

SECTION 09 51 00

ACOUSTICAL CEILING SYSTEMS

PART 1 -- GENERAL

1.01 SCOPE OF WORK

Supply and install all Acoustical Ceiling Work as shown on Drawings and as specified herein. All the requirements of the Contract Documents apply to this Section.

1.02 SUBMITTALS

- A. Submit complete layout of all systems including attachments, intersections of members and edge conditions.
- B. Samples: submit 2 samples of each type of unit specified herein.

1.03 SUBSTITUTIONS

Substitutions will be considered per the Instructions to Bidders, Section 3.3 Substitutions.

1.04 QUALITY ASSURANCE

- A. Have applicators approved by manufacturer of material or system being installed.
- B. Work hereunder requires coordination with trades who's Work connects with, is affected, or concealed by acoustical units. Before proceeding with Work, make certain all required inspections have been made.
- C. Examine sub-surfaces to receive Work. Commencement of Work will be construed as acceptance of all sub-surfaces.
- D. Comply with all applicable requirements of Acoustical Materials Association, Bulletin "Architectural Acoustical Materials".

1.05 DELIVERY AND STORAGE

Deliver all manufactured materials in original containers bearing manufacturer's name and brand. Use only one brand for each type of unit throughout job. Store materials within building in locations directed.

PART 2 -- PRODUCTS

2.01 SUSPENSION GRID

- A. Ceiling Suspension Materials: Comply with ASTM C635, as applicable to the type of suspension system required for the type of ceiling units indicated. Coordinate with other work supported by or penetrating through the ceilings.
- B. Manufacturer, Type, Location, and Pattern: as indicated on the drawings.
- C. Edge Mouldings: Manufacturer's standard channel moulding for edges and penetrations of ceiling, with a single flange of moulding exposed, white baked enamel finish, unless otherwise indicated.
- D. Substitutions: As approved by Architect.

2.02 ACOUSTICAL TILE

- A. Manufacturer, Type, Location, and Pattern: as indicated on the drawings.

- B. Substitutions: As approved by Architect.

2.03 EXTRA STOCK

Order additional 3% of each type of acoustical unit specified, for maintenance use, at no additional cost to Owner. (One box minimum.)

PART 3 -- EXECUTION

3.01 INSTALLATION

- A. Installer must examine the conditions under which the acoustical ceiling work is to be performed and notify the Contractor in writing of any unsatisfactory conditions. This installer shall make sure all unsatisfactory conditions have been corrected in a manner acceptable to the installer before proceeding with Work.
- B. Provide all materials and accessories for complete installation per Drawings and manufacturer's printed instructions and recommendations.
- C. Install units to sub-surfaces from setout points and to pattern shown on Drawings. Verify location of Work of other trades so their items occur within a whole unit or at joints as shown.
- D. Install units in place fitting snugly. Provide spacers or hold-down clips where shown or required.
- E. After installation, clean any soiled surfaces. Replace any damaged units at no additional cost to the Owner.
- F. Arrange acoustical units in the manner shown by reflected ceiling plans. Consult with Architect pertaining to any adjustments.

3.02 SUPPORT SYSTEMS FOR SUSPENDED CEILING

- A. General: Ceilings shall not support material or building components other than grills, insulation batts or light fixtures. Duct work, plumbing and like work shall have its own support system and shall not use the ceiling system or suspension wires.
- B. Vertical Support System: Suspension wires shall be a minimum of 12-gauge galvanized wire attached to the main runner at 4 ft. maximum spacing in both directions. Each wire shall be anchored to the structure above with a device capable of supporting a minimum of 75 pounds. Wires supporting fixtures shall be capable of supporting four times the fixture weight. Suspension wires shall not hang more than 1 in 6 out of plumb unless counter sloping wires are provided. Wires shall not attach to or bond around interfering material such as ductwork. Trapeze or equivalent devices shall be used where obstructions interfere with direct suspension.
- C. Horizontal Support System: The lateral support system for ceilings shall be shown in detail shop Drawings. Provisions shall be made for possible differential movement between ceilings and sidewalls. Terminal ends of each main and each cross runner shall be wire supported; wall trim angles shall not provide primary support for runners. Lateral support of ceilings shall not be provided by the angle trim and runner shall not be riveted to wall trim.
- D. Light Fixture Support: All recessed or drop-in light fixtures shall be supported directly from the fixture housing to the structure above with a minimum of two 12 gauge wires; leveling and positioning of fixture may be provided by the ceiling grid. Fixture support wires may be slightly loose to allow fixture to seat in heavy-duty grid system only.
- E. Secure wire hangers by looping and wire tying either directly to structures or to inserts, eye-screws or other devices which are secure and appropriate for the substrate, and which will

not deteriorate or fail with age or elevated temperatures.

3.03 CLEANING AND PROTECTION

- A. Clean exposed surfaces of acoustical ceilings, including trim, edge mouldings and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.
- B. The installer shall advise the Contractor of required protection for the acoustical ceilings, including temperature and humidity limitations and dust control, so that the Work will be without damage and deterioration at the time of acceptance by the Owner.

***** END OF SECTION *****

THIS PAGE IS INTENTIONALLY BLANK

SECTION 09 54 26

TONGUE & GROOVE WOOD CEILING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following ceiling system:
 - 1. Linear Wood tongue and groove planks.
 - 2. Concealed combinations ceiling/walls installation clips.
 - 3. All factory applied and/or field installed accessories, wood molding or trim.

1.2 SUBMITTALS

- A. Product Data: Product data, product specifications, and installation instruction.
- B. Shop Drawings: Show penetration details, perimeter treatment and other details deemed pertinent to proper installation.
- C. Samples: A 9" wide x 12" long wood ceiling sample. The sample shall be made of the wood species selected, with the selected finish applied, and installed on clip rails.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: The installer must be a firm with a minimum of two (2) years of successful experience in installation of suspended wood ceilings of similar requirements to this project. The installer must be acceptable to the architect, manufacturer and owner's representative.
- B. Fire Performance Characteristics: When specified as "Fire Resistant", wood ceiling boards shall conform to Class 1, or A flame spread rating, when tested according to ASTM E-84.
- C. Environmental Standards: When required the wood ceiling shall originate from well managed forests as certified by accredited and recognized industry certifying organizations.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. All materials shall be delivered to the project site in the original, labeled, unopened packages.
- B. Materials shall be stored flat and level in a fully enclosed space. For a minimum of seventy-two (72) hours immediately prior to ceiling installation, the Linear Wood Strips shall be stored in the room in which they will be installed. The temperature and humidity of the room shall closely approximate those conditions that will exist when the building is occupied. Linear Wood Planks shall be stored off the floor.

1.5 PROJECT CONDITIONS

- A. Install shall be done only when the temperature and humidity closely approximate the interior conditions that will exist when the building is occupied. The heating and cooling systems shall be operating before, during and after installation, with the humidity of the interior spaces maintained between 25% and 55%.
- B. It is important that plenums have proper ventilations, especially in high moisture areas. There shall be no excessive building up of heat in the ceiling areas.
- C. Prior to the start of installation, all exterior windows and doors are to be in place, glazed and weather-stripped. The roof is to be watertight, and all wet trades' work is to be completed, and thoroughly dry.

- D. Mechanical, electrical, and other utility service installations above the ceiling plane shall have been completed. No materials should rest against, or wrap around, the ceiling suspension components or connecting hangers.

1.6 WARRANTY

- A. Manufacturer: All materials supplied by the ceiling manufacturer shall be guaranteed against manufacturing defects for one (1) year.
- B. Contractor: All work shall be guaranteed for one (1) years from final acceptance of completed work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Linear Wood Ceiling or Wall System:

- 1. Linwood I as manufactured by Architectural Surfaces, Inc.
 - a. 123 Columbia Court North, Suite 201, Chaska, MN 55318.
 - b. 952-448-5300, Fax: 952-448-2613.
 - c. Toll Free: 1-800-448-0121.
- 2. Or equal.

2.2 LINEAR WOOD TONGUE AND GROOVE PLANKS

A. Materials:

- 1. The Linear Wood tongue and groove planks shall be Linwood I, or equal.
 - a. Species: As specified in the Drawings.
 - b. Cut: As specified in the Drawings.
 - c. Length: As specified in the Drawings.
 - d. Joint Side by Side: V-Groove
 - e. Factory Finish:
 - 1) Clear Lacquer, Clear Class A FR Varnish or Stain to match architects sample with lacquer or class A FR Varnish topcoat.
 - 2) All finishes shall be selected by the designer, architect, or designated owner's representative.

2.3 SUSPENSION SYSTEM

- A. Materials: (Optional-ceilings only) The grid suspension shall be as manufactured by Chicago Metallic Corporation, Armstrong or approved equal.
- B. All main runners and cross runners shall conform to the heavy duty classification of ASTM C635.
- C. Main runners shall be installed 48" o.c. and be directly suspended by not less than 12 ga galvanized steel wire wrapped tightly at least three full turns. Suspension wires shall be straight and vertically installed not more than 48" o.c.
- D. Main runners shall be interconnected by cross tees to form a 2'x4' module.
- E. Wall channel moldings shall be standard cold rolled electro-galvanized steel.
- F. (Optional) wall spring clips shall be used on at least two adjoining walls behind the edge molding to allow for wood system expansion and contraction.

2.4 EDGES, BORDERS AND PERIMETER TRIMS

- A. Edges, borders, and perimeter trims shall be designated by Architect in accordance with standard design details available. All wood ceiling products specified shall be supplied by the ceiling manufacturer.

2.5 CLIP SYSTEM OVER GYPSUM BOARD

- A. If installing planks directly over gypsum board without furring or backing, the concealed clip system as manufactured by Architectural Surfaces, Inc. or approved equal shall be used.
- B. Clips shall be screwed into gypsum 16" o.c. maximum and within 1-1/2" from the top and bottom into the plates. Only 1" or longer hi-low type S bugle head screws shall be used.
- C. Adhesive in bands 4" to 6" o.c. shall be used between concealed clips.
- D. Planks shall not be installed tightly against one another. Manufacturer clips shall be used for automatic spacing between planks.
- E. A minimum of 1/16" between each plank's tongue and groove and 1/4" clearance in height at the bottom or top shall be maintained throughout installation.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Ceiling Layout: The contractor shall measure ceiling areas and establish the layout of the mains and cross tees, in accordance with installation instructions.
- B. Coordination: The contractor shall furnish the layout for supports that shall be installed for suspension of ceilings. He shall furnish concrete inserts, steel deck hanger clips, or similar devices for installation, in time to coordinate the work. The contractor shall coordinate with other trades the location of devices which will penetrate the Ceiling Panels or interfere with installation. Recessed or surface devices located within the ceiling panels are to be located and cut in the field.

3.2 INSTALLATION

- A. General: The contractor shall install materials in accordance with Architectural Surfaces Inc, printed instructions. The contractor will comply with applicable regulations and industry standards.
- B. Layout and installation of linear ceiling and its suspension system shall be coordinated with other work penetrating through the ceiling. This includes light fixtures, HVAC equipment, and fire suppression systems components.
- C. Perimeters: Using a leveling device, the contractor shall lay out and install perimeter trim, as specified.
- D. Suspensions: The contractor shall install suspension systems to comply with appropriate industry standards.
- E. HVAC and Light Fixture Suspensions: Electrical and mechanical installations must be supported independently of the linear wood ceiling.

3.3 INSPECTION

- A. Upon completion of ceiling installation, the owner's representative shall inspect all finished surfaces to ensure that the work has been completed in a manner satisfactory to the owner. Any deficiencies in the installed ceiling shall be corrected by the contractor at no additional cost to the owner, or to the ceiling manufacturer.

3.4 ADJUSTMENT, CLEANING, and REPAIR

- A. Upon completion of ceiling installation, all Linear Wood Strips and borders shall be cleaned free of dirt, dust, grease, oils, and fingerprints.
- B. All Work that cannot be successfully cleaned or repaired shall be removed and replaced.

***** END OF SECTION *****

SECTION 09 60 00

MOISTURE VAPOR EMISSION CONTROL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

Division 0, Contract Requirements and Division 1, General Conditions apply to this Section.

1.02 SECTION INCLUDES

- A. Pre-formed moisture suppression membrane installed over concrete subfloor as a floor covering underlayment.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- C. Coordinate the work of this section and directly related sections with concrete floor construction and repair.
- D. Coordinate the work of this section and directly related sections with finish flooring work.

1.03 REFERENCES

- A. ASTM International
 - 1. D2646-05- Standard test Methods for Backing Fabric Characteristics of Pile Yarn Floor Coverings
 - 2. D3273-00- Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
 - 3. D5729-97 (2004)e1 – Standard Test Method for Thickness of Nonwoven Fabrics
 - 4. E-96-05 – Standard Test Methods for Water Vapor Transmission of Materials
 - 5. F 2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
 - 6. F 710 - Standard Practice Preparing Concrete Floors

1.04 SUBMITTALS

- A. Provide in accordance with the General Conditions.
- B. Product Data: Provide data indicating product physical characteristics, performance criteria, and limitations of use.
- C. Manufacturer's Current Installation Instructions.
- D. Manufacturer's warranty registration with concrete subfloor moisture test results and building ambient air temperature and relative humidity test results.

1.05 SUBSTITUTIONS

Substitutions will be considered per the Instructions to Bidders, Section 3.3 Substitutions.

PART 2 - PRODUCTS

2.01 MANUFACTURER

Basis of Design: Halex Corporation, VersaShield 95 & VersaShield MBX. Location: 4200 E. Santa Ana Street, Ontario, CA 91761. Phone: 800-576-1636. Fax: 800-576-1635. Website: www.halexcorp.com.

2.02 MOISTURE SUPPRESSION SYSTEM FOR FLOORING PRODUCTS

- A. Product name: VersaShield 95 Flooring Underlayment and VersaShield MBX Flooring Underlayment.
 - 1. Material: Free-standing, dimensionally stable, 4-ply composite product, engineered as a moisture suppression membrane to be used on concrete floors where high moisture exists.
 - 2. Dimensions: [144 ft. long by 5 ft. wide] standard roll.
 - 3. Mold, Mildew & Fungal Resistance, ASTM D3273: 10 rating
 - 4. Moisture Vapor Transmission rate, ASTM E96-05: less than 0.01 g/hr/sq m
- B. Accessories: VersaShield tape
 - 1. Application: Joining of moisture suppression underlayment seams
 - 2. Description: Membrane manufacturer's moisture suppression tape with pressure sensitive adhesive.
 - 3. Properties: Moisture suppression and adhesion per manufacturer's specifications
 - 4. Dimensions: VersaShield 95 supplied as 2 inch by 180 ft. rolls; VersaShield MBX supplied as 2-1/2 inch by 180 ft. rolls and 4 inch by 100 ft. double-sided rolls.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Concrete Sub Floor:
 - 1. Verify internal RH of the concrete according to ASTM F-2170.
 - a. Record readings and submit with manufacturer's warranty registration.
 - b. VersaShield 95: Do not install if relative humidity levels within the concrete exceed 95% Relative Humidity.
 - c. VersaShield MBX: Do not install if relative humidity levels within the concrete exceed 99% Relative Humidity.

3.02 PREPARATION

- A. New or Remedial Installation
 - 1. Concrete Sub Floor
 - a. Prepare floor according to VersaShield 95 or VersaShield MBX manufacturer's instructions including removal of existing materials on concrete surface, grinding protrusions flat, and filling low spots with water-resistant cementitious patching or leveling compound. Patch cracks greater than 1/8-in. width using VersaShield manufacturer's approved crack mending compound.
 - b. Remove debris and excessive dust from the surface.

3.03 UNDERLAYMENT INSTALLATION

- A. Install moisture suppression membrane with smooth film side facing concrete slab.
- B. Install in accordance with membrane manufacturer's current written installation instructions.

- C. If any jobsite condition interferes with compliance with manufacturer's instructions, contact manufacturer and obtain written job-specific procedures. Notify architect or owner's representative as required in the Quality Section of this project manual describing the interfering jobsite condition and manufacturer's job-specific instructions.

3.04 FLOORING INSTALLATION

- A. Adhesives - Apply adhesive to mineral-coated surface of moisture suppression membrane. Use only water-based adhesives. Do not use solvent-based adhesives.
- B. Protection - Protect moisture suppression membrane from damage during flooring installation. Do not tear, rip, puncture, or delaminate membrane when applying trowel-on adhesive. Repair damaged areas according to membrane manufacturer's instructions before flooring installation. Provide continuous, intact moisture suppression membrane under entire designated flooring area.
- C. Install flooring according to flooring manufacturer's instructions
 - 1. Laminate or Engineered Wood: Install according to manufacturer's instructions for floating floors.
 - 2. Broadloom Carpet or Carpet Tiles: Adhere directly to moisture suppression membrane using carpet manufacturer's recommended adhesive.
 - 3. Vinyl Tile: Adhere directly to moisture suppression membrane using tile manufacturer's recommended adhesive.
 - 4. Ceramic Tile: Adhere only to approved surfaces - concrete, plywood, precast flooring, gypcrete, radiant heated floors, existing well-bonded vinyl, VCT, LVT, LVP, metal floors, and chemically treated or contaminated surfaces.
- D. Not approved for unitary back direct glue wide width carpet, linoleum, rubber tile, sheet vinyl, mechanically fastened solid wood.

*****END OF SECTION*****

THIS PAGE IS INTENTIONALLY BLANK

SECTION 09 68 00

CARPET

PART 1 -- GENERAL

1.01 GENERAL REQUIREMENTS

Division 0, Contract Requirements and Division 1, General Requirements apply to this Section

1.02 SCOPE OF WORK

Furnish all Materials and perform labor required to execute this work as indicated on the drawings, as specified and as necessary to comply with the Contract Documents, including, but not limited to, these major items:

1. Direct glue down carpet with backing.
2. Metal edge trim and backing for carpet covered wall base if indicated on the drawings.

1.03 SUBMITTALS

A. Submit the following:

1. Product data on specified products, describing physical and performance characteristics: sizes, patterns, colors available, and method of installation.
2. Samples illustrating color and pattern for each carpet material specified if substituting from color board.
3. Manufacturer's installation instructions. When approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on this Work.
4. Results of compliance of Flooring Substrate for requirements of Testing prior to installation – See Item 3.01.D.

1.04 ENVIRONMENTAL REQUIREMENTS

- A. Store materials for three days prior to installation in area of installation to achieve temperature stability.
- B. Maintain minimum 72 degrees F ambient temperature plus/minus 5 degrees with relative humidity not exceeding 65% three days prior to, during, and 72 hours after installation of materials.

1.05 OPERATION AND MAINTENANCE DATA

Submit operation and maintenance data maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning and shampooing.

1.06 CLOSE-OUT: EXTRA MATERIALS

Provide an extra 5% of carpeting of each color specified.

