15 percent nitrogen, 15 percent phosphorous, and 15 percent potassium, by weight or as otherwise recommended by the soil analysis.
2. Registration: Fertilizer must be registered with the Maine State Department of Agriculture and shall meet their standard requirements.

2.5 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley. No material shall be used which is too wet, decayed or compacted as to inhibit even uniform spreading.

B. Hydro mulch: Shall be Terra-Sorb GB, or an approved equal. Add Terra-Sorb to the hydro seed tank at the amount of 60 pounds per acre.

C. Mulch Binder: Asphalt emulsion; ASTM D 977, Grade SS-1; nontoxic and free of plant-growth or germination inhibitors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

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

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Owner's Representative and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from hydro-seeding and hydro-mulching overspray.
2. Protect grade stakes set by others until directed to remove them.

3.3 TURF AREA PREPARATION

A. Limit turf subgrade preparation to areas to be planted.

B. Prevent surface water and ground water from entering excavations, from ponding on prepared sub-grades, and from flooding project site and surrounding area.

C. Protect sub-grade from softening, undermining washout and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

D. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edges of excavation and outside drip line of remaining trees.

E. Uniformly moisten or aerate subgrade as required for proper placement and compaction.

F. It is critical that neither the sub-soil nor top-soil shall be over-compacted and that as soil is brought in to raise the grade that underlying areas be scarified to eliminate layering of materials. Heavy equipment should be avoided. Use wide tracked or tired equipment specifically designed to minimize compaction. Heavy equipment should be kept off subgrades and topsoil areas during wet conditions.

G. Place soil as indicated on the Drawings in layers not to exceed 8 inches or as directed by the Owner's Representative. Prior to placing soil scarify or otherwise loosen a minimum of 4 inches below sub-grade. Soils shall not be compacted beyond 85%.

H. Thoroughly mix soil amendments into the entire depth of soil prior to fine grading or as other wise directed to insure uniform mixing.

I. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 4 inches (100 mm). Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Spread topsoil, apply planting soil amendments and fertilizer on surface, and thoroughly blend planting soil.

a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
b. Mix lime with dry soil before mixing fertilizer.

2. Spread topsoil to a depth as indicated or a minimum to meet finish grades after light rolling and natural settlement. Do not spread if topsoil or subgrade is frozen, muddy, or excessively wet.

J. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

K. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

L. Before planting, obtain Owner's Representative acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

M. Provide fertilizer and lime application if recommended by the soil testing lab or if not avialbe use manufactures recommendations. Apply with broadcast spreader and incorporate into the top 4 inches of topsoil.

3.4 SEEDING

A. Method of seeding may be varied at discretion of Contractor. It is his or her responsibility to establish a smooth, uniform turf composed of approved grasses.

B. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h). Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

1. Do not use wet seed or seed that is moldy or otherwise damaged.

2. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

C. Sow seed at rate recommended by the supplier.

D. Rake seed lightly into top 1/8 inch (3 mm) of soil, roll lightly, and water with fine spray.

E. Protect seeded areas with slopes exceeding 1:4 with erosion-control blankets and 1:6 with erosion-control fiber mesh installed and stapled according to manufacturer's written instructions.

F. Mulch seeded areas with straw mulch, 1-1/2 to 2 tons per acre. Secure mulch at Contractor's discretion as to method or need.

3.5 HYDRO-SEEDING

A. Method of seeding may be varied at discretion of Contractor. It is his or her responsibility to establish a smooth, uniform turf composed of approved grasses.

B. Hydro-seeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydro-seed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

1. Mix slurry with asphalt-emulsion tackifier.
2. Apply slurry uniformly to all areas to be seeded in a two-step process. Apply first slurry coat at a rate so that mulch component is deposited at not less than 500-lb/acre (5.2-kg/92.9 sq. m) dry weight, and seed component is deposited at not less than the specified seed-sowing rate. Apply slurry cover coat of fiber mulch (hydromulching) at a rate of 1400 lb/acre.

3.6 TURF MAINTENANCE

A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and additional mulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

4. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
5. Water turf with fine spray at a minimum rate of 1 inch (25 mm) per week unless rainfall precipitation is adequate.

B. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain a grass height of 2-1/2 to 3 inches.

3.7 INSPECTION AND ACCEPTANCE

A. Turf installations shall meet the following criteria as determined by Owner's Representative. The Owner's Representative will inspect lawns upon written request by the Contractor. The request shall be received at least ten (10) days before the anticipated date of inspection.

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm).

B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

C. If the grass is in satisfactory condition, the Contractor's care and maintenance responsibilities will end. If the grass stand is unsatisfactory, the Contractor's maintenance responsibility shall continue, including a normal program of mowing, trimming, reseeding, fertilization and repair until and acceptable stand of grass is achieved.

3.8 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

C. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION

SECTION 32 93 00 PLANTINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Plants
2. Shrubs
3. Trees
4. Planting soils.
5. Tree stabilization.

B. Related Sections include the following::

1. Division 31 Section “Site Clearing” for protection of existing trees and plantings, topsoil stripping and stockpiling, and site clearing.
2. Division 31 Section “Earth Moving” for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
3. Division 32 Section “Turf and Grasses” for turf (lawn) and roadway planting, hydro-seeding, and erosion-control materials.

C. References Included in this Section:
1. ANSI – American National Standards Institute.
2. ASTM- American Society for Testing & Materials.
3. ASME – American Society of Mechanical Engineers

1.3 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with ball size not less than sizes indicated; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.

C. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than sizes indicated.

D. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

E. Finish Grade: Elevation of finished surface of planting soil.

F. Planting Area: Areas to be planted.

G. Topsoil: The uppermost layer of soil characterized by high concentrations of organic matter.

H. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

I. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

J. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

K. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

L. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

M. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

N. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 QUALITY ASSURANCE

A. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

1. Selection of plants purchased under allowances will be made by Architect, who will tag plants at their place of growth before they are prepared for transplanting.

B. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.

1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches (150 mm) above the root flare for trees up to 4-inch (100-mm) caliper size, and 12 inches (300 mm) above the root flare for larger sizes.
2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

C. Plant Material Observation: Owner's Representative may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Owner's Representative of sources of planting materials seven days in advance of delivery to site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

C. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

D. Handle planting stock by root ball.

E. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F (16 to 18 deg C) until planting.

F. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and

trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
2. Do not remove container-grown stock from containers before time of planting.
3. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.

1.6 PROJECT CONDITIONS

A. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

B. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.7 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.
b. Structural failures including plantings falling or blowing over.
c. Faulty performance of tree stabilization, edgings, or tree grates.
d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Periods from Date of Acceptance: 12 months.

3. Include the following remedial actions as a minimum:

a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
c. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.

d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

1.8 MAINTENANCE SERVICE

A. Initial Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

1. Maintenance Period: Until date of Substantial Completion.

B. Initial Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

1. Maintenance Period: Until date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch (19 mm) in diameter; or with stem girdling roots will be rejected.
2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. Labeling: Label each at least one plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant as shown on Drawings.

E. Annuals and Biennials: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery.

2.2 FERTILIZERS

A. Planting Tablets: Tightly compressed chip type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.

1. Size: 10-gram tablets.
2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

2.3 PLANTING SOILS

A. Refer to Division 32 Section “Turf and Grasses” for topsoil requirements and Drawings for planting soil mix.

2.4 MULCHES

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:

1. Type: Aged spruce and pine bark, consisting of the outer bark of the trees with minimum hardwood bark. Bark shall be thoroughly mixed and aged in stock piles a minimum of 6 months, partially decomposed, dark brown in color, and generally free of chunks of wood thicker than 1/4". Aged mulch containing an excess of fine particles will not be acceptable.

2.5 TREE STABILIZATION MATERIALS

A. Stakes and Guys:

1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal (38-by-38-mm actual) by length indicated, pointed at one end.
   a. Guying: 30 inches long.
   b. Staking: 96 inches long.

2. Guys and Tie Wires: ASTM A 641/A 641M, Class 1, galvanized-steel wire, two-strand, twisted, 14 gage in diameter, with rubber hose or Chain Lock brand plastic tree tie or approved equivalent.
3. Wrapping Material: First quality, heavy, waterproof crepe paper manufactured for this purpose; not less than 4" wide. Install only when required as noted on the drawings.

B. Root-Ball Stabilization Materials:

1. Upright Stakes and Horizontal Hold-Down: Rough-sawn, sound, new hardwood or softwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal (38-by-38-mm actual) by length indicated; stakes pointed at one end.
2. Wood Screws: ASME B18.6.1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

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

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Owner’s Representative and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Owner’s

Representative acceptance of layout before excavating or planting. Make minor adjustments as required.

C. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

3.3 PLANTING AREA ESTABLISHMENT

A. Loosen subgrade of planting areas to a minimum depth of 12 inches (300 mm). Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Spread planting soil to a depth of 12 inches (300 mm) unless indicated or directed otherwise but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

B. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

C. Before planting, obtain Owner’s Representative acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

D. Application of Mycorrhizal Fungi: Apply as required for best plant growth.

3.4 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.

1. Excavate planting pits as indicated on the drawings or as follows if not indicted:
    a. Excavate at least 12 inches (300 mm) wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
    b. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
    c. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
    d. Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
2. Maintain supervision of excavations during working hours.
3. Keep excavations covered or otherwise protected at all times.

4. If drain tile is shown on Drawings or required under planting areas, excavate to top of porous backfill over tile.

B. Subsoil and topsoil removed from excavations may be used as planting soil if determined suitable for site conditions and plant selections.

C. Obstructions: Notify Owner's Representative if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

1. Hardpan Layer: Drill 6-inch- (150-mm-) diameter holes, 24 inches (600 mm) apart, into free-draining strata or to a depth of 10 feet (3 m), whichever is less, and backfill with free-draining material.

D. Drainage: Notify Owner's Representative if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.5 TREE, SHRUB, AND VINE PLANTING

A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Set balled and burlapped stock plumb and in center of planting pit or trench with root flare as indicated to adjacent finish grades.
1. Plant per planting plan details.
2. Do not use planting stock if root ball is cracked or broken before or during planting operation.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.6 TREE, SHRUB, AND VINE PRUNING

A. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Owner's Representative, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.

B. Do not apply pruning paint to wounds.

3.7 TREE STABILIZATION

A. Install trunk stabilization only if in a windy area. Install as follows unless otherwise indicated:

1. Upright Staking and Tying: Stake trees of 2- through 5-inch (50- through 125-mm) caliper. Stake trees of less than 2-inch (50-mm) caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least 18 inches (450 mm) below bottom of backfilled excavation. Set vertical stakes and space to avoid penetrating root balls or root masses.
2. Use two stakes for trees up to 12 feet (3.6 m) high; three stakes for trees less than 14 feet (4.2 m) high and greater than 2-1/2 inches (63 mm) in caliper. Space stakes equally around trees.
3. Support trees with two strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

3.8 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicted on the drawing in even rows with triangular spacing for review by Owner's Representative.

B. Use planting soil for backfill.

C. Dig holes large enough to allow spreading of roots.

D. For rooted cutting plants supplied in flats, plant each in a manner that will minimally disturb the root system but to a depth not less than two nodes.

E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.9 PLANTING AREA MULCHING

A. Mulch backfilled surfaces of planting areas and other areas indicated.

3.10 EDGING INSTALLATION

A. Shovel-Cut Edging: Separate mulched areas from turf areas, curbs, and paving with a 45-degree, 4- to 6-inch- (100- to 150-mm-) deep, shovel-cut edge as shown on Drawings.

3.11 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.

B. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated past management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.12 INSPECTION AND ACCEPTANCE

A. The Owner’s Representative will inspect all planting in the presence of the contractor at the end of the maintenance period or whenever the planting installation is complete. The Contractor shall make all necessary adjustments, repairs, and replacements at the end of the warranty period.

1. Contractor to repair or replace plantings and accessories that fail in materials, workmanship, or growth as defined under Warranty specified hereinbefore.

3.13 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.

B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

C. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

3.14 DISPOSAL

A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION

SECTION 33 11 00 - WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. See Division 01 Section "Allowances" for procedures for using unit prices to adjust quantity allowances.

1.2 SUMMARY

A. Description of work: Provide labor, materials, equipment, and services necessary for proper and complete site clearing as indicated on the Drawings and as herein specified including the following items:

1. Fire service piping and connections.
2. Domestic service piping and connections.

B. The Contractor shall pay all fees associated with connection to the existing utilities and inspections by the Portland Water District (PWD). Contractor shall obtain PWD requirements and comply with all requisite requirements and standards.

C. The Contractor shall pay all fees associated with third party inspection services.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Field quality-control test reports.

C. The Contractor shall submit three (3) copies to the PWD of the name of the pipe, fitting, valve, and brass suppliers and a list of materials to be furnished. **The request for any approved equal materials shall be made in writing prior to the start of any work.**

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with requirements of the PWD. Include tapping of water mains and backflow prevention.
2. Comply with standards of PWD for potable-water-service piping, including materials, installation, testing, and disinfection.

3. Comply with standards of PWD and City of Portland Fire Department for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare valves according to the following:

1. Ensure that valves are dry and internally protected against moisture and corrosion.
2. Protect valves against damage to threaded ends and flange faces.
3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. During Storage: Use precautions for valves according to the following:

1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
2. Protect from weather. Store indoors and maintain temperature higher than ambient dew- point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Use sling to handle valves if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

D. Deliver piping 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.

E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

F. Protect flanges, fittings, and specialties from moisture and dirt.

G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:

1. Notify Architect, Owner, and PWD no fewer than two days in advance of proposed interruption of service.
2. Do not proceed with interruption of water-distribution service and/or fire

protection without PWD's and the City of Portland Fire Chief's written permission.

1.7 COORDINATION

A. Contractor shall coordinate connection to water main with the PWD.

B. Contractor shall coordinate with the PWD and provide all necessary notifications prior at least 10 business days prior to scheduled water main shutdown.

PART 2 - PRODUCTS

2.1 DUCTILE-IRON PIPE

A. All pipe for the fire suppression service shall be size as noted on plans, ductile iron, cement lined, push-on joint, thickness class 52. Joints shall be "Tyton" or an approved equal. Cement lining shall be a minimum of one-eighth (1/8) inch thick and be bituminous coated. The manufacturing of pipe shall be in accordance with AWWA/ANSI C151/A21.51. All pipe joints shall be in conformance with AWWA/ANSI C111/A21.11.

B. Restrained joint pipe shall be TR FLEX tm , SNAP-LOK tm , Fastite, mechanical joint with a retaining gland, Tyton tm joint with a Field Lok tm gasket, or an approved equal. The specification shall be the same as for normal push-on pipe, except as noted.

2.2 TYPE "K" COPPER PIPING

A. All pipe for the water service shall be size as noted on plans, type K copper, conforming to ASTM B88 and AWWA/ANSI C800.

2.3 FITTINGS

A. All fittings shall be mechanical joint with retainer gland, ductile iron class 350 and shall be manufactured in strict conformance with ANSI/AWWA C-153/A-21.53. Joints shall be ANSI/AWWA C-153/A-21.11 and cement lining for sizes 3-inch though 12-inch shall meet or exceed ANSI/AWWA C-104/A21.4. Nuts and T-bolts for all mechanical joint fittings shall be Corten, high strength low allow steel meeting ANSI A21.11. All mechanical joint fitting 12-inches or less shall have GripRing tm manufactured by Romac, Inc. or an approved equal.

2.4 GATE VALVES

A. Valves for pipe under 14" in diameter, and all tapping valves shall be constructed of ductile iron meeting the requirements of AWWA C-509. They shall be Resilient Wedge Type and manufactured of light weight, high strength ductile iron with wall thickness with meets or exceeds the requirements of AWWA C-153. Wedges shall be ductile iron encased in synthetic rubber as per AWWA C-509. Valve body and bonnet shall be

fusion bonded epoxy coated both inside and out as per AWWA C-550. Exterior bolts shall be five-eighths inch (5/8") minimum diameter stainless steel type 18-8 as per ASTM F593,6P1. **Valves shall open right**.

B. Valve boxes shall be cast iron, two piece, sliding type with a top flange, bell type base, and a minimum inside diameter of 5.5". Boxes shall have the word "water" clearly cast into the cover. A "posi-cap" approved equal shall be used with all new valve installations. The posi-cap^{tm} shall be tight fitting against the bell in the base section to the valve box. A typical valve box shall consist of a 48" bell base section, a 36" top section with a flare, and a cover.

2.5 SADDLE TAPS

A. Saddle taps shall be nylon coated with stainless steel bands. The saddle tap threads shall match the corporation threads. The exact outside diameter of any main is unknown, a test hole is recommended prior to installation.

2.6 REPAIR CLAMPS

A. Repair clamps shall be 15" long FS2 Repair Clamp for 8" nominal pipe size as manufactured by the Ford Meter Box Company, or approved equal. Outside diameter of the existing main shall be determined prior to selection of the repair clamp.

2.7 SERVICE BRASS

A. All required underground service brass shall conform to AWWA standard C-800 (latest revision) and pack joint end connections consisting of Buna-N beveled gasket. Service brass shall be as manufactured by the Ford Meter Box Company, Inc. or an approved equal.

2.8 CORPORATIONS

A. Corporation inlets shall have AWWA taper (CC) and outlets shall be compression pack joint. Corporations shall be manufactured by the A.Y. Macdonald, low lead model 4701B-22 corporation or an approved equal. Only ball corporations shall be used.

2.9 CURB STOPS

A. Curb stops shall be ball valves as manufactured by A.Y. MacDonald, low lead model 6100-22 ball valve curb stop or an approved equal. Curb stops shall have copper packed joints on inlets and outlets and have no drains. Curb stops for the domestic service shall be 2".

B. Curb boxes shall be cast iron extension type with an arch pattern base. Curb box covers shall come complete with a "rope" thread brass pentagon plug and marked "WATER". The service boxes shall be installed with a 9/16" x 24" stainless steel service box rod.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Refer to Section 31 20 00 "Earth Moving" for excavating, trenching, and backfilling.

3.2 ABANDONMENT OF EXISTING SERVICE

A. All work shall be conducted in accordance with the PWD standards.

B. Contractor shall coordinate the shutdown of the existing water main prior to excavation in Center Street.

C. The existing abandoned water service shall be retired in Preble Street. The existing service pipe shall be cut at the main and the corporation shall be shut.

D. The existing service box and rod shall be removed from the Preble Street sidewalk.

3.3 PIPING APPLICATIONS

A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications:

1. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.

2. Do not use flanges or unions for underground piping.

3.4 VALVE APPLICATIONS

A. General Application: Use mechanical-joint-end valves for underground installation.

3.5 PIPING INSTALLATION

A. Water-Main Connection: Coordinate with the PWD prior to any water service or water main work. The arrangement of fittings, number and size of taps for services larger than one-inch shall be approved by the district.

B. Pipe shall be installed to follow the latest revision of AWWA C600-82 and the manufacture’s recommendations.

C. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.

1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105

D. Bury piping with depth of cover over top at least 6 ft., for frost protection.

E. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.

1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.

F. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

3.6 JOINT CONSTRUCTION

A. Make pipe joints according to the following:

1. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure.

3.7 ANCHORAGE INSTALLATION

A. General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:

1. Concrete thrust blocks.

a. Concrete used for thrust blocks shall be type I cement, ¾" stone with a minimum compressive strength of three thousand pounds per square inch (3000 psi) at 28 days. Pipe and fittings shall be wrapped in a 4 mil loose polyethylene film to keep the concrete from coming into contact with the bolts and fittings. Thrust blocks shall be installed to support all tees, tapping sleeves, bends, etc. unless an alternate method is approved by the Engineer. Thrust block shall extend to the vertical face of the undisturbed sides of the trench, or in a manner acceptable to the Engineer. The use of thrust block shall be coordinated with the District. Wooden blocking should be kept on hand to support the main and fittings during installation. When blocking is used, the supported work shall have the fill compacted under the main and fittings with portable compaction equipment to prevent the work only being supported by such blocking.

2. Locking mechanical joints.

3. Set-screw mechanical retainer glands.

4. Pipe clamps and tie rods.

B. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.8 VALVE INSTALLATION

A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

B. Corporation Valves: Corporations shall be directly tapped into the main.

C. Curb Valves: Curbs stops and boxes shall be installed at the right-of-way limit. Curb boxes shall be installed plumb with the box lid installed flush with the finish grade. Curb stops and boxes shall be supports as to not put any pressure on the service line.

3.9 FIELD QUALITY CONTROL

A. Piping tests shall be conducted by a qualified third party testing agency.

1. Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

2. Hydrostatic Tests shall be conducted in accordance with the PWD standards.

3. Results of piping tests shall be submitted to the PWD.

3.10 CHLORINATION AND DECHLORINATION

A. Chlorination and dechlorination shall be conducted by a qualified third party agency.

B. Chlorination and dechlorination shall be conducted in accordance with the PWD standards.

3.11 IDENTIFICATION

A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping.

3.12 CLEANING

A. Coordinate flushing, chlorination, and dechlorination with the PWD. Clean and disinfect water-distribution piping to meet PWD standards.

B. Following acceptable pipe testing, chlorination, and dechlorination, and prior to backfilling trenches, the pipe testing and disinfecting corporations shall be shut off and risers shall be removed.

C. Prepare reports of purging and disinfecting activities, and submit to Water District and Engineer.

END OF SECTION 33 11 00

SECTION 33 31 00 - SANITARY SEWERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Description of work: Provide labor, materials, equipment, and services necessary for proper and complete installation of gravity-flow non-pressure sanitary sewerage outside the building as indicated on the Drawings and as herein specified including the following items:

1. Pipe and fittings.
2. Precast concrete manhole connections.
3. Fees: Contractor shall be responsible for all permit and inspection fees required by sanitary district.

1.3 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: Water

1.4 SUBMITTALS

A. Shop Drawings: Submit Product Specification Literature and/or Shop Drawings for:

1. Sewer drainage piping.
2. Backwater valves
3. Grease interceptor
4. Cast iron frame and cover

B. Field quality-control test reports.

1.5 CLOSEOUT SUBMITTALS

A. Comply with Section 01 73 00 - Execution Requirements: Requirements for submittals.

B. Project Record Documents:

1. Accurately record actual locations of pipe runs, connections, manholes, and invert elevations.

2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic pipe and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

1.7 PROJECT CONDITIONS

A. Interruption of Existing Sanitary Sewerage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Architect, Owner, and utility company no fewer than two days in advance of proposed interruption of service.

2. Do not proceed with interruption of service without Owner's or utility company's written permission.

1.8 AS- BUILT DRAWINGS

A. As-built scale Drawings, accurately showing actual installed locations and inverts of all underground and surface drainage lines and structures, shall be produced by the Contractor and turned over to the Architect/Engineer at the completion of the project.

PART 2 - PRODUCTS

2.1 PVC PIPE AND FITTINGS

A. PVC Sewer Pipe (non-pressure) and Fittings, 15” and Smaller: ASTM D 3034, SDR 35, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.

2.2 FRAME AND COVERS

A. Cast Iron Frames and Covers: ASTMA48, Class 35, MDOT Section 712.07. Covers shall have the word “Sewer” cast thereon.

1. Sanitary Manholes: Standard Solid Cover – 24 in. round opening; M248S, (heavy-duty) manufactured by Ethridge Foundary Co., Portland, ME or approved equivalent.

B. Waterproofing: All sewer manholes shall be waterproofed with two coats of bituminous sealer applied to the exterior of the manhole by the manufacturer. Waterproofing shall comply with ASTM D449, Type A.

C. Brick: ASTM C32-69, Grade MS, except Grade SS for drainage manhole inverts; MDOT Section 704.01.

2.3 GREASE INTERECEPTOR

A. Schier products GB-250

2.4 BACKWATER VALVES

A. “Clean-Check Backwater Valve” as manufactured by rectorseal, or approved equal

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Section 31 20 00 "Earth Moving"

3.2 COORDINATION

A. Coordinate work with Sanitary District for all required fees (paid by contractor) and all required inspections.

3.3 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.

C. Install manholes for changes in direction, unless fittings are indicated.

D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. Install gravity-flow, nonpressure, drainage piping according to the following:

1. Install piping pitched down in direction of flow, at minimum slope of 1 percent, unless otherwise indicated.
2. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.

F. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.4 PIPE JOINT CONSTRUCTION

A. Join gravity-flow, nonpressure, drainage piping according to the following:

1. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.

3.5 CONNECTIONS

A. Connect non-pressure, gravity-flow drainage piping to building's sanitary drains specified in Section 22 00 00 “Plumbing”.

B. Make connections to existing piping and underground manholes.

1. Remove existing 6” sewer line as indicated on the Drawings.
2. Install new pipe to manhole connector; Kor-N-Seal ring, or equal.

3.6 IDENTIFICATION

A. Materials and their installation are specified in Section 31 20 00 "Earth Moving".

B. Arrange for installation of green warning tapes directly over piping.

1. Use warning tape or detectable warning tape over ferrous piping
2. Use detectable warning tape over nonferrous piping.

3.7 GREASE INTERCEPTOR

A. Install per manufacturer’s instructions.

B. Excavation shall be 12” wider than tank on all sides

C. Compact subgrade to 95% proctor. Set tank on 6” of compacted crushed stone

D. Backfill with ¾” stone. Do not compact backfill around unit.

3.8 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24-inches of backfill is in place, and again at completion of Project.

1. Submit separate report for each system inspection.

2. Defects requiring correction include the following:

   a. Alignment: Less than full diameter of inside of pipe is visible between structures.

   b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.

   c. Crushed, broken, cracked, or otherwise damaged piping.

   d. Infiltration: Water leakage into piping.

   e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.

4. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, manholes, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.

2. Test completed piping systems and manholes according to requirements of authorities having jurisdiction.

3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours advance notice.

4. Submit separate report for each test.

5. Air Tests: Test sanitary sewerage and manholes according to requirements of authorities having jurisdiction, UNI-B-6, and the following:

   a. Option: Test plastic gravity sewer piping according to ASTM F 1417.

C. Leaks and loss in test pressure constitute defects that must be repaired.

D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.9 CLEANING

A. Clean interior of piping and structures of dirt and superfluous material.

END OF SECTION 33 31 00

SECTION 33 46 00 - SUBDRAINAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Description of work: Provide labor, materials, equipment, and services necessary for proper and complete installation of the subdrainage systems as indicated on the Drawings and as herein specified including the following items:

1. Foundation drain
2. Site underdrain

1.3 ACTION SUBMITTALS

A. Product Data:

1. Perforated-wall drainage conduits and fittings, including rated capacities.
2. Cleanout frames and covers.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Use 6-inch perforated SDR35 PVC (ASTM D 3034) or approved equivalent for foundation drain and subslab underdrain piping, unless noted otherwise.

2.2 STONE MATERIALS

A. Crushed stone as specified in Division 31 Section "Earth Moving".

2.3 GEOTEXTILE FILTER FABRICS

A. Non-woven, continuous filament fibers of polypropylene; Mirifi 160N or approved equivalent.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces and areas for suitable conditions where subdrainage systems are to be installed.

B. If subdrainage is required for landscaping, locate and mark existing utilities, underground structures, and aboveground obstructions before beginning installation and avoid disruption and damage of services.

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

3.2 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Section 31 20 00 "Earth Moving".

3.3 FOUNDATION DRAINAGE INSTALLATION

A. Place fill material on subgrade adjacent to bottom of footing after concrete footing forms have been removed, and compact to dimensions indicated.

B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.

C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.

D. Install drainage piping as indicated on the Drawings.

E. Add drainage course to width of at least 4 inches on sides and over top of pipe.

F. Wrap the flat-style geotextile filter fabric over top of drainage course, overlapping edges at least 8 inches

1. Place backfill material over compacted drainage course with geotextile wrap. Place material in loose-depth layers not exceeding 6 inches (150 mm). Thoroughly compact each layer. Final backfill to finish elevations and slope away from building.

3.4 SITE UNDERDRAIN INSTALLATION

A. Provide trench width to allow installation of drainage conduit. Grade bottom of trench excavations to required slope, and compact to firm, solid bed for drainage system.

B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.

C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 6 inches (150 mm).

D. Add drainage course to width of at least 6 inches (150 mm) on sides and over top of pipe.

E. Wrap the flat-style geotextile filter fabric over top of drainage course, overlapping edges at least 8 inches.

F. Fill to Grade: Place granular fill material over drainage course with geotextile wrap Place material in loose-depth layers not exceeding 6 inches (150 mm). Thoroughly compact each layer. Fill to finish grade.

3.5 PIPING INSTALLATION

A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.

1. Foundation Subdrainage: Install piping pitched down in direction of flow, at a minimum slope of 0.25 %, unless otherwise indicated.
2. Underslab Subdrainage: Install piping pitched down in direction of flow, at a minimum slope of 0.25 %, unless otherwise indicated.
3. Retaining Wall Subdrainage: When water discharges at end of wall into storm water piping system, install piping pitched down in direction of flow, at a min. slope of 0.25 %, unless otherwise indicated.
4. Site Subdrainage: Install piping pitched down in direction of flow, at a min. slope of 0.25 %, unless otherwise indicated.
5. Lay perforated pipe with perforations down.
6. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.

B. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.

3.6 PIPE JOINT CONSTRUCTION

A. Join perforated pipe and fittings according to ASTM D 3212 with push-on joints. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

3.7 CLEANOUT INSTALLATION

A. Cleanouts for Subdrainage:

1. Install cleanouts from piping to grade. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.

2. Provide cleanout plug inside a cast iron or aluminum hand hole and cover, set 4 inches below finish grade.

3. Hand holes shall be H20 rated in paved areas.

3.8 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

3.9 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling.

2. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

3.10 CLEANING

A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses and at project completion. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

END OF SECTION 33 46 00

SECTION 34 41 16 - TRAFFIC CONTROL EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Traffic Signage

1.3 SUBMITTALS

A. Product Data: For each type of product.

1. Signs

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the site in an undamaged condition.

B. Carefully store materials off the ground to provide proper protection against oxidation, and other damage caused by ground contact.

PART 2 - PRODUCTS

A. Signs and sign post products shall be in conformance with all Maine DOT and ADA requirements.

B. See Drawings.

PART 3 - EXECUTION

3.1 Locate where shown on Drawings. Assemble as per manufacturer's instructions, and as shown on Drawings

END OF SECTION 34-41-16

SECTION 44 15 16 - SOLID WASTE STATIONARY CONTAINERS AND ENCLOSURE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Description of work: Provide labor, materials, equipment, and services necessary for proper and complete installation of solid waste disposal containers and screening as indicated on the Drawings and as herein specified including the following items:

1. Solid waste container (dumpster).
2. Concrete pad.
3. Dumpster enclosure.

1.3 SUBMITTALS

A. Product Data: For each type of product.

B. Shop drawings for fabrication of dumpster enclosure including wood and steel post shop drawings, materials, and dimensions.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the site in an undamaged condition.

B. Carefully store materials off the ground to provide proper protection against oxidation, and other damage caused by ground contact.

PART 2 - PRODUCTS

2.1 DUMPSTER ENCLOSURE

A. The dumpster enclosure shall be constructed with the following materials:

1. “Corvit” model 1111 as distributed by Cityscapes Architectural Innovations (www.cityscapesinc.com)
2. Screen wall material and style: Metal series, shallow rib

3. Gate style: Mission
4. Trim style: Box top
5. Top rails & cap: Mortarboard

2.2 CONCRETE

A. Provide a concrete pad at dumpster (4,000 psi/28 day).

2.3 DUMPSTER

A. Contractor to coordinate with Troiano Waste Services to relocate existing dumpster in southeast parking lot (corner of Preble Street and Oxford Street) to proposed dumpster pad location.

PART 3 - EXECUTION

3.1 DUMPSTER ENCLOSURE

A. Locate where shown on Drawing. Assemble as per manufacturer's instructions, and as shown on Drawings

3.2 CONCRETE PAD

A. Install bollards and fence posts, supports, etc. where necessary

B. Coordinate concrete testing.

C. Prepare gravel surface and install forms.

D. Install rebar on supports.

E. Pour concrete.

3.3 DUMPSTER

A. Contractor to coordinate with Troiano Waste Services to relocate existing dumpster in southeast parking lot (corner of Preble Street and Oxford Street) to proposed dumpster pad location.

END OF SECTION 44 51 16