

SECTION 08800 - GLASS AND GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

Extent of glass and glazing work is indicated on drawings.

Types of work in this section include glass and glazing for: Doors, as scheduled

1.3 DESCRIPTION OF WORK

Provide glass and glazing that has been produced, fabricated and installed to withstand normal impact without failure including loss or breakage of glass, failure of sealants or gaskets to remain tight, deterioration of glass and glazing materials and other defects in the work.

1.4 SUBMITTALS

Submit manufacturer's technical data for each glazing material and fabricated glass product required.

1.5 QUALITY ASSURANCE:

Where safety glass is indicated or required by authorities having jurisdiction, provide type of products indicated which comply with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for category II materials.

Wire Glass: Provide wire glass products that are identical to those tested per ASTM E 163 (UL 9) and are labeled and listed by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.

1.6 DELIVERY, STORAGE, AND HANDLING:

Protect glass and glazing materials during delivery, storage and handling to comply with manufacturer's directions and as required to prevent edge damage to glass, and damage to glass and glazing materials from effects of moisture including condensation, of temperature changes, of direct exposure to sun, and from other causes.

1.7 WARRANTY:

General: Warranties shall be in addition to, and not a limitation of, other rights the Owner may have under the Contract Documents.

Warranty Period: Manufacturer's standard but not less than 3 years after date of substantial completion.

PART 2 - PRODUCTS

2.1 Subject to compliance with requirements, provide products of one of the following:

PPG Industries, Inc.
Guardian Industries Corp.
Pilkington Sales (North America) Limited.

2.2 GLASS PRODUCTS, GENERAL

A. Primary Glass Standard: Provide primary glass which complies with ASTM C 1036 requirements, including those indicated by reference to type, class, quality, and, if applicable, form, finish, mesh and pattern.

B. PRIMARY GLASS PRODUCTS:

Clear Float Glass: Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select).

Wired Glass: Type II (patterned and wired glass, flat), Class 1 (translucent), Quality q8 (glazing); complying with ANSI Z97.1; 1/4" thick, Form 1 (wired, polished both sides), diamond or square mesh.

PART 3 - EXECUTION

3.1. EXAMINATION:

A. Glazier to inspect work of glass framing erector for compliance with manufacturing and installation tolerances, including those for size, squareness, offsets at corners; for existence of minimum required face or edge clearances; and for effective sealing of joinery. Do not allow work to proceed until unsatisfactory conditions have been corrected.

B. GLAZING, GENERAL:

Comply with combined printed recommendations of glass manufacturers, of manufacturers of sealants, gaskets and other glazing materials.

3.2 PROTECTION AND CLEANING:

A. Protect exterior glass from breakage immediately upon installation by use of crossed streamers attached to framing and held away from glass. Do not apply markers to surfaces of glass. Remove nonpermanent labels and clean surfaces.

B. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during construction period. Clean glass.

END OF SECTION

SECTION 09300 - CERAMIC TILE

PART 1 - GENERAL

1.1 DEFINITION

- A. Tile includes ceramic surfacing units made from clay or other ceramic materials.

1.2 SECTION INCLUDES

- A. Installation Glazed Wall tile over gypsum wallboard.
- B. Installation of floor tile on concrete.
- C. Extent of tile work is indicated on drawings and schedules.

1.3 QUALITY ASSURANCE:

A. SOURCE OF MATERIALS

1. Obtain each color, grade, finish, type, composition, and variety of tile from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the work.
2. Obtain ingredients of a uniform quality from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.

B. INSTALLER'S QUALIFICATIONS

1. Engage an experienced Installer who has successfully completed tile installations similar in material, design, and extent to that indicated for Project.

C. SUBMITTALS:

1. Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
2. Submit product data for each type of product specified.
3. Samples for Selection Purposes: in form of manufacturer's color charts consisting of actual tiles or sections of tile showing full range of colors, textures and patterns available for each type of tile indicated. Include samples of grout and accessories involving color selection.

1.4 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use.

1.5 PROJECT CONDITIONS:

- A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.

- B. Maintain temperatures at not less than 50 deg.F (10 deg.C) in tiled areas during installation and for 7 days after completion, unless higher temperatures are required by referenced installation standard or manufacturer's instructions.

PART 2 - PRODUCTS

2.1 GENERAL

- A. ANSI Standard for Ceramic Tile: Comply with ANSI A137.1 "American National Standard Specifications for Ceramic Tile" for types and grades of tile indicated.
ANSI Standard for Tile Installation Materials: Comply with ANSI standard referenced with products and materials indicated for setting and grouting.

2.2 MANUFACTURERS

A. CERAMIC TILE

- 1. Subject to compliance with requirements, provide products of one of the following manufacturers:
 - a. American Olean Tile Co., Inc.,
 - b. Dal-Tile Corp.,
 - c. Interceramic

B. DRY-SET MORTARS AND GROUT

- 1. Subject to compliance with requirements, provide products of one of the following manufacturers:
 - a. Summitville
 - b. C-Cure
 - c. US Gypsum Co.

2.3 TILE PRODUCTS:

A. FLOOR TILE

- 1. Unglazed Ceramic Mosaic Tile (Toilet Room Floors): Provide factory-mounted flat tile complying with the following requirements:
 - a. Type: Porcelain.
 - b. Nominal Facial Dimensions: 2" x 2", equal to Dal-Tile Price, Group I.
 - c. Nominal Thickness: 1/4".
 - d. Face: Plain with cushion edges.

B. WALL TILE (Toilet Rooms)

- 1. Provide flat tile complying with the following requirements:
 - a. Nominal Facial Dimensions: 4-1/4" x 4-1/4"; equal to Dal-Tile, Price Group I with Price Group II for accent bands at Restrooms.
 - b. Nominal Thickness: 5/16".
 - c. Face: Plain with modified square edge or cushion edge.
 - d. Mounting: Factory back-mounted.

C. WALL TRIM UNITS

1. Provide tile trim units to match characteristics of adjoining flat tile and to comply with following requirements:
 - a. Wainscote cap: 2" x 6" bullnose
 - b. Internal Corners: Field-buttet square corners, except use covered base angle pieces designed to member with stretcher shapes.

2.4 SETTING MATERIALS:

- A. Portland Cement Mortar Installation Materials: Provide materials to comply with ANSI A108.1 as required for installation method designated, unless otherwise indicated.
- B. Latex-Portland Cement Mortar: ANSI A118.4 composition as follows:
 1. Prepackaged dry mortar mix composed of Portland cement, graded aggregate, and the following dry polymer additive in the form of a re-emulsifiable powder to which only water is added at job site.
- C. Latex additive (water emulsion) of type described below, serving as a replacement for part or all of gauging water, added at job site to prepackaged dry mortar mix supplied or specified by latex manufacturer.

2.5 GROUTING MATERIALS:

- A. Latex-Portland Cement Grout: ANSI A118.6 color as indicated, composition as follows:
 1. Latex additive (water emulsion) service as replacement for part or all of gauging water added at job site with dry grout mixture, with type of late and dry grout mix as follows:
 - a Latex Type: Manufacturer's standard.
 - b. Latex Type: Acrylic resin.

2.6 MIXING MORTARS AND GROUT:

- A. Mix mortars and grouts to comply with requirements of referenced standards and manufacturers for accurately proportioning of materials, water or additive content, mixing equipment and mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortars and grouts of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. EXAMINATION

1. Inspect substrates at areas where surfaces are to receive tile work and conditions Do not proceed with tile work until surfaces and conditions comply with requirements indicated in referenced tile Installation standard.

3.2 INSTALLATION

A. STANDARDS

1. ANSI Tile Installation Standard: Comply with applicable parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile".
2. TCA Installation Guidelines: TCA "Handbook for Ceramic Tile Installation"; comply with TCA installation methods indicated or, if not otherwise indicated, as applicable to installation conditions shown.

B. PROCEDURES

1. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures and other penetrations so that plates, collars, or covers overlap tile.
2. Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls and trim are same size. Layout tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths.
3. Grout tile to comply with the requirements of the following installation standards:
 - a. For ceramic tile grouts (sand-Portland cement, dry-set, commercial Portland cement, and latex-Portland cement grouts) comply with ANSI A108.10.

3.3 CLEANING AND PROTECTION:

A. CLEANING

1. Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
2. Remove latex-Portland cement grout residue from tile as soon as possible.
3. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions, but no sooner than 14 days after installation. Protect metal surfaces, cast iron and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
4. Leave finished installation clean and free of cracked, chipped, broken, unbanded, or otherwise defective tile work.

B. PROTECTION

1. Maintain conditions in a manner that ensures that tile is without damage or deterioration at time of Substantial Completion.
2. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.

END OF SECTION

SECTION 09501 – ACOUSTICAL CEILING SUSPENSION SYSTEM

PART 1: GENERAL:

1.1 SCOPE:

- A. Perform all work required to complete the Acoustical ceiling Steel exposed suspension system indicated by the Contract Documents and furnish all supplementary items for the proper installation.
- B. The requirements of Division 0 - " Bidding and Contract Requirements" and division 1 - " General Requirements " of this Project manual apply to all work required for this Section.

1.2 SUBMITTAL:

- A. Samples: Submit sample of suspension system showing cross tee connection to main beam. Submit sample of angle molding.

PART 2: PRODUCTS:

2.1 ACCEPTABLE MANUFACTURERS:

- A. Material manufactured by any of the following manufacturers is acceptable, provided it complies with the Contract Documents:

- 1. SUSPENSION SYSTEMS:
 - a. ARMSTRONG
 - b. CHICAGO METALLIC
 - c. DONN PRODUCTS, INC.

2.2 MATERIALS: only as applicable.

- A. STEEL EXPOSED SUSPENSION GRID SYSTEM: chemically cleansed, electro-galvanized and bonderized, with high baked enamel finish on all parts and painted white enamel finish on exposed surfaces, ASTM C-635, maximum deflection 0.133 inch, Intermediate Duty.

- 1. Main Beams: .015 inch minimum commercial grade steel, bulb section, 1- 1/2" web and 15/16" flange, 12 lbs. per lineal foot simple span minimum load limit. Rout beams at 12" on center.
- 2. Cross Tees: .015 inch minimum steel, 1-1/4 " web and 15/16" flange, force TAB-LOCK ends for attachment to adjoining beam cross tee, providing

minimum torsional movement and lateral displacement. Rout tees at 12" on center.

3. Beam Cross Tees: .015 inch minimum steel, 1-1/2' web and flange formed TAB-LOCK ends for attachment to adjoining main beam, providing torsional movement and lateral displacement, 12 lbs. per lineal foot simple span minimum load limit. Rout tees at 12".
4. Angle Moulding: .020 inch minimum cold rolled steel, 15/16"x15/16".
5. Accessories: Specifically designed as an integral part of the grid system.
6. Fire rating: Not required.

B. WIRE: 12 gauge galvanized, soft annealed, mild steel wire.

PART 3: EXECUTION:

3.1 PREPARATION:

- A. Examine spaces and correct defects that could interfere with proper installation. Installed suspension system shall meet requirements of "Specifications for Acoustical Tile and Lay-In Panel Ceiling Suspension System," published by the Acoustical Materials Association.
- B. Install acoustical treatment after moist materials have been installed. maintain temperature and humidity conditions closely approximating the interior conditions which will exist when the building is occupied but not less than 50 degrees or more than 85 degrees F. before, during and after installation.
- C. Layout spaces and arrange suspension system in a regular pattern parallel or perpendicular to surrounding walls. Arrange system symmetrically about room centerlines in both directions equalizing borders. No border shall be less than one -half the tile width.

3.2 STEEL EXPOSED SUSPENSION SYSTEM INSTALLATION:

- A. Install angle moulding around perimeters and abutting surfaces, at proper level for finished ceiling height. Miter angle moulding at exterior corners; cut flanges and bend web to form interior corners.
- B. Suspend main beams spaced 4'-0" on center from structure with wire hangers spaced 4'-0" on center. Install main beams level within 1/8" in 12 feet with hanger wire taut and tightly wrapped to prevent vertical movement or rotation.

do not make local kinks or bends in hanger wires as a means of leveling. Join beams with approved splice unit. Install at 2'-0" o.c. where 24" x 24" ceiling tile is scheduled.

- C. Install beam cross tees at right angles to main beams, space at 2'-0" on center and join to main beams with positive interlock. Install beam cross tees to within 1/32" of their required location and within 0.015 inch of the same horizontal plane as main beam, and never below continuous member.
- D. Lay ends of main beams and cross tees on angle mouldings at vertical surfaces. Provide additional hanger wires at each corner of recessed light troffers and other concentrated load conditions to prevent deflection in excess of 1/240th of the span.
- E. Install cross tees at right angles to beams cross tees to support ends of light fixtures, diffusers or grilles.

3.3 CLEANING AND PROTECTION

- A. Protect acoustical materials and treatment from damage before, during and after installation. Clean to remove soil and stain. Remove and replace damaged units and units which cannot be cleaned. Remove excess materials and debris from Site.

END OF SECTION

SECTION 09511 - ACOUSTICAL CEILING LAY-IN PANELS

PART 1: GENERAL

1.1 SCOPE

- A. Perform all work required to complete the Acoustical Ceiling lay-In Panels indicated by the Contract Documents and furnish all supplementary items for their proper installation.
- B. The requirements of Division 0 - " Bidding and Contract Requirements " and Division 1 - " General Requirements " of this Project Manual shall apply to all work required for this Section.

1.2 SUBMITTAL

- A. Submit sample of acoustical unit specified.

PART 2: PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Material manufactured by any of the following manufacturers is acceptable provided it complies with the Contract Documents:

Armstrong Building Products
Conweb Corporation

The Celotex Corporation
National Gypsum Company

2.2 MATERIALS

- A. **CEILING TILES, Equal to following:**

24" x 48" ceilings: Armstrong, medium fissured white, square edge, grid face: 15/16"

PART 3: EXECUTION

3.1 PREPARATION

- A. Examine spaces and correct defects that could interfere with proper installation.
- B. Install tiles after-moist materials have been installed. Maintain temperature and humidity conditions closely approximating the interior conditions which will exist when the building is occupied but not less than 50F degrees or more than 85F degrees before, during and after installation.

3.2 ACOUSTICAL PANEL INSTALLATION

- A. Rest acoustical units on flanges of inverted tees with units neatly fitted against abutting surfaces. Fit acoustical units closely and accurately around recessed lighting fixtures, grilles and other fixtures or equipment passing through or in the plane of acoustical finish.
- B. Hold acoustical units in place with a minimum of **four hold-down clips** per unit at entrances and over partitions. Provide additional hold down clips where acoustical units do not fit snug to system flanges.

3.3 INSULATION INSTALLATION

- A. Install insulation above ceilings with all joints butted tightly. Completely cover entire surface with blankets free from wrinkles, sags, tears, ruptures, etc. Lay batts flat in the ceiling without being compressed. place snug against each other so as to leave no space between batts.

3.4 CLEANING AND PROTECTION

- A. Protect acoustical materials and treatment from damaged before, during and after installation. Clean to remove soil and stain. Remove and replace Damage units and units which cannot be cleaned. Remove excess materials and debris from Site.

END OF SECTION

SECTION 09650 - RESILIENT FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Provide and install vinyl composition tile flooring over concrete floors.
- B. Provide and install resilient base and related accessories.
- C. Extent of resilient flooring and accessories is shown on drawings and in schedules.

1.2 QUALITY ASSURANCE

A. SINGLE SOURCE RESPONSIBILITY

- 1. Provide each type of resilient flooring and accessories as produced by a single manufacturer, including recommended primers, adhesives, sealants, and leveling compounds.

B. MATERIALS PERFORMANCE STANDARD

- 1. Flame Spread: Not more than 75 per ASTM E 84.
- 2. Smoke Developed: Not more than 450 per ASTM E 84.
- 3. Smoke Density: Not more than 450 per ASTM E 662.

1.3 SUBMITTALS

- A. Samples for Initial Selection Purposes: Submit manufacturer's standard color charts in form of actual sections of resilient flooring, including accessories, showing full range of colors and patterns available.
- B. Maintenance Instructions: Submit manufacturer's recommended maintenance practices for each type of resilient flooring and accessory required.

1.4 PROJECT CONDITIONS

- A. Maintain minimum temperature of 65 deg. F (18 deg. C) in spaces to receive resilient flooring for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. Store resilient flooring materials in spaces where they will be installed for at least 48 hours before beginning installation. Subsequently, maintain minimum temperature of 55 deg. F (13 deg. C) in areas where work is completed.
- B. Install resilient flooring and accessories after other finishing operations, including painting, have been completed. Do not install resilient flooring over concrete slabs until the latter have been cured and are sufficiently dry to achieve bond with adhesive as determined by resilient flooring manufacturer's recommended bond and moisture test.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products of one of the following:
 - 1. Manufacturers of Vinyl Composition Tile & Striping
 - a. Armstrong World Industries, Inc.
 - b. Azrock Floor Products Div., Azrock Industries, Inc.
 - c. Kentile Floors, Inc.
 - 2. Manufacturers of Vinyl Wall Base:
 - a. Armstrong World Industries, Inc.
 - b. Azrock Floor Products Div., Azrock Industries, Inc.
 - c. Mercer

2.2 RESILIENT FLOORING

- A. Vinyl Composition Tile: FS SS-T-312, Type IV; 12" x 12" Composition 1 - asbestos-free. Gage: 1/8".
- B. Provide color and patterns as indicated, or if not otherwise indicated, as selected by Architect from manufacturer's standards.