PART 2 -- PRODUCTS

2.01 CARPET

Manufacturer(s), Type(s), Location(s), Pattern(s), and Color(s) as indicated on drawings.

2.02 CARPET BASE (WHEN APPLICABLE)

Manufacturer(s), Type(s), Location(s), Finishes(s), and Color(s) as indicated on drawings.

2.03 FLOORING TRANSITIONS

Manufacturer(s), Type(s), Location(s), Finishes(s), as indicated on drawings.

2.04 OTHER ACCESSORIES

- A. Sub-Floor Filler: White premix latex; type recommended by carpet manufacturer.
- B. Primers and Adhesives: Waterproof; of types recommended by carpet manufacturer.

PART 3 -- EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed.
- B. Correct conditions detrimental to timely and proper completion of the Work.
- C. Verify that substrate surfaces are smooth and flat with maximum variation of 1/8 inch in 10 ft. and are ready to receive work. Have all previous adhesives removed.
- D. Concrete Slab Testing:
 - 1. Alkalinity: Test the concrete for alkalinity prior to beginning the installation. Check the concrete for surface pH at several locations. A reading below 5.0 or above 9.0 requires corrective measures. Specific information on the correct method of neutralizing low or high pH is available through Shaw Technical Services Department.
 - 2. Moisture: Check the concrete for moisture at several locations using the anhydrous calcium test kits. The moisture transmission rate must not exceed 5.0 pounds per 1000 square-feet per 24-hours. Do not begin the installation if an unacceptable moisture level is detected. Do not use other methods of moisture testing as they are not reliable. If excessive moisture is present, advise the Construction Manager.
- E. Do not proceed until unsatisfactory conditions are corrected.
- F. Beginning of installation means acceptance of conditions.

3.02 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with sub-floor filler.
- B. Apply, trowel, and float filler to leave smooth, flat, hard surface.
- C. Prohibit traffic until filler is cured.
- D. Vacuum floor surface.

3.03 INSTALLATION

- A. Apply carpet and adhesive in accordance with manufacturers' instructions. Direct glue-down.
- B. Lay out rolls of carpet.
- C. Verify carpet match before cutting to ensure minimal variation between dye lots.
- D. Locate seams in area of least traffic. Carpet shall be installed in full lengths wherever possible.
- E. Fit seams straight, not crowded or peaked, free of gaps.
- F. Lay carpet on floors with run of pile in same direction as anticipated traffic. Lay carpet so that seams perpendicular to a wall do not occur at door openings in that wall.
- G. Do not change run of pile in any room where carpet is continuous through a wall opening into another room. Locate change of color or pattern between rooms under door centerline.
- H. Cut and fit carpet around interruptions.

- I. Fit carpet tight to intersection with vertical surfaces without gaps.
- J. All seams shall be beaded and sealed with "seam sealer". The seam sealer shall be applied to the cut edge of the carpet at the level of the carpet backing.
- K. No stretching will be permitted.
- L. Unroll carpet face up and cut the lengths required with pile-lay runs in the same direction. Check starting wall for squareness and allow for off-square walls. Strike chalk line the entire length of area where seam falls.
- M. Place two lengths in proper position for installing; trim salvage, and line up seam edge with chalk line. Lay carpet perfectly flat and tension free.
- N. Roll both widths back 3' from seam area the entire length of carpet.
- O. Spread adhesive from approximate center towards each end.
- P. When sufficient floor area has been covered with adhesive, drop or roll first width into place. Apply coating of edge sealer to seam edge of first width. Follow this procedure on each succeeding width at seam. Drop or roll second width into position and fit the seam in tightly using knee-kicker if necessary. Brush or roll looseness and air bubbles away from seam.
- Q. Fold or roll the remaining portion of the first width from the wall. Apply adhesive to the floor and drop or roll carpet into place.
- R. Roll or fold back dry portion of second width towards seam; spread adhesive and place carpet 3' from where next seam will fall.
- S. Brush or roll out looseness and air bubbles as carpet is put into place. Repeat above procedure on continuing widths. Trim carpet at wall using razor blade knife or suitable wall trimmer.

3.04 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean and vacuum carpet surfaces.

3.05 PROTECTION

- A. Prohibit traffic from carpet areas for 24 hours after installation.
- B. Cover with non-staining building paper, firmly fastened down to protect floor surfaces.
- C. Near completion of the project, remove paper, clean and vacuum carpet.

***** END OF SECTION *****

THIS PAGE IS INTENTIONALLY BLANK

SECTION 09 71 00

ACOUSTICAL WALL PANELS

PART 1 — GENERAL

1.01 SUMMARY

- A. Provide Site Fabricated Tackable/Acoustical Wall Systems as shown on the drawings, as specified herein and as needed for a complete and proper installation.
- B. Contractor will provide Manufacturer's Standard Fabric Replacement Warranty.
- C. Contractor will perform a "value engineering" review of provided drawings, seeking product manufacturers input as appropriate, and make recommendations for the benefit of the project.

1.02 RELATED WORK

- A. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and sections in Division 1 of these Specifications.

1.03 SUBMITTALS

- A. General: Submit five (5) copies of the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product Data: Submit manufacturer's technical data, installation instructions, and maintenance and cleaning instructions.
- C. Certified Test Reports: Submit test data for the manufacturer's products from an independent testing agency, acceptable to authorities having jurisdiction, evidencing the panel components and/or assemblies comply with requirements indicated for Tackable/Acoustical and fire performance characteristics.
- D. Provide a copy of the Manufacturer's Standard Fabric Replacement Warranty and Manufacturer's Lifetime Warranty on Track, 10-Year Warranty on ReCore certificates, available at manufacturer's website: www.fabricmate.com. All Warranty Certificates must include the Project Registration Number to ensure validity of Manufacturer's Warranty. Warranty certificates without a registration number are not valid.
- E. Samples:
 - 1. Fabric — Submit manufacturer's standard size swatches of Tackable/Acoustical fabric.
 - 2. Core Material — Submit 8 ½"X 11" samples of each core material used, showing full range of materials, thicknesses, acoustics, and densities.
 - 3. Track — Submit samples of manufacturer's "Track" or "Frame" showing full range of edge profiles, thicknesses, and details for each type of Tackable/Acoustical panel. Where more than one edge profile is used on a panel, clearly show how each edge profile transitions into a different edge profile.
 - 4. Samples — Provide 8 ½"X 11" samples of each type of panel used, including representative samples of each thickness and panel type. Install samples on a substrate of sufficient firmness to allow the samples to be handled without damage.
 - 5. Accessory Package: Submit one Fabricmate FS670 Accessory Package.

1.04 QUALITY ASSURANCE

- A. Contractor: Provide verifiably genuine products for each type of wall panel as produced by the manufacturer(s), including recommended primers, adhesives, and sealants. The

manufacturer's published product literature shall clearly indicate compliance of wall panels with requirements indicated.

- B. Both individual components and finished assemblies shall meet the following as appropriate:
1. Thickness: 1/2", Density: 9.4 pcf.
 2. Fire Performance Characteristics: Provide Tackable/Acoustical wall panels with surface-burning characteristics as indicated below, as determined by testing assembled materials and construction according to ASTM E-84 Class A, by a testing organization acceptable to authorize having jurisdiction.
 - i. Flame Spread: 25 or less
 - ii. Smoke Developed: 450 or less
 3. Sound Absorption Characteristics: Provide Tackable/Acoustical wall panels with a noise reduction coefficient (NRC) of 0.5 or better.
 4. Be free of volatile organic compounds (VOCs).
 5. Fungi Resistance Certification of core material in accordance with ASTM C 1338.

1.05 DELIVERIES, STORAGE, AND HANDLING

Protect the Fabric, core material, and track from excessive moisture in shipment, storage, and handling. Deliver in unopened bundles and store in a dry place with adequate air circulation. Do not deliver material until wet work such as concrete and plaster has been completed.

1.06 PROJECT CONDITIONS

Do not begin installation until spaces to receive Tackable/Acoustical panels have been enclosed and maintained at approximately the same humidity and temperature conditions as planned for occupancy. Maintain temperature conditions as recommended by panel manufacturer.

1.07 EXTRA MATERIALS

- A. The following extra materials are to be provided:
1. Accessory Package: Installer shall provide extra 10 Percent of the FS670 Accessory Packages issued, but no less than 1 extra unit.
 2. Contractor to provide Owner additional system materials at manufacturer's current retail price.
 3. No free fabric to be provided, except as provided by the Manufacturer's Standard Fabric Replacement Warranty.

PART 2 — PRODUCTS

2.01 TACKABLE/ACOUSTICAL WALL PANEL MATERIALS

- A. Available Manufacturers: Subject to compliance with requirements, the product used as basis-of-design is provided by the manufacturer listed below:
- B. Tackable/Acoustical Site-fabricated Track System, as distributed by Fabricmate Systems, Inc., P:(805)642-7470, F:(805)642-3154, Toll Free:(866)622-2996, www.fabricmate.com. No substitutions accepted.
1. Contractor shall provide a Standard Fabric Replacement Warranty.
- C. Design Requirements:
1. Stretched fabric panel system shall consist of continuous perimeter and intermediate mounting extrusions that are site fabricated, and applied directly to the wall surface.

2. Fabric face shall be stretched over core materials and tucked into the track's locking jaws, leaving fabric floating above core surface. Installation of fabric facing shall not utilize any adhesives, nails, tacks, screws, sewn seams, thermally bonded seams, or tape.
3. Systems shall allow for removal and replacement of fabric from individual panels. Removal of fabric shall provide access to surface behind fabric. Fabric shall be removable and replaceable without dismantling, removal, damaging, or replacement of the track extrusions or core material.
4. All fabrics shall be evaluated by the contractor for suitability with its system, the intended application, and for warranty purposes. When uncertain, the contractor should consult with the system manufacturer.
5. Framework: One-piece extruded polymer track system with jaws of sufficient strength to securely hold fabric in place after repeated applications. Minimum track wall thickness specification shall be .065". Track style and color (standard colors or specified PMS color) to be selected by architect.
6. Edge detail: Square.
7. Intermediate detail: Square.
8. Outside Corner Detail: Fabric shall wrap around MDF backed corners in one piece without seams or joints unless otherwise indicated or necessary.
9. Prefabricated panels "fabric or vinyl wrapped" do not satisfy the intent of this specification and will not be accepted.
10. Hinged, self-locking (snap-lock) type mounting extrusions do not satisfy the intent of this specification and will not be accepted.
11. Fire resistance: Complete panel assembly shall have an ASTM E-84 Class A.

D. Tackable/Acoustical wall panels: Fabricmate Systems Site-fabricated track system.

1. Track profile: Fabricmate Systems FS100, FS105 and FS110 for perimeter and FS100 for intermediate joints as indicated on drawings.
2. ReCore polyester core material: 1/2" thick, 9.4 pcf white, certified tackable, ASTM E84 rated insulation board to fit within track's perimeter. Said board to have a minimum 50% post-consumer content. Material density to be consistent throughout the material.
3. Fabrics: Suitable for the particular application, as selected by the Architect/Designer from the Manufacturer's Standard Fabric offering and indicated in the Drawings.
4. Accessory Package: Supply one Fabricmate FS670 Accessory Package for each room with Tackable/Acoustic panels.

PART 3 — EXECUTION

3.01 INSPECTION

- A. Contractor must examine substrates and conditions under which the Tackable/Acoustical system is to be applied and notify the Architect in writing of conditions detrimental to proper and timely completion. Do not proceed with work until unsatisfactory conditions have been deemed corrected and acceptable to contractor.
- B. Verify all stationary objects abutting Tackable/Acoustical panels are installed (i.e. casework, marker boards, door and window jams, ceiling) prior to installation.

3.02 INSTALLATION

- A. Install Tackable/Acoustical wall panels in locations indicated on plans. Comply with manufacturer's printed instructions for installing site-fabricated track systems.
- B. Track: Install perimeter and intermediate track using screws, anchors and staples as project conditions warrant. Secure track base to wall (or ceiling) to prevent track framework from separating away from the wall. For masonry surfaces use a continuous bead of PL200 or equal with conical anchor and pin/nail/rivets every 6-8 inches per manufacturer's recommendation.
 - 1. Follow contours of the wall and scribe to adjoining work accurately at borders, penetrations, and imperfections.
 - 2. Track around all openings within a panel when needed as per manufacturer's instructions.
 - 3. Allow adequate spacing for insertion of installation tool.
 - 4. Wrap fabric around outside corners in one piece without seams or joints, creating one panel on two different wall planes. Fabric shall float over the corner matching the adjacent track's detail.
- C. Core Material — Prep surfaces that receive treatment; remove wall plates and other obstacles. Attach core to mounting surface per manufacturer's specifications. Cut core material to accurately fit inside tracked perimeter, maintaining the same plane. Mechanically fasten core to prevent air gaps between core and wall and to assure proper adhesion.
 - 1. Assure that all fixtures have the necessary backing to keep them flush with the Tackable/Acoustical panels.
- D. Fabrics — Stretch fabric into the track's locking jaws using the manufacturer's recommended "rolling tool", keeping fabric weave plumb, level and true in proper relation to the building lines without ripples, waviness, or "hourglass" effects.
 - 1. Use of adhesives or mechanical fasteners is strictly prohibited.
 - 2. The Fabricmate "floating-fabric" design shall not be compromised. Fabric shall not be glued or attached to the core material in any way.
 - 3. Fabric shall be stretched and tensioned sufficiently taut to avoid sagging under varying year-round temperature and humidity conditions.
 - 4. Fabric shall maintain its shape after being touched or leaned against without leaving any indentations, sags, or blisters.
 - 5. Ceiling applications shall not deviate more than 1" from true plane of ceiling in 20' span.

3.03 CLEANING AND PROTECTION

- A. Clean exposed surfaces of Tackable/Acoustical panels; comply with manufacturer's instructions for cleaning and repair of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.
- B. The sub-contractor shall advise the general contractor of the required protection for the Fabricmate Systems panels, such as; temperature and humidity limitations and dust control, so that the finished work will be without damage and deterioration at the time of acceptance by the Owner.

3.04 WARRANTY

- A. All tackable and Tackable/Acoustical wall and ceiling panels shall have a warranty against defects or workmanship of not less than 5-Years, commencing on the date of substantial completion.

1. Contractor shall provide a Standard Fabric Replacement Warranty.
2. All certificates of warranty must include the Manufacturer's Project Registration Number, which must be obtained by installer prior to the date of installation. Project Registration Numbers may not be obtained after the installation has commenced.
3. Warranty Certificates without a Manufacturer's Project Registration Number shall be deemed as invalid and unenforceable.

*****END OF SECTION*****

THIS PAGE IS INTENTIONALLY BLANK

SECTION 09 77 00

PREFINISHED WALL PANELS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

Division 0, Contract Requirements and Division 1, General Requirements apply to this Section.

1.02 SUMMARY

- A. Section includes: Sound absorptive wall panels.
- B. Related Work: Section 09 21 16 - Gypsum Board Systems.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's product data including certified laboratory test reports and other data required to show compliance with these specifications.
- B. Samples: Submit minimum 6 inch x 6 inch samples of specified wall panel.
- C. Shop Drawings: Layout and details of wall panels.
- D. Field mock up for review of installation with lighting.

1.04 QUALITY ASSURANCE

- A. Single source responsibility: Obtain wall panel materials from a single manufacturer. Provide panels of each type required from one manufacturer or uniform texture and color.
- B. Installer to provide evidence of appropriate experience in system installation and that installation method proposed is acceptable to panel manufacturer.
- C. Coordination of Work: Coordinate work with installers of related work including, but not limited to gypsum board, light fixtures, mechanical systems and electrical systems.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Project Conditions: Protect materials from excessive moisture in shipment, storage and handling. Deliver in unopened bundles and store in a dry place with adequate air circulation. Do not deliver material to building until wet conditions such as concrete, plaster, paint and adhesives have been completed and cured to a condition of equilibrium.
- B. Before installing, permit materials to reach room temperature and a stabilized moisture content.

1.06 WARRANTY

- A. Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include sagging and warping.
- B. Warranty Period: One year from date of substantial completion.
- C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.07 MAINTENANCE

- A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.

1. Prefinished panels: Furnish quality of full-size units equal to 5.0 percent of amount installed.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Armstrong World Industries, Inc.

2.02 PRODUCT

- A. Prefinished wall panels
 1. Surface Texture: Fine
 2. Composition: Fiberglass
 3. Color: White
 4. Size: 48 inches x 48 inches
 5. Edge Profile: Square
 6. Sabin: 1.49
 7. Flame Spread: ASTM 1264; Class A (UL)
 8. Light Reflectance White Panel: ASTM E 1477; 0.90
 9. Dimensional Stability: Standard
 10. Acceptable Product: SoundScapes Shapes, 5440 as manufactured by Armstrong World Industries.
 11. Installation: Wall Hanging Kit.

PART 3 - EXECUTION

3.01 EXAMINATION

Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations.

3.02 INSTALLATION

Install products in accordance with manufacturer's written instructions and in proper relationship with adjacent construction.

3.03 CLEANING

Touch-up, repair or replace damaged units until satisfactory results are obtained.

SECTION 09 90 00

PAINTING

PARTS 1 -- GENERAL

1.01 SUMMARY

- A. Division 0, Contract Requirements and Division 1, General Conditions apply to this Section.
- B. Section Includes: Painting and finishing of all interior and exterior items and surfaces, unless otherwise indicated or listed under exclusions below:
 - 1. Paint all exposed surfaces, except as otherwise indicated, whether or not colors are designated.
 - 2. Include field painting of exposed exterior and interior structural steel, plumbing, mechanical and electrical work, except as indicated below.
 - 3. Paint exterior plaster where indicated on Drawings.
- C. Work Included:
 - 1. The intent and requirements of this section is that all work, items and surfaces which are normally painted and finished in a building of this type and quality, shall be so included in this contract, whether or not said work, item or surface is specifically called out and included in the schedules and notes on the drawings, or is, or is not, specifically mentioned in these specifications.
 - 2. All the requirements of Division Zero and Division One apply to this Section.
- D. The following general categories of work and items that are included under other sections, shall not be a part of this section:
 - 1. Shop prime painting of structural and miscellaneous iron or steel.
 - 2. Shop prime painting of hollow metal work.
 - 3. Shop finished work and items.
 - 4. Any drywall or plaster permanently concealed from view.
 - 5. Any factory finished equipment and other materials with a complete factory applied finish.
 - 6. Finish hardware except where primed for paint finish.
 - 7. Any glass, plastics, floor tiles and sheet vinyl coved or vinyl top set bases.
 - 8. Plumbing fixtures: Toilet room accessories.
 - 9. Lighting fixtures except as noted on drawings or specified.
 - 10. Any acoustical surfaces; unless otherwise specified.
- E. The Room Finish Schedules indicated on the drawings, indicates the location of interior room surfaces to be painted or finished. The schedule indications are general and do not necessarily define the detail requirements. Include all detailed refinements and further instructions as may be given for the required complete finishing of all spaces and rooms.

1.02 SUBSTITUTIONS

Substitutions will be considered per the Instructions to Bidders, Section 3.3 Substitutions.

1.03 SUBMITTALS

- A. Provide in accordance with the General Conditions.
 - 1. Materials List: Submit complete lists of materials proposed for use, giving the manufacturer's name, catalog number, and catalog cut for each item when applicable. When required, provide a list of paint and coating materials proposed for use, which equates such materials with the design-basis products specified.
- B. Samples: Submit, on 8-1/2 inch by 11 inch hardboard, samples of each color, gloss, texture and material selected by the Architect from standard colors available for the coatings required.
 - 1. For natural and stained finishes, provide sample on each type and quality of wood used on the project.
- C. Manufacturer's Instructions: Submit the manufacturer's current recommended methods of installation, including relevant limitations, safety and environmental cautions, application rates, and composition analysis.
- D. Closeout: Coating Maintenance Manual: Provide a S-W Custodian or similar coating maintenance manual including area summary with finish schedule, area detail designating location where each product/color/finish was used, product data pages, material safety data sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with applicable codes and regulations of governmental agencies having jurisdiction including those having jurisdiction over airborne emissions and industrial waste disposal. Where those requirements conflict with this Specification, comply with the more stringent provisions.

Regulatory changes may affect the formulation, availability, or use of specified coatings. Confirm availability of coatings to be used prior to job going out to bid and before start of painting project.

- 1. Comply with the current applicable regulations of the California Air Resources Board (CARB) and the South Coast Air Quality Management District (SCAQMD). Field Sample: When and as directed by the Architect, apply one complete coating system for each color, gloss and texture required. When approved, the sample panel areas will be deemed incorporated into the Work and will serve as the standards by which the subsequent Work of this Section will be judged.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Protection: Use all means necessary to protect the materials of this Section before, during, and after installation.
- B. Deliver materials to job site in new, original, and unopened containers bearing manufacturer's name and trade name. Store where directed in accordance with manufacturer's instructions.

1.06 PROJECT CONDITIONS

Do not apply exterior materials during fog, rain or mist, or when inclement weather is expected within the dry time specified by the manufacturer. No exterior or interior painting shall be done until the surfaces are thoroughly dry and cured. Do not apply paint when temperature is below 50° F. Avoid painting surfaces when exposed to direct sunlight.

PART 2 -- PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Sherwin-Williams. Architectural representative: John Dumesnil; Phone (619) 665-9341 or Email john.t.dumesnil@sherwin.com.
- B. Acceptable Manufacturers: Frazee Paint Company, Dunn Edwards, and Vista Paint.

2.02 MATERIALS

- A. Paints: Provide Ready-Mixed, except field catalyzed coatings. Pigments shall be fully ground maintaining soft paste consistency, capable of being readily and uniformly dispersed to complete homogeneous mixture. Paints shall have good flowing and brushing properties and be capable of drying or curing free of streaks and sags.
- B. Accessory Materials: Linseed oil, shellac, solvents, and other materials not specified but required to achieve required finishes shall be of high quality and approved by manufacturer.
- C. Colors shall be selected from color chip samples provided by manufacturer of paint system approved for use. Match approved samples for color, texture and coverage.

2.03 MIXES

Mix, prepare, and store painting and finishing materials in accordance with manufacturer's directions.

PART 3 -- EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed.
- B. Examine surfaces to be painted before beginning painting work. Work of other trades that has been left or installed in a condition not suitable to receive paint, stain, other specified finish shall be repaired or corrected by the applicable trade before painting. Painting of defective or unsuitable surface implies acceptance of the surfaces.
- C. Beware of a condition known as "critical lighting". This condition causes shadows that accentuate even the slightest surface variations. A pigmented sealer will provide tooth for succeeding decorative coating, but "does not" equalize smoothness or surface texture. Any corrective action to gypsum board/drywall must be done by the drywall contractor prior to decorating.
- D. Correct conditions detrimental to timely and proper completion of the Work.
- E. Do not proceed until unsatisfactory conditions are corrected.
- F. Beginning of installation means acceptance of conditions.

3.02 PROTECTION

- A. Protect previously installed work and materials, which may be affected by Work of this Section.
 - 1. Protect prefinished surfaces, lawns, shrubbery and adjacent surfaces against paint and damage.
 - 2. Furnish sufficient drop cloths, shields, and protective equipment to prevent spray or splatter from fouling surfaces not being painted.
 - 3. Protect surfaces, equipment, and fixtures from damage resulting from use of fixed, movable and hanging scaffolding, planking, and staging.

- B. Provide WET PAINT signs, barricades, and other devices required to protect newly finished surfaces. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.

3.03 PREPARATION

- A. Perform preparation and cleaning procedures in strict accordance with coating manufacturer's instructions for each substrate condition.
- B. Concrete and masonry surfaces shall be dry, clean, and free of dirt, efflorescence, encrustation, and other foreign matter. Glazed surfaces on concrete shall be roughened or etched to uniform texture.
- C. Ferrous metal shall be cleaned per SSPC-SP1. All welds, loosely adhered rust, and debris must be power tool cleaned per SSPC-SP3. Prime within 3 hours after preparation.
- D. Clean per SSPC-SP1 to remove greases and oils. Apply a test area, priming as required. Allow the coating to dry at least one week before testing. If adhesion is poor, power tool clean per SSPC-SP3 to remove these treatments.
- E. Remove dust, grit and foreign matter from wood surfaces. Sand surfaces and dust clean. Spot coat knots, pitch streaks, and sappy section with pigmented stain sealer when surfaces are to be painted. Fill nail holes, cracks and other defects after priming and spot prime repairs when fully cured.
- F. Remove hardware and accessories, machined surfaces, plates, lighting fixtures and similar items in place and not-to-be-finish painted, or provide surface-applied protection. Reinstall removed items upon completion of work in each area.
- G. Existing surfaces to be recoated shall be thoroughly cleaned and de-glossed by sanding or other means prior to painting. Patched and bare areas shall be spot primed with same primer as specified for new work.
- H. Thoroughly backpaint all surfaces of exterior and interior finish lumber and millwork, including doors and window frames, trim, cabinetwork, etc., which will be concealed after installation. Backpaint items to be painted or enameled with the priming coat. Use a clear sealer for backpriming where transparent finish is required.
- I. Bar and covered pipes, ducts, hangers, exposed steel and ironwork, and primed metal surfaces of equipment installed under mechanical and electrical work shall be cleaned prior to priming.
- J. Preparation of other surfaces shall be performed following specific recommendations of the coatings manufacturer.
- K. Bond breakers and curing agents must be removed and the surface cleaned before primers, sealers or finish paints can be applied.
- L. All drywall surfaces must be completely dry and dust free before painting. Skim coated drywall must be sealed with an alkyd based sealer or a waterborne sealer recommended by the paint manufacturer for this surface. Use the appropriate light or medium tack masking tape.

3.04 APPLICATION

- A. Apply painting and finishing materials in accordance with the manufacturer's submittals, as approved. Use applicators and techniques best suited for the material and surfaces to which applied.
 - 1. The number of coats specified is the minimum that shall be applied. Apply additional coats when undercoats, stains or other conditions show through final paint coat, until paint film is of uniform finish, color and appearance.
 - 2. All undercoats shall be tinted slightly to approximate the color of the finish coat.

- B. Apply each material at not less than the manufacturer's recommended spreading rate:
 - 1. Provide a total dry film thickness of not less than 1.2 mils for each required coat.
- C. Apply prime coat to surface, which is required to be painted or finished.
- D. Finish exterior doors on tops, bottoms, and edges same as exterior faces, after fitting.
- E. Sand lightly and dust clean between succeeding coats.

3.05 CLEANING, TOUCH-UP AND REFINISHING

- A. Carefully remove all spattering, spots and blemishes caused by work under this section from surfaces throughout the project.
- B. Upon completion of painting work remove all rubbish, paint cans, and accumulated materials resulting from work in each space or room. All areas shall be left in a clean, orderly condition.
- C. Runs, sags, misses, holidays, stains and other defects in the painted surfaces, including inadequate coverage and mil thickness shall be satisfactorily touched up, or refinished, or repainted as necessary.

3.06 FINISH SCHEDULE

- A. Apply the following finishes to the surfaces specified and/or as on the finish schedule on the Drawings. Apply all materials in accordance with manufacturer's instructions on properly prepared surfaces and foundation coats. All intermediate undercoats must be tinted to approximate the final color.

- 1. Architect will issue a color schedule prior to start of painting to designate the various colors and locations required for the work.

B. Exterior Systems:

- 1. Stucco & Plaster
 - Flat – 100% Acrylic
 - First Coat Epoxy Tilt-up Primer B42WW49
 - Second Coat A-100 Exterior Latex Flat A6 Series
 - Third Coat A-100 Exterior Latex Flat A6 Series

- 2. Concrete Tilt-Up
 - Flat – 100% Acrylic
 - First Coat Epoxy Tilt-up Primer B42WW49
 - Second Coat A-100 Exterior Latex Flat A6 Series
 - Third Coat A-100 Exterior Latex Flat A6 Series

- 3. Brick Masonry
 - Flat – 100% Acrylic
 - First Coat Epoxy Tilt-up Primer B42WW49
 - Second Coat A-100 Exterior Latex Flat A6 Series
 - Third Coat A-100 Exterior Latex Flat A6 Series

- 4. Concrete Block
 - a. Flat – 100% Acrylic
 - First Coat PrepRite Block Filler B25W25
 - Second Coat A-100 Exterior Latex Flat A6 Series
 - Third Coat A-100 Exterior Latex Flat A6 Series

 - b. Satin – 100% Acrylic
 - First Coat PrepRite Block Filler B25W25
 - Second Coat A-100 Exterior Latex Satin A82 Series

- | | | |
|----|--|--|
| | Third Coat | A-100 Exterior Latex Satin A82 Series |
| c. | Gloss – 100% Acrylic | |
| | First Coat | PrepRite Block Filler B25W25 |
| | Second Coat | A-100 Exterior Latex Gloss A8 Series |
| | Third Coat | A-100 Exterior Latex Gloss A8 Series |
| d. | High Gloss, High Performance – Acrylic/Urethane | |
| | First Coat | Heavy Duty Block Filler B42W46 |
| | Second Coat | Macropoxy 646-100 B58Series |
| | Third Coat | High Solids Polyurethane 100 B65 Series |
| 5. | Ferrous Metal | |
| a. | Flat – Acrylic | |
| | First Coat | ProCryl Universal Acrylic Metal Primer B66-310 |
| | Second Coat | A-100 Exterior Latex Flat A6 Series |
| | Third Coat | A-100 Exterior Latex Flat A6 Series |
| b. | Semi-Gloss – Acrylic | |
| | First Coat | ProCryl Universal Acrylic Metal Primer B66-310 |
| | Second Coat | Solo Acrylic Latex Semigloss A76 Series |
| | Third Coat | Solo Acrylic Latex Semigloss A76 Series |
| c. | Gloss – Acrylic | |
| | First Coat | ProCryl Universal Acrylic Metal Primer B66-310 |
| | Second Coat | Solo Acrylic Latex Gloss A77 Series |
| | Third Coat | Solo Acrylic Latex Gloss A77 Series |
| d. | Gloss – Rust Preventative Acrylic | |
| | First Coat | ProCryl Universal Acrylic Metal Primer B66-310 |
| | Second Coat | ProIndustrial Acrylic Gloss B66-600 Series |
| | Third Coat | ProIndustrial Acrylic Gloss B66-600 Series |
| e. | Gloss, Industrial High Performance – Inorganic Zinc/Epoxy/Acrylic | |
| | First Coat | ZincClad III HS-100 B69 Series |
| | Second Coat | Macropoxy 646-100 B58 Series |
| | Third Coat | ProIndustrial Acrylic Gloss B66-600 Series |
| f. | Matte, Industrial High Performance – Epoxy Primer/Epoxy/Acrylic
(VOC compliant in SCAQMD) | |
| | First Coat | Macropoxy 646-100 B58 Series |
| | Second Coat | Macropoxy 646-100 B58 Series |
| | Third Coat | ProIndustrial Acrylic Eg-shel B66-660 Series |
| g. | High Gloss, Industrial High Performance – Inorganic Zinc/Epoxy/Urethane
(VOC compliant in SCAQMD) | |
| | First Coat | ZincClad III HS-100 B69 Series |
| | Second Coat | Macropoxy 646-100 B58 Series |
| | Third Coat | High Solids Polyurethane 100 Gloss B65 Series |
| h. | High Gloss, Industrial High Performance – Epoxy Primer/Epoxy/Urethane
(VOC compliant in SCAQMD) | |
| | First Coat | Macropoxy 646-100 B58 Series |
| | Second Coat | High Solids Polyurethane 100 Gloss B65 Series |
| | Third Coat | High Solids Polyurethane 100 Gloss B65 Series |

6. Galvanized Metal
 - a. Flat – Acrylic

Pretreatment	GLL Clean n Etch
First Coat	ProCryl Universal Acrylic Metal Primer B66-310
Second Coat	A-100 Exterior Latex Flat A6 Series
Third Coat	A-100 Exterior Latex Flat A6 Series
 - b. Semi-Gloss – Acrylic

Pretreatment	GLL Clean n Etch
First Coat	ProCryl Universal Acrylic Metal Primer B66-310
Second Coat	Solo Acrylic Latex Semigloss A76 Series
Third Coat	Solo Acrylic Latex Semigloss A76 Series
 - c. Gloss – Acrylic

Pretreatment	GLL Clean n Etch
First Coat	ProCryl Universal Acrylic Metal Primer B66-310
Second Coat	Solo Acrylic Latex Gloss A77 Series
Third Coat	Solo Acrylic Latex Gloss A77 Series
 - d. Gloss – Rust Preventative Acrylic

First Coat	ProCryl Universal Acrylic Metal Primer B66-310
Second Coat	ProIndustrial Acrylic Gloss B66-600 Series
Third Coat	ProIndustrial Acrylic Gloss B66-600 Series
 - e. Matte, Industrial High Performance – Epoxy Primer/Acrylic
(VOC compliant in SCAQMD)

First Coat	Macropoxy 646-100 B58 Series
Second Coat	ProIndustrial Acrylic Eg-shel B66-660
Third Coat	ProIndustrial Acrylic Eg-shel B66-660
 - f. High Gloss, Industrial High Performance – Epoxy Primer/Urethane

First Coat	Macropoxy 646-100 B58 Series
Second Coat	High Solids Polyurethane 100 Gloss B65 Series
Third Coat	High Solids Polyurethane 100 Gloss B65 Series
7. Wood – Paint Finish
 - a. Semi-Gloss – Acrylic

First Coat	PrepRite ProBlock Primer B51W8020
Second Coat	Solo Acrylic Latex Semigloss A76 Series
Third Coat	Solo Acrylic Latex Semigloss A76 Series
 - b. Gloss – Acrylic

First Coat	PrepRite ProBlock Primer B51W8020
Second Coat	Solo Acrylic Latex Gloss A77 Series
Third Coat	Solo Acrylic Latex Gloss A77 Series
8. Wood – Stain Finish – Opaque:

Two Coats	AcryStain Water-based Solid Stain CK6688
-----------	--
9. Wood – Stain Finish – Semi-Transparent:

One Coat	WoodScapes Ext Semi-transparent Stain A15T
----------	--

C. Interior Systems:

1. Gypsum Board
 - a. Flat – Acrylic

- | | |
|-------------|-------------------------------------|
| First Coat | ProMar 400 Zero VOC Primer B28W4600 |
| Second Coat | ProMar 200 Zero VOC Flat B30-2600 |
| Third Coat | ProMar 200 Zero VOC Flat B30-2600 |
- b. Low Sheen – Acrylic
- | | |
|-------------|--|
| First Coat | ProMar 400 Zero VOC Primer B28W4600 |
| Second Coat | ProMar 200 Zero VOC Low Sheen B24-2600 |
| Third Coat | ProMar 200 Zero VOC Low Sheen B24-2600 |
- c. Eggshell – Acrylic
- | | |
|-------------|--------------------------------------|
| First Coat | ProMar 400 Zero VOC Primer B28W4600 |
| Second Coat | ProMar 200 Zero VOC Eg-shel B20-2600 |
| Third Coat | ProMar 200 Zero VOC Eg-shel B20-2600 |
- d. Semi-Gloss - Acrylic
- | | |
|-------------|--|
| First Coat | ProMar 400 Zero VOC Primer B28W4600 |
| Second Coat | ProMar 200 Zero VOC Semigloss B31-2600 |
| Third Coat | ProMar 200 Zero VOC Semigloss B31-2600 |
- e. Gloss – Acrylic
- | | |
|-------------|--|
| First Coat | ProMar 400 Zero VOC Primer B28W4600 |
| Second Coat | Sologloss Acrylic Latex Gloss A77 Series |
| Third Coat | Sologloss Acrylic Latex Gloss A77 Series |
- f. Gloss– Industrial High Performance – Waterborne Epoxy
- | | |
|-------------|-------------------------------------|
| First Coat | ProMar 200 Zero VOC Primer B28W2600 |
| Second Coat | WB Catalyzed Epoxy Gloss B73 Series |
| Third Coat | WB Catalyzed Epoxy Gloss B73 Series |
- g. High Gloss – Industrial High Performance – Waterborne Epoxy/Urethane
- | | |
|-------------|---|
| First Coat | Macropoxy 646-100 B58 Series |
| Second Coat | High Solids Polyurethane 100 Gloss B65 Series |
| Third Coat | High Solids Polyurethane 100 Gloss B65 Series |
2. Concrete & Plaster:
- a. Flat – Acrylic Copolymer
- | | |
|-------------|-----------------------------------|
| First Coat | Epoxy Masonry Tilt Primer B42WW49 |
| Second Coat | ProMar 200 Zero VOC Flat B30-2600 |
| Third Coat | ProMar 200 Zero VOC Flat B30-2600 |
- b. Low Sheen – Acrylic Copolymer
- | | |
|-------------|--|
| First Coat | Epoxy Masonry Tilt Primer B42WW49 |
| Second Coat | ProMar 200 Zero VOC Low Sheen B24-2600 |
| Third Coat | ProMar 200 Zero VOC Low Sheen B24-2600 |
- c. Eggshell –Acrylic Copolymer
- | | |
|-------------|--------------------------------------|
| First Coat | Epoxy Masonry Tilt Primer B42WW49 |
| Second Coat | ProMar 200 Zero VOC Eg-shel B20-2600 |
| Third Coat | ProMar 200 Zero VOC Eg-shel B20-2600 |
- d. Semi-Gloss –Acrylic Copolymer
- | | |
|-------------|--|
| First Coat | Epoxy Masonry Tilt Primer B42WW49 |
| Second Coat | ProMar 200 Zero VOC Semigloss B31-2600 |
| Third Coat | ProMar 200 Zero VOC Semigloss B31-2600 |
- e. Gloss – 100% Acrylic

- | | | |
|--|-------------|--|
| | First Coat | Epoxy Masonry Tilt Primer B42WW49 |
| | Second Coat | Sologloss Acrylic Latex Gloss A77 Series |
| | Third Coat | Sologloss Acrylic Latex Gloss A77 Series |
- f. Gloss – Industrial High Performance - Waterborne Epoxy
- | | | |
|--|-------------|-------------------------------------|
| | First Coat | Epoxy Masonry Tilt Primer B42WW49 |
| | Second Coat | WB Catalyzed Epoxy Gloss B73 Series |
| | Third Coat | WB Catalyzed Epoxy Gloss B73 Series |
- g. High Gloss- Industrial High Performance - Epoxy/Urethane
- | | | |
|--|-------------|---|
| | First Coat | Macropoxy 646-100 B58 Series |
| | Second Coat | High Solids Polyurethane 100 Gloss B65 Series |
| | Third Coat | High Solids Polyurethane 100 Gloss B65 Series |
3. Brick
- a. Flat – Acrylic Copolymer
- | | | |
|--|-------------|-----------------------------------|
| | First Coat | Epoxy Masonry Tilt Primer B42WW49 |
| | Second Coat | ProMar 200 Zero VOC Flat B30-2600 |
| | Third Coat | ProMar 200 Zero VOC Flat B30-2600 |
- b. Low Sheen – Acrylic Copolymer
- | | | |
|--|-------------|--|
| | First Coat | Epoxy Masonry Tilt Primer B42WW49 |
| | Second Coat | ProMar 200 Zero VOC Low Sheen B24-2600 |
| | Third Coat | ProMar 200 Zero VOC Low Sheen B24-2600 |
- c. Eggshell –Acrylic Copolymer
- | | | |
|--|-------------|--------------------------------------|
| | First Coat | Epoxy Masonry Tilt Primer B42WW49 |
| | Second Coat | ProMar 200 Zero VOC Eg-shel B20-2600 |
| | Third Coat | ProMar 200 Zero VOC Eg-shel B20-2600 |
- d. Semi-Gloss –Acrylic Copolymer
- | | | |
|--|-------------|--|
| | First Coat | Epoxy Masonry Tilt Primer B42WW49 |
| | Second Coat | ProMar 200 Zero VOC Semigloss B31-2600 |
| | Third Coat | ProMar 200 Zero VOC Semigloss B31-2600 |
- e. Gloss – 100% Acrylic
- | | | |
|--|-------------|--|
| | First Coat | Epoxy Masonry Tilt Primer B42WW49 |
| | Second Coat | Sologloss Acrylic Latex Gloss A77 Series |
| | Third Coat | Sologloss Acrylic Latex Gloss A77 Series |
- f. Gloss – Industrial High Performance - Waterborne Epoxy
- | | | |
|--|-------------|-------------------------------------|
| | First Coat | Epoxy Masonry Tilt Primer B42WW49 |
| | Second Coat | WB Catalyzed Epoxy Gloss B73 Series |
| | Third Coat | WB Catalyzed Epoxy Gloss B73 Series |
- g. High Gloss- Industrial High Performance - Epoxy/Urethane
- | | | |
|--|-------------|---|
| | First Coat | Macropoxy 646-100 B58 Series |
| | Second Coat | High Solids Polyurethane 100 Gloss B65 Series |
| | Third Coat | High Solids Polyurethane 100 Gloss B65 Series |
4. Concrete Block
- a. Flat – Acrylic Copolymer
- | | | |
|--|-------------|-----------------------------------|
| | First Coat | PrepRite Block Filler B25W25 |
| | Second Coat | ProMar 200 Zero VOC Flat B30-2600 |
| | Third Coat | ProMar 200 Zero VOC Flat B30-2600 |

- b. Low Sheen – Acrylic Copolymer
 - First Coat PrepRite Block Filler B25W25
 - Second Coat ProMar 200 Zero VOC Low Sheen B24-2600
 - Third Coat ProMar 200 Zero VOC Low Sheen B24-2600

- c. Eggshell –Acrylic Copolymer
 - First Coat PrepRite Block Filler B25W25
 - Second Coat ProMar 200 Zero VOC Eg-shel B20-2600
 - Third Coat ProMar 200 Zero VOC Eg-shel B20-2600

- d. Semi-Gloss –Acrylic Copolymer
 - First Coat PrepRite Block Filler B25W25
 - Second Coat ProMar 200 Zero VOC Semigloss B31-2600
 - Third Coat ProMar 200 Zero VOC Semigloss B31-2600

- e. Gloss – 100% Acrylic
 - First Coat PrepRite Block Filler B25W25
 - Second Coat Sologloss Acrylic Latex Gloss A77 Series
 - Third Coat Sologloss Acrylic Latex Gloss A77 Series

- f. Gloss – Industrial High Performance - Waterborne Epoxy
 - First Coat PrepRite Block Filler B25W25
 - Second Coat WB Catalyzed Epoxy Gloss B73 Series
 - Third Coat WB Catalyzed Epoxy Gloss B73 Series

- g. High Gloss- Industrial High Performance – Acrylic/Urethane
 - First Coat Heavy Duty Block Filler B42W46
 - Second Coat Macropoxy 646-100 B58 Series
 - Third Coat High Solids Polyurethane 100 Gloss B65 Series

- 5. Ferrous Metal
 - a. Flat – Acrylic Copolymer
 - First Coat ProCryl Universal Acrylic Metal Primer B66-310
 - Second Coat ProMar 200 Zero VOC Flat B30-2600
 - Third Coat ProMar 200 Zero VOC Flat B30-2600

 - b. Low Sheen –Acrylic Copolymer
 - First Coat ProCryl Universal Acrylic Metal Primer B66-310
 - Second Coat ProMar 200 Zero VOC Low Sheen B24-2600
 - Third Coat ProMar 200 Zero VOC Low Sheen B24-2600

 - c. Eggshell –Acrylic Copolymer
 - First Coat ProCryl Universal Acrylic Metal Primer B66-310
 - Second Coat ProMar 200 Zero VOC Eg-shel B20-2600
 - Third Coat ProMar 200 Zero VOC Eg-shel B20-2600

 - d. Semi-Gloss – Acylic Primer/ Acrylic Copolymer
 - First Coat ProCryl Universal Acrylic Metal Primer B66-310
 - Second Coat ProMar 200 Zero VOC Semigloss B31-2600
 - Third Coat ProMar 200 Zero VOC Semigloss B31-2600

 - e. Semi-Gloss –Rust Preventative Acrylic
 - First Coat ProCryl Universal Acrylic Metal Primer B66-310
 - Second Coat ProIndustrial Acrylic SemiGloss
 - Third Coat ProIndustrial Acrylic SemiGloss

- f. Gloss – Acrylic Primer /100% Acrylic
 - First Coat ProCryl Universal Acrylic Metal Primer B66-310
 - Second Coat Solo Acrylic Latex Gloss A77 Series
 - Third Coat Solo Acrylic Latex Gloss A77 Series
 - g. Gloss –Rust Preventative Acrylic
 - First Coat ProCryl Universal Acrylic Metal Primer B66-310
 - Second Coat ProIndustrial Acrylic Gloss
 - Third Coat ProIndustrial Acrylic Gloss
 - h. Gloss – Industrial High Performance - Waterborne Epoxy
 - First Coat ProCryl Universal Acrylic Metal Primer B66-310
 - Second Coat WB Catalyzed Epoxy Gloss B73 Series
 - Third Coat WB Catalyzed Epoxy Gloss B73 Series
 - i. High Gloss – Industrial High Performance - Epoxy/Urethane
 - First Coat Macropoxy 646-100 B58 Series
 - Second Coat High Solids Polyurethane 100 Gloss B65 Series
 - Third Coat High Solids Polyurethane 100 Gloss B65 Series
6. Wood – Paint Finish
- a. Flat – Acrylic Copolymer
 - First Coat PrepRite ProBlock Primer B51W8020
 - Second Coat ProMar 200 Zero VOC Flat B30-2600
 - Third Coat ProMar 200 Zero VOC Flat B30-2600
 - b. Low Sheen – Acrylic Copolymer
 - First Coat PrepRite ProBlock Primer B51W8020
 - Second Coat ProMar 200 Zero VOC Low Sheen B24-2600
 - Third Coat ProMar 200 Zero VOC Low Sheen B24-2600
 - c. Eggshell – Acrylic Copolymer
 - First Coat PrepRite ProBlock Primer B51W8020
 - Second Coat ProMar 200 Zero VOC Eg-shel B20-2600
 - Third Coat ProMar 200 Zero VOC Eg-shel B20-2600
 - d. Semi-Gloss – 100% Acrylic
 - First Coat PrepRite ProBlock Primer B51W20
 - Second Coat Solo Acrylic Latex Semigloss A76 Series
 - Third Coat Solo Acrylic Latex Semigloss A76 Series
 - e. Semi-Gloss – Alkyd – Class A Fire Retardant
 - First Coat Please contact your Sherwin-Williams representative for
 - Second Coat fire retardant wood finish information.
 - Third Coat
 - f. Gloss – 100% Acrylic
 - First Coat PrepRite ProBlock Primer B51W8020
 - Second Coat Solo Acrylic Latex Gloss A77 Series
 - Third Coat Solo Acrylic Latex Gloss A77 Series
7. Wood – Stain & Lacquer
- (VOC Rule in SCAQMD is 275 g/L for field-applied coatings)**
- a. Flat
 - First Coat SherWood BAC Wiping Stain S64
 - Filler Jasco Paste Wood Filler

- | | |
|---------------|---|
| Second Coat | KemAqua Lacquer Sanding Sealer T65F520 |
| Third Coat | KemAqua Dull Rub Clear Lacquer T75F528 |
| Fourth Coat | KemAqua Dull Rub Clear Lacquer T75F528 |
| b. Semi-Gloss | |
| First Coat | SherWood BAC Wiping Stain S64 |
| Filler | Jasco Paste Wood Filler |
| Second Coat | KemAqua Lacquer Sanding Sealer T65F520 |
| Third Coat | KemAqua Semigloss Clear Lacquer T75F526 |
| Fourth Coat | KemAqua Semigloss Clear Lacquer T75F526 |
| c. Gloss | |
| First Coat | SherWood BAC Wiping Stain S64 |
| Filler | Jasco Paste Wood Filler |
| Second Coat | KemAqua Lacquer Sanding Sealer T65F520 |
| Third Coat | KemAqua Gloss Clear Lacquer T75C525 |
| Fourth Coat | KemAqua Gloss Clear Lacquer T75C525 |

*****END OF SECTION*****

SECTION 09 96 23

ANTI- GRAFFITI PROTECTION WATER REPELLENTS PROTECTION

PART 1 -- GENERAL

1.01 SUMMARY

Division 0, Contract requirements and Division 1, General Conditions apply to this section.

1.02 SECTION INCLUDES

- A. Application of water repellents to protect horizontal masonry & concrete garden wall surfaces.

1.03 REFERENCES

- A. ASTM D 2369-92 - Test Methods for Volatile Content of Coatings.
- B. ASTM D 3960-93 - Practice for Volatile Organic Compound (VOC) Content of Paints and Related Coatings.
- C. Federal Specification SS-W-110C - Water Repellent, Colorless Silicon, Resin Base.

1.04 SUBSTITUTIONS

Substitutions will be considered per the Instructions to Bidders, Section 3.3 Substitutions.

1.05 SUBMITTALS

- A. In accordance with Article 3 of the General Conditions.
- B. Product Data: Submit manufacturer's product data sheets on all products to be used for the work. Submit description for protection of surrounding areas and nonmasonry surfaces, surface preparation, application, and final cleaning.
- C. Applicator Qualifications: Submit qualifications of applicator.
 - 1. Certification stating applicator is experienced in the application of the specified products.
 - 2. List of recently completed water repellent projects, including project name and location, names of owner and architect, and description of products used, substrates, applicable local environmental regulations, and application procedures.
- D. Environmental Regulations: Submit applicable local environmental regulations.

1.06 QUALITY ASSURANCE

- A. Applicator Qualifications:
 - 1. Experienced in the application of the specified products.
 - 2. Employs persons trained for the application of the specified products.
- B. Pre-Application Meeting: Convene a pre-application meeting two weeks before the start of application of water repellents. Require attendance of parties directly affecting work of this section, including the Contractor, Architect, applicator, and a PROSOCO representative. Review environmental regulations, test panel procedures, protection of surrounding areas and nonmasonry surfaces, surface preparation, application, field quality control, final cleaning, and coordination with other work.

1.07 ENVIRONMENTAL REGULATIONS

Comply with applicable federal, state, and local environmental regulations.

1.08 TEST PANELS

- A. Before full scale application, review manufacturer's product data sheets to determine the suitability of each product for the specific surfaces. Apply each water repellent to test panels to determine number of applications, coverage rates, compatibility, effectiveness, surface preparation, application procedures, and desired results.
- B. Apply water repellents to test panels in accordance with manufacturer's written instructions. Allow 48 hours or until test panels are thoroughly dry before evaluating final appearance and results. Do not begin full scale application until test panels are inspected and approved by the Architect.
- C. Test Panel Requirements:
 - 1. Size: Minimum 4 feet by 4 feet each.
 - 2. Locations: As determined by the Architect.
 - 3. Number: As required to completely test each water repellent with each type of substrate to be protected.
- D. Retain and protect test panels approved by the Architect in undisturbed condition during the work of this section, to be used as a standard for judging the water repellent work.

1.09 DELIVERY, STORAGE, AND HANDLING

Delivery: Deliver materials to site in manufacturer's original, unopened container and packaging, with labels clearly identifying product name and manufacturer.

Storage and Handling: Store containers upright in a cool, dry, well ventilated place, out of the sun. Store away from all other chemicals and potential sources of contamination. Keep lights, fire, sparks, and heat away from containers. Do not drop containers or slide across sharp objects. Keep containers tightly closed when not in use. Store and handle materials in accordance with manufacturer's written instructions.

1.010 PROJECT CONDITIONS

- A. Temperature Limitations:
 - 1. Do not apply at surface and air temperatures below 40°F or above 95°F, unless otherwise indicated by manufacturer's written instructions.
 - 2. Do not apply when surface and air temperatures are not expected to remain above 40°F for a minimum of 8 hours after application, unless otherwise indicated by manufacturer's written instructions.
- B. Do not apply under windy conditions such that water repellent may be blown to surfaces not intended.
- C. Do not apply to frozen substrate. Allow adequate time for substrate to thaw, if freezing conditions exist before application.
- D. Do not apply earlier than 24 hours after rain or if rain is predicted for a period of 8 hours after application, unless otherwise indicated by manufacturer's written instructions.

PART 2 -- PRODUCTS

2.01 MANUFACTURER

2.02 WATER REPELLENTS / NON-SACRIFICIAL GRAFFITI PROTECTION

- A. "Weather Seal Blok-Guard & Graffiti Control II" is a clear-drying , water-based silicone emulsion formulated to weatherproof masonry and concrete and protect from repeated graffiti attacks without altering natural appearance.
- B. Active Solids: 6%
Form: Milky liquid
Specific Gravity: 1.0
Flash Point: >212 degrees F

PART 3 -- EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed.
- B. Correct conditions detrimental to timely and proper completion of the Work.
- C. Do not proceed until unsatisfactory conditions are corrected.
- D. Beginning of installation means acceptance of conditions.
- E. Verify by examination that brick masonry and concrete surfaces are acceptable to receive the specified water repellents. Notify the Architect if surfaces are not acceptable to receive the specified products.

3.02 PROTECTION

- A. Protect surrounding areas, landscaping, building occupants, pedestrians, vehicles, and nonmasonry surfaces during the work from contact with water repellents, masonry or concrete cleaners if used, residues, rinse water, fumes, wastes, and effluents in accordance with manufacturer's written instructions.
- B. Apply water repellents after protection of windows.
- C. Divert and protect pedestrian and auto traffic.

3.03 SURFACE PREPARATION

- A. Clean all dirt, dust, oil, grease, and other contaminants from surfaces that interfere with penetration or performance of water repellents. Use appropriate masonry or concrete cleaners approved by the water repellent manufacturer where necessary. Rinse thoroughly using pressure water spray to remove cleaner residues. Allow surfaces to dry completely before application of water repellents.
- B. Repair, patch, and fill all cracks, voids, defects, and damaged areas in surface as approved by the Architect. Allow repair materials to cure completely before application of water repellents.
- C. Apply specified sealants and caulking and allow to cure completely before application of water repellents.
- D. Seal all open joints.
- E. Allow new brick masonry and concrete construction and repointed surfaces to cure for minimum of 28 days before application of water repellents.

3.04 APPLICATION

- A. Apply water repellents to substrates in accordance with manufacturer's written instructions, environmental regulations, and application procedures determined from test panel results approved by the Architect.
- B. Apply to clean, dry, cured, and properly prepared surfaces approved by the Architect.
- C. Consult manufacturer's written instructions for information on application equipment to be used and precautions to be taken with the specified products.
- D. Do not dilute or alter water repellents. Apply as packaged.
- E. Do not apply to below-grade surfaces.
- F. Do not apply to asphalt or other non-masonry materials.
- G. Do not apply to painted surfaces.
- H. Do not apply to compensate for structural or material defects in substrates.
- I. Avoid overspray, wind drift, and splash of water repellents.

3.05 FIELD QUALITY CONTROL

- A. Inspection: Inspect the water repellent work with the Contractor, Architect, applicator, and ProSoCo representative, and compare with test panel results approved by the Architect. Determine if the substrates are suitably protected by the water repellents.
- B. Manufacturer's Field Services: Provide the services of a manufacturer's authorized field representative to verify specified products are used, and protection, surface preparation, and application of water repellents are in accordance with the manufacturer's written instructions and the test panel results approved by the Architect.

3.06 FINAL CLEANING

- A. Clean site of all unused water repellents, residues, rinse water, wastes, and effluents in accordance with environmental regulations.
- B. Remove and dispose of all materials used to protect surrounding areas and non-masonry surfaces, following completion of the work of this section.
- C. Repair, restore, or replace to the satisfaction of the Architect, all materials, landscaping, and non-masonry surfaces damaged by exposure to water repellents.

*****END OF SECTION*****

SECTION 10 14 00

IDENTIFYING DEVICES

PART 1 -- GENERAL

1.01 GENERAL REQUIREMENTS

Division 0, Contract Requirements and Division 1, General Requirements apply to this Section.

1.02 SECTION INCLUDES

- A. Molded plastic signs.
- B. Aluminum free-standing signs.
- C. Aluminum channel letters.
- D. Dedication Plaque

1.03 SUBMITTALS

- A. Submit the following:
 - 1. samples illustrating full size sample sign, of type, style and color specified including method of attachment.
 - 2. manufacturer's installation instructions.

1.04 SUBSTITUTIONS

Substitutions will be considered per the Instructions to Bidders, Section 3.3 Substitutions.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Comply with the requirements of Section 01 66 00.
- B. Package signs, labeled in name groups.
- C. Store adhesive tape at ambient room temperatures.

1.06 ENVIRONMENTAL REQUIREMENTS

Do not install signs when ambient temperature is below 70 degrees F. Maintain this minimum during and after installation of signs.

PART 2 -- PRODUCTS

2.01 MATERIALS – EXTERIOR BUILDING SIGNAGE

- A. Basis of Design: A.R.K. Ramos Architectural Signage Systems; Oklahoma City, OK 73109; Toll Free 1-800-725-7266; Fax 405-232-8516.
- B. Material: Aluminum Channel Letter
- C. Letters and/or Numbers – Font/Size/Finish/Color: as indicated on the Drawings.
- D. Brackets: PPM-1 bracket sleeved stud.
 - 1. Set in adhesive in masonry.
 - 2. Attach to support in framed wall.

2.02 MATERIALS – ROOM IDENTIFICATION SIGNAGE

- A. 1/8" thick ES Plastic. Color to be selected by Architect.
- B. Graphics to be vinyl die-cut. 3/4" Helvetica Medium, Caps.

- C. Adhesive mounting.
- D. All signs to have 1/2" Radius corners.
- E. See Schedule for types.
- F. All signs installed on glass shall have a full size backing plate adhered to the opposite side of the glass of the same color as the sign.

2.03 MATERIALS – OTHER INTERIOR SIGNAGE

- A. Products: See Drawings for types.
- B. Material: 1/8" thick ES Plastic.
- C. Size and color as indicated on the drawings.
- D. All signs to have 1/2" Radius corners.
- E. Graphics: to be vinyl die-cut.
- F. Text, Font, size and color as indicated on the drawings.
- G. Mounting: Adhesive mounting.

2.04 MATERIALS -- ALUMINUM FREE-STANDING SIGN

- A. See Drawings for types and locations.
- B. Provide 1/8" thick aluminum sign, on 1-3/4" x 1-3/4" x 1/8" x 7' post; black duranodic aluminum tubing and sign.
- C. Letters are to be vinyl die-cut. Test shall conform to access requirements of the CBC.
- D. Color to be black anodized with white lettering.
- E. Signs are to be sleeve mounted in concrete footings.

2.05 DEDICATION PLAQUE

See Drawings for: location at Flagpole, size, text, and material details.

2.06 ACCESSORIES

- A. Mounting Hardware: Chrome screws; base sleeve and studs per manufacturer's recommendations.
- B. Tape Mount: Double sided tape, permanent adhesive.
- C. Adhesive: Silastic adhesive as recommended by manufacturer.

PART 3 -- EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed.
- B. Verify adequate support for Building Signs. Coordinate footings with other trades.
- C. Correct conditions detrimental to timely and proper completion of the Work.
- D. Do not proceed until unsatisfactory conditions are corrected.
- E. Beginning of installation means acceptance of conditions.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install signs after doors and surfaces are finished, in locations indicated.

1. Furnish and install all anchorage devices required to install the item and its appurtenances complete. Provide anchorage in ample time when required to be built in by other trades.
 2. All wall-mounted items shall be securely fastened to solid backing or blocking.
- C. Center plastic signs on doors, level.
- D. Anchor all components firmly into position for long life under hard use.
- E. Clean and polish.

*****END OF SECTION*****

THIS PAGE IS INTENTIONALLY BLANK

SECTION 11 15 50

SOLID PLASTIC TOILET PARTITIONS

PART 1 -- GENERAL

1.01 GENERAL REQUIREMENTS

Division 0, Contract Requirements and Division 1, General Conditions apply to this section.

1.02 SUMMARY

A. Section Includes:

1. Plastic toilet compartment partitions for following applications:
 - a. Toilet enclosures.
 - b. Privacy screens.
 - c. Urinal screens.

B. Related Requirements:

1. Division 03 Section "Cast in Place Concrete" for compartment anchorage to concrete substrates.
2. Division 04 Section "Unit Masonry" for compartment anchorage to masonry substrates.
3. Division 05 Section "Metal Fabrications" for miscellaneous structural and support metal components required to secure compartments.
4. Division 06 Section "Rough Carpentry" for compartment anchorage to frame walls.

1.03 REFERENCES

A. ASTM International (ASTM):

1. ASTM A 240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
2. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
3. ASTM A 743/A 743M - Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application.
4. ASTM B 86 - Standard Specification for Zinc and Zinc-Aluminum (ZA) Alloy Foundry and Die Castings.
5. ASTM B 221 - Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
6. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

B. International Code Council (ICC)/American National Standards Institute (ANSI):

1. ICC/ANSI A117.1 - Accessible and Usable Buildings and Facilities, as applicable to toilet compartments designated as accessible.

C. United States Department of Justice:

1. ADA - Americans with Disabilities Act, Excerpt from 28 CFR Part 36 - ADA Standards for Accessible Design.

D. GREENGUARD Environmental Institute (GREENGUARD):

1. GREENGUARD certified low emitting products.

1.04 SUBSTITUTIONS

Substitutions will be considered per the Instructions to Bidders, Section 3.3 Substitutions.

1.05 ACTION SUBMITTALS

- A. Provide in accordance with Article 3 of the General Conditions.
- B. Product Data: Manufacturer's data sheets for each type of product indicated. Include fabrication details, description of materials and finishes.
 1. Product Test Reports: When requested by Architect, submit documentation by qualified independent testing agency indicating compliance of products with requirements.
- C. Shop Drawings: Include overall product dimensions, floor plan, elevations, sections, details, and attachments to other work. Include choice of options with details.
- D. Samples for Verification: Furnish physical sample of material in selected color.

Size: 2 by 2 inch (52 by 52 mm) minimum, in type of finish specified.

1.06 INFORMATIONAL SUBMITTALS

Warranty: Sample of special warranty.

1.07 CLOSEOUT SUBMITTALS

Maintenance and cleaning instructions.

1.08 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Approved manufacturer listed in this section, with minimum [5] years' experience in the manufacture of toilet compartments.
- B. Manufacturer Qualifications: Approved manufacturer listed in this section, with minimum [5] years' experience in the manufacture of toilet compartments. Manufacturers seeking approval must submit the following in accordance with Instructions to Bidders and Division 01 requirements:
 1. Product data, including test data from qualified independent testing agency indicating compliance with requirements.
 2. Samples of each component of product specified.
 3. List of successful installations of similar products available for evaluation by Architect.
- C. Installers Qualifications: Experienced Installer regularly engaged in installation of toilet compartments for minimum 3 years.
- D. Source Limitations: Obtain toilet compartment components and accessories from single manufacturer.
- E. Accessibility Requirements: Comply with requirements of ICC/ANSI 117.1, and with requirements of authorities having jurisdiction.
- F. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 1. Flame-Spread Index: Not greater than [75 - Class B] [200 - Class C].
 2. Smoke-Developed Index: 450.

G. Indoor Environmental Quality Certification: Provide certificate indicated that products have been certified under the following programs, or a comparable certification acceptable to Owner:

1. GREENGUARD Indoor Air Quality Certified.
2. GREENGUARD Certified for Children and Schools.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver toilet compartments to site until building is enclosed and HVAC systems are in operation.

1. Deliver toilet compartments in manufacturer's original packaging.
2. Store in an upright condition.

1.10 WARRANTY

A. Special Manufacturer's Warranty: Provide manufacturer's standard form in which manufacturer agrees to repair or replace products that fail in materials or workmanship during the following period after substantial completion:

1. Plastic Toilet Partitions: Against corrosion, breakage, and delamination: 15 years.

PART 2 -- PRODUCTS

2.01 MANUFACTURERS

Basis-of-Design Manufacturer: Subject to compliance with requirements, provide products of Bradley Corporation, Mills Metals Division, Menomonee Falls, WI 53051. Contact Information: (800)272-3539, fax (262)251-5817; Email info@BradleyCorp.com; Website www.bradleycorp.com.

2.02 MATERIALS

A. Plastic Panels: High density polyethylene (HDPE) suitable for exposed applications, waterproof, non-absorbent, and graffiti-resistant smooth surface, [Class C] [Class B].

1. Provide panels with minimum 30 percent pre-consumer recycled content.
- 10 Provide panels with 100 percent post-consumer recycled content.

B. Zinc Aluminum Magnesium and Copper Alloy (Zamac): ASTM B 86.

C. Stainless Steel Sheet: ASTM A 240 or A 666, 300 series.

D. Stainless Steel Castings: ASTM A 743/A 743M.

E. Aluminum: ASTM B 221.

2.03 PLASTIC TOILET COMPARTMENTS

A. Toilet Compartment Type:

1. Overhead braced.
 - a. Basis of Design: Bradley, Mills Partitions, Sentinel, Series 400.

B. Privacy Screen Type:

1. Floor and ceiling anchored.
 - a. Basis of Design: Bradley, Mills Partitions, Floor to Ceiling, Series 700.

C. Urinal Screen Style:

1. Wall hung with brackets:
 - a. Basis of Design: Bradley, Mills Partitions, Model No. 4.

- D. Door, Panel, and Pilaster Construction, General: HDPE, with formed edges with 3/16 inch (4.8 mm) radius.
 - 1. Provide exposed surfaces free of pitting, visible seams and fabrication marks, stains, or other imperfections.
 - 2. Provide aluminum heat sink at bottom edge of panels and doors.
 - 3. Provide no-sightline system.
- E. Door Construction: 1 inch (25 mm) thick.
 - 1. Provide pre-punched hole to permit field installation of ADA-compliant surface mounted slide latch.
- F. Panel Construction: 1 inch (25 mm) thick.
- G. Pilaster Construction: 1 inch (25 mm) thick.
- H. Headrail: Extruded anodized aluminum headrail with anti-grip profile. Provide clamps for attachment to pilaster and stainless steel brackets to secure to wall.
- I. Shoes: 3 inches (76 mm) high minimum, Type 304 stainless steel with No. 4 satin brushed finish. Provide concealed retainer clips to attach to pilaster.
- J. Urinal-Screen Construction: Matching toilet compartment panel construction
- K. Urinal-Screen Post: Manufacturer's standard post design of [material matching the thickness and construction of pilasters] [or] [1-3/4-inch- (44-mm-) square], aluminum tube with satin finish]; with shoe [and sleeve (cap)] matching that on the pilaster.
- L. Brackets (Fittings):
 - 1. Stirrup Type: Ear or U-brackets; [chrome-plated zamac] [stainless steel].
 - 2. Full-Height (Continuous) Type: Manufacturer's standard design; [aluminum] [stainless steel].
- M. Plastic Panel Finish: Manufacturer's standard impregnated finish, with [one color] [two colors] in each room.
 - 1. Color: As selected by Architect from manufacturer's full range.

2.04 HARDWARE

- A. Hardware, Standard Duty: Manufacturer's standard chrome-plated zamac castings, including corrosion-resistant, tamper-resistant fasteners:
 - 1. Hinges: Self-closing [integral, nylon, gravity-type] [continuous spring-loaded type] adjustable to hold doors open at any angle up to 90 degrees, with emergency access by lifting door.
 - 2. Latch and Keeper: Surface-mounted slide latch with flat rubber-faced combination door strike and keeper, with provision for emergency access, meeting requirements for accessibility at accessible compartments.
 - 3. Coat Hook: Combination hook and rubber-tipped stop, sized to prevent door from hitting compartment-mounted accessories. Provide wall bumper where door abuts wall. Provide formed L-shaped hook without stop at outswing doors.
 - 4. Door Pull: Standard unit on outside of inswing doors. Provide pulls on both sides of outswing doors.
- B. Hardware, Heavy Duty: Manufacturer's heavy-duty stainless steel castings, including stainless steel tamper-resistant fasteners:

1. Hinges: Self-closing [integral, nylon, gravity-type] [continuous spring-loaded type] adjustable to hold doors open at any angle up to 90 degrees, with emergency access by lifting door.
2. Latch and Keeper: Surface-mounted slide latch with flat rubber-faced combination door strike and keeper, with provision for emergency access, meeting requirements for accessibility at accessible compartments.
3. Coat Hook: Combination hook and rubber-tipped stop, sized to prevent door from hitting compartment-mounted accessories. Provide wall bumper where door abuts wall. Provide formed L-shaped hook without stop at outswing doors. Mount with stainless steel through-bolts.
4. Door Pull: Standard unit on outside of inswing doors. Provide pulls on both sides of outswing doors.

2.05 FABRICATION

- A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- B. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.
- C. Ceiling-Hung Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for connection to structural support above finished ceiling. Provide assemblies that support pilasters from structure without transmitting load to finished ceiling. Provide sleeves (caps) at tops of pilasters to conceal anchorage.
- D. Floor-and-Ceiling-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment at tops and bottoms of pilasters. Provide shoes and sleeves (caps) at pilasters to conceal anchorage.
- E. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment at tops and bottoms of posts. Provide caps, shoes, and covers at posts to conceal anchorage.
- F. Door Size and Swings: Unless otherwise indicated, provide 26-inch- (660-mm-) wide, in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide, out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments designated as accessible.

PART 3 -- EXECUTION

3.01 EXAMINATION

- A. Examine work area to verify that measurements, substrates, supports, and environmental conditions are in accordance with manufacturer's requirements to allow installation.
 1. Proceed with installation once conditions meet manufacturer's requirements.

3.02 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

- B. Install toilet partitions and screens in spaces with operating, temperature controlled HVAC systems. Shield partitions and screens from direct sunlight.
- C. Clearances: Install with clearances indicated on Drawings. Where clearances are not indicated, allow maximum 1/2 inch (13 mm) between pilasters and panels, and 1 inch (25 mm) between panels and walls.
- D. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than three brackets attached at midpoint and near top and bottom of panel. Locate wall brackets so holes for wall anchors occur in masonry or tile joints. Align brackets at pilasters with brackets at walls.

3.03 ADJUSTING

Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 15 degrees from closed position when unlatched. Set hinges on out-swinging doors [and doors in privacy screens] to return doors to fully closed position.

3.04 FINAL CLEANING

- A. Remove packaging and construction debris and legally dispose of off-site.
- B. Clean partition and screen surfaces with materials and cleansers in accordance with manufacturer's recommendations.

*****END OF SECTION*****

SECTION 10 41 00

KNOX BOXES

PART 1 -- GENERAL

1.01 GENERAL REQUIREMENTS

Division 0, Contract Requirements and Division 1, General Requirements apply to this Section.

1.02 SCOPE OF WORK

This Section describes the requirements for furnishing and installing lock boxes.

1.03 QUALITY ASSURANCE

Coordinate ordering lock boxes with local Fire District.

1.04 SUBSTITUTIONS

Substitutions will be considered per the Instructions to Bidders, Section 3.3 Substitutions.

1.05 SUBMITTALS

A. Provide in accordance with Article 3 of the General Conditions.

B. Product Data: Manufacturer's descriptive and technical data and installation details.

1.06 CLOSE-OUT: Comply with the requirements of Section 01 78 00 – Contract Closeout.

A. Reports: None required.

B. As-Builts: Comply with the requirements of Section 01 78 00 – Contract Closeout.

C. Operation and Maintenance Data: None required

D. Extra Materials: None required

E. Extended Warranty: Comply with the requirements of the General Condition Article 3.5.

PART 2 -- PRODUCTS

2.01 LOCK BOXES

A. Basis of Design: Knox Company

1. Construction: Heavy-duty, high security
2. Door: $\frac{5}{8}$ -inch solid steel with gasket
3. Size: 9½-inches high x 9½-inches wide x 5-inches deep
4. Mounting: Recessed
5. Finish: Aluminum Finish

B. Model:

1. Model #4400 at Doors
2. Model #3770 at Gates
3. Vehicular Gate Key Control Switch: Knox #3502

C. Fastenings: Non-ferrous, type to suit installation conditions

PART 3 -- EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed.
- B. Verify that specified items may be installed in accordance with the approved design.
- C. Correct conditions detrimental to timely and proper completion of the Work.
- D. Do not proceed until unsatisfactory conditions are corrected.
- E. Beginning of installation means acceptance of conditions.

3.02 INSTALLATION

- A. Install lock boxes at locations indicated in accordance with manufacturer's instructions.
- B. Securely fasten in place with sides plumb and level.
- C. Exposed surfaces shall be free from scratches, tool marks, and other damage and defects.

***** END OF SECTION *****

SECTION 10 44 00
FIRE PROTECTION SPECIALTIES

PART 1 -- GENERAL

1.01 GENERAL REQUIREMENTS

Division 0, Contract Requirements and Division 1, General Requirements apply to this Section.

1.02 SCOPE OF WORK

- A. Provide and install all Fire extinguishers and Cabinets as shown on the documents and as required by the local Fire Marshall.
- B. Accessories as required for a complete and proper project.

1.03 QUALITY ASSURANCE

- A. Conform to NFPA 10 requirements for extinguishers.
- B. Provide fire extinguishers, cabinets, and accessories by single manufacturer.

1.04 SUBMITTALS

- A. Submit the following:
 - 1. Physical dimensions, operational features, color and finish, wall-mounting brackets with mounted measurements, anchorage details, rough-in measurements, location, and details.
 - 2. Manufacturer's installation instructions.
 - 3. Manufacturer's operation and maintenance data.
 - 4. Include test, refill or recharge schedules, procedure, and re-certification requirements.

1.05 ENVIRONMENTAL REQUIREMENTS

Do not install extinguishers when ambient temperatures may cause freezing.

PART 2 -- PRODUCTS

2.01 BASIS OF DESIGN

- A. Larsen's Manufacturing Company, 7421 Commerce Lane, N.E. Minneapolis, MN 55432. Website: www.larsensmfg.com; Toll Free: 1-800-527-7367.
- B. Or Architect approved equal.

2.02 EXTINGUISHERS

Multi-Purpose Chemical Type: Larsen's Steel tank, Model MP 5, with pressure gage, and UL Rating 2A-10B:C or approved equal.

2.03 CABINETS

Typical Extinguisher Cabinet:

- A. Provide Larsen's 2409-5R Vertical Duo Panel cabinet.
- B. Primer finish.

2.04 ACCESSORIES

- A. Mounting Hardware: Appropriate to cabinet - see manufacturer's installation instructions.
- B. Provide other materials, not specifically described but required for a complete and proper

installation, as selected by the Contractor subject to the approval of the Architect.

2.05 FABRICATION

- A. Form body of cabinet with tight inside corners and seams.
- B. Pre-drill holes for anchorage.
- C. Form perimeter trim and door stiles by welding, filling, and grinding smooth.
- D. Hinge doors for 180 degree opening.
- E. Glaze doors with resilient channel gasket glazing.

2.06 FINISHES

- A. Extinguisher: Red enamel.
- B. Cabinet Trim and Door: Primed to be painted to match adjacent surface.
- C. Cabinet Interior: Enamel white.

PART 3 -- EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which work of this Section will be performed.
- B. Verify that rough openings for cabinet are correctly sized and located.
- C. Correct conditions detrimental to timely and proper completion of the Work.
- D. Do not proceed until unsatisfactory conditions are corrected.
- E. Beginning of installation means acceptance of conditions.

3.02 INSTALLATION

- A. Install cabinets plumb and level in wall openings so that there is 54 inches from finished floor to door handle.
- B. Secure rigidly in place in accordance with manufacturer's instructions.

***** END OF SECTION *****

SECTION 10 75 00

FLAGPOLES

PART 1 -- GENERAL

1.01 WORK INCLUDED

- A. Aluminum flagpoles.
- B. Ground mount.
- C. Halyards, accessories, and flag.

1.02 SYSTEM DESCRIPTION

- A. Type: Ground set, fixed type.
- B. Pole Design: Cone tapered
- C. Nominal Height: Per Construction Drawings
- D. Halyard: Internal type.

1.03 PERFORMANCE

Pole with Flag Flying: Resistant without permanent deformation, 90-miles/hr. wind velocity, non-resonant, safety design factor of 2.5.

1.04 QUALITY ASSURANCE

Design flagpole foundation, supports under direct supervision of a Professional Structural Engineer experienced in design of this work, registered in the state of California.

1.05 SUBSTITUTIONS

Substitutions will be considered per the Instructions to Bidders, Section 3.3 Substitutions.

1.06 SUBMITTALS

- A. Indicate on shop drawings, detailed dimensions, base attachment details, anchor requirements, and imposed loads.
- B. Provide product data on pole, accessories, and configurations.
- C. Submit manufacturer's installation instructions.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and protect products.
- B. Spiral wrap flagpole with protective covering and pack in protective shipping tubes or containers.
- C. Protect flagpole and accessories on site from damage or moisture.

PART 2 -- PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. The Flag Factory.
- B. Bartal International.

2.02 POLE MATERIALS

Aluminum: 6063 alloy, T6 temper. Dark bronze anodized.

2.03 COMPONENTS AND ACCESSORIES

- A. Finial Ball: Gold tone, 6-inch diameter.
- B. Truck Assembly: Cast aluminum or Stainless steel; revolving; stainless steel ball bearings, non-fouling.
- C. Flag(s): Provided by Owner.
- D. Halyard: 1/8-inch diameter stainless steel cable.

2.04 MOUNTING COMPONENTS

- A. Pole Base Attachment: Sleeve with base cover.
- B. Lightning Ground Rod and Cable: As recommended by manufacturer.

2.05 POLE FABRICATION

- A. Outside Butt Diameter: 6 inches.
- B. Outside Tip Diameter: 3-1/2 inches.
- C. Nominal Thickness: 188 inches.

PART 3 -- EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which work of this Section will be performed.
- B. Verify that concrete foundation is ready to receive work and dimensions are as indicated on shop drawings and instructed by the manufacturer.
- C. Correct conditions detrimental to timely and proper completion of the Work.
- D. Do not proceed until unsatisfactory conditions are corrected.
- E. Beginning of installation means acceptance conditions.

3.02 PREPARATION

Coat metal sleeve surfaces below grade and surfaces in contact with dissimilar materials with asphaltic paint.

3.03 INSTALLATION

- A. Install flagpole, base assembly, and fittings in accordance with manufacturer's instructions.
- B. Electrically ground flagpole installation.
- C. Install foundation plate and centering wedges for flagpoles base set in concrete base and fasten.

3.04 TOLERANCES

Maximum variation from plumb: One inch.

3.05 ADJUSTING AND CLEANING

- A. Clean surfaces.
- B. Adjust operating devices so that halyard and flag function smoothly.

***** END OF SECTION *****

SECTION 10 80 00

TOILET ACCESSORIES

PART 1 -- GENERAL

1.01 GENERAL REQUIREMENTS

Division 0, Contract Requirements and Division 1, General Requirements apply to this Section.

1.02 SUBMITTALS

- A. Provide, within 35 days of Notice to Proceed, product data on accessories describing size, finish, details of function, attachment methods.
- B. Submit shop drawings, manufacturer's literature and brochures, and catalog cuts, showing complete details of all manufactured and fabricated items. Do not purchase items until the shop drawings have been approved. See Section "Samples and Shop Drawings" for number and manner of submittals.

1.03 KEYING

Supply two (2) keys for each accessory to Owner. Master Key all accessories.

1.04 REGULATORY REQUIREMENTS

Conform to Title 24 for installing work in conformance with ANSI A117.1.

1.05 SEQUENCING AND SCHEDULING

Coordinate the work of this Section with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

PART 2 -- PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

As indicated on the Drawings.

2.02 MATERIALS

- A. Stainless Steel Sheet: ASTM A167, Type 304.
- B. Tubing: ASTM A269, stainless steel.
- C. Fasteners, Screws, and Bolts: Hot dip galvanized as recommended by manufacturer.
- D. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.03 PRODUCTS

As indicated on the Drawings.

2.04 FACTORY FINISHING

Stainless Steel: No. 4 satin luster finish.

PART 3 -- EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed.
- B. Verify that site conditions are ready to receive work and dimensions are as instructed by the manufacturer.
- C. Correct conditions detrimental to timely and proper completion of the Work.
- D. Do not proceed until unsatisfactory conditions are corrected.
- E. Beginning of installation means acceptance of conditions.

3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site at appropriate time for building-in.
- B. Provide complete information, diagrams, templates, and instructions for the installation of all items, in sufficient time so that all backing, blocking, framing and formwork can be properly installed, and so that the work of other trades will not be delayed.
- C. Verify exact location of accessories for installation.

3.03 INSTALLATION

- A. Install the work of this Section in strict accordance with the manufacturer's recommended installation procedures as approved by the Architect, anchoring all components firmly into position for long life under hard use.
 - 1. Furnish and install all anchorage devices required to install the item and its appurtenances complete. Provide anchorage in ample time when required to be built in by other trades.
 - 2. All wall-mounted items shall be securely fastened to solid backing or blocking.
- B. Install fixtures, accessories and items in accordance with manufacturer's instructions.
- C. Install plumb and level, securely and rigidly anchored to substrate.

***** END OF SECTION *****

SECTION 12 20 00

WINDOW TREATMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Manually operated sunscreen roller shades.
- B. Manually operated room-darkening shades.

1.02 RELATED SECTIONS

- A. Section 09 21 16 – Gypsum Board Systems: Coordination with gypsum board assemblies for installation of shade pockets, closures and related accessories.
- B. Section 09 51 00 – Acoustical Ceilings: Coordination with acoustical ceiling systems for installation of shade pockets, closures and related accessories.
- C. Division 16 – Electrical: Electric service for motor controls.

1.03 REFERENCES

- A. ASTM G 21, G 22, G 2180 – Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- B. NFPA 70 – National Electric Code.
- C. NFPA 701-99- Fire Tests for Flame-Resistant Textiles
- D. Lead Free: RoHS/Directive 2002/95/ED, US Consumer Product Safety Commission Section 101, ANSI/WCMA A100.1-2007 and REACH (EC 1907/2006)

1.04 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including, but not limited to the following:
 - 1. Preparation instructions and recommendations.
 - 2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
 - 3. Storage and handling requirements and recommendations.
 - 4. Mounting details and installation methods
 - 5. Typical wiring diagrams including electrical connections.
- B. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.
 - 1. Prepare shop drawings on AutoCAD format using base sheets provided electronically by the Architect.
 - 2. Prepare shop drawings on Micro station format using base sheets provided electronically by the Architect.
- C. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.
- D. Selection Samples: For each finish product specified, one set of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.

- E. Verification Samples: For each product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shade cloth sample and aluminum finish sample as selected. Mark surface of material to indicate interior surface.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years experience in manufacturing products comparable to those specified in this section.
- B. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in the section.
- C. Fire-Test-Response Characteristics: Passes NFPA 701-99 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.
- D. Electrical Components: NFPA Article 100 listed and labeled by either UL and/or ETL or other testing agency acceptable to authorities having jurisdiction, marked for intended use and tested as a system. Individual testing of components will not be acceptable in lieu of system testing.
- E. Anti-Microbial Characteristics: "No Growth" per ASTM G 21, G 22, G 2180 results for fungi ATCC9642, ATCC 9644, ATCC 9645.
- F. Mock-Up: Provide a mock-up of one roller shade assembly for evaluation of mounting, appearance and accessories.
 - 1. Locate mock-up window designated by Architect.
 - 2. Do not proceed with remaining work until, mock-up is accepted by Architect
- G. Safety Standards: The scope of ANSI/WCMA A100.1-2010

1.06 SUBSTITUTIONS

Substitutions will be considered per the Instructions to Bidders, Section 3.3 Substitutions.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.08 PROJECT CONDITIONS

- A. Environmental Limitations: Install roller shades after finish work including painting is complete.

1.09 WARRANTY

- A. Roller Shade Hardware: Manufacturer's standard non-depreciating twenty-five (25) year limited warranty. Chain to have manufacturer's standard non-depreciating one (1) year limited warranty.
- B. Roller Shade Installation: One (1) year from date of Substantial Completion, not including scaffolding, lifts or other means to reach inaccessible areas.
- C. Roller Shade Fabric: Manufacturer's standard non-depreciating ten (10) year limited warranty on most fabrics. See Fabric Specification for specific fabric warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of design: Roll-A-Shade; 12101 Madera Way. Riverside, CA. 92502, Telephone (951) 245-5077; Fax (951) 245-5075; E-Mail: info@rollashade.com, www.rollashade.com
Estimator: Jose Reynoso jose@rollashade.com, Phone: 951.245.5077 x126.

2.02 APPLICATIONS / SCOPE

- A. Roller Shade Type: Dual shade, manual operating interior, chain drive, sunscreen roller shades in all windows of rooms and spaces shown on the Drawings and related mounting systems and accessories.

2.03 SHADE CLOTH

- A. Shades as indicated in the Drawings.

2.04 SHADE BAND

- A. Shade Bands: Construction of shade band includes the fabric, the hem weight, hem-pocket and/or bottom rail with end caps, shade roller tube and the attachment of the shade band to the roller tube. Sewn hems and open hem packets are not acceptable.
 - 1. Hem Pockets and Hem Weights: Fabric hem pocket with impulse-welded seams (including welded ends) and concealed hem weights. Hem weights shall be of appropriate size and weight for shade band. Hem weight shall be continuous inside a sealed hem pocket. Hem pocket construction and hem weights shall be similar, for all shades within one room and/or adjacent space.
 - 2. Bottom Rails and End Caps: Bottom rail is 0.625 inch diameter with 0.625 inch diameter end caps. Plastic end caps are available in black and white.
 - 3. Shade Band and Shade Roller Attachment:
 - a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection.
 - b. Provide for positive attachment of shade band to roller tube

2.05 SHADE FABRICATION

- A. Fabricate units to completely fill existing openings from head to sill and jamb to jamb, unless specifically indicated otherwise.
- B. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for lead content of components; and warning labels.
- C. Fabricate shade cloth to hang flat without buckling or distortion. Fabricate with polyester heat sealed trim and fiberglass crust cut to hang straight without curling or raveling. Fabricate unguided shade cloth to roll true and straight without shifting sideways more than 1/8 inch (3.18 mm) in either direction per eight (8) feet (2438 mm) of shade height due to wrap distortion or weave design.
 - Fabricate hem as follows:
 - 1. Concealed Hembar
 - 2. Exposed bottom rail
- D. Provide battens in standard shades as required assuring proper tracking and uniform rolling of the shade bands. Contractor shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shade cloth within specified standards. Battens shall be extruded aluminum.

- E. For Railroad shade bands, provide seams in railroaded multi-width shade bands as required to meet size requirements and in accordance with seam alignment as acceptable to Architect. Seams shall be properly located. Furnish battens in place of plain seams when the width height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, assure proper use of seams or battens as required to assure the proper tracking of the railroaded multi-width shade bands.
- F. Provide battens for railroaded shades when width width-to-height (W:H) ratios meet or exceed manufacturer's standards. In absence of manufacturer's standards, the contractor shall be responsible for proper use and placement of battens to assure proper tracking and roll of shade bands.
- G. Blackout shade bands, when used in side channels, shall have horizontally mounted extruded aluminum battens not more than three (3) feet (115 mm) on center extending fully into the side channels. Battens shall be concealed in a integrally-colored fabric to match the inside and outside colors of the shade band, in accordance with manufacturer's published standards for spacing and requirements.
 - 1. Battens shall be roll formed of extruded aluminum and concave to match the contour of the roller tube.
 - 2. Batten pockets shall be self colored fabric front and back RF welded into the shade cloth. A self color opaque liner shall be provided front and back to eliminate any see through of the batten pocket that shall not exceed one and one-half (1 1/2) inches (38.1 mm) high and be totally opaque. A see through moiré effect, which occurs with multiple layers of transparent fabrics, shall not be acceptable.

2.06 COMPONENTS

A. Access and Material Requirements

- 1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening.

B. Manual Operated Chain Drive Hardware and Shade Brackets:

- 1. Provide hardware capable for installation of a removable fascia, which shall be installed without exposed fastening devices of any kind.
- 2. Provide shade hardware system that allows for fascias to be mounted continuously across two or more shade bands without requiring exposed fasteners of any kind.
- 3. Provide shade hardware system that allows for operation of multiple shade bands (multi-banded shades) by a single chain operator, subject to manufacturer's design criteria. Link drives shall be adjustable to assure alignment from the first to the last shade band.
- 4. Shade bands shall be adjustable without removing shade roller tube or hardware from window.
- 5. Splined shade roller tube must be used to provide positive engagement with drive mechanism. Smooth wall tube not permitted.
- 6. Provide shade hardware constructed of minimum one sixteenth (1/16") (1.59mm) thick plated steel, or heavier as required.
- 7. Bracket shall be fully integrated with all accessories, including, but not limited to fascia, room darkening side / sill channels, and connectors for multi-banded shades.

C. Drive Mechanism:

- 1. Drive sprocket and brake assembly shall have a minimum of four (4) wrap springs.

2. The entire assembly shall be fully mounted on the steel support bracket, which may be removed and reinstalled without effecting the roller shade limit adjustments.
3. Drive Chain requirements:
 - a. #10 qualified stainless steel chain rated to 90 lbs (41 kg) minimum breaking strength. Nickel plate chain shall not be accepted.
 - b. Tension device shall be installed on shade using a device that when not installed properly renders the shade partially inoperable.
4. Drive mechanism shall be per manufacturer's recommendations.

2.07 ACCESSORIES

A. Fascia:

1. Continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.
2. Fascia shall be able to be installed across two (2) or more shade bands in one (1) piece.
3. Fascia shall fully conceal brackets, shade roller and fabric on the tube.
4. Provide bracket / fascia end caps where mounting conditions expose outside of roller shade brackets.
5. Fascia to match specified pantone color system.
6. Three inch top fascia to conceal top and front of shade roller and fabric on tube.

B. Room Darkening Side and / or Sill Channels:

1. Extruded aluminum two piece channel with concealed fastening. Exposed fastening is not acceptable. Channels shall accept one-piece exposed blackout hembar with vinyl seal to assure side light control and sill light control.
 - a. Side channels shall be 2-3/8" (60.3mm) wide by 1" (25.4 mm) deep.
 - b. Color: Selected from manufacturer's standard colors.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect/Contractor of any unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Contractor shall 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.

3.03 INSTALLATION

- A. Install roller shades level, plumb, and true according to manufacturer's written instructions. Allow proper clearances for window operation hardware.
- B. Contractor shall provide power panels and circuits of sufficient size to accommodate roller shade manufacturer's requirements.

1. Contractor shall coordinate with requirements of roller shade installer / dealer, before inaccessible areas are constructed.
 2. Contractor shall run line voltage as indicated home runs (of sufficient quantity and sufficient capacity as required) terminating in junction boxes in locations designated by roller shade dealer.
- C. Adjust and balance roller shades to operate smoothly, easily and free from binding or
 - D. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
 - E. Engage installer to train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.
- 3.04 PROTECTION
- A. Protect installed products until completion of project.
 - B. Touch-up repair and/or replace any damaged products before Substantial Completion.

*****END OF SECTION*****

SECTION 12 93 00
SITE FURNISHINGS

PART 1 -- GENERAL

1.01 SUMMARY

Division 0, Contract requirements and Division 1, General Conditions apply to this section.

1.02 SCOPE OF WORK

Work included: Provide items as shown and specified on the Drawings, as specified herein, and as needed for a complete and proper installation.

1.03 RELATED WORK

Site Concrete.

1.04 QUALITY ASSURANCE

Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.05 SUBSTITUTIONS

Substitutions will be considered per the Instructions to Bidders, Section 3.3 Substitutions.

1.06 SUBMITTALS

- A. In accordance with Article 3 of the General Conditions.
- B. Product Data: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Cut sheets and product data of items proposed to be provided under this Section;
 - 2. Erection procedures, sequence of erection, and required handling equipment.

PART 2 -- PRODUCTS

2.01 EXTERIOR BOOK DROP

- A. Furnish: size(s), color(s), pattern(s) and shape(s) as indicated on the drawings.
- B. Manufacturer: as indicated on the drawings.

PART 3 -- EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed.
- B. Correct conditions detrimental to timely and proper completion of the Work.
- C. Do not proceed until unsatisfactory conditions are corrected.
- D. Beginning of installation means acceptance of conditions.

3.02 PREPARATION

- A. Coordinate rough-in for electrical and embed requirements with other trades.
- B. Confirm locations with Owner and Architect in field.

3.03 INSTALLATION

- A. Install items per manufacturer's recommendations.
- B. All items to be secured in place to limit vandalism.

3.04 CLEAN-UP

Wipe clean all surfaces and protect from work of other trades.

*****END OF SECTION*****

SECTION 26 01 00

BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SCOPE

- A. This section supplements all sections of this division and shall apply to all phases of work hereinafter specified, shown on the contract documents and as required to provide a complete installation of electrical systems for this project. The work required under this division is not limited to the electrical specifications and drawings. Refer to all bid documents including Architectural and Structural documents which may designate Work to be accomplished. The intent of the Specifications is to provide a complete and operable electrical system, which shall include all documents that are a part of the entire Project Contract.
 - 1. Work included: Furnish all labor, material, tools, equipment, facilities, transportation, skilled supervision necessary for, and incidental to, performing operations in connection with furnishing, delivery, and installation of the work in this division complete as shown or noted on the Drawings and specified herein.
- B. Related Work Specified Elsewhere:
 - 1. Refer to all sections in the general contract conditions, Contract Requirements and Division 1, General Requirements.
- C. Work Installed but Furnished by Others:
 - 1. The electrical work includes the installation or connection of certain materials and equipment furnished by others. Verify installation details. Foundations for apparatus and equipment will be furnished by others unless otherwise noted or detailed.

1.2 GENERAL REQUIREMENTS

- A. Guarantee See General Conditions:
 - 1. Except as may be specified under other Sections in the specification, guarantee equipment furnished under the specifications for a period of one year, except for equipment required to have a longer guarantee period, from date of final completion. Guarantee all work against defective workmanship, material, and improper installation. Upon notification of failure, correct deficiency immediately and without additional cost to the Owner.
 - 2. Standard warranty of manufacturer shall apply for replacement of parts after expiration of the above period. Manufacturer shall furnish replacement parts to the Owner or his service agency as approved. Furnish to the Owner, through the Architect, printed manufacturer's warranties complete with material included and expiration dates, upon completion of project. Conform to Division 01.
- B. Equipment Safety: All electrical materials and equipment shall be new and shall be listed by Underwriter's Laboratories and bear their label, or listed and certified by a nationally recognized testing authority where UL does not have an approval. Custom made equipment must have complete test data submitted by the manufacturer attesting to its safety.

C. Codes and Regulations:

1. Design, manufacturer, testing and method of installation of all apparatus and materials furnished under the requirements of these specifications shall conform to the latest publications or standard rules of the following:
 - a. Institute of Electrical and Electronic Engineers - IEEE
 - b. National Electrical Manufacturers' Association - NEMA
 - c. Underwriters' Laboratories, Inc. - UL
 - d. National Fire Protection Association - NFPA
 - e. American Society for Testing and Materials - ASTM
 - f. American National Standards Institute – ANSI
 - g. State & Municipal Codes in Force in the Specific Project Area
 - h. Occupational Safety & Health Administration – OSHA
 - i. California State Fire Marshal
 - j. National Electrical Testing Association – NETA
 - k. 2013 California Administrative Code (CAC)
Part 1, Title 24, California Code of Regulations (CCR)
 - l. 2013 California Building Code (CBC)
Part 2, Title 24, CCR, Based on the 2012 International Building Code (IBC)
 - m. 2013 California Electrical Code (CEC)
Part 3, Title 24, CCR, Based on the 2011 National Electrical Code (NEC)
 - n. 2013 California Mechanical Code (CMC)
Part 4, Title 24, CCR, Based on the 2012 Uniform Mechanical Code (UMC)
 - o. 2013 California Plumbing Code (CPC)
Part 5, Title 24, CCR, Based on the 2012 Uniform Plumbing Code (UPC)
 - p. 2013 California Fire Code (CFC)
Part 9, Title 24, CCR, Based on the 2012 International Fire Code (IFC)
2. The term "Code", when used within the specifications, shall refer to the Publications, Standards, ordinances and codes, listed above. In the case where the codes have different levels of requirements the most stringent rules shall apply.

D. Requirements of Regulatory Agencies:

1. Codes, Permits, and Fees: Where the Contract Documents exceed minimum requirements, the Contract Documents take precedence. Where code conflicts occur, the most stringent shall apply. The most stringent condition shall be as interpreted by the Engineer.
 - a. Comply with all requirements for permits, licenses, fees and Code. Permits, licenses, fees, inspections and arrangements required for the Contractor at his expense shall obtain the Work, unless otherwise specified.
 - b. Comply with the requirements of the applicable utility companies serving the Project. Make all arrangements with the utility companies for proper coordination of the Work.

E. Shop Drawings:

1. See Division 01 for additional requirements.
2. Time Schedules for Submission and Ordering: The Contractor shall prepare, review and coordinate his schedule of submissions carefully, determining the necessary lead time for preparing, submitting, checking, ordering and delivery of materials and equipment for timely arrival. The Contractor shall be responsible for conformance with the overall construction schedule.

3. Submittals will be checked for general compliance with specifications only. The Contractor shall be responsible for deviations from the drawings or specifications and for errors or omissions of any sort in submittals.
 4. Submit a complete list of materials and equipment proposed for the job, including manufacturer's names and catalog numbers.
 5. Shop drawings shall be submitted in completed groups of materials (i.e., lighting fixtures or switchgear). The Contractor shall add and sign the following paragraph on equipment and materials submitted for review. "It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into the project; is in compliance with the Contract Drawings and specifications and can be installed in the allocated spaces". Failure to add the above written statement for compliance will result in return of submittals without review.
 - a. Bind catalog cuts, plate numbers, descriptive bulletins and drawings, 11" x 17" (275 mm x 435 mm) or smaller, in sets with covers neatly showing titles.
 - b. The Contractor shall verify dimensions of equipment and be satisfied as to Code compliance for fit prior to submitting shop drawings for approval.
 - c. Where current limiting devices are specified, submit technical data to substantiate adequate protection of equipment cascaded downstream. Submittals shall not be reviewed unless supporting calculations and data are submitted therewith.
 - d. Include complete catalog information such as construction, ratings, and insulation systems, as applicable.
 - e. For any material specified to meet UL or trade standards, furnish the manufacturers or vendor's certification that the material furnished for the work does in fact equal or exceed such specifications.
 - f. Reference listings to the specifications' Sections and Article to which each is applicable.
 - g. Equipment Floor Plans: After approval of material is secured prepare a floor plan of each electrical and communication equipment space, room or yard, drawn to scale at 1/2 inch equals 1 foot and submit for approval in the same manner as for shop drawings. The layout drawings shall be exact scale.
 6. Contractor shall prepare coordinated drawings when required by Division 01 or where noted otherwise.
- F. Interpretations: The Contractor through the Architect must make Requests for interpretations of drawings and specifications. Any such requests made by equipment manufacturers or suppliers will be referred to the Contractor.
- G. Standard of Quality
1. The contract Drawings and Specifications establish the "MINIMUM STANDARD OF QUALITY" each product and/or system must meet to be considered acceptable. Products of other manufactures will be considered if the product and/or system meet or exceed the "MINIMUM STANDARD OF QUALITY" established by this Contract Document.
- H. Submit comprehensive material list, shop drawings and complete technical data for all systems, equipment and materials.
- I. Record Drawings: Refer to Division 01, Contract Closeout.
- J. Work Responsibilities:
1. The drawings indicate diagrammatically the desired locations or arrangement of conduit runs, outlets, junction boxes and equipment and are to be followed. Execute the work so

as to secure the best possible installation in the available space and to overcome local difficulties due to space limitations. The Contractor is responsible for the correct placing of his work. Where conflicts occur in plans and/or specifications, the most stringent application shall apply and shall be part of the base bid.

2. Locations shown on architectural plan or on wall elevations shall take precedence over electrical plan locations, but where a major conflict is evident, notify the Architect.
3. In the event minor changes in the indicated locations or arrangement are necessary due to developed conditions in the building construction or rearrangement of furnishings or equipment or due to interference with other trades, such changes shall be made without extra cost.
4. Verify dimensions and the correct location of Owner-Furnished equipment before proceeding with the roughing-in of connections.
5. All scaled and figured dimensions are approximate of typical equipment of the class indicated. Before proceeding with work carefully check and verify dimensions and sizes with the drawings to see that the furnished equipment will fit into the spaces provided without violation of applicable Codes.
The Architect shall be notified should any changes to the work indicated on the drawings or described in the specifications be necessary in order to comply with the above requirements.
6. Contractor shall be responsible for coordination of coordinated drawings when required by the Architect.
7. Replace or repair, without additional compensation any work which does not comply with or which is installed in violation of any of these requirements.

K. Installation General: For special requirements, refer to specific equipment under these requirements.

1. Unless otherwise specified elsewhere in the specifications, do all excavating necessary for the proper installation of the electrical work.
2. Locations of Openings: Cutting or drilling in any structural member is prohibited without approval of the Architect. Furnish all access panels to make all boxes, connections and devices accessible as required by CEC.
3. Wherever conduit extends through roof, install flashings in accordance with drawings and details.
4. Contractor shall be responsible for cutting and patching which may be required for the proper installation of the electrical work.
5. Protect work, materials and equipment cause whatever and provide adequate and proper storage facilities during the progress of the work. Storage outdoors shall be weather protected and shall include space heaters to prevent condensation. Provide for the safety and good condition of all work until final acceptance of the work. Replace all damaged or defective work, materials and equipment before requesting final acceptance.
6. Conduit and Equipment to be installed: Clean thoroughly to remove plaster, spattered paint, cement and dirt on both exterior and interior.
7. Conduit and Equipment to be painted: Clean conduit exposed to view in completed structure by removing plaster and dirt. Remove grease, oil and similar material from conduit and equipment by wiping with clean rags and suitable solvents in preparation for paint.
8. Items with Factory Finish: Remove cement, plaster, grease and oil, and leave surfaces, including cracks and corners, clean and polished. Touch up scratched or bare spots to match finish.
9. Site Cleaning: Remove from site all packing cartons, scrap materials and other rubbish on a weekly basis. Vacuum out all cabinets, switchgear and panels and junction boxes prior to pulling any conductors.
10. Electrical equipment and materials exposed to public and in finished areas shall be finish-painted after installation in accordance with the Painting Section. All exposed screw-type

fasteners, exterior, or interior in restrooms, shall be vandal-resistant spanner type; include tool.

L. Tests

1. Equipment and systems for which the National Electrical Testing Association (NETA) has an approved or recommended procedure, shall be tested in accordance with that procedure. Test values shall equal values recommended by NETA. Copies of test reports shall be submitted as required under shop drawing submittals.
2. Resistance to ground tests shall be accomplished by a qualified independent testing firm to measure resistance to ground at grounding electrodes. Make tests before slabs or affected areas are poured in order that corrective measures, if required, may be taken. Submit a report showing the results of these measurements. If the resistances exceed values specified elsewhere or NETA test procedure recommendations, perform corrective measures required to reduce resistance to acceptable values.
3. Prior to energizing any motor, measure the service voltage for phase balance and report if unbalance exceeds 1% from mean.
4. Measure the three-phase voltage at no load and at maximum load conditions and submit to the engineer a report showing the results of these measurements.
5. Upon completion of the work and adjustment of all equipment, conduct an operating test. Conduct the test in the presence of an authorized representative of the Architect. Demonstrate system and equipment to operate in accordance with requirements of the Contract Documents and to be free from electrical and mechanical defects. Provide systems free from short circuits and grounds and show an insulation resistance between phase conductors and ground not less than the requirements of the governing electric code. Test circuits for proper neutral connection.
6. Complete tests prior to final inspection of project, including corrective work based on the results of the tests.
7. Perform special tests on systems and equipment as specified herein using personnel qualified to perform such tests.

M. Protection: Protect finish parts of the materials and equipment against damage during the progress of the work and until final completion and acceptance. Cover materials and equipment in storage and during construction in such a manner that no finished surfaces will be damaged or marred. Keep moving parts clean, dry and lubricated.

N. Cleaning Up:

1. Upon completion of the work and at various time during the progress of the work, remove from the building all surplus materials, rubbish and debris resulting from the work of this Division.
2. Thoroughly clean switchgear including busses, apparatus, exposed conduit, metal work including the exterior and interior, and accessories for the work of this Division, of cement, plaster and other deleterious materials; remove grease and oil spots with cleaning solvent; carefully wipe surfaces and scrape cracks and corners clean.
3. Thoroughly polish chromium or plated work. Remove dirt and stains from lighting fixtures.
4. Leave the entire installation in a clean condition.

O. Completion:

1. The work will not be reviewed for final acceptance until operating and maintenance data, manufacturer's literature, panel directories and nameplates specified herein have been approved and properly posted or installed and final cleaning of equipment and premises has been completed.

2. When the installation is complete and adjustments have been made, operate the system for a period of one week, during which time demonstrate that systems are completed and operating in conformance with the specifications.
- P. Operating and Maintenance Data: Submit complete and at one time, prior to acceptance of the installation, 4 copies of manufacturer's instructions for operation and maintenance of electrical equipment, including replacement parts lists. As specified in Division 01.
- Q. Inspection and Acceptance Procedures: The Architect will submit observation reports periodically during the construction phase detailing Contract deficiencies. The Contractor is responsible for making corrections immediately. Notice of Completion of the project will not be made until all items have been corrected.
- R. Final Completion of Electrical Systems:
1. Prior to Final Completion of operating electrical systems, the Contractor shall:
 - a. Provide materials of the type and quality specified and as necessary for proper operation, tested and ready for use.
 - b. Deliver to the Architect, the Record Documents per 1.3 of this section.
 - c. Furnish the required Operating and Maintenance Data/Manuals.
 - d. Clean up of the project pertaining to this Division of the work.
 - e. After installation has been completed and adjustments made, operate the system for a period of one week, during which time, demonstrate to the Architect that systems are complete and operating in conformance with Contract Documents.
 - f. Conduct tests required and as specified in this Division and submit test reports and corrective actions taken.
 - g. Submission of warranties and guarantees.
 2. Final Completion of Work Shall be Contingent On:
 - a. Contractor replacing defective materials and workmanship.
 - b. Upon completion of work and adjustments made, Contractor shall conduct an operating test for each system for approval at such time as Architect directs. Conduct test in presence of authorized representative of Architect and demonstrate that systems and equipment do operate in accordance with requirements of the Contract Documents and are free from electrical and mechanical defects.
 - c. Contractor shall provide the necessary training programs and instructions to the Owner's representative. Number of hours shall be a minimum of four (4) hours for each system or days as required under separate Sections of these Specifications. Complete operation and maintenance manuals shall be provided at least two (2) weeks prior to training.
 - d. Submit copies of manufacturer's instructions and maintenance of electrical equipment including replacement parts lists. Each set shall include one set of shop drawings of equipment installed.
- S. Submittals for Change Orders: When changes are made during the construction phase, deletions and additions shall be presented in a manner that will indicate the cost of each item of material and corresponding labor. Markup shall be then added in accordance with the requirements of the General Conditions as modified by the Supplementary Conditions.
- T. The Contractor at a time convenient to the Owner shall provide instruction to the Owner's operating personnel in the proper operation and maintenance of all equipment and systems. The instructors shall have received factory training and shall be thoroughly familiar with the

equipment installed. The operating personnel shall receive the number of day's instruction as indicated in other sections.

1.3 PROJECT RECORD DOCUMENTS

- A. Record Drawings: CAD: Use a computer aided drafting (CAD) system in the preparation of record drawings for this Project. Acceptable CAD systems shall be capable of producing files in AutoCAD Version 2000 compatible DWG or DXF format.
- B. At all times when the work is in progress, maintain at the workplace, fabrication shop or Project Site as applies, a complete separate, clean, undamaged set of the latest stamped, actioned submittals. As work progresses, maintain records of "as installed" conditions on this set in suitable ink or chemical fluid. Update the set daily. After successful completion of Project Site testing specified herein, and after completion of Punch List corrections, copy all records of "as installed" conditions on to originals.
- C. Quantity:
 - 1. Review sets: As for Shop and Field Drawings.
 - 2. Record set: Three (3) bond. One (1) DVD with CAD & PDF files..
- D. Format: Record Drawings:
 - 1. Disk copy of Record Drawings - 1 copy of each drawing file in format noted above, DVD-ROM.
- E. Content: All drawings required under "Field and Shop Drawings". Show "as installed" condition. Where room designations according to Project permanent signage differ from construction designations in the Contract Documents, show both designations.
- F. Warranty Certificates: Comply with Division 01.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

***** END OF SECTION *****

THIS PAGE IS INTENTIONALLY BLANK

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

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. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.

1.5 QUALITY ASSURANCE

- A. Testing Qualifications: The contractor shall have the experience and capability to conduct the testing indicated that is acceptable to authorities having jurisdiction.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Available Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Alcan Products Corporation; Alcan Cable Division.
 - 2. American Insulated Wire Corp.; a Leviton Company.
 - 3. General Cable Corporation.
 - 4. Senator Wire & Cable Company.
 - 5. Southwire Company.
- B. Copper Conductors: Comply with NEMA WC 70.
- C. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN or XHHW.

2.2 CONNECTORS AND SPLICES

- A. Available Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Hubbell Power Systems, Inc.
 - 3. O-Z/Gedney; EGS Electrical Group LLC.
 - 4. 3M; Electrical Products Division.
 - 5. Tyco Electronics Corp.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Feeders: Type THHN-THWN or XHHW, single conductors in raceway.
- B. Branch Circuits: Type THHN-THWN or XHHW, single conductors in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test all conductors for insulation integrity.
 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 3. Infrared Scanning: After Substantial Completion, perform an infrared scan of each splice and termination. Remove box and equipment covers so splices are accessible to portable scanner.
 - a. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - b. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- C. Test Reports: Prepare a written report to record the following:
1. Test procedures used.
 2. Test results that comply with requirements.
 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- D. Remove and replace malfunctioning units and retest as specified above.

***** END OF SECTION *****

THIS PAGE IS INTENTIONALLY BLANK

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

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: Grounding systems and equipment.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Informational Submittals: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
 - 1. Grounding arrangements and connections for separately derived systems.
- C. Qualification Data: For qualified testing agency and testing agency's field supervisor.
- D. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. 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.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.

2.2 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors: Copper or copper alloy, pressure type with at least two bolts.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- D. Bus-bar Connectors: Mechanical type, cast silicon bronze, solderless compression or exothermic-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Conductor Terminations and Connections:
 - 1. Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Connections to Structural Steel: Bolted or Welded connectors.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 - 1. Feeders and branch circuits.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
 - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

3.4 LABELING

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems" Article for instruction signs. The label or its text shall be green.
- B. Install labels at the telecommunications bonding conductor and grounding equalizer[and at the grounding electrode conductor where exposed].
 - 1. Label Text: "If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

3.5 FIELD QUALITY CONTROL

- A. Perform inspections.
 - 1. Inspect components, assemblies, and equipment installations, including connections.
- B. Inspections:
 - 1. After installing grounding system but before permanent electrical circuits have been energized, inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
- C. Grounding system will be considered defective if it does not pass inspections.
- D. Prepare inspection reports.

***** END OF SECTION *****

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

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. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.
- B. Related Sections include the following:
 - 1. Division 26 Section "Vibration And Seismic Controls For Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. IMC: Intermediate metal conduit.
- C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of [five] <Insert number> times the applied force.

1.5 SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel slotted support systems.
 - 2. Nonmetallic slotted support systems.
- B. Shop Drawings:[Signed and sealed by a qualified professional engineer.] Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze hangers. Include Product Data for components.
 - 2. Steel slotted channel systems. Include Product Data for components.
 - 3. Nonmetallic slotted channel systems. Include Product Data for components.
 - 4. Equipment supports.

- C. Welding certificates.
- 1.6 QUALITY ASSURANCE
- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - B. Comply with NFPA 70.
- 1.7 COORDINATION
- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
 - B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 1. 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:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. ERICO International Corporation.
 - d. GS Metals Corp.
 - e. Thomas & Betts Corporation.
 - f. Unistrut; Tyco International, Ltd.
 - g. Wesanco, Inc.
 2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 5. Channel Dimensions: Selected for applicable load criteria.
- B. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with 9/16-inch- (14-mm-) diameter holes at a maximum of 8 inches (200 mm) o.c., in at least 1 surface.
 1. 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:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. Fabco Plastics Wholesale Limited.
 - d. Seasafe, Inc.

2. Fittings and Accessories: Products of channel and angle manufacturer and designed for use with those items.
 3. Fitting and Accessory Materials: Same as channels and angles[, except metal items may be stainless steel].
 4. Rated Strength: Selected to suit applicable load criteria.
- C. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- D. Conduit and Cable Support Devices: [Steel] [Steel and malleable-iron] hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- F. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. 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:
 - 1) Hilti Inc.
 - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
 2. Mechanical-Expansion Anchors: Insert-wedge-type, [zinc-coated] [stainless] steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. 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:
 - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
 3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 6. Toggle Bolts: All-steel springhead type.

7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as [required by] [scheduled in NECA 1, where its Table 1 lists maximum spacings less than stated in] NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted [or other]support system, sized so capacity can be increased by at least [25] <Insert number> percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with [two-bolt conduit clamps] [single-bolt conduit clamps] [single-bolt conduit clamps using spring friction action for retention in support channel].
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, [EMT] [IMC] [RMC] [EMT, IMC, and RMC] may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm)

thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.

6. To Steel: [Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts] [Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69] [Spring-tension clamps].
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate [by means that meet seismic-restraint strength and anchorage requirements].

- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use [3000-psi (20.7-MPa)] <Insert value>, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03 Section "[Cast-in-Place Concrete] [Cast-in-Place Concrete (Limited Applications)]."
- C. Anchor equipment to concrete base.
 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).
- B. Touchup: Comply with requirements in Division 09 [painting Sections] [Section "High-Performance Coatings"] for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

***** END OF SECTION *****

THIS PAGE IS INTENTIONALLY BLANK

SECTION 26 05 33

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

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 raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. ENT: Electrical nonmetallic tubing.
- C. EPDM: Ethylene-propylene-diene terpolymer rubber.
- D. FMC: Flexible metal conduit.
- E. IMC: Intermediate metal conduit.
- F. LFMC: Liquidtight flexible metal conduit.
- G. LFNC: Liquidtight flexible nonmetallic conduit.
- H. NBR: Acrylonitrile-butadiene rubber.
- I. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

- A. Product Data: For pull boxes and cabinets.

1.5 QUALITY ASSURANCE

- A. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

- A. 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:
 - 1. AFC Cable Systems, Inc.
 - 2. Alflec Inc.
 - 3. Allied Tube & Conduit; a Tyco International Ltd. Co.
 - 4. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 5. Electri-Flex Co.
 - 6. Manhattan/CDT/Cole-Flex.
 - 7. Maverick Tube Corporation.
 - 8. O-Z Gedney; a unit of General Signal.
 - 9. Wheatland Tube Company.

- B. Rigid Steel Conduit: ANSI C80.1.
- C. Aluminum Rigid Conduit: ANSI C80.5.
- D. IMC: ANSI C80.6.
- E. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit or IMC.
 - 1. Comply with NEMA RN 1.
 - 2. Coating Thickness: 0.040 inch (1 mm), minimum.
- F. EMT: ANSI C80.3.
- G. FMC: Zinc-coated steel.
- H. LFMC: Flexible steel conduit with PVC jacket.
- I. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
 - 1. Fittings for EMT: Steel or die-cast, compression type.
 - 2. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.
- J. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.2 BOXES, ENCLOSURES, AND CABINETS

- A. 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:
 - 1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
 - 2. EGS/Appleton Electric.
 - 3. Erickson Electrical Equipment Company.
 - 4. Hoffman.
 - 5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
 - 6. O-Z/Gedney; a unit of General Signal.
 - 7. RACO; a Hubbell Company.
 - 8. Robroy Industries, Inc.; Enclosure Division.
 - 9. Scott Fetzer Co.; Adalet Division.
 - 10. Spring City Electrical Manufacturing Company.
 - 11. Thomas & Betts Corporation.
 - 12. Walker Systems, Inc.; Wiremold Company (The).
 - 13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.
- B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- E. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, galvanized, cast iron with gasketed cover.

- F. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
 - 1. Exposed Conduit: Rigid steel conduit or IMC.
 - 2. Concealed Conduit: Rigid steel conduit, IMC, or EMT.
 - 3. Connection to Vibrating Equipment (Including Transformers) LFMC.
 - 4. Boxes and Enclosures: NEMA 250, Type 3R.
- B. Comply with the following indoor applications, unless otherwise indicated:
 - 1. Exposed, Not Subject to Physical Damage: Rigid steel conduit, IMC, or EMT.
 - 2. Exposed and Subject to Severe Physical Damage: Rigid steel conduit or IMC.
 - 3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 - 4. Connection to Vibrating Equipment (Including Transformers) LFMC.
 - 5. Damp or Wet Locations: Rigid steel conduit or IMC.
 - 6. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel in damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch (21-mm) trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
 - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
 - 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with that material. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer.

3.2 INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
- E. Install no more than the equivalent of three 90-degree bends in any conduit run.
- F. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
- G. Threaded Conduit Joints, exposed to Wet, Damp, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- H. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.

- I. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 24 inches (600 mm) of slack at each end of pull wire.
- J. Flexible Conduit Connections: Use maximum of 72 inches (1830 mm) of flexible conduit for transformers.
 - 1. Use LFMC.

3.3 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor, roof, and wall assemblies to restore original fire-resistance rating of assembly.

3.4 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to paint finishes with matching touchup coating recommended by manufacturer.

***** END OF SECTION *****

SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

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. Identification for conductors.
 - 2. Warning labels.
 - 3. Equipment identification labels.

1.3 SUBMITTALS

- A. Product Data: For each electrical identification product indicated.

1.4 QUALITY ASSURANCE

- A. Comply with ANSI A13.1 and IEEE C2.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices with permanent marker before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- C. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with

- D. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

2.2 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
- C. Warning label and sign shall include, but are not limited to, the following legends:
 - 1. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

2.3 EQUIPMENT IDENTIFICATION LABELS

- A. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

3.2 IDENTIFICATION SCHEDULE

- A. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
 - 1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.
 - a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
 - b. Colors for 208/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - c. Colors for 480/277-V Circuits:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where

splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

- B. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels Baked-enamel warning signs Metal-backed, butyrate warning signs.
 - 1. Comply with 29 CFR 1910.145.
 - 2. Identify system voltage with black letters on an orange background.
 - 3. Apply to exterior of door, cover, or other access.
- C. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with schedules. Apply labels to disconnect switches, panelboards, and transformers.
 - 1. Labeling Instructions:
 - a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high. Include power supply/source and load/equipment served information.

***** END OF SECTION *****

THIS PAGE IS INTENTIONALLY BLANK

SECTION 26 05 73

OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY

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 computer-based, arcing faults, fault-current and overcurrent protective device coordination studies. Protective devices shall be set based on results of the protective device coordination study.

1.3 SUBMITTALS

- A. Product Data: For computer software program to be used for studies.
- B. Product Certificates: For coordination-study and fault-current-study computer software programs, certifying compliance with IEEE 399.
- C. Qualification Data: For coordination-study specialist.
- D. Other Action Submittals: The following submittals shall be made after the approval process for system protective devices has been completed. Submittals [shall] [may] be in digital form.
 - 1. Coordination-study input data, including completed computer program input data sheets.
 - 2. Study and Equipment Evaluation Reports.
 - 3. Coordination-Study Report.

1.4 QUALITY ASSURANCE

- A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are not acceptable.
- B. Coordination-Study Specialist Qualifications: An entity experienced in the application of computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.
 - 1. Professional engineer, licensed in the state where Project is located, shall be responsible for the study. All elements of the study shall be performed under the direct supervision and control of engineer.
- C. Comply with IEEE 242 for short-circuit currents and coordination time intervals.
- D. Comply with IEEE 399 for general study procedures.

PART 2 - PRODUCTS

2.1 COMPUTER SOFTWARE DEVELOPERS

- A. Available Computer Software Developers: Subject to compliance with requirements, companies offering computer software programs that may be used in the Work include, but are not limited to, the following:
 - 1. CGI CYME.
 - 2. EDSA Micro Corporation.

3. ESA Inc.
4. Operation Technology, Inc.
5. SKM Systems Analysis, Inc.

2.2 COMPUTER SOFTWARE PROGRAM REQUIREMENTS

- A. Comply with IEEE 399.
- B. Analytical features of fault-current-study computer software program shall include "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.
- C. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output. Computer software program shall report device settings and ratings of all overcurrent protective devices and shall demonstrate selective coordination by computer-generated, time-current coordination plots. Software shall include the following for this analysis.
 - a. Arcing faults.
 - b. Simultaneous faults.
 - c. Explicit negative sequence.
 - d. Mutual coupling in zero sequence.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine Project overcurrent protective device submittals for compliance with electrical distribution system coordination requirements and other conditions affecting performance. Devices to be coordinated are indicated on Drawings.
 1. Proceed with coordination study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to coordination study may not be used in study.

3.2 POWER SYSTEM DATA

- A. Gather and tabulate the following input data to support coordination study:
 1. Product Data for overcurrent protective devices specified in other Division 26 Sections and involved in overcurrent protective device coordination studies and for existing devices to the existing main utility service switchboard and to the existing emergency generator. This study shall only include the portion of the electrical distribution serving the new electrical equipment. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
 2. Impedance of utility service entrance. Contact utility company.
 3. Electrical Distribution System Diagram: In hard-copy and electronic-copy formats, showing the following:
 - a. Circuit-breaker and fuse-current ratings and types.
 - b. Relays and associated power and current transformer ratings and ratios.
 - c. Transformer kilovolt amperes, primary and secondary voltages, connection type, impedance, and X/R ratios.
 - d. Generator kilovolt amperes, size, voltage, and source impedance.

- e. Cables: Indicate conduit material, sizes of conductors, conductor material, insulation, and length.
 - f. Busway ampacity and impedance.
 - g. Motor horsepower and code letter designation according to NEMA MG 1.
4. Data sheets to supplement electrical distribution system diagram, cross-referenced with tag numbers on diagram, showing the following:
- a. Special load considerations, including starting inrush currents and frequent starting and stopping.
 - b. Transformer characteristics, including primary protective device, magnetic inrush current, and overload capability.
 - c. Motor full-load current, locked rotor current, service factor, starting time, type of start, and thermal-damage curve.
 - d. Generator thermal-damage curve.
 - e. Ratings, types, and settings of utility company's overcurrent protective devices.
 - f. Special overcurrent protective device settings or types stipulated by utility company.
 - g. Time-current-characteristic curves of devices indicated to be coordinated.
 - h. Manufacturer, frame size, interrupting rating in amperes rms symmetrical, ampere or current sensor rating, long-time adjustment range, short-time adjustment range, and instantaneous adjustment range for circuit breakers.
 - i. Manufacturer and type, ampere-tap adjustment range, time-delay adjustment range, instantaneous attachment adjustment range, and current transformer ratio for overcurrent relays.
 - j. Panelboards, switchboards, motor-control center ampacity, and interrupting rating in amperes rms symmetrical.

3.3 FAULT-CURRENT STUDY

- A. Calculate the maximum available short-circuit current in amperes rms symmetrical at circuit-breaker positions of the electrical power distribution system. The calculation shall be for a current immediately after initiation and for a three-phase bolted short circuit at each of the following:
 - 1. Switchboard bus.
 - 2. Motor-control center.
 - 3. Distribution panelboard.
 - 4. Branch circuit panelboard.
- B. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Include studies of system-switching configurations and alternate operations that could result in maximum fault conditions.
- C. Calculate momentary and interrupting duties on the basis of maximum available fault current.
- D. Calculations to verify interrupting ratings of overcurrent protective devices shall comply with IEEE 141, IEEE 241, and IEEE 242.
 - 1. Transformers:
 - a. ANSI C57.12.10.

- b. ANSI C57.12.22.
 - c. ANSI C57.12.40.
 - d. IEEE C57.12.00.
 - e. IEEE C57.96.
 - 2. Low-Voltage Circuit Breakers: IEEE 1015 and IEEE C37.20.1.
 - 3. Low-Voltage Fuses: IEEE C37.46.
 - E. Study Report:
 - 1. Show calculated X/R ratios and equipment interrupting rating (1/2-cycle) fault currents on electrical distribution system diagram.
 - F. Equipment Evaluation Report:
 - 1. For 600-V overcurrent protective devices, ensure that interrupting ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.
 - 2. For devices and equipment rated for asymmetrical fault current, apply multiplication factors listed in the standards to 1/2-cycle symmetrical fault current.
 - 3. Verify adequacy of phase conductors at maximum three-phase bolted fault currents; verify adequacy of equipment grounding conductors and grounding electrode conductors at maximum ground-fault currents. Ensure that short-circuit withstand ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.
- 3.4 COORDINATION STUDY
- A. Perform coordination study using approved computer software program. Prepare a written report using results of fault-current study. Comply with IEEE 399.
 - 1. Calculate the maximum and minimum 1/2-cycle short-circuit currents.
 - 2. Calculate the maximum and minimum interrupting duty (5 cycles to 2 seconds) short-circuit currents.
 - 3. Calculate the maximum and minimum ground-fault currents.
 - B. Comply with IEEE 141, IEEE 241, and IEEE 242 recommendations for fault currents and time intervals.
 - C. Transformer Primary Overcurrent Protective Devices:
 - 1. Device shall not operate in response to the following:
 - a. Inrush current when first energized.
 - b. Self-cooled, full-load current or forced-air-cooled, full-load current, whichever is specified for that transformer.
 - c. Permissible transformer overloads according to IEEE C57.96 if required by unusual loading or emergency conditions.
 - 2. Device settings shall protect transformers according to IEEE C57.12.00, for fault currents.
 - D. Motors served by voltages more than 600 V shall be protected according to IEEE 620.
 - E. Conductor Protection: Protect cables against damage from fault currents according to ICEA P-32-382, ICEA P-45-482, and conductor melting curves in IEEE 242. Demonstrate that equipment withstands the maximum short-circuit current for a time equivalent to the tripping time of the primary relay protection or total clearing time of the fuse. To determine temperatures that damage insulation, use curves from cable manufacturers or from listed standards indicating conductor size and short-circuit current.

- F. Coordination-Study Report: Prepare a written report indicating the following results of coordination study:
1. Tabular Format of Settings Selected for Overcurrent Protective Devices:
 - a. Device tag.
 - b. Relay-current transformer ratios; and tap, time-dial, and instantaneous-pickup values.
 - c. Circuit-breaker sensor rating; and long-time, short-time, and instantaneous settings.
 - d. Fuse-current rating and type.
 - e. Ground-fault relay-pickup and time-delay settings.
 2. Coordination Curves: Prepared to determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between devices installed in series, including power utility company's upstream devices. Prepare separate sets of curves for the switching schemes and for emergency periods where the power source is local generation. Show the following information:
 - a. Device tag.
 - b. Voltage and current ratio for curves.
 - c. Three-phase and single-phase damage points for each transformer.
 - d. No damage, melting, and clearing curves for fuses.
 - e. Cable damage curves.
 - f. Transformer inrush points.
 - g. Maximum fault-current cutoff point.
- G. Completed data sheets for setting of overcurrent protective devices.

3.5 ARC FLASH STUDY

A. System Data

1. Provide an electrical system single-line diagram as required by NFPA 70E, 2004 Edition, "Standard for Electrical Safety in the Workplace", as referenced in OSHA 29 CFR 1910 Subpart S, Appendix A. This information shall include nameplate data for electrical components (e.g. transformers, panelboards, switchboards, motor control centers, etc.) for all portions of the electrical system from the utility intertie through the lowest rated panelboard in the scope of this project.
2. Cable sizes, types and lengths between electrical equipment components and up to date utility source data shall be provided for an accurate single-line representation of the electrical system. Unique characteristics of the equipment installation shall be provided which may impact the magnitude of the potential hazard (e.g. open space versus enclosure). Overcurrent device settings shall be verified.
3. Data collection may require removal of barriers, opening of front panels, etc. while equipment is energized. The consultant must provide proof (written documentation) that its employees working on the premises of have been properly trained in the use and application of personal protective equipment (PPE) and the hazards of working on or near energized equipment. The consultant must provide its own PPE protection with a minimum arc thermal performance rating (ATPV) of 40 calories/cm².

B. System Analysis: A comprehensive analysis of the electrical system shall be performed for all equipment. This analysis shall include the following:

1. Short Circuit Study – A short circuit analysis shall be performed in accordance with ANSI standard C37 and IEEE standard 141-1993 (Red Book) for each electrical component as defined in “Section A. “
2. Coordination Study – A coordination study shall be performed in accordance with IEEE 242-2001 “Buff” to determine the proper overcurrent device settings that will balance system reliability through selective coordination while minimizing the magnitude of an electrical arc flash hazard incident.
3. Incident Energy Study – An incident energy study shall be done in accordance with the IEEE 1584-2004a,” IEEE Guide for Performing Arc Flash Hazard Calculations” as referenced in NFPA 70, “Standard for Electrical Safety in the Workplace”, 2004 Revision, in order to quantify the hazard for selection of personal protective equipment (PPE). Tables that assume fault current levels and clearing time for proper PPE selection are not acceptable. The consultant shall in selecting appropriate combinations of PPE prior to the final analysis and preparation of equipment labels.

C. Design Review: The consultant shall assist with system design adjustments to optimize the results of the study as it relates to safety and reliable electrical system operation (e.g. overcurrent device settings, working distances, current limiting devices). This includes mitigation, where possible, of incident energy levels that exceed 40 calories/cm². A qualified engineer with power systems design experience shall provide this assistance.

D. Study Report: The consultant shall supply a comprehensive report that includes:

- Report summary with analysis methodology, findings and recommendations
- Summary of input data for utility source, equipment and cables
- Available fault current at each equipment location with comparison to equipment rating
- Overcurrent device settings (e.g. pick-up, time delay, curve), “as found” and “as recommended”
- Incident energy level (calories/cm²) for each equipment location and recommended PPE
- Overcurrent device coordination curves including related section of the single-line diagram
- Complete system single-line diagram for the system analyzed

E. Labels: Based on the results of the incident energy study, the consultant shall produce and install a warning label (orange ≤ 40 cal/cm²) or danger label (red > 40 cal/cm²) for each piece of equipment as specified in “Section A” in accordance with ANSI Z535.4-2002. The label must be readable in both indoor and outdoor environments for at least 3 years and contain the following information:

- Arc hazard boundary (inches)
- Working distance (inches)