2.3 ACCESSORIES

- A. Vinyl Wall Base: Provide vinyl base complying with FS SS-W-40, Type II, with matching end stops and preformed corner units, and as follows:
 - 1. Wall Base: Height: 4". (Roll Stock)
 - 2. Thickness: 1/8" gage.
 - 3. Style: Standard top-set cove
 - 4. Finish: Standard Matte
- B. Stair Treads: Johnsonite VIVG-sq, or
Stair nosings: Johnsonite VDL-XX-sq
- C. Adhesives (Cements): Waterproof, stabilized type as recommended by flooring manufacturer to suit material and substrate conditions.
- D. Concrete Slab Primer: Non-staining type as recommended by tile flooring manufacturer.
- E. Leveling and Patching Compounds: Latex types as recommended by flooring manufacturer.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Require Installer to inspect subfloor surfaces to determine that they are satisfactory.

- B. A satisfactory sub-floor surface is defined as one that is smooth and free from cracks, holes, ridges, coatings preventing adhesive bond, and other defects impairing performance or appearance. Do not allow resilient flooring work to proceed until sub-floor surfaces are satisfactory.

3.2 PREPARATION

- A. Prepare sub-floor surfaces as follows:
 1. Use leveling and patching compounds as recommended by resilient flooring manufacturer for filling small cracks, holes and depressions in subfloors.
 2. Remove coatings from subfloor surfaces that would prevent adhesive bond, including curing compounds incompatible with resilient flooring adhesives, paint, oils, waxes and sealers.
 3. Broom clean or vacuum surfaces to be covered, and inspect subfloor.
- B. Apply concrete slab primer, if recommended by flooring manufacturer, prior to application of adhesive. Apply in compliance with manufacturer's directions.

3.3 INSTALLATION

A. INSTALLATION, GENERAL

1. Install resilient flooring using method indicated in strict compliance with manufacturer's printed instructions. Extend resilient flooring into toe spaces, door reveals, and into closets and similar openings.
2. Scribe, cut, and fit resilient flooring to permanent fixtures, built-in furniture and cabinets, pipes, outlets and permanent columns, walls and partitions.
3. Tightly cement resilient flooring to sub-base without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections. Hand roll resilient flooring at perimeter of each covered area to assure adhesion.

3.4 INSTALLATION OF MATERIALS

A. Install floor tile as follows:

1. Lay tile from center marks established with principal walls, discounting minor offsets, so that tile at opposite edges of room area of equal width. Adjust as necessary to avoid use of cut widths less than 1/2 tile at room perimeters. Lay tile square to room axis.
2. Match tiles for color and pattern by using tile from cartons in same sequence as manufactured and packaged if so numbered. Cut tile neatly around all fixtures. Broken, cracked, chipped, or deformed tiles are not acceptable.
3. Adhere tile flooring to substrates using full spread of adhesive applied in compliance with flooring manufacturer's directions.
4. Caulk around bottom of all door frames.

B. Install accessories as follows:

1. Apply wall base to walls, columns, pilasters, casework and other permanent fixtures in rooms or areas where base is required. Install base in lengths as long as practicable, with preformed corner units, or fabricated from base materials with mitered or coped inside corners.
2. Tightly bond base to substrate throughout length of each piece, with continuous contact at horizontal and vertical surfaces.
3. On masonry surfaces, or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.

3.5 CLEANING AND PROTECTION

- A. Perform following operations immediately upon completion of resilient flooring:
 1. Sweep or vacuum floor thoroughly. Do not wash floor until time period recommended by resilient flooring manufacturer has elapsed to allow resilient flooring to become well-sealed in adhesive. Damp-mop floor being careful to remove black marks and excessive soil.
 2. Remove any excess adhesive or other surface blemishes, using cleaning product recommended by resilient flooring manufacturers.
 3. Clean resilient flooring not more than 4 days prior to date scheduled for inspections intended to establish date of substantial completion in each area of project. Clean resilient flooring by method recommended by resilient flooring manufacturer.
 4. Strip protective floor polish, which was applied after completion of installation, prior to cleaning. Reapply floor polish after cleaning.

3.6 EXTRA STOCK

- A. Deliver stock of maintenance materials to Owner. Furnish maintenance materials from same manufactured lot as materials installed and enclosed in protective packaging with appropriate identifying labels. Furnish not less than one box for each 50 boxes or fraction thereof, for each type, color, pattern and size of tile installed.

END OF SECTION

SECTION 09900 - PAINTING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Work includes painting and finishing of interior and exterior exposed items and surfaces throughout project, except as otherwise indicated.
- B. Extent of painting work is indicated on drawings and schedules, and as herein specified.

1.2 DESCRIPTION OF WORK

- A. Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of work.
- B. "Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.
- C. Surfaces to be Painted: Except where natural finish of material is specifically noted as a surface not be painted, paint exposed surfaces whether or not colors are designated in "schedules". Where items or surfaces are not specifically mentioned, paint the same as similar adjacent materials or areas. If color or finish is not designated, Architect will select these from standard colors or finishes available.
- D. Do not paint over any code-required labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

1.3 QUALITY ASSURANCE

- A. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.
- B. Coordination of Work: Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical information including paint label analysis and application instructions for each material proposed for use.
- B. Samples: Prior to beginning work, Architect will furnish color chips for surfaces to be painted. Use representative colors when preparing samples for review. Submit

samples for Architect's review of color and texture only. Provide a listing of material and application for each coat of each finish sample.

- C. On 12" x 12" hardboard, provide two samples of each color and material, with texture to simulate actual conditions. Resubmit samples as requested by Architect until acceptable sheen, color, and texture is achieved.
- D. On actual wall surfaces and other exterior and interior building components, duplicate painted finishes of prepared samples. Provide full-coat finish samples on at least 9 sq. ft. of surface, as directed, until required sheen, color and texture is obtained; simulate finished lighting conditions for review of in-place work.
- E. Final acceptance of colors will be from samples applied on the job.

1.5 DELIVERY AND STORAGE

- A. Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name and label, and following information:
 - 1. Name or title of material.
 - 2. Manufacturer's name.
 - 3. Contents by volume, for major pigment and vehicle constituents.
 - 4. Thinning instructions.
 - 5. Application instructions.
 - 6. Color name and number.
- B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage of paint in a clean condition, free of foreign materials and residue.
- C. Protect from freezing where necessary. Keep storage area neat and orderly. Remove oily rags and waste daily. Take all precautions to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of paints.

1.6 JOB CONDITIONS

- A. Apply water-base paints only when temperature of surfaces to be painted and surrounding air temperatures are between 50 deg. F (10 deg. C) and 90 deg. F (32 deg. C), unless otherwise permitted by paint manufacturer's printed instructions.
- B. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between 45 deg. F (7 deg. C) and 95 deg. F (35 deg. C), unless otherwise permitted by paint manufacturer's printed instructions.
- C. Do not apply paint in rain, fog or mist, or when relative humidity exceeds 85%, or to damp or wet surfaces, unless otherwise permitted by paint manufacturer's printed instructions.
- D. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include; but are not limited to, the following:
 - 1. PPG Industries, Pittsburgh Paints (PiPG).
 - 2. Pratt and Lambert (P&L)
 - 4. The Sherwin-Williams Company (S-W).

- B. MATERIALS
 - 1. Rust-Inhibiting Primer: Quick-drying, rust- inhibiting primer for priming ferrous metal and touch-up of shop-primed steel.
 - a. PPG: Pitt-Tech One Pack
 - b. P&L: Steeltech
 - c. S-W: All Surface
 - 2. Wood Primer: Interior Undercoat (FS TT-E-543).
 - 3. Paint for metal: Exterior oil base enamel for use over primed metal including all hollow metal doors and frames, bollards, stairs and railings.
 - a. PPG: Speedhide
 - b. P&L: Accollade
 - c. S-W: Superpaint
 - 4. Exterior Finish Paint:N/A
 - 5. Masonry Block Filler: Heavy duty latex block filler used for filling open textured interior and exterior concrete masonry block before application of top coats:
 - a. PPG: 6-7 Latex Masonry Block Filler
 - b. P & L: Pro-Hide Plus Block Filler
 - c. S-W: Heavy-Duty Block Filler B42W46
 - 6. Latex Based Interior White Primer: Latex-based primer coating used on interior gypsum drywall under a flat latex paint or an alkyd semigloss enamel.
 - a. PPG: 602 Quick-Dry Latex Primer Sealer
 - b. P & L: Latex Wall Primer Z30001
 - c. S-W: Pro-Mar 200 Latex Wall Primer B28W200.
 - 7. Interior Semigloss Odorless Alkyd Enamel: Low-odor, semigloss, alkyd enamel for use on concrete block, wood, and hardboard and both ferrous and zinc-coated (galvanized) metal surfaces and over a primer on gypsum drywall:
 - a. PPG: 27 Line Wallhide Semigloss Enamel
 - b. P & L: Cellu-Tone Alkyd Satin Enamel
 - c. S-W: Classic 99 Semigloss Enamel A40 Series

PART 3 - EXECUTION

3.1 INSPECTION

- A. Applicator must examine areas and conditions under which painting work is to be applied and notify Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions been corrected in a manner acceptable to Applicator.

- B. Starting of painting work will be construed as Applicator's acceptance of surfaces and conditions within any particular area.

- C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.

3.2 SURFACE PREPARATION

- A. General: Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.
- B. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for complete painting of items and adjacent surfaces. Following completion of painting of each space or area, reinstall removed items.
- C. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly-painted surfaces.
- D. Cementitious Materials: Prepare cementitious surfaces of concrete block, and cement plaster to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, and by roughening as required to remove glaze.
- E. Wood: Clean wood surfaces to be painted of dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view, and dust off. .
- F. Prime, stain, or seal wood required to be job-painted immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of such wood, including cabinets, counters, cases, paneling.
- G. When transparent finish is required, use spar varnish for backpriming.
- H. Seal tops, bottoms, and cut-outs of un-primed wood doors with a heavy coat of varnish or equivalent sealer immediately upon delivery to job.
- I. Ferrous Metals: Clean ferrous surfaces, which are not galvanized or shop-coated, of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.
- J. Touch-up shop-applied prime coats wherever damaged or bare, where required by other sections of these specifications. Clean and touch-up with same type shop primer.

3.3 MATERIALS PREPARATION

- A. Mix and prepare painting materials in accordance with manufacturer's directions.
- B. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.

- C. Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

3.4 APPLICATION

- A. Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
- B. Provide two finish coats which are compatible with prime paints used.
- C. Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance. Give special attention to insure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
- D. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently-fixed equipment or furniture with prime coat only before final installation of equipment.
- E. Finish exterior doors on tops, bottoms and side edges same as exterior faces, Use oil base enamel for exterior doors
- F. Sand lightly between each succeeding enamel or varnish coat.
- G. Omit first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless otherwise indicated.
- H. Apply first-coat material to surfaces that have been cleaned, pre-treated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
- I. Allow sufficient time between successive coatings to permit proper drying. Do not re-coat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
- J. Apply materials at not less than manufacturer's recommended spreading rate, to establish a total dry film thickness as indicated or, if not indicated, recommended by coating manufacturer.
- K. Apply prime coat of material which is required to be painted or finished, and which has not been prime coated by others.
- L. Re-coat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.
- M. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling such as laps, irregularity in texture, skid marks, or

other surface imperfections.

- N. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable.
- O. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

3.5 FIELD QUALITY CONTROL

A. TESTING

1. The right is reserved by Owner to invoke the following material testing procedure at any time, and any number of times during period of field painting: Engage services of an independent testing laboratory to sample paint being used. Samples of materials delivered to project site will be taken, identified and sealed, and certified in presence of Contractor.
2. Testing laboratory may perform tests for any or all of following characteristics: Abrasion resistance, apparent reflectivity, flexibility, washability, absorption, accelerated weathering, dry opacity, accelerated yellowness, re-coating, skinning, color retention, alkali resistance and quantitative materials analysis.
3. If test results show that material being used does not comply with specified requirements, Contractor may be directed to stop painting work, and remove non-complying paint; pay for testing; repaint surfaces coated with rejected paint; remove rejected paint from previously painted surfaces if, upon repainting with specified paint, the two coatings are non-compatible.

3.6 CLEAN-UP AND PROTECTION

A. CLEAN-UP

1. During progress of work, remove from site discarded paint materials, cans and rags at end of each work day.
2. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

B. PROTECTION

1. Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.
2. Provide "Wet Paint" signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.
3. At completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

END OF SECTION

SECTION 10100 MARKERBOARDS / TACKBOARDS

PART 1 GENERAL:

1.1 SECTION INCLUDES

- A. Providing and installing marker board and tack boards as herein specified.

1.2 RELATED SECTIONS

- A. Refer to drawings for locations of items provided under this section.

1.3 ACCEPTABLE MANUFACTURERS

- A. Unless otherwise acceptable to the Architect, furnish all products by one manufacturer for the entire project. The following are approved manufacturers:
 1. Claridge
 2. Best-Rite
 3. Greensteel

1.4 SUBMITTALS

- A. Submit drawings with details and dimensions for each item specified Submit manufacturer's data for product surfaces .
- B. Submit manufacturer's standard color selection chart.

PART 2 PRODUCTS

2.1 GENERAL

- A. Provide factory-built units of sizes shown Provide straight, single length units wherever possible and keep joints to a minimum. Miter all corners to a neat, hairline closure. Furnish exposed aluminum trim, accessories and fasteners with anodized finish complying with AA-M3A31
- B. Marker boards to have standard extruded ribbed trough, continuous along bottom of unit. Troughs to have end closures.
- C. Provide marker board units with map rail at top. Rail to have integral cork display strip, approximately 2" wide and be equipped with stops at each end.

2.2 TACK BOARDS

- A. Type: Equal to Claridge Series 8 with 1/4" thick fabricork.
Size : 4' H x 5' W , **2 req'd.**

2.2 MARKER BOARDS

- A. Type: Equal to Claridge Series 5
Board LCS 24-217-A
Size: 4' H x 8' W, **2 req'd**

PART 3 INSTALLATION

3.1 MANUFACTURER'S INSTRUCTIONS

- A. Install as per manufacturer's written instructions. Verify Room & mounting location before installing.

3.2 REPLACEMENTS AND CLEAN-UP.

- A. Replace any damaged materials.
- B. Clean all surfaces affected by installations.

END OF SECTION

SECTION 10160 - TOILET PARTITIONS

1 PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

Extent of toilet partitions is indicated on drawings.

Type of toilet compartments :

Plastic laminate finish.

Style of toilet compartments :

Floor supported, overhead braced.

Toilet accessories, such as toilet paper holders, grab bars, are specified elsewhere in Division 10.

1.3 SUBMITTALS

Product Data: Submit manufacturer's detailed technical data for materials, fabrication, and installation, including catalog cuts of anchors, hardware, fastenings, and accessories.

Shop Drawings: Submit shop drawings for fabrication and erection of toilet partition assemblies not fully described by product drawings, templates, and instructions for installation of anchorage devices built into other work.

Samples: Submit full range of color samples for each type of unit required.

1.4 QUALITY ASSURANCE

Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication where possible, to ensure proper fitting of work. However, allow for adjustments within specified tolerances where ever taking of field measurements before fabrication might delay work.

Coordination: Furnish inserts and anchorages which must be built into other work for installation of toilet partitions and related work; coordinate delivery with other work to avoid delay.

PART 2 - PRODUCTS

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

Accurate Partitions Div., United States Gypsum Co.
American Sanitary Partition Corp.
Ampco Products Inc.
General Partitions Mfg. Corp.
Tex-Lam Manufacturing

2 MATERIALS

General: Provide materials which have been selected for surface flatness and smoothness. Exposed surfaces which exhibit pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections on finished units are not acceptable.

Plastic Laminate: NEMA Std. LD-3, minimum 0.050" thick, color and pattern as indicated or, if not indicated, as selected by Architect from manufacturer's standards.

Core Material for Plastic Laminate: Manufacturer's standard particleboard, in thickness to provide nominal dimension of 1" minimum for all components.

Pilaster Shoes: ASTM A 167, Type 302/304 stainless steel, not less than 3" high, 20 gage, finished to match hardware.

Stirrup Brackets: Manufacturer's standard design for attaching panels to walls and pilasters, either chromium-plated non-ferrous cast alloy ("Zamac") or anodized aluminum.

Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories of chromium-plated non-ferrous cast alloy ("Zamac").

Overhead-Bracing: Continuous extruded aluminum, anti-grip profile, with clear anodized finish.

Anchorage and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, chromium-plated steel, or brass finished to match hardware, with theft-resistant type heads and nuts. For concealed anchors, use hot-dip galvanized, cadmium-plated, or other rust-resistant protective-coated steel.

2.1 FABRICATION

General: Furnish standard doors, panels, screens, and pilasters fabricated for partition system, unless otherwise indicated. Furnish units with cutouts, drilled holes, and internal reinforcement to receive partition-mounted hardware, accessories, and grab bars, as indicated.

Doors Dimensions: Unless otherwise indicated, furnish 24" wide toilet stalls and 32" wide at stalls equipped for use by handicapped as shown on plan.

Plastic Laminate Partitions:

General: Pressure-laminate one-piece face sheets to core material with no splices or joints, and with edges straight and sealed. Seal exposed core material at cutouts to protect against moisture.

Overhead-Braced Partitions: Furnish galvanized steel supports and leveling bolts at pilasters, as recommended by manufacturer to suit floor conditions. Make provisions for setting and securing continuous extruded aluminum anti-grip overhead-bracing at top of each pilaster. Furnish shoe at each pilaster to conceal supports and leveling mechanism.

Floor-Supported Partitions: Furnish galvanized steel anchorage devices, complete with threaded rods, lock washers, and leveling adjustment nuts at pilasters, to permit structural connection at floor. Furnish shoe at each pilaster to conceal anchorage.

Hardware: Furnish hardware for each compartment in partition system, as follows:

Hinges: Cutout inset type, adjustable to hold door open at any angle up to 90 degrees. Provide gravity type, spring-action cam type, or concealed torsion rod type, to suit manufacturer's standards.

Latch and Keeper: Manufacturer's standard surface-mounted latch unit, designed for emergency access, with combination rubber-faced door strike and keeper.

Coat Hook: Manufacturer's standard unit, combination hook and rubber-tipped bumper, sized to prevent door hitting mounted accessories.

Door Pull: Manufacturer's standard unit for out-swing doors.

3 PART 3 - EXECUTION

3.1 INSTALLATION

General: Comply with manufacturer's recommended procedures and installation sequence. Install partitions rigid, straight, plumb, and level. Provide clearances of not more than 1/2" between pilasters and panels, and not more than 1" between panels and walls. Secure panels to walls with not less than two stirrup brackets attached near top and bottom of panel. Locate wall brackets so that holes for wall anchorages occur in masonry or tile joints. Secure panels to pilasters with not less than two stirrup brackets located to align with stirrup brackets at wall. Secure panels in position with manufacturer's recommended anchoring devices.

Overhead-Braced Partitions: Secure pilasters to floor and level, plumb, and tighten installation with devices furnished. Secure overhead-brace to each pilaster with not less than two fasteners. Hang doors and adjust so that tops of doors are parallel with overhead-brace when doors are in closed position.

Floor-Supported Partitions: Set pilaster units with anchorages having not less than 2" penetration into structural floor, unless otherwise recommended by partition manufacturer.

Level, plumb, and tighten installation with devices furnished. Hang doors and adjust so that tops of doors are level with tops of pilasters when doors are in closed position.

3.2 ADJUST AND CLEAN

Hardware Adjustment: Adjust and lubricate hardware for proper operation. Set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors (and entrance swing doors) to return to fully closed position.

Clean exposed surfaces of partition systems using materials and methods recommended by manufacturer, and provide protection as necessary to prevent damage during remainder of construction period.

END OF SECTION

SECTION 10440 - IDENTIFYING DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Furnishing and installing one building plaque, room identification signs and building identification letters in the quantities and of the types listed herein.

1.2 RELATED DOCUMENTS

- A. Refer to drawings for the plaque design and locations of the identifying devices and the related wall finishes.

1.3 QUALITY ASSURANCE

- A. Manufacturer: For each product indicated, furnish product of a single manufacturer.

1.4 SUBMITTALS

- A. Plaque: Submit scaled drawing indicating size, finishes and lettering.
- B. Room Identification Signs: Submit list of signs required and standard color chart.
- C. Building Identification Letters: Submit manufacturer's data showing size, material and letter style based on the requirements shown below.

PART 2 PRODUCTS

2.1 AVAILABLE MANUFACTURERS

- A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
 1. A.R.K. Ramos,
 2. Southwell
 3. Matthews
 4. Metallic Arts

2.2 DESCRIPTIONS OF PRODUCTS

A. BUILDING PLAQUE:

1. Cast aluminum, 18"x 24". Double border, raised letters.
2. Install in strict accordance with manufacturers recommendations.
3. Locate as directed by Architect on masonry. wall.

B. ROOM IDENTIFICATION SIGNS (NAMEPLATES)

1. Material: Multi-layered acrylic nameplates. All nameplates to include braille.
2. Letter Style: Helvetica Medium, upper case
3. Size: Height and length as required.
4. Adhesive mounting

5. Sign Text and quantity: Provide as follows:

OFFICE (2)	CLASSROOM 1 (1)
STORAGE (2)	CLASSROOM 2 (1)
CONCESSIONS (1)	MECHANICAL (2)

C. HANDICAP SIGN FOR RESTROOMS

1. Provide two handicap signs lettered **MEN** and two lettered **WOMEN** toilet room. Signs shall have raised letters and symbols.
2. Characters shall be minimum of 3/4" high. Sign shall include the room name, international symbol of accessibility and the respective adult symbol for men and women.
3. Include Type II ADA Braille

E. BUILDING IDENTIFICATION LETTERS

1. Material: Standard cast aluminum,
2. Letter size: 15" high
3. Letter style: Helvetica Medium, all upper case
4. Finish: Baked enamel
5. Color:
6. Fastening: Projected mount with collars and threaded studs set in adhesive.
7. Letters: WESLACO BOYS AND GIRLS CLUB RECREATION CENTER

F. BUILDING ADDRESS NUMBERS

1. Same description as letters. 8" high.
2. Provide four numbers. Numbers to be determined.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Locate signage and accessories where shown, using mounting methods of the type described and in compliance with the manufacturers instructions. Install sign units level, plumb and with sign surfaces free from distortion or other defects. defects in appearance.
- B. At completion of the installation, clean soiled sign surfaces in accordance with the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

END OF SECTION

SECTION 10522 - FIRE EXTINGUISHERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Provide and install fire extinguisher units where indicated on drawings.
10 required, on brackets

1.3 RELATED SECTIONS

- A. Drawings for mounting height and locations.

1.4 QUALITY ASSURANCE

- A. Single Source Responsibility: Obtain products in this section from one manufacturer.
- B. UL-Listed Products: Provide new portable fire extinguishers which are UL-listed and bear UL "Listing Mark" for type, rating, and classification of extinguisher indicated.

1.5 SUBMITTALS

- A. Submit manufacturer's data for product included in this section.

PART 2 PRODUCT

2.1 AVAILABLE MANUFACTURERS

- A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
J.L. Industries Larsen's Mfg. Co.

2.2 FIRE EXTINGUISHER TYPE

- A. Multi-purpose ABC, 2A- 40 BC rating. Fill and service extinguishers to comply with requirements of governing authorities and manufacturer's requirements.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install items in locations and at mounting heights indicated.
- B. Securely fasten mounting brackets and fire extinguisher cabinets to masonry walls, square and plumb, to comply with manufacturer's instructions.

END OF SECTION

SECTION 10530 - ALUMINUM OVERHEAD SUPPORTED CANOPY

Part 1: General

1.01 Related Documents

- A. The requirements of Division 1 specifications shall apply to work specified in the section.**

1.02 References

- A. International Building Code 2006**
B. ASCE 7-05, Minimum Design Loads for Buildings and Other Structures
C. Aluminum Design Manual 2005
D. Local governing codes and standards for site location

1.03 General Description of Work

- A. Work in this section shall include design, fabrication, and installation of canopies.**
Two 4'-0" wide x 10'-0" long and three 4'-0" wide x 8'-0" long **required.**

1.04 Submittals

- A. Shop Drawings - Submit complete shop drawings including:**
- 1) Overall canopy layout dimensions**
 - 2) Cut section details including elevation, wall attachment details, and connection details**
 - 3) Flashing details pertaining to aluminum canopy**
 - 4) Canopy anchorage details**
- B. Product Data - Submit manufacturer's product information, specifications, and installation instructions for the aluminum canopy.**
- C. Samples - Submit color selection samples of actual coated aluminum material or actual anodized aluminum material.**
- D. Certification - Provide letter of compliance certifying that the proposed canopy design and layout meets or exceeds all applicable loadings (ex: wind load, rain, live load, dead load, snow load) for the job in accordance with IBC 2006 and ASCE 7-05.**

1.05 Quality Assurance

- A. Manufacturer Qualifications: Minimum five years experience in design, fabrication, and production of aluminum protective covers.**
- B. Components shall be assembled in shop to greatest extent possible to minimize field assembly.**
- C. Aluminum protective cover, including material and workmanship, shall be warranted from defects for a period of one year from date of completion of aluminum protective cover installation.**

Part 2: Products and Materials

2.01 Acceptable Manufacturers

- A. Mitchell Metals, LLC 1761 McCoba Drive, Suite A Smyrna, GA 30080**
Phone 770.431.7300 Fax 770.431.7305

B. Equivalent systems by other manufacturers will be considered for substitution if the following conditions are met:

- 1) Other manufacturers must have submitted requested information and have been qualified to bid no less than 10 days prior to bid closing date.
- 2) Manufacturer must submit complete company literature and information to the architect for review
- 3) Manufacturer must submit complete proposed canopy system details, including size and strength values of all members to be used.

2.02 Design & Assembly

A. Canopy shall use perimeter extruded gutter and extruded decking running perpendicular to wall being attached to. Extruded Decking shall be a roll-locked design where the extruded cap and pan shall interlock

to make a rigid structure. Crimped decking is not allowed. Roll formed decking shall be allowed upon approval by the architect.

B. Canopy gutter frame shall be welded into a single frame unless shipping does not allow. If shipping does not allow, canopy frame shall be riveted together at the corners and caulked inside to make a water-tight frame.

C. Canopy shall be secured to the wall using a 6"x6" extruded wall bracket. A 2"x2" square tube shall be used to connect the canopy frame to the extruded wall bracket. The 2"x2" square tube shall be secured to the canopy frame using an extruded saddle bracket.

D. Canopies shall drain from the decking to the perimeter gutter, and discharge from the bottom of the gutter out of a drain scupper.

E. Canopy shall be pitched toward the scupper/downspout to allow proper drainage out of the canopy frame.

2.03 Materials

A. Support Rods

- 1) Support rods shall be 2"x2" square tubing at 0.125" thick.

B. Decking

- 1) Decking shall be a rigid roll-locked design that is self flashing and utilizes interlocking sections.
- 2) Extruded decking is to be of size indicated on architect's drawings.
- 3) Roll Formed is allowed upon the architect's approval
- 4) Where decking is run parallel to walkway, the ends of the pans shall be welded closed where decking does not terminate into a drain beam.

C. Gutter

- 1) Gutter shall be radius cornered aluminum extrusion of size indicated on architect's drawings. Minimum gutter size shall be 4"x 6" at 0.093" thick.

D. Flashing

- 1) Flashing shall be made of aluminum sheet painted to match the color of the canopy. Minimum flashing thickness shall be 0.040" thick.

2.04 Fasteners

A. All fasteners shall be stainless steel with neoprene washers and rivets are 3/16" aluminum.

2.05 Finish:

A. Factory applied baked enamel

- 1) Enamel is to comply with AAMA 2603.
- 2) Color to be selected from manufacturer's standard color chart.

Part 3: Installation and Execution

3.01 Erection

- A. Canopies are to be installed according to approved shop drawings and plans.
- B. The entire structure shall be installed straight, true, and plumb according to standard construction procedures.
- C. All fasteners penetrating the building's face shall be caulked.
- D. Any blocking necessary to install the overhead supported canopy shall be installed by the General

Contractor according to the approved shop drawings prior to canopy installation.

- E. Canopies shall be installed with positive and negative slope of 1/8" per foot to allow water drainage

from top of canopy to draining scuppers/downspouts and eliminate ponding.

- F. All joints, corners, and connections shall be tight and clean.
- G. All exposed fasteners are to be painted to match the canopy color.
- H. Decking is to be aligned and secured to aluminum frame structure.

3.02 Cleaning

- A. Canopy surfaces exposed are to be cleaned after installation is complete.
- B. Surplus materials and debris shall be removed from the jobsite after installation is complete.

3.03 Protection

- A. General Contractor shall ensure protection of installed aluminum canopy from other construction so that canopy is without damage at time of Substantial Completion of project.

END OF SECTION

SECTION 10800 - TOILET ROOM ACCESSORIES

GENERAL:

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

DESCRIPTION: Provide and install accessories as scheduled herein.

PRODUCTS:

All toilet and bath accessories shall be complete with all required fastenings, and all fastenings shall harmonize with the item being fastened. Provide concealed fastenings

All exposed portions of toilet accessories shall be Type 304 stainless steel.

Provide products of the same manufacturer for each type of accessory unit and for units exposed in the same areas, wherever possible. Coordinate with the Architect for acceptable designs and finishes.

ACCESSORIES: American Specialties, Inc. numbers shown:

Item	Item Number	Quantity required
Toilet Tissue Dispenser	0710	5
Soap Dispenser	0345	2
Paper Towel Dispenser	0210	2
Mirror	0620 (18"x 36")	3
Grab Bar	3200 Series (42")	2
Grab Bar	3200 Series (36")	2
Waste Receptacle	0210	2

Mounting heights to be as shown on plans.

END OF SECTION

SECTION 11481 GYMNASIUM EQUIPMENT

PART 1 – GENERAL

SUMMARY

Section includes: Ceiling suspended, forward folding, manually operated basketball backstops with backboard, goal, winch, backboard edge padding and net, plus all other items included in this Section.

REFERENCES

ASTM A500 - Formed Welded Seamless Structural Tubing in Rounds and Shapes.

SUBMITTALS :

1. List of proposed products and product data.
2. Shop drawings showing layout, dimensions, construction, and method of anchorage.
3. Calculations for actual vertical and horizontal loads to be transmitted to structural roof framing] supporting backstop assemblies. Loads shall be calculated for specific support configuration shown on Drawings.
4. Manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

A. All components including framing, backboard, goals, winches, and accessories for basketball backstop assemblies shall be products of a single manufacturer.

B. Backstops shall be designed, fabricated, and installed to comply with National Collegiate Athletic Association (NCAA) and National Federation of State High School Associations (NFSA) regulations.

1.5 WARRANTY

- A. Provide under provisions of Closeout Procedures:
1. 25 years warranty for basketball backstop structure.
 2. Lifetime warranty against breakage for backboards installed with goal brace.
 3. 5 years warranty for bolt-on safety edge padding.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. These specifications are based on products manufactured by Draper, Inc.. Other acceptable manufacturers include: Porter Athletic Equipment Co.

Aalco Athletic Equipment
Performance Sports Systems (PSS)

2.2 MATERIALS

- A. Structural steel tubing: Steel, mechanical, round tubing conforming to ASTM A500.
- B. Clamps:
 - 1. Beam clamps: Split-A type with [7 square inches] [4516 square mm] minimum beam flange contact area and secured with 2 all thread bolts at each attachment point.
 - 2. Component attachment clamps: Full surface type fabricated from 1/4 inch [6 mm] thick steel.
 - 3. Goal brace: Type attaching behind goal mounting plate and directly to backstop main stem transferring load directly to structural frame.
- C. Extruded aluminum: ASTM B221, alloy 6063 Temper T5.
- D. Aluminum castings: ASTM B85.
- E. Particleboard: Solid core, 55 pounds per cubic foot density industrial grade complying with ASTM A208, Type 1, Grade 1-M-3 factory finished with phenolic resin sheet thermally fused to front and back surfaces.
- F. Finish: Factory applied black powder coat for steel parts.

2.3 CEILING SUSPENDED FORWARD FOLDING BACKSTOP

- A. Type: Ceiling suspended, forward folding, front braced basketball backstop with bent main stem; Model EZ Fold TF-20S as manufactured by Draper, Inc.
- B. Distance from court floor to backstop attachment at roof structure: As indicated on Drawings.
- C. Main frame: Rigid T design of back-to-back right triangles constructed by welding together steel tubing of the following outside diameters and gauges. Parallelogram frames are not acceptable.
 - 1. Bent main center stem: 6 inches diameter, 11 gauge thick]. Strut suspended diagonally from roof structure at 22 degrees angle from vertical. Bend at lower end provides vertical member of length sufficient to allow backstop height adjustment of plus or minus 6 inches.
 - 2. Top member of T frame: 4 inches diameter, 11 gauge.
 - 3. Folding front brace: Jackknife type, fully adjustable, self-locking in down position constructed from 2-1/2 inches diameter, 13 gauge thick outer tube and 2-1/4 inches diameter, 14 gauge inner tube.
 - 4. Diagonal side braces: 2-1/4 inches diameter, 14 gauge thick.
- D. Pivot point: 1-1/4 inches diameter solid steel shaft and 1/2 inch steel plate hangers.

2.8 MANUAL WINCHES (6 required)

A. Provide manual winch for lowering and raising each folding basketball backstop; Manual Winch Model A0489 as manufactured by Draper, Inc.

B. Type: Sealed-bearing, self-locking, worm-gear type. Winch shall be capable of holding backstop in any position during raising and lowering.

1. Provide winch with removable handle.
2. Spool: Designed to lay cable uniformly without stacking.
3. Hoist cable: [1/4 inch] [6 mm] diameter, 7 by 19, galvanized aircraft cable with 7,000 pounds [3175 kg] ultimate breaking strength.
4. Provide [2 by 8 inches] [50 by 203 mm] southern yellow pine pad with chamfered edges and clear lacquer finish for wall mounting winch.

2.9 SAFETY BELT AND LOCK

A. Provide each front and rear folding basketball backstop with safety belt and lock test to withstand [1000 pounds] [454 kg] free fall load.

B. Safety lock: Inertia sensitive to automatically lock backstop in position at any time during storage, raising, or lowering. Sudden increase in either tension or speed shall activate lock.

C. Safety belt: 2 inches wide nylon belt rated at 6000 pounds breaking strength; Safety Belt A0549 as manufactured by Draper, Inc.

D. Belt shall extend 35 feet and shall be automatically retracted and stored on reel equipped with constant force spring. Operation and locking action shall be activated by centrifugal force to lock backstop before unit travels 12 feet [3.7 m] of free fall.

E. Unit shall incorporate automatic reset not requiring poles, ropes, levers, or buttons for resetting.

2.10 BACKBOARD - Type 'A' (2 thus)

A. Type: Rectangular, glass, official size backboard to be used with direct attachment goal; Model A0136 as manufactured by Draper, Inc.

B. Size: [72 inches] [1829 mm] wide by [42 inches] [1067 mm] high.

C. Construction: [1/2 inch] [13 mm] thick fully tempered glass in extruded aluminum frame with mitered corners. Provide steel gusset type mounting corner brackets with slots for mounting backboard to support structure.

D. Goal mounting assembly: Steel assembly secured to aluminum frame and equipped with steel sleeves through glass allowing rear structure to be secured to front mounting plate. Provide with holes and studs to secure backboard and goal directly to goal brace. Front plate provided with holes for goal attachment.

- E. Equip frame and goal mounting assembly with neoprene shock absorbing cushions.
- F. Permanently etch official white border and target area on front side of glass.

2.11 BACKBOARD - Type 'B' (4 thus)

- A. Cast aluminum with competition striping. Equivalent to Draper Model 503143.

2.12 GOALS (6 required)

A. Type: Front mounted goal fabricated from steel rod and steel plate; Model A0570 as manufactured by Draper, Inc.

B. Ring: Fabricated from [5/8 inch] [16 mm] diameter steel rod formed into [18 inches [457 mm] ring. Provide with 12 no-tie net attachment clips welded to ring. Rigidly brace ring with [7/16 inch] [11 mm] diameter steel rod welded to mounting plate.

C. Mounting plate: [8 gauge] [4.4 mm] steel plate bracket with mounting holes and designed to position inside of ring [6 inches] [152 mm] from backboard.

D. Finish: Orange enamel.

E. Anti-whip net: Top half made of durable fibers encased in nylon to prevent net from whipping up on rim. Lower half all nylon. Color white.

F. Mounting hardware: Zinc plated.

2.14 SAFETY EDGE PADDING (for Type 'A' backboards)

A. Type: Foam padding for bottom edge and corners of backboard to provide safety protection to meet NCAA and NFHSA requirements; Model A0253 Safe-Edge Padding as manufactured by Draper, Inc..

2.15 VOLLEYBALL EQUIPMENT

A. Draper 500021SVS-01 two pole system (1 required) with 500004 net and antennas.

B. Floor Sleeve: 501006

C. Pads: Draper 5011, purple color

D. Floor Cover Plates: 501 03, 5" brass plated.

2.16 FABRIC COVERED URETHANE WALL PROTECTION PADS WALL PADS

A. Description:

1. Pads include flat (24" wide x 72" high), L shaped and C shaped.
2. Cushioning Material: 2" thick urethane filler with 3.5 pounds density.
3. Backer: 7/16" urea formaldehyde-free Oriented Strand Board for pads around columns.

4. Cover: Solid vinyl coated polyester fabric with embossed pattern.
Weight: 14 oz. Per SY.
Breaking strength: 350 PSI.
Tear Resistance: 65 pounds.
Resistant to rot, mildew and ultraviolet light.
Flammability: Rated self-extinguishing in accordance with California State Fire Code F-230.
Color: To be selected by Owner from manufacturer's standard range.
Mounting: 1" wide fabric flanges at top and bottom of pads.
Pads without solid backing to have hook and loop strips at top of pad.

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate provision of basketball backstops with construction of roof framing supporting basketball backstop to ensure proper support and method of attachment.

B. Coordinate support of backstops to ensure proper distribution of loads and adequacy of attachment points. Provide additional structural framing members as required.

3.2 INSTALLATION

A. Instructions

1. Install folding basketball backstops in accordance with approved shop drawings and manufacturer's instructions.
2. Install backstops, backboards, and goals plumb, level, and rigid. Attach to roof framing with anchors of size and type recommended by manufacturer.
3. Install backboards such that goal is 10 feet [3048 mm] above court floor. After installing, verify that mounting height is correct.
4. Install manual winches, hoisting cables, safety belt and lock securely to operate properly and smoothly to safely lower and raise folding backstops.

B. Install other equipment in accordance with manufacturer's instructions.

3.3 FIELD QUALITY CONTROL

A. Operate each folding basketball backstop a minimum of three times to ensure proper lifting and lowering. Adjust as required to ensure smooth operation and accurate positioning.

3.4 CLEANING

A. Remove protective wrappings, wash surfaces, and attach nets.

3.5 DEMONSTRATION

A. Demonstrate to Owner's designated representatives complete operation and required maintenance for folding basketball backstops.

B. Submit operation and maintenance manuals in accordance with Section 01770 - Closeout Procedures.

END OF SECTION

SECTION 09624 – SYNTHETIC ATHLETIC FLOORING

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope

1. The complete installation of synthetic sports surfacing system including striping.

B. Related work specified under other sections.

1. CONCRETE MOISTURE VAPOR EMISSION AND pH TESTING - SECTION 01450

a. Moisture vapor emission and pH of concrete shall be tested. Moisture vapor emissions must not exceed three (3) pounds per 1000 square feet per 24 hours as verified using Calcium Chloride test ASTM F 1869-04. Concrete pH level should be in the range between 7 and 8.5.

2. CONCRETE SUBFLOORS - SECTION 03__ __

a. The general contractor shall furnish and install the concrete sub-floor in a suitable condition to accommodate the floor system.

b. The slab shall be steel troweled and finished smooth to a tolerance of 1/8" in any 10' radius. Floor flatness and floor levelness (FF and FL) numbers are not recognized. High spots shall be ground level and low spots filled with approved leveling compound.

c. No concrete curing, hardening or sealing agents shall be applied or mixed with the concrete subfloor.

3. MEMBRANE WATERPROOFING

a. Concrete subfloors on or below grade shall be installed over a suitable moisture retardant membrane. Water vapor membrane shall comply with ASTM E 1745-97 (2004)

1.2 REFERENCES

A. ASTM (American Society for Testing & Materials)

1. ASTM E 1745-97 (2004).

2. ASTM F-1869

3. ASTM F-1869-98

4. ASTM F 1869-04

1.3 SUBMITTALS

A. Submit Connor SportGrain Plus™ specification sheets.

B. Sample - Submit one sample of specified system showing wood pattern and color.

C. Maintenance Literature - Upon completion of floor installation, send to owner, attendants or individuals in charge and responsible for the upkeep of the building a Connor Synthetic Care & Maintenance Guide. These instructions shall be followed. Any variations, deviations or substitutions shall be submitted to manufacturer for review and approval.

D. Current installation instructions as published by synthetic flooring manufacturer.

E. Approval – Installer to be approved by flooring manufacturer. Submit verification indicating installer (Floor Contractor) is approved to install proposed sport flooring system.

1.4 QUALITY CONTROL

A. INSTALLER

1. The complete installation of the flooring system, as described in these specifications, shall be carried out by an experienced installer (Flooring Contractor), and the work shall be performed in accordance with flooring manufacturer's current installation instructions.
2. Installer (Flooring Contractor) shall be liable for all matters related to the installation for a period of one year after the floor has been installed and completed.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Materials must be delivered in Connor's original, unopened and undamaged packaging with identification labels intact. Material shall not be delivered until all related work is finished and/or proper storage facilities can be guaranteed.
- B. Store the material protected from exposure to harmful weather conditions on a clean, dry flat surface protected from possible damage. Store sports flooring rolls on their side. *Do not stack rolls of material.* Storage conditions shall be 60 F to 80 F.

1.6 SITE CONDITIONS

- A. Synthetic materials specified herein shall not be installed until all masonry, painting, plaster, tile, marble and terrazzo etc. work is completed, and overhead mechanical trades and painters have finished in the synthetic floor areas. The building shall be enclosed and weather tight.
- B. Permanent heat, light and ventilation shall be installed and operating during and after installation. Subfloors shall be clean, dry and free from dirt, dust, oil, grease, paint, alkali, concrete curing agents, hardening and parting compounds, old adhesive residue or other foreign materials. Moderate room temperature between 65 F and 80 F, and relative humidity under 50% shall be maintained for one week prior to, during, and for 72 hours after installation.
- C. The installation areas shall be closed to all traffic and activity for a period to be specified by the flooring contractor.
- D. Moisture vapor transmission of the concrete slab shall not exceed 3 lbs/1,000 ft² in 24 hours per ASTM F-1869 Anhydrous Calcium Chloride Test.
- E. Environmental Limitations.
 1. Comply with Connor's requirements.
 2. Adhere to all MSDS requirements for materials employed in the work. Protect all persons from exposure to hazardous materials at all times.
- F. After synthetic floors are installed and the game lines painted, the area is to be kept locked by the general contractor to allow curing time for the flooring system. No other trades or personnel are allowed on the floor until the owner has accepted it.

1.7 WARRANTY

- A. Connor provides a limited warranty of one (1) year on the materials it has supplied. (A copy of the full warranty, with its Terms and Exclusions, is available from the authorized Connor Dealer.) This warranty is expressly limited to the flooring materials (goods) supplied by Connor. This warranty does not cover floor damage caused (wholly or in part) by fire, winds, floods, moisture migration or water vapor transmission through the substrate, failure of vapor barrier, other unfavorable atmospheric conditions or chemical action, nor does it apply to damage caused by normal wear, misuse, abuse, negligent or intentional misconduct, aging, faulty building construction, concrete slab separation, faulty or unsuitable subsurface or site preparation, settlement of the building walls or faulty or unprofessional installation of Connor flooring systems. The presence of moisture

between the sport flooring and subfloor shall be considered proof of subfloor failure or faulty design or construction.

- B. Connor shall not be liable for incidental or consequential losses, damages or expenses directly or indirectly arising from the sale, handling or use of the materials (goods) or from any other cause relating thereto, and their liability hereunder in any case is expressly limited to the replacement of materials (goods) not complying with this agreement or, at their election, to the repayment of, or crediting buyer with, an amount equal to the purchase price of such materials (goods), whether such claims are for breach of warranty or negligence. Any claim shall be deemed waived by buyer unless submitted to Connor in writing within 30 days from the date buyer discovered, or should have discovered, any claimed breach.

PART 2-PRODUCTS

2.1 MATERIALS

- A. Connor SportGrain Plus™ - Prefabricated sport surface 7.0 MM, with maple flooring design as supplied by Connor. Printing of maple wood design shall closely replicate standard maple strip flooring in size (approximately 2-1/4" face width), color, board length and grain appearance. The maple design shall be protected by a clear layer of pure PVC (Polyvinyl Chloride) and top coated with a factory applied polyurethane finish. Intermediate layers of calendared PVC and fiberglass provide balance and stability. The foam force reduction layer is a high-density closed cell PVC foam, and is applied in one continuous manufacturing process. Laminated or adhered foam layers will not be allowed. Flooring will contain anti-fungal treatment.
 - 1. Color – SportGrain Plus is available in maple design.
 - 2. Physical Properties
 - a. Weight..... 1.3 lbs/sf
 - b. Standard Roll Length..... 20 m (65 ft.)
 - c. Standard Roll Width..... 1.8 (5'-11")
 - d. Shock Absorption..... > 37%
 - e. Coefficient of Friction..... 0.55
 - f. Ball Rebound..... > 99%
 - g. Impact Resistance..... > 8N/m
 - h. Abrasion Resistance..... < 300 mg
 - i. Vertical Deformation..... < 0.6mm
- B. Vinyl welding thread – Matching vinyl supplied by Connor.
- C. Adhesive – One-component acrylic supplied by Connor.
 - 1. Optional adhesive – Two-component polyurethane supplied by Connor.
- D. Game Line Paint – Two-component polyurethane supplied by Connor. Select from six (6) standard colors (white, black, red, yellow, green, and blue).
- E. Optional Base (*specify or delete*) – Vinyl wall base 4" high; select from standard colors.
- F. Optional Moisture Barrier (*specify or delete*) – 1mm PVC Connor Lay slip sheet.

PART 3-EXECUTION

3.1 INSPECTION

- A. Inspect concrete slab for proper tolerance and dryness. Test moisture vapor transmission of concrete flooring by means of a Calcium Chloride Test. A minimum number of three (3) tests shall be performed and strictly adhered to per ASTM F-1869-98. Maximum vapor level of 3lb/1000 ft². Report any discrepancies to the general contractor
- B. Concrete slab shall be broom cleaned by general contractor.
- C. Verify with general contractor and by visual inspection that no curing compounds and/or sealers have been applied to the concrete.

- D. Installer (Flooring Contractor) shall document all working conditions provided in General Specifications prior to commencement of installation.

3.2 INSTALLATION

- A. Prep concrete to receive flooring material per the installation instructions.
- B. Unroll flooring and allow to relax.
- C. Apply acrylic adhesive directly to concrete with notched trowel per Connor's instructions. Total flooring surface must be fully adhered.
- D. Install flooring into applied adhesive.
- E. Roll sport surface with a 100 lb segmented roller to remove entrapped air.
- F. Join side and end seams by hot welding. Route seams to receive vinyl welding thread. Use vinyl welding thread as supplied by Connor. Refer to installation instructions for complete preparation and installation recommendations.
- G. Game Lines
 1. Use only high quality masking tape approved by Connor.
 2. Follow installation instructions for preparation and application of game line paint.
 3. Provide game lines as indicated on drawings.
- H. Wall Base (*Optional*) – Install vinyl base anchored to walls with base cement.
- I. Remove all excess and waste materials from the work area. Dispose of empty containers in accordance with federal and local statutes.

END OF SECTION

TECHNICAL SPECIFICATIONS "STRUCTURAL"

**BOYS & GIRLS CLUB RECREATION CENTER
WESLACO, TEXAS
TEXAS PARKS AND WILDLIFE DEPARTMENT
LOCAL PARK GRANT PROGRAM
PROJECT NUMBER: 51-000065**

DIVISION 3- CONCRETE

SECTION 03 10 00	CONCRETE FORMING & ACCESSORIES
SECTION 03 20 00	CONCRETE REINFORCING
SECTION 03 30 00	CAST IN PLACE CONCRETE
SECTION 03 39 00	CONCRETE CURING

DIVISION 4 - MASONRY

SECTION 04 05 11	MASONRY MORTARING & GROUTING
SECTION 04 20 00	UNIT MASONRY (CMU BLOCK)
SECTION 04 27 31	REINFORCED UNIT MASONRY

DIVISION 5 - METALS

SECTION 05 12 00	STRUCTURAL STEEL
SECTION 05 50 00	MISCELLANEOUS METALS

DIVISION 13 - SPECIAL CONSTRUCTION

SECTION 13 34 19	METAL BUILDING SYSTEMS
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DIVISION 31 - EARTHWORK

SECTION 31 00 00	EARTHWORK
SECTION 31 11 00	SITE CLEARING AND GRUBBING
SECTION 31 23 16	EXCAVATION
SECTION 31 31 16	TERMITE CONTROL



3-06-13

SECTION 03 10 00

CONCRETE FORMING AND ACCESSORIES

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Formwork for cast-in place concrete, with shoring, bracing and anchorage.
- B. Form accessories.
- C. Form stripping.

1.2 RELATED REQUIREMENTS

- A. Section 03 20 00 – Concrete Reinforcing.
- B. Section 03 30 00 – Cast-in-Place Concrete.
- C. Section 03 39 00 – Concrete Curing.
- D. Section 04 20 00 – Unit Masonry: Spacing for veneer anchor reglets recessed in concrete.

1.3 REFERENCE STANDARDS

- A. ACI 117 – Standards Specifications for Tolerances for Concrete Construction and Materials; 2006.
- B. ACI 301 – Specifications for Structural Concrete for Buildings; American Concrete Institute; 2005.
- C. ACI 318 – Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute; 2008.
- D. ASME A17.1 – Safety Code for Elevators and Escalators; The American Society of Mechanical Engineers; 2007.

1.4 DESIGN REQUIREMENTS

- A. Design, engineer and construct formwork, shoring and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line and dimension.

1.5 SUBMITTALS

- A. See Section 01 33 00 – Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties.

1.6 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
- B. Maintain one copy of each installation standard on site throughout the duration of concrete work.

1.7 REGULATORY REQUIREMENTS

- A. Conform to applicable code for design, fabrication, erection and removal of formwork.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver void forms and installation instructions in manufacturer's packaging.
- B. Storage void forms off ground in ventilated and protected manner to prevent deterioration from moisture.

PART 2 PRODUCTS

2.1 FORMWORK - GENERAL

- A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.
- B. Design and construct to provide resultant concrete that conforms to design with respect to shape, lines, and dimensions.
- C. Comply with applicable State and local codes with respect to design, fabrication, erection, and removal of formwork.

2.2 WOOD FORM MATERIALS

- A. Form Materials: At the discretion of the Engineer.

2.3 PREFABRICATED FORMS

- A. Manufacturers:
 - 1. Alabama Metal Industries Corporation: www.amico-online.com
 - 2. Molded Fiber Glass Construction Products Co: www.mfgcp.com
 - 3. Reward Wall Systems: www.rewardwalls.com
 - 4. Substitutions: See Section 01 25 13 – Product requirements.
- B. Void Forms: Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set; 2 inches thick.

2.4 FORMWORK ACCESSORIES

- A. Form Ties: Removable type, galvanized metal, fixed length, with waterproofing washer, free of defects that could leave holes larger than 1 inch in concrete surface.

- B. Form Release Agent: Colorless mineral oil that will not stain concrete.
- C. Flashing Reglets: Galvanized steel, 22 gage thick, longest possible lengths, with alignment splines for joints, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
- D. Waterstops: Preformed mineral colloid strips, 3/8 inch thick, moisture expanding.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.2 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 1301.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and strip. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.
- E. Coordinate this section with other sections of work that require attachment of components to formwork.
- F. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, request instruction from Hinojosa Engineering, Inc. before proceeding.

3.3 APPLICATION – FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to replacement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.4 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Construct formed cavities of debris prior to placing concrete.

3.5 FORM TOLERANCES

- A. Construct formwork to maintain tolerances required by AC 117.
- B. Construct and align formwork for elevator hoistway in accordance with ASME A17.1

3.6 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 45 23.

3.7 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCING

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Reinforcing steel for cast-in-place concrete.
- B. Supports and accessories for steel reinforcement.

1.2 RELATED REQUIREMENTS

- A. Section 03 30 00 – Cast-in-Place Concrete.

1.3 REFERENCE STANDARDS

- A. ACI 301 – Specifications for Structural Concrete for Buildings; American Concrete Institute International; 2005
- B. ACI SP-66 – ACI detailing Manual; American Concrete Institute International; 2004.
- C. ASTM A 185/A 185M – Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2007.
- D. ASTM A 615/A 615M – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 2007.
- E. CRSI (DA4) – Manual of Standard Practice; Concrete Reinforcing Steel Institute; 2001.

1.4 SUBMITTALS

- A. See Section 01 33 00 – Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.

1.5 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301.

PART 2 PRODUCTS

2.1 REINFORCEMENT

- A. Reinforcing Steel: ASTM A 615/A 615M Grade 60 (420)
 - 1. Deformed billet-steel bars.
 - 2. Unfinished.
- B. Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain type.

1. Flat Sheets.
 2. Mesh Size: 4 x 4.
 3. Wire Gage: W2.9 x W2.9 or as indicated on the plans.
- C. Reinforcement Accessories:
1. Tie Wire: Annealed, minimum 16 gage.
 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
 3. Provide stainless steel or plastic components for placement within 1-1/2 inches of weathering surfaces.

2.2 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI (DA4) – Manual of Standards Practice.
- B. Welding of reinforcement is not permitted.

PART 3 EXECUTION

3.1 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- B. Do not displace or damage vapor barrier.
- C. Accommodate placement of formed openings.
- D. Maintain concrete cover around reinforcing as follows:
 1. Footings and Concrete Formed Against Earth: 3 inch.
 2. Slabs on Fill: 2 inch.
- E. Conform to applicable code for concrete cover over reinforcement.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Labor, materials, services and equipment required in conjunction with or properly incidental to placing of cast-in-place concrete slabs, building members, and MEP equipment pads as described herein or as shown on the Drawings, including but not limited to:
 - 1. Concrete mix designs.
 - 2. Assistance with Owner provided laboratory testing of concrete.
 - 3. Installation of items to be built-in formwork or embedded in concrete but furnished by other trades, including metal anchors, anchor slots, reglets, hangers, supports, ties, inserts, bolts, corner guards, and sleeves.
 - 4. Cast-in-place concrete, with formwork, under slab vapor barrier, reinforcing, accessories, appurtenances, finishing and curing required to complete concrete work.
 - 5. Grouting under structural steel base plates.
 - 6. Foundation for columns, walls, and slabs on grade.
 - 7. Super-structure for walls, columns, slabs, curbs, stairs, steps, equipment pads, walks, and pre-moulded expansions joints.

- B. Examine the drawings for Plumbing, Mechanical, and Electrical work. These subcontractors will furnish and set sleeves or box forms required for openings. Contractor shall use care in placing reinforcement and pouring concrete so as not to displace such sleeves or boxes.
 - 1. All slots, chases, recesses, or openings indicated on the drawings, which are not formed by sleeves or boxes shall be provided in locations shown. When the work of other contractors is completed, the excess part of the openings shall be completely closed with concrete.

1.2 RELATED REQUIREMENTS

- A. Division 1 Sections applicable to the Work of this Section.

1.3 RELATED SECTIONS

- A. Section 01 45 23 - Testing and Inspecting Services
- B. Section 02 32 00 - Geotechnical Report
- C. Section 04 20 00 - Unit Masonry
- D. Section 05 12 00 - Structural Steel
- E. Section 05 50 00 - Miscellaneous Metals
- F. Section 07 92 00 - Building sealants

- G. Section 31 00 00 - Earthwork
- H. Section 31 63 29 - Drilled and Reamed Foundation
- I. Section 32 13 13 - Concrete Paving
- J. Electrical and Mechanical Drawings and Specifications for sleeves, conduit, and other items embedded in concrete.

1.4 QUALITY ASSURANCE

- A. Where standards or requirements of this Section are in conflict with those noted on the Contract Drawings, or the Building Code, the more stringent requirements shall govern. Bring all conflicts and discrepancies to the attention of the Architect and do not start work until such conflicts and discrepancies are clarified and corrected. Failure to do so will not relieve the Contractor from performing the Work correctly at no additional expense to the Owner.
- B. Testing Laboratory Services:
 - 1. Test results shall meet or exceed established standards. A technician from the Owner's Testing Laboratory must be present during all operations.
- C. Evaluation and Acceptance:
 - 1. Codes and Standards: The Work described in this Section, unless otherwise noted on the Drawings, or herein specified, shall be governed by the editions of the following codes or specifications approved by authorities having jurisdiction.
 - a. American Association of State Highway and Transportation Officials (AASHTO)
 - 1) TP 23, "Proposed Standard Method of Test for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying"
 - b. American Concrete Institute (ACI)
 - 1) 211.1, "Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete"
 - 2) 214, "Recommended Practice for Evaluation of Strength Test Results of Concrete"
 - 3) 301, "Specifications for Structural Concrete for Buildings"
 - 4) 302, "Guide for Concrete Floor and Slab Construction"
 - 5) 304, "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete"
 - 6) 305, "Hot Weather Concreting"
 - 7) 306, "Cold Weather Concreting"
 - 8) 309, "Standard Practice for Consolidation of Concrete"
 - 9) 311, "ACI Manual of Concrete Inspection"
 - 10) 315, "Manual of Standard Practice for Detailing Reinforced Concrete Structures"
 - 11) 318, "Building Code Requirements for Reinforced Concrete"
 - 12) 347, "Recommended Practice for Concrete Formwork"
 - 13) Keep one copy of "Manual of Concrete Practice" at job site at all times.
 - c. American Society for Testing and Materials (ASTM)
 - 1) A36, Standard Specification for Carbon Structural Steel
 - 2) A108, Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality

- 3) A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - 4) A185, Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
 - 5) A615, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
 - 6) A704, Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement
 - 7) C33, Standard Specification for Concrete Aggregate
 - 8) C42, Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
 - 9) C94, Standard Specification for Ready-Mix Concrete
 - 10) C136, Standard Method for Sieve Analysis of Fine and Coarse Aggregates
 - 11) C150, Standard Specification for Portland Cement
 - 12) C172, Standard Practice for Sampling Freshly Mixed Concrete
 - 13) C260, Standard Specification for Air-Entraining Admixtures
 - 14) C330, Standard Specification for Lightweight Aggregates for Structural Concrete
 - 15) C494, Standard Specification for Chemical Admixtures for Concrete
 - 16) C595, Standard Specification for Blended Hydraulic Cements
 - 17) C881, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
 - 18) C979, Standard Specification for Pigments for Integrally Colored Concrete
 - 19) C1107, Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink)
 - 20) C1315, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete
 - 21) E96, Standard Test Methods for Water Vapor Transmission of Materials
 - 22) E1643, Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs
 - 23) E1745, Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs
 - 24) F710, Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
- d. American Welding Society (AWS)
- 1) D1.4 Structural Welding Code- Reinforcing Steel
- e. Federal Specification (FS)
- 1) FF-S-325
 - 2) QQ-Z-325C
- e. Concrete Reinforcing Steel Institute (CRSI)
- 1) "Reinforced Concrete – A Manual of Standard Practice"
 - 2) "Recommended Practice for Placing Reinforcing Bars"
 - 3) "Recommended Practice for Placing Bar Supports"

D. Source Quality Control:

1. Concrete production facilities shall meet the requirement for certification by the National Ready Mixed Concrete Association. All ready mix concrete trucks

- proposed for use on the project shall meet the requirements of NRMCA, Certification of Ready Mix Concrete Production Facilities.
2. Concrete batchers shall be completely interlocked semi-automatic or automatic batchers, as defined by the Concrete Plant Manufacturers Bureau.
 3. Concrete batchers shall have graphic, digital, or photographic recorders, which shall register both empty balance and total weight (or volume of water or admixture) of each batched material, time to the nearest minute, date, identification of batch, and numerical count of each batch. Copies of the record shall be furnished to the Inspection and Testing Laboratory.
 4. The Inspection and Testing Laboratory shall provide concrete batch plant inspection as follows:
 - a. Provide a qualified inspector with necessary equipment and apparatus to inspect weighing and batching of controlled concrete at batch plant on a random basis, approximately once daily as the concrete is being placed on this project.
 - b. Make certain that materials and batch equipment used are in accordance with requirements of Specifications.
 - c. Check for adjustment in batch weights to compensate for variations in moisture content.
 - d. Submit promptly to Architect, certification of weights used in loads of acceptable concrete which has been batched during plant inspection time.
- E. Concrete Mix Design Criteria:
1. Design concrete mixes in accordance with ACI 318, Section 5.3, Proportioning on the basis of field experience and/or trial mixtures.
 2. Submit the proposed mix designs for each concrete mix type proposed.
 3. Determination of required average strength above specified strength shall be in accordance with ACI 318.
 4. If trial mixes are used as the basis for the proposed mix design, mold and cure test cylinders in accordance with ASTM C39. Do not place concrete on project until laboratory reports and results of confirmation cylinder tests have been evaluated by the Inspection and Testing Laboratory and results indicate that proposed mixes will develop required strengths.
 5. Inspection and Testing Laboratory shall furnish the Architect with a written evaluation of each proposed concrete mix design submitted by the Contractor.
 6. Check mix designs and revise if necessary wherever changes are made in aggregates or in surface water content of aggregate or workability of concrete. Water content shall be the minimum to produce workable mix. The water content shall be verified in the field by use of the Microwave Test.

1.5 SUBMITTALS

- A. Mix Designs: Submit proposed mix designs, including confirmation cylinder test results, in accordance with ACI 318, Section 5.3, Proportioning on the basis of field experience and/or trial mixtures. Submit mix designs to Architect/Engineer and Inspection and Testing Laboratory for evaluation a minimum of 14 days prior to placing concrete. Key requirements:
1. Combined aggregate gradation.
 2. Proportions of cement, fine and coarse aggregates, and water.
 3. Type, color and dosage of integral coloring compounds, where applicable.
 4. Range of ambient temperature and humidity for which design is valid.
 5. Any special characteristics of mix which require precautions in mixing, placing, or finishing techniques to achieve finished product.

- B. Complete test data for trial mixes or a complete summary of previous project test results for mix design based on standard deviation analysis must be included.
- C. Provide duplicate delivery tickets for each load of ready-mix concrete delivered to site, in accordance with ASTM C94. Show batch weights on each ticket.
- D. Provide mill test reports on an as-used basis for each type and brand of cementitious material used.
- E. Provide certification from independent test laboratory indicating underslab vapor retarder compliance with specification and ASTM 1745 Class A requirements.
- F. Provide product data for each accessories item specified but necessarily not listed above which are required for a complete installation, including, but not limited to reinforcing, chairs, admixtures, stains and color pigments, grouts, sealers, vapor retarders and barriers, water stops, epoxy adhesives, curing compounds and anchors.
- G. Provide Shop Drawings for all reinforcing steel. Show bending diagrams, splicing and laps of rods, shapes, dimensions and details of bar reinforcement and accessories.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Mix and deliver concrete to project ready-mixed in accordance with ASTM C94. Mix concrete a minimum of 70 revolutions of transit mix drum at mixing speed. A minimum of 40 revolutions shall be at the production plant.
- B. Schedule delivery so that continuity of any pour will not be interrupted for over 15 minutes.
- C. Place concrete on site within 90 minutes after proportioning materials at batch plant.
- D. Store bagged cement on platforms off ground. Protect stored cement against the elements. Handle and store fine and coarse aggregate separately in manner to prevent intrusion of foreign material or segregation of the material. Protect all reinforcement until used. Do not use any hardened cement.
- E. Mild steel reinforcement at the time of placement of concrete shall be clean and free of all loose dirt, form oil, and other coatings affecting bond.

1.7 JOB CONDITIONS

- A. Hot Weather Concreting:
 - 1. Follow ACI 301 and ACI 305.
 - 2. Provide water-reducing retarding admixture conforming to ASTM C494, Type D when necessary to retard initial set. The admixture shall be dispensed in accordance with manufacturer's recommendations.
 - 3. Maximum concrete temperature shall not exceed 95 degrees F at time of placement.
 - a. Concrete with temperatures above 90 degrees F shall be placed only if a high range water reducer (superplasticizer) is added to the mix as directed by the Testing Laboratory to maintain the specified slump during placement.

- B. Cold Weather Concreting: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures.
 - 1. Follow ACI 301 and ACI 306.
 - 2. When ambient temperature at site is below 40 degrees F or is expected to fall to that temperature within ensuing 24 hours, heat water and/or aggregate prior to adding to mix so that temperature of concrete will be between 55 degrees F and 85 degrees F at time of placement.
 - 3. Maintain temperature of deposited concrete between 50 degrees F and 70 degrees F for minimum of seven (7) days after placing.
 - 4. Add the specified non-corrosive accelerator for all floor concrete placed at air temperatures below 50 degrees F.
- C. Temperature Changes: Maintain changes in concrete temperature as uniformly as possible, but in no case exceed change of 5 degrees F per hour or 25 degrees F in any 24 hour period.
- D. Combustion heaters shall not be used during the first 48 hours without precautions to prevent exposure of concrete and workmen to exhaust gasses containing carbon dioxide and/or carbon monoxide.
- E. Admixtures intended to accelerate hardening of concrete or produce higher than normal strength at early periods will not be permitted unless approved by the Architect. The use of calcium chloride is specifically prohibited.

1.8 PRE-INSTALLATION CONFERENCE

- A. Refer to Section 01 31 00 – Project Coordination

1.9 SEQUENCING/SCHEDULING

- A. Coordinate Work of this Section with work of other Sections as required to properly execute the Work and as necessary to maintain satisfactory progress of the work of other Sections.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. Manufacturers named within this Section are approved for use on the Project for the product for which they are specified. Other manufacturers must have a minimum of five (5) years experience manufacturing the product specified and meet or exceed the specifications for that product. Substitution of products must be in accordance with the General Conditions, Supplementary Conditions, and Section 01300, Submittals to be considered prior to proposal.

2.2 MATERIALS

- A. Formwork:
 - 1. General: Contractor may use any of the following formwork materials as long as material meets the following and will not stain, or impart any undesirable texture, i.e. wood grain, where such texture would be objectionable in an exposed location.
 - a. Wood Forms:
 - 1) Plywood: PS 1, Douglas Fir or Spruce species.

- 2) Medium Density Overlay (MDO): One (1) side grade; sound undamaged sheets with clean, true edges.
 - 3) Lumber: Southern Yellow Pine species; No. 2 grade, with grade stamp clearly visible.
 - b. Pre-Fabricated Forms:
 - 1) Preformed Steel Forms: Minimum 16 gauge matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
 - 2) Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
 - c. Form Liner: Any material recommended by manufacturer to impart finish which will exhibit the finish or design characteristics, i.e. smooth, textured, ribbed, etc. detailed by the Architect for exposed locations as shown or required and capable of being stripped from complex designs without damaging the finish or design. Form liner shall be as manufactured by Symons Corporation, Greenstreak, Inc. or Architect approved equal.
 - d. Self-expanding corkboard expansion joint fillers should conform to ASTM D1752 for exterior work. Joint fillers shall extend full depth of slab or joint and be of thickness and lengths indicated on drawings.
- B. Metal Reinforcement:**
1. Bars:
 - a. General: Conform to ACI 315, latest edition.
 - b. Comply with ASTM A615, Grade 60.
 - c. Number 3 bars comply with ASTM A615, Grade 40
 2. Welded Steel Wire Fabric (Mesh): Not permitted in structural concrete, unless approved by Structural Engineer
- C. Concrete, General:**
1. Ready-mixed concrete, ASTM C94
 2. Comply with ACI 318.
 3. Concrete must be approved by Architect through design mix and cylinder test of testing laboratory.
 4. Unless approved otherwise by the Architect, use one (1) brand of cement throughout the work where finished surface will be exposed to view.
 5. Strength: Refer to Paragraph 2.3, A.
 6. Unless approved otherwise by the Structural Engineer, use one (1) ready-mix concrete company throughout the project.
- D. Concrete Materials:**
1. Cement:
 - a. Portland Cement, Type I or III, conforming to the requirements of ASTM C150.
 - b. Combined aggregate gradation for slabs and other designated concrete shall be 8 percent - 18 percent for large top size aggregates (1-1/2 in.) or 8 percent - 22 percent for smaller top size aggregates (1 in. or 3/4 in.) retained on each sieve below the top size and above the No. 100.
 2. Fly ash: Maximum of 25% fly ash by weight is acceptable.
- E. Aggregate:**
1. Fine Aggregate: ASTM C33; clean, hard, durable, uncoated, natural and manufactured sand, free of silt, loam or clay.

2. Coarse Aggregate: ASTM C33; hard, durable, uncoated, crushed stone; gradation in accordance with Size No. 467 for piers and concrete footings and Size No. 67 for all other concrete. Maximum aggregate size in accordance with ACI 318.
 3. Grading shall be in accordance with "Standard Method for Fine Analysis of Sieve and Coarse Aggregates" (ASTM C136).
- F. Water: ASTM C94, Paragraph 4.1.3; potable, clean and free from oil, acid and injurious amount of vegetable matter, alkalis, and other impurities.
- G. Admixtures:
1. Cement-dispersing, water-reducing types. Admixtures shall conform to ASTM C494, Type A or D, and shall be used strictly in accordance with manufacturer's recommendations and as determined by the Inspection and Testing Laboratory. Admixture shall not discolor concrete or in any way affect the appearance of the concrete.
 - a. High-range water reducing admixture conforming to ASTM C494, Type F or G shall be used as required and shall be one (1) of the following or Architect approved equal:
 - 1) Eucon 37 (Type F), Eucon 537 (Type G) by The Euclid Chemical Company
 - 2) Rheobuild 1000 (Type F), Rheobuild 716 (Type G) by Master Builders
 - 3) Sikament 300 (Type F), Sikament 86 (Type G) by Sika Chemical Corp.
 - 4) WRDA-19 (Type F), Daracem 100 (Type G) by W.R. Grace
 2. An air-entraining admixture conforming to ASTM C260 shall be used as required on the Drawings and shall be one (1) of the following or Architect approved equal:
 - a. Air-Mix or AEA-92 by The Euclid Chemical Company
 - b. Sika Aer by Sika Corporation
 - c. MB-VR or MB-AE by Master Builders
 3. Prohibited Admixtures: Calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions are not permitted.
 4. Certification: Written conformance to the above-mentioned requirements and the chloride ion content of admixtures will be required from the admixture manufacturer prior to mix design review by the Architect/Engineer.
- H. Non-Shrink Cement Grout:
1. The non-shrink grout shall be a factory pre-mixed grout and shall conform to ASTM C1107, "Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink)." In addition, the grout manufacturer shall furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95 percent bearing under a 4 foot x 4 foot base plate. Provide one (1) of the following or Architect approved equal:
 - a. NS Grout by The Euclid Chemical Company
 - b. Five Star Grout by U.S. Grout Corp.
 - c. Horn Non-Corrosive Non-Shrink Grout by Tamms Industries
 - d. Duragrout by L & M Construction Chemicals, Inc.
 - e. Masterflow 713 by Master Builders
 - f. SikaGrout 212 by Sika Corp.
 - g. Sonogrout 10K by Sonneborn
 - h. 588 Grout by W. R. Meadows, Inc.
 - i. US SPEC GP Grout by US Mix Products Company

2. High Flow Grout: Where high fluidity and/or increased placing time is required, use high flow grout. The factory pre-mixed grout shall conform to ASTM C1107, "Standard Specification for Packages Dry, Hydraulic-Cement Grout (Non-Shrink)." In addition, the grout manufacturer shall furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95 percent bearing under a 18 inch x 36 inch base plate. Provide one (1) of the following or Architect approved equal:
 - a. Hi-Flow Grout by The Euclid Chemical Company
 - b. Crystex by L & M Construction Chemicals, Inc.
 - c. Masterflow 928 by Master Builders
 - d. CG-86 Grout by W. R. Meadows, Inc.
 - e. US SPEC MP Grout by US Mix Products Company
- I. Evaporation Retardant:
 1. Evaporation Retardant shall be a thin, continuous film which prevents rapid moisture loss from the concrete surface. For use when concrete operations must be performed in direct sun, wind, high temperatures, or for relative humidity. Products: Subject to compliance with requirements, provide one (1) of the following or Architect approved equal:
 - a. Eucobar by The Euclid Chemical Company
 - b. Confilm by Master Builders
 - c. Evapre by W. R. Meadows, Inc.
 - d. US SPEC Monofilm ER by US Mix Products Company.
 - e. E-Con by L& M Construction Chemicals
- K. Sealer/Densifier: Provide "Euco Diamond Hard" by The Euclid Chemical Company, "Sealhard" by L&M Construction Chemicals, or equal by Master Builders, Sika Corp., Sonneborn, US SPEC, or Architect approved equal.
- L. Chemical Hardener/Dustproofers: Provide "Surfhard" by The Euclid Chemical Company, "Chemhard" by L&M Construction Chemicals, or equal by Master Builders, Sika Corp., Sonneborn, US SPEC, or Architect approved equal.
- M. Curing Compound: dissipating resin type, which chemically breaks down after approximately eight (8) weeks. Membrane forming compound shall meet ASTM C309, Types 1 and 1D Class B, water based, VOC/AIM Compliant. Provide "Kurez DR VOX" by The Euclid Chemical Company, "Cure R" by L&M Construction Chemicals, "1100 Clear" by W. R. Meadows, Inc., US SPEC "Maxcure Resin Clear" by US Mix Products Company, or equal by Master Builders, Sika Corp., BASF, or Architect approved equal.
- N. Curing and Sealing Compound: high solids acrylic copolymer emulsion blend. Membrane forming compound shall meet ASTM C1315, Type 1 Class B. Provide "Super Rez-Seal" by The Euclid Chemical Company, "Dress & Seal" by L&M Construction Chemicals, "VOCOMP 25 1315" by W. R. Meadows, Inc., US SPEC "CS-25-1315" by US Mix Products Company, or equal by Master Builders, Sika Corp., BASF, or Architect approved equal.
- O. Epoxy Adhesive: ASTM C881, two (2) component, 100 percent solids, 100 percent reactive compound suitable for use on dry or damp surfaces. Provide one (1) of the following or Architect approved equal:
 - a. Euco #452 Epoxy System or Euco #620 Epoxy System by The Euclid Chemical Company
 - b. Sikadur Hi-Mod by Sika Corp.
 - c. Rezi-Weld 1000 by W. R. Meadows, Inc.

- d. US SPEC Maxibond 2500 by US Mix Products Company.
 - e. Epobond by L& M Construction Chemicals.
- P. Underslab Vapor Retarders and Barriers:
- 1. Vapor Retarder Membrane:
 - a. Requirements:
 - 1) Class: ASTM E1745, Class A.
 - 2) Water Vapor Permeance: ASTM E96, 0.01 perms maximum.
 - 3) Tensile Strength: ASTM E154 (Section 9, Average), 45.0 pounds per inch, minimum.
 - 4) Puncture Resistance: ASTM D1709 (Method B), 2300 grams, minimum.
 - b. Provide compatible seam taping and pipe boots or sealing mastic in accordance with manufacturer's requirements.
 - c. Provide proof of compliance to Architect at time of delivery of materials.
 - d. Provide one (1) of the following under entire slab, unless noted otherwise:
 - 1) Fortifiber Building Products "Moistop Ultra A"
 - 2) Reef Industries, Inc. "Griffolyn T-85"
 - 3) Stego Industries, LLC "Stego-Wrap 10-mil"
 - 2. Vapor Barrier: Under Wood Floors at Gymnasiums, Stages, and Dance Floors, and at Auditorium Areas Below Finish Floor Level: Premoulded Membrane Vapor Seal with Plasmatic Core manufactured by W.R. Meadows, Inc., Hampshire, IL; or Architect approved equal.
 - 3. Below Grade Waterproofing: Provide below grade waterproofing at vertical walls below grade and beneath elevator pit in accordance with Section 07140.
- Q. Miscellaneous Structural Metals Associated with Structural Concrete:
- 1. Structural steel pieces, including miscellaneous structural metals placed in concrete, exposed to weather, in permanent contact with soil, or accessible to salt intrusion shall be hot dipped galvanized in accordance with ASTM A123.
 - 2. Structural steel pieces embedded in concrete shall conform to ASTM A36, unless noted otherwise on the Drawings.
 - 3. Welding of inserts, anchors and other steel pieces used in conjunction with structural concrete shall conform to AWS D1.4.
 - 4. Welding of reinforcing steel used in conjunction with structural concrete shall conform to AWS D1.4.
 - 5. Headed stud anchors shall conform to ASTM A108, minimum tensile strength 60,000 PSI.
 - 6. Concrete expansion anchors shall be wedge-type anchors, meeting the requirements of FS FF-S-325, Group 11, Type 4, Class 1, plated in accordance with FS QQ-Z-325C, Type 11, Class 3. Size and location shall be as indicated on the Drawings. Products shall be by Hilti Corp., Powers Fasteners, Inc. or Architect approved equal.
- R. Miscellaneous Materials and Accessories:
- 1. Form ties: Adjustable length and type which will not leave holes larger than 1 inch in diameter in face of concrete. Ties shall be such that when forms are removed, no metal will be within 1 inch of the finished concrete surface. The holes must be patched.
 - 2. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages, Fasteners: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

3. Form Release Agent: Colorless mineral oil which will not stain concrete, or absorb moisture.
4. Chairs and Spacers: Heavy-duty plastic-type sized to support all reinforcing steel to proper height. Use type with sand cushion pads where concrete is on grade. Provide chairs and spacers Series "B" by W.H.C. Products, Inc., E-Z Chair by Aztec Concrete Accessories, Inc., GTI Bar Chair by General Technologies, Inc., or Architect approved equal.
5. Waterstops:
 - a. Ribbed flat 3/16 inch by six (6) inch with 1/8 inch ribs, rated for 75 foot of head pressure. Provide factory made corner fittings weld splices with thermostatically controlled heating iron. Style No. 782 by Greenstreak, Inc., or Architect approved equal.
 - b. Contractor's Material Option: Specially formulated preformed joint sealant that provides a lasting, watertight bond to both fresh and cured concrete surfaces. Synko-Flex Preformed Plastic Adhesive Waterstop and Synko-Flex Primer manufactured by Synko-Flex Products, Division of Henry Company, Houston, Texas; (713) 671-9502 or Architect approved equal.
6. Carton Void Forms: If shown or required, shall be wax impregnated cardboard trapezoidal shape, with 1/8 inch thick tempered hardboard for top plane when requested by Architect.
7. Corners: Chamfer, wood strip type; one (1) inch x one (1) inch size; maximum possible lengths.
8. Dovetail Anchor Slot: Galvanized steel, 22 gauge thick, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
9. Flashing Reglets: Galvanized steel, 22 gauge thick, longest possible lengths, with alignment splines for joints, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
10. Bonding Agent: Acrylic latex emulsion type as recommended for bonding new concrete to old concrete.
11. Integral Color Pigment (If shown or required): Mineral oxide, lightfast, lime-proof, water-resistant type conforming to ASTM C979. Color(s) shall be as selected by Architect from manufacturer's standard color line. Provide one (1) of the following or Architect approved equal:
 - a. ChemSystems, Inc.
 - b. Davis Colors
 - c. New Riverside Ochre Co., Inc.
 - d. L.M. Scofield Company
12. Color Stain (If shown or required): A chemically reactive stain, designed for adding variegated color to new or old concrete. Color(s) shall be as selected by Architect from manufacturer's standard color line. Provide Lithochrome Chemstain by L.M. Scofield Company or Architect approved equal.
13. Joint Sealants: Refer to Section 07900, Building Sealants

2.3 CONCRETE MIXES

- A. Strength: Concrete is classified and specified by ultimate compressive strength (f c) at the age of 28 days. Unless indicated otherwise on the Drawings, strengths shall be as follows:
 1. All concrete including grade beams, footings, slabs, and pads: 5 sack/3,000 psi/28 days.
 2. Strength recommendations on Structural Drawings supersede when they are greater than specified here.

- B. Interior slabs subjected to vehicular traffic: This concrete shall have a maximum W/cm of 0.48 and maximum air content of 3 percent. No air-entraining admixture shall be added to this mix.
- C. Concrete permanently exposed to freezing and thawing shall contain an air-entraining admixture to produce 4.5 percent - 7.5 percent of air by volume of concrete.
- D. Proportions: Proportions of cement, aggregate, admixture and water to attain required plasticity and compressive strength shall be in accordance with ACI 318, Section 5.3, Proportioning on the basis of field experience and/or trial mixtures. Do not make changes in proportions without submitting proposed changes to Inspection and Testing Laboratory for evaluation.
 - 1. Trial mixtures having proportions and consistencies suitable for the work shall be made based on ACI 211. 1, using at least three (3) different water-cement ratios which will produce a range of strengths encompassing those required for this project.
 - 2. Trial mixes shall be designed to produce a slump within 3/4 inch of the maximum permitted, and for air-entrained concrete, within 0.5 percent of maximum allowable air content. The temperature of concrete used in trial batches shall not exceed the maximum temperature specified.
 - 3. For each water-cement ratio, at least three confirmation compression test cylinders for each test age shall be made and cured in accordance with ASTM C192. Confirmation cylinders shall be tested at seven (7) and 28 days in accordance with ASTM C39.
 - 4. From the results of the 28 day confirmation tests, a curve shall be plotted showing the relationship between the water-cement ratio and compressive strengths. From this curve, the water-cement ratio to be used in the concrete shall be selected to produce the average strength required.
 - 5. The cement content and mixture proportions to be used shall be such that this water-cement ratio is not exceeded when slump is the maximum permitted. Control in the field shall be based upon maintenance of proper cement, water content, slump and air content.
 - 6. Mix designs furnished by the concrete supplier, shall be based on the standard deviation analysis of previous test records meeting the requirements of Section 5.3.1 - Standard deviation of ACI 318. These mixes will be accepted in lieu of trial mixtures described in paragraphs above.
 - a. Temperature of concrete in test data shall be within 5 degrees F of maximum temperature specified for this project.
 - b. Strengths indicated in test data shall be in accordance with ACI 318, Section 5.3.
 - c. The specified strength of concrete used in supporting test data shall vary no more than 500 PSI plus or minus from that specified for this project.
 - d. The Testing Laboratory shall keep a strength and standard deviation record of all concrete for the duration of the project as specified in this section.

PART 3 - EXECUTION

3.1 GENERAL

- A. Inserts: Give the various trades and subcontractors ample notification and opportunity to furnish all anchors, nailers, pipes, conduits, boxes, inserts, thimbles, sleeves, frame vents, wires, supports, or other items required to be built into the concrete by the provisions of the Drawings or of the Specification governing the work of such trades and

subcontractors, or as it may be necessary for the proper execution of their work. Obtain suitable templates or instructions for the installation of such items which are required to be placed in the forms.

- B. Install under-slab vapor retarder as instructed by manufacturer in accordance with ASTM E1643. Penetrations shall be sealed to maintain integrity of barrier. Tape around all openings and seal all penetrations as instructed by the barrier manufacturer. Grade stakes shall not be driven through the vapor barrier. Avoid punctures during reinforcement and concrete placement.
- C. Slump:
1. Concrete not containing a high range water reducing admixture shall not be placed when its plasticity, as measured by slump test, is outside the following limits:
 - a. Footings: 6 inches maximum, 4 inches minimum
 - b. All other Structural Concrete: 5 inches maximum, 3 inches minimum
 - c. Pavement: 4 inches maximum. Coordinate slump with requirements in Section 02520, Concrete Paving.
 - d. Slump drop not to exceed 2 inches when pumped.
 2. Concrete containing a high range water reducing admixture shall not be placed when its plasticity, as measured by slump test, is outside the following limits:
 - a. Prior to addition high range water reducer: 3 inches maximum, 2 inches minimum.
 - b. After addition of high range water reducer: 9 inches maximum.
- D. Classes of Concrete and Usage: Concrete of the several classes of concrete required shall have the characteristics shown on the Drawings.
- E. Mixing:
1. Transit-mixed concrete conforming to the requirements of ASTM C94 and ACI 304 shall be used in lieu of concrete mixed at the job site. Concrete shall not be transported or used in any case after a period in excess of 90 minutes has elapsed after the introduction of water into the mixer.
 2. Indiscriminate addition of water to increase slump of concrete is prohibited. Add water only at the direction of the Testing Laboratory. No water shall be added which increases the water cement ratio of the concrete in excess of the water cement ratio indicated on the approved mix design. At the direction of the Inspection and Testing Laboratory the addition of a high range water reducing admixture may be used to retemper concrete.
 3. The agency supplying transit-mixed concrete shall have a plant of sufficient capacity and adequate transportation facilities, to assure continuous delivery at the rate required. The frequency of deliveries to the site of the work must be such as to provide for placing the concrete continuously throughout any one (1) pour.
- F. Conveying Concrete: Convey concrete from the mixer to the place of final deposit by methods which will prevent the separation or loss of the ingredients. Concrete to be conveyed by pumping shall be submitted to the Inspection and Testing Laboratory for evaluation for each class of concrete specified before being used. Test cylinders for pumped concrete shall be taken at the discharge end of the pumping equipment.
- G. Equipment for chuting, pumping, and pneumatically conveying concrete shall be of such size and design as to assure a practically continuous flow of concrete at the delivery end

without separation of the materials. The use of gravity-flow or aluminum chutes or conveyors for transporting concrete horizontally will not be permitted.

- H. Miscellaneous Materials and Accessories: if not specifically noted, install all materials and accessories per manufacturer's instructions as if noted here in full.
- I. Extend underslab vapor barrier continuously under entire slab, slab turn downs, vertical face of grade beams and footings to completely protect concrete adjacent to earth. Overlap joints and install seam tape and pipe boots, and seal penetrations as instructed by manufacturer.
- J. Bars shall be supported on chairs or spacers on metal hangers, accurately placed and securely fastened to steel reinforcement in place. No wood or clay brick will be permitted inside forms.
- K. All reinforcing shall be set in place, spaced, and rigidly and securely tied or wired at all splices and at all crossing points and intersections.
- L. Minimum center to center distance between parallel bars shall be in accordance with the details on the drawings. Where not shown, the clear spacing shall be 1-1/2 times the bar diameter but never less than 1-1/2 inches.
- M. Lap of splices where shown and noted on the drawings shall be a minimum of 32 bar diameters but never less than 12 inches.
- N. Except where shown on the drawings, minimum concrete coverage for reinforcing steel shall be:
 - 1) 3 inches...where concrete is placed against earth
 - 2) 1-1/2 inches...over column ties
 - 3) 1-1/2 inches...for #5 and smaller bars in formed walls
 - 4) 2 inches...for all bars larger than #5 in formed walls
 - 5) 1 inch...for #11 and smaller bars in suspended slabs
 - 6) 1-1/2 inches...for all bars larger than #11 in suspended slabs

3.2 CONCRETE CONTROL AND TESTING

- A. Inspection and Testing laboratory services shall be in accordance with Section 01115, Inspection and Testing Laboratory Services.
- B. Except as noted below, all inspection and testing related to concrete placement, including reinforcing and embedded items, shall be the responsibility of the Owner. The Owner will directly engage the services of a qualified Testing and Inspection Laboratory, however, the Contractor shall provide access to the Owner's consultant, and, if required, the Contractor shall provide patching and repairing of surfaces removed to facilitate testing and inspection.
- C. Should the strength of concrete fall below the minimum, then additional tests, including load tests, may be required. These tests, if required, shall be made at the Contractor's expense and shall be in accordance with ASTM C42 and ACI 318. If tests do not meet the applicable requirements, then the structure, or any part of the structure, shall be removed and replaced at the Contractor's expense.

- D. Any concrete testing requested by the Contractor for early formwork or shoring removal, etc., shall be at the Contractor's expense.
- E. Do not permit placement of concrete having a measured slump outside limits given on Drawings or Specifications, except when approved by Architect/Engineer.

3.3 PLACING CONCRETE

- A. Place concrete in reasonably uniform layers, approximately horizontal, and not more than 18 inches deep, exercising care to avoid vertical joints or inclined planes. The piling up of concrete in the forms in such a manner as to cause the separation or loss of any of its ingredients will not be permitted. Concrete which has partially set or hardened shall not, under any circumstances, be deposited in the work. All slabs shall be placed for full thickness in one operation without change in proportions, screeded to proper elevation, and floated. Dusting of surfaces with cement is prohibited.
- B. Place concrete in the forms as nearly in its final position as is practical to avoid rehandling. Exercise special care to prevent splashing the forms or reinforcement with concrete. Remove any hardened or partially hardened concrete which has accumulated on the forms or reinforcement before the work proceeds. Do not place concrete on previously deposited concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the respective member of section, except as hereinafter specified.
- C. Do not permit concrete to drop freely any distance greater than five (5) feet. Where longer drops are necessary, use a chute, tremie, or other acceptable conveyance to assist the concrete into place without separation. Do not pour directly into any excavations where water is standing.
- D. Vibration: As soon as concrete is deposited, thoroughly agitate same by means of mechanical vibrators and suitable hand tools, so manipulated as to work the mixture well into all parts and corners of the forms, and entirely around the reinforcement and inserts. Mechanical vibrators shall maintain frequencies in accordance with the recommendations of ACI 309, Table 5.1.4, and shall be operated by competent workmen. Over vibrating and use of vibrators to transport concrete within forms shall not be allowed. A spare vibrator shall be kept on the job site during all concrete placing operations.
- E. Bonding: Before depositing any new concrete on or against previously deposited concrete which has partially or entirely set, the surface of the latter shall be thoroughly roughened and cleaned of all foreign matter, scum and laitance. The specified or an Architect approved bonding agent or epoxy adhesive shall be used.
- F. Construction Joints: Except as otherwise specifically indicated on the Drawings, each concrete member shall be considered as a single unit of operation, and all concrete for the same shall be placed continuously in order that such unit will be monolithic in construction. Should construction joints prove to be absolutely unavoidable, same shall be located at or near the midpoints of spans. Additional construction joints shall not be made under any circumstances without prior review by the Architect.
- G. Protect all freshly placed concrete from washing by rain, flowing water, etc. Do not allow the concrete to dry out from the time it is deposited in the forms until the expiration of the curing period.

- H. Imperfect or damaged work, or any material damaged or determined to be defective before final completion and acceptance of the entire job, shall be satisfactorily replaced at the Contractor's expense and shall be in conformity with all of the requirements of the Contract Documents. Removal and replacement of concrete work shall be done in such a manner as not to impair the appearance or strength of the structure in any way.
- I. Cleaning: Upon completion of the work, all forms, equipment, protective coverings and any rubbish resulting therefrom shall be removed from the premises. Finished concrete surfaces shall be left in clean and perfect condition, satisfactory to the Owner. Sweep with an ordinary broom and remove all mortar, concrete droppings, loose dirt, mud, etc.

3.4 FLOOR AND SLAB FINISHES

- A. Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated.
 - 1. After placing slabs, surface shall be leveled to an $F_F 15 - F_L 13$ tolerance. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set, with stiff brushes, brooms or rakes.
- B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, or sand-bed terrazzo, and as otherwise indicated.
 - 1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture. Surface shall achieve an $F_F 20 - F_L 17$ tolerance.
- C. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system.
 - 1. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final troweling operation, free of trowel marks, uniform in texture and appearance and to a $F_F 35/ F_L 30$ tolerance ($F_L 17$ for elevated slabs). Grind smooth surface defects, which would telegraph through applied floor covering system.
- D. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps and ramps, and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application. A sample panel is required.
- E. Liquid Densifier/Sealer: Apply liquid densifier/sealer on exposed interior floors subject to vehicular abrasion and as indicated on the Drawings. Compound shall be mechanically scrubbed into the surface in strict accordance with the directions of the manufacturer and just prior to completion of construction.

3.5 NON-SHRINK GROUT

- A. Refer to Structural Drawings for column base plates and other structural grouting requirements.
- B. Non-shrink grout shall be mixed only in such quantities as are needed for immediate use. No retempering shall be permitted and materials which have been mixed for a period exceeding 30 minutes shall in no case be used upon any portion of the work.
- C. Where high fluidity and/or increased placing time is required use the specified high flow grout. This grout shall be used for all base plates larger than ten (10) square feet.
- D. For every 1/3 cubic yards of grout placed, grout strength shall be tested with a set of cubes as follows:
 - 1. A set of cubes shall consist of three cubes to be tested seven (7) days, and three (3) cubes to be tested at 28 days.
 - 2. Test cubes shall be made and tested in accordance with ASTM C1107, Section 12.5, with the exception that the grout should be restrained from expansion by a top plate.

3.6 CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. All concrete shall be kept continuously moist and above 50 degrees F for seven days. When high early strength concrete is used this temperature requirement may be lowered to three (3) days.
- B. Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as herein specified.
 - 1. Provide specified curing compound to exposed interior slabs. This curing compound must be dissipating or easily removed in the cleaning process prior to the application of any liquid densifier/ sealer.

3.7 DEFECTIVE WORK

- A. Imperfect or damaged work, or any material damaged or determined to be defective before final completion and acceptance of the entire job, shall be satisfactorily replaced at the Contractor's expense and shall be in conformity with all of the requirements of the Contract Documents. Removal and replacement of concrete work shall be done in such a manner as not to impair the appearance or strength of the structure in any way.

3.8 CLEANING

- A. Upon completion of the work, all forms, equipment, protective coverings and any rubbish resulting therefrom, shall be removed from the premises. Finished concrete surfaces shall be left in clean and perfect condition, satisfactory to the Owner. Sweep with an ordinary broom and remove all mortar, concrete droppings, loose dirt, mud, etc.

3.9 REPAIR OF DEFECTIVE AREAS

- A. With prior approval of the Architect/Engineer, as to method and procedure, all repairs of defective areas shall conform to ACI 301, Section 5.3.7, using the polymer repair mortars

and/or epoxy adhesives furnished by The Euclid Chemical Company, Sika Chemical Corp., or Architect approved equal.

3.10 FIELD QUALITY CONTROL AND TESTING

- A. Inspection and Testing Laboratory services shall be in accordance with Section 01115, Inspection and Testing Laboratory Services.

END OF SECTION

SECTION 03 39 00

CONCRETE CURING

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Initial and final curing of horizontal and vertical concrete surfaces.

1.2 RELATED REQUIREMENTS

- A. Section 03 30 00 – Cast-in-Place Concrete.

1.3 REFERENCE STANDARDS

- A. ACI 301 – Specifications for Structural Code for Buildings; American Concrete Institute International; 2005.
- B. ACI 302.1R – Guide for Concrete Floor and Slab Construction; American Concrete Institute International; 2004 (Errata 2007)
- C. ACI 308R - Guide to Curing Concrete; American Concrete Institute International; 2001 (Reapproved 2008).
- D. ASTM C 171 – Standard Specification for Sheet Materials for Curing Concrete; 2007.
- E. ASTM C 309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2007.

1.4 SUBMITTALS

- A. See Section 01 33 00 – Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on curing compounds and moisture-retaining sheet, including compatibility of different products and limitations.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301 and ACI 302 1R.

1.6 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.1 MATERIALS

- A. Membrane Curing Compound: ASTM C 309 Type 1 – Clear or translucent, Class A

- B. Moisture-Retaining Sheet: ASTM C 171.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that substrate surfaces are ready to be cured.

3.2 EXECUTION-HORIZONTAL SURFACES

- A. Cure floor surfaces in accordance with ACI 308R.

3.3 EXECUTION-VERTICAL SURFACES

- A. Cure surfaces in accordance with ACI 308R.

3.4 PROTECTION

- A. Do not permit traffic over unprotected floor surface.

END OF SECTION

SECTION 04 05 11

MASONRY MORTARING AND GROUTING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Mortar for masonry.
- B. Grout for masonry.

1.2 RELATED REQUIREMENTS

- A. Section 04 20 00 – Unit Masonry: Installation of mortar and grout
- B. Section 04 27 31 – Reinforced Unit Masonry: Installation of mortar and grout.
- C. Section 04 72 00 – Cast Stone Masonry: Installation of mortar.

1.3 REFERENCE STANDARDS

- A. ASTM C 91 – Standard Specification for Masonry Cement; 2005.
- B. ASTM C 94/C 94M – Standard Specification for Ready-Mixed Concrete; 2007.
- C. ASTM C 144 – Standard Specification for Aggregate for Masonry Mortar; 2004.
- D. ASTM C 270 – Standard Specification for Mortar for Unit Masonry; 2007a.
- E. ASTM C 404 – Standard Specification for Aggregates for Masonry Grout; 2007.
- F. ASTM C 476 – Standard Specification for Grout for Masonry; 2008.
- G. ASTM C 780 – Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2008a.
- H. ASTM C 979 – Standard Specification for Pigments for Integrally Colored Concrete; 2005.
- I. ASTM C 1019 – Standard Test Method for Sampling and Testing Grout; 2008.
- J. ASTM C 1072 – Standard Test Method for Measurement of Masonry Flexural Bond Strength; 2006.
- K. ASTM C 1314 – Standard Test Method for Compressive Strength of Masonry Prisms; 2007.
- L. ASTM E 518 – Standard Test Methods for Flexural Bond Strength of Masonry; 2003.

- M. IMIAWC (HW) – Recommended Practices and Guide Specifications for Hot Weather Masonry Construction; International Masonry Industry All-Weather Council; current edition.

1.4 SUBMITTALS

- A. See Section 01 33 00 – Administrative Requirements, for submittal procedures.

1.5 QUALITY ASSURANCE

1.6 FIELD CONDITIONS

- A. Cold Weather Requirements: Comply with recommendations of IMIAWC (CW).
- B. Hot Weather Requirements: Comply with IMIAWC (HW).

PART 2 PRODUCTS

2.1 MATERIALS

- A. Masonry Cement: ASTM C 91, types as scheduled in this section.
 - 1. Colored mortar: Premixed cement as selected by architects.
- B. Mortar Aggregate: ASTM C 144.
- C. Grout Aggregate: ASTM C 404.
- D. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C 979.
 - 1. Color(s): As selected by architect from manufacturer's full range
- E. Water: Clean and potable

2.2 MORTAR MIXES

- A. Mortar for Unit Masonry: ASTM C 270, Property Specification.
 - 1. Exterior, loadbearing masonry: Type S.
 - 2. Exterior, non-loadbearing masonry: Type S.
 - 3. Interior, loadbearing masonry: Type S.
 - 4. Interior, non-loadbearing masonry: Type N.
 - 5. Glass unit masonry: Type S.
- B. Colored Mortar: Proportion selected pigments and other ingredients as selected by the architects, without exceeding manufacturer's recommended pigment-to-cement ratio.

2.3 MORTAR MIXING

- A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C 270 and in quantities needed for immediate use.
- B. Maintain sand uniformly damp immediately before the mixing process.

- C. Add mortar color in accordance with manufacturer's instructions. Provide uniformity of mix and coloration.
- D. Do not use anti-freeze compounds to lower the freezing point of mortar.
- E. If water is lost by evaporation, re-temper only within two hours of mixing.
- F. Use mortar within two hours after mixing at temperatures of 90 degrees F, or two-and-one-half hours at temperatures under 40 degrees F.

2.4 GROUT MIXES

- A. Bond Beams and Lintels: 3,000 psi strength at 28 days; 8-10 inches slump; provide premixed type in accordance with ASTM C 94/C 94M.
 - 1. Fine grout for spaces with smallest horizontal dimension of 2 inches or less.
 - 2. Coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

2.5 GROUT MIXING

- A. Mix grout in accordance with ASTM C 94/C 94M.
- B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C 476 for fine and coarse grout.

2.6 PRECONSTRUCTION TESTING

- A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01 40 00.
- B. Mortar Mixes: Test mortars prebatched by weight in accordance with ASTM C 780 recommendations for preconstruction testing.
 - 1. Test results will be used to establish optimum mortar proportions and establish quality control values for construction testing.
- C. Grout Mixes: Test grout batches in accordance with ASTM C 1019 procedures
 - 1. Test results will be used to establish optimum grout proportions and establish quality control values for construction testing.

PART 3 EXECUTION

3.1 PREPARATION

- A. Plug clean-out holes for grouted masonry with brick masonry units. Brace masonry to resist wet grout pressure.

3.2 INSTALLATION

- A. Install mortar and grout to requirements of section(s) in which masonry is specified.
- B. Work grout into masonry cores and cavities to eliminate voids.
- C. Do not install grout in lifts greater than 48 inches without consolidating grout by rodding.
- D. Do not displace reinforcement while placing grout.
- E. Remove excess mortar from grout spaces.

3.3 GROUTING

- A. Perform grouting by means of high-lift technique, except in locations that mandate use of low-lift grouting technique.
- B. Low-Lift Grouting:
 - 2. Limit height of pours to 12 inches
 - 3. Limit height of masonry to 16 inches above each pour.
 - 4. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.
 - 5. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.
- C. High-Lift Grouting:
 - 1. Verify that horizontal and vertical reinforcement is in proper position and adequately secured before beginning pours.
 - 2. Hollow Masonry: Limit lifts to maximum 8 feet and pours to maximum height of 8 feet.
 - 3. Place grout for spanning elements in single, continuous pour.

3.4 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field tests, in accordance with provisions of Section 01 40 00.
- B. Test and evaluate mortar in accordance with ASTM C 780 procedures.
 - 1, Test with same frequency as specified for masonry units.
- C. Test and evaluate grout in accordance with ASTM C 1019 procedures.
 - 1, Test with same frequency as specified for masonry units
- D. Prism Test: Test masonry and mortar panels for compressive strength in accordance with ASTM C 1314, and for flexural bond strength in accordance with ASTM C 1072 or ASTM E 518; perform tests and evaluate results as specified in individual masonry sections.

END OF SECTION

SECTION 04 20 00

UNIT MASONRY (CMU BLOCK)

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Concrete masonry units (CMU)
- B. Mortar, grout, reinforcement, anchorages, flashing, and accessories shown, specified, or required to complete Work.

1.2 RELATED WORK

- A. Section 01 45 23 - Testing and Inspecting Services
- B. Section 05 50 0 - Miscellaneous Metals: Steel masonry lintels.
- C. All Sections of Work built-in, adjacent to, or applied to unit masonry work.

1.3 REFERENCES

- A. ASTM International (ASTM)
 - 1. A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron & Steel Hardware
 - 2. A307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
 - 3. A615, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
 - 4. A706, Standard Specification for Low-Alloy Steel Deformed Bars for Concrete
 - 5. C90, Standard Specification for Loadbearing Concrete Masonry Units
 - 6. C140, Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units
 - 7. C144, Standard Specification for Aggregate for Masonry Mortar
 - 8. C150, Standard Specification for Portland Cement
 - 9. C207, Standard Specification for Hydrated Lime for Masonry Purposes
 - 10. C270, Standard Specification for Mortar for Unit Masonry
 - 11. C332, Standard Specification for Lightweight Aggregates for Insulating Concrete
 - 12. C404, Standard Specification for Aggregates for Masonry Grout
 - 13. C476, Standard Specification for Grout for Masonry
 - 14. C578, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
 - 15. C780, Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
 - 16. C979, Standard Specification for Pigments for Integrally Colored Concrete
 - 17. D226, Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
 - 18. D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
 - 19. E119, Standard Test Methods for Fire Tests of Building Construction and Materials

- B. Underwriters' Laboratories, Inc. (UL)

1.4 QUALITY ASSURANCE

- A. Where requirements of this Section are in conflict with requirements noted on the Structural Drawings, the Structural Drawings shall take precedence. Refer to Structural Drawings for information on load-bearing CMU walls.
- B. Fire Performance Characteristics: Where indicated or required, provide materials and construction, which are identical to assemblies whose fire endurance has been determined by testing in compliance with ASTM E119 by U.L. or other recognized testing and inspection organization or by other means, acceptable to authority having jurisdiction.
- C. Single Source Responsibility:
 - 1. For Masonry Units: Obtain masonry units of uniform texture and color, or a uniform blend within the accepted ranges for those characteristics, from one (1) manufacturer for each different product required for each continuous surface or visually related surfaces.
 - 2. For Mortar and Grout Materials: Brands of cementitious materials and admixtures, and the source of supply of sand and aggregates shall remain the same throughout the Work where exposed to view and where not scheduled to receive a subsequently applied finish, i.e. parging, painting, etc., unless directed otherwise in writing by the Architect.
 - 3. Contractor's Responsibility: Contractor performing Work of this Section shall be responsible for coordinating with others performing work which is built-in or adjacent to unit masonry work.

1.5 SUBMITTALS

- A. Product Data: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, and accessories.
- B. Samples: Two (2) sets of color chips representing manufacturer's full range of available colors and textures of each exposed face veneer or block for Architect's selection and approval.
- C. Sample Panel(s):
 - 1. Do not start masonry until Architect has approved samples.
 - 2. Sample panel shall be 4 feet long by 4 feet high showing selected color range and texture, bonding, joint shape, and quality of workmanship. Include an expansion joint, and any specialty details, such as reveals, soldier courses, etc. Include mock-up of installation of thru-wall flashing at foundation sill and lintel above openings.
 - 3. A separate panel for each type of masonry used is required.
 - 4. Sample panel(s) shall remain at the jobsite until all masonry is completed.
 - 5. Installed materials shall be visible and integrated into adjacent materials.
- D. Certification: Submit manufacturer's affidavit that materials used in Project contain no asbestos.
- E. Mortar and Grout Mix Designs: Submit two (2) copies of proposed mortar and grout mix designs to Owner's testing laboratory.

1.6 PRE-INSTALLATION CONFERENCE

- A. Refer to Section 01 31 00 – Project Coordination

1.7 TESTS AND INSPECTIONS

- A. Materials and installation of masonry shall be subject to testing and inspection by an independent testing laboratory. Such tests and inspections shall not relieve Contractor of responsibilities for providing materials and procedures which comply with Contract Documents. Promptly remove and replace materials which do not comply.
- B. Owner will select Inspection and Testing Laboratory and will pay for all Work required by Inspection and Testing Laboratory.

1.8 DELIVERY, STORAGE AND PROTECTION

- A. Deliver and store materials in dry protected areas off ground. Keep free of stain or other damage before, during and after installation. Replace any damaged material at no cost to Owner.
- B. During freezing weather, protect masonry units with tarpaulins or other suitable material. Keep free of stain or other damage before, during and after installation. Replace damaged material at no cost to Owner.
- C. Protect reinforcement and accessories from elements.

1.9 SITE CONDITIONS

- A. Cold Weather Protection:
 - 1. No masonry shall be laid when the temperature of the outside air is below 40 degrees F, unless protection measures are employed and pre-approved by the Architect.
 - 2. Protection measures for cold weather erection include maintaining space and masonry unit temperatures of at least 40 degrees F for 48 hours prior to and after erection.
- B. Hot Weather Protection:
 - 1. When the mean daily temperature exceeds 100 degrees F or exceeds 90 degrees F with a wind velocity greater than 8 mph, fog spray all newly constructed masonry until damp, at least three (3) times a day until the masonry is three (3) days old.

1.10 BRACING OF MASONRY DURING ERECTION

- A. All masonry shall be adequately braced at all times during erection.

1.11 COORDINATION

- A. Openings and chases for heating, plumbing, electrical ducts, pipes, and conduits shall be built into masonry walls as required. Provide for installation of bolts, toggles, flashings, beams, anchors, hangers, nailing strips, wall plugs, and frames as required. Consult other trades in advance and make provisions for installation of their work to avoid cutting

and patching. Coordinate installation of steel reinforcement for reinforced masonry. Coordinate placement of concrete in masonry beams, lintels, soffits, and pilasters.

- B. Contractor performing Work of this Section shall be responsible for and coordinate with work of Section 07160, Dampproofing Above Grade and all Sections of Work built-in, adjacent to, or applied to unit masonry work.

1.12 WARRANTY

- A. Warrant the Work specified herein for one (1) year against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.
- B. Defects shall include, but not be limited to, the following:
1. Noticeable deterioration of unit or mortar finish.
 2. Chalking or dusting excessively.
 3. Changing color in irregular fashion.
 4. Cracking or spalling.
 5. Releasing from substrate.
 6. Staining or discoloring, including efflorescence.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. Specifications are based on products of manufacturers named within the specifications. Other manufacturers must have a minimum of five (5) years experience manufacturing products equal to those specified and comply with requirements of Division 1 regarding substitutions to be considered.

2.2 MATERIALS

- A. Concrete Masonry Units (CMU/Block):
1. Type/Sizes:
 - a. Concealed cavity block and interior block, unless otherwise noted: Regular smooth face units with 8 inch x 16 inch face dimensions as shown on drawings or required, 4 inch, 6 inch, and 8 inch depths as indicated on drawings.
 - b. Exterior exposed block: **[Regular smooth] [Split]** face units with 8 inch x 16 inch face dimensions as shown on drawings or required, 4 inch, 6 inch, and 8 inch depths as indicated on drawings.
 2. Color: Shall be standard or as shown on the drawings.
 3. Integral Water Repellant (In exterior exposed CMU): "Dry-Block Block Admixture" integral water repellant admixture as manufacturer by W.R. Grace & Co., or equal.
 4. Specification: Comply with ASTM C90 (Class D-2 (2 hr.) and Class B-4 (4 hr.)) block at rated walls)
 - a. Grade: Type N, highest standard for typical cavity block and interior use. Type S, for exterior exposed masonry walls.
 - b. Aggregate: Lightweight
 5. Curing: Rotary kiln process.

6. Provide bullnose units at all outside corners.
 7. Provide bond beams, control joints, jambs, lintels (solid bottom), soaps, cap blocks, and fillers to match and compliment block units as shown or required.
- B. Flashing and Accessories: Per Architectural Drawings and Specifications**
- D. Mortar:**
1. Materials: (Unless stated otherwise on Structural Drawings)
 - a. Portland Cement: ASTM C150, Type 1.
 - b. Hydrated Lime: ASTM C207, TYPE "S", typical. Use TYPE "N" for CMU veneer.
 - c. Aggregate: Sand conforming to ASTM C144
 - d. Water: Clean and potable
 - e. Admixtures For Mortar:
 - 1) General: Do not use calcium chloride
 - 2) Concrete Masonry Units: Shall be standard color.
 - 3) Integral Water Repellant (In mortar of exterior exposed CMU): "Dry- Block Mortar Admixture" integral water repellant admixture as manufacturer by W.R. Grace & Co., or equal. Note: Water repellent block admixture and mortar admixture are not interchangeable.
 2. Mix Design: (Proportions by volume) (Unless stated otherwise on Structural Drawings)
 - a. Type: ASTM C270, Type "S"
 - b. Proportions: 1 part cement, 1/2 part hydrated lime and 4-1/2 parts sand to provide a compressive strength of 1,800 psi in 28 days. Do not use calcium chloride.
- E. Grout:**
1. Materials: (Unless stated otherwise on Structural Drawings)
 - a. Hydrated Lime: ASTM C207, TYPE "S"
 - b. Portland Cement: ASTM C150, Type 1.
 - c. Water: Clean and potable
 - d. Aggregates:
 - 1) Course aggregate shall conform to ASTM C404.
 - 2) Fine aggregate shall conform to ASTM C144.
 2. Mix Design: (Unless stated otherwise on Structural Drawings)
 - a. Comply with ASTM C476 to provide a compressive strength of 3,000 psi in 28 days, unless noted otherwise. Do not use calcium chloride.
 - 1) Fine Grout: Fine grout conforming to ASTM C476 and consisting of 1 part Portland cement, 0 to 1/10 part lime and 2-1/4 to 3 parts sand by volume.
 - 2) Course Grout Mix: Course grout conforming to ASTM C476 and consisting of 1 part Portland cement, 0 to 1/10 part lime and 2-1/4 to 3 parts sand, and 1 to 2 parts course aggregate.
- F. Reinforcement, Anchors and Tie Systems:**
1. General: Reinforcement used in all wythes shall be galvanized after fabrication in accordance with ASTM A153, Class B-2.
 2. Approved Manufacturers include the following:
 - a. Dur-O-Wal
 - b. Heckmann Building Products
 - c. Hohmann & Barnard, Inc
 - d. Wire-Bond

3. At solid multiple wythe masonry walls and single wythe masonry walls, (Interior partitions) use #9 gauge truss type reinforcing. Pre-fab corners and tees shall be used at all wall corners and intersections; width shall be two (2) inches less than nominal thickness of walls. Dur-O-Wal "Truss" at single wythe; "Trirod" at multiple, or Architect approved equal.
4. At Double Wythe Cavity Walls with Insulation Board: Use Hot-dipped galvanized, #9 gauge truss type with 3/16 inch adjustable pintle wall ties. Width of truss reinforcement shall be 2 inches less than the nominal thickness of wall. 3/16 inch wall tie double eye sections welded at 16 inches o.c. extended as required for insulation thickness. Pre fab corners and tees shall be used at all wall corners and intersections. Dur-O-Wal "Dur-O-Eye", or Architect approved equal.
5. At all Masonry Anchored to Steel Spandrel Beam and Columns: Hot-dipped galvanized, No. 315 Anchor and No. 316 Pintle Tie manufactured by Heckmann Building Products, Inc., or Architect approved equal. Anchors detailed on Structural Drawings supersede.
6. At all Veneer Block Anchored to Light Gauge Steel Framing: Hot-dipped galvanized, No. 75HE Pos-i-Tie System utilizing self-tapping screw for steel studs with 5/8 inch barrel length, and 4 inch triangle wire tie for 2 inch cavity manufactured by Heckmann Building Products, Inc., or Architect approved equal. Anchors detailed on structural drawings supersede. Attachment screws shall be corrosion resistant type as recommended by manufacturer to suit application. Adjust wire tie size as required to conform with cavity depth if other than 2 inch.
7. Control Joint Anchor: Equal to Heckmann Building Products, Inc. No. 352 Anchor.

G. Block Insulation: (As shown or required)

1. Rigid Core Inserts:
 - a. Type: "U" shaped insulation inserts conforming to ASTM C578, replacing Federal Specification (FS) HH-I-524C, Type I, specification for Preformed Cellular Polystyrene Thermal Insulation.
 - b. Sizes: As required for 6 inch, 8 inch, 10 inch, and 12 inch blocks as shown or required.
 - c. Approved Product/Manufacturer: Korfil Insulation Inserts manufactured by Concrete Block Insulating Systems (CBIS), West Brookfield, MA; (800) 628-8476, or Architect approved equivalent.
2. Loose Core Fill: Loose perlite or vermiculite insulation conforming to ASTM C332, Standard Specification for Lightweight Aggregates for Lightweight Concrete, such as Zonolite manufactured by Siplast, Irving, TX; (800) 922-8800, or Architect approved equivalent. Loose fill insulation shall be certified asbestos-free.
3. Foamed-In Place Block Insulation:
 - a. Type: Two (2) component system consisting of amino-plast resin and a catalyst foaming agent surfactant.
 - b. Features:
 - 1) Designed to completely fill irregular or hard-to-reach spaces.
 - 2) Can be installed in both new and existing concrete masonry unit construction.
 - 3) Excellent energy and sound insulation values.
 - 4) No settling or expansion after installation.
 - 5) Superior fire and safety performance.
 - 6) No CFC's or HFC's.
 - 7) Safe for the environment.
 - 8) Approved Products/Manufacturers: "Core-Fill 500" manufactured by Tailored Chemical Products, Inc., Hickory, NC;

(828) 322-6512, Polymaster R-501 Foam Insulation manufactured by Polymaster of Houston, (713) 856-6318, or Architect approved equivalent.

4. Sand Fill: Clean, dry sand of type recommended to suit application.

H. Miscellaneous Materials: (As shown or required)

1. Reinforcing Steel: ASTM A615, Grade 60.
2. Forms: Form grade plywood with wood studs and wales as required.
3. Shores: Patented shores of design and manufacture sufficient to safely support imposed loads.
4. Premolded Filler: Fibrous mastic strips containing 35 percent to 50 percent asphaltic impregnation, ASTM D1751.
5. Cleaner: "Deox" chemical cleaner manufactured by National Chemsearch, or "Sure Klean" manufactured by ProSoCo, Inc., or Architect approved equal.
6. Flashing Cement: "Nervaplast" cold setting mastic manufactured by Nervastral, Inc., or Architect approved equal.
7. Building Felt: No. 15 asphalt saturated felt, ASTM D226.
8. Control Joints: "Regular Rapid Control Joint" preformed gasket manufactured by Dur-O-Wal, Inc., or Architect approved equal.
9. Dovetail Anchors: 16 gauge galvanized dovetail corrugated masonry anchor, 1 inch x 3-1/2 inch manufactured by AA Wire Products Co., Heckman Building Products, Inc., Dur-O-Wal, Inc., Hohmann & Barnard, Inc., Masonry Reinforcing Corporation of America, or Architect approved equal.
10. Steel Shapes and Plates: As shown on drawings and specified in Section 05500, Miscellaneous Metals.
11. Headed Stud Anchor: Welded by full-fusion process as furnished by TRW Nelson Stud Welding Division, or Architect approved equal.
12. Bolts: ASTM A307. Furnish with carbon steel washers.
13. Deformed Bar Anchors: Welded by full-fusion process as furnished by TRW Nelson Stud Welding Division, or Architect approved equal.
14. Reinforcing Bars to be Welded: ASTM A706.
15. Cavity Drainage Protection: 2 inch thick by 10 inch high by 5 feet long recycled polyester/ polyethylene mesh, trapezoidal-shaped, continuous at foundation, at heads above openings, and shelf angles as indicated on drawings. Provide Mortar Net™ manufactured by Mortar Net USA, Ltd., Gary, IN; (800) 664-6638, or Architect approved equal.
16. Masonry Color: Iron oxide pigment conforming to ASTM C979 in color(s) selected by Architect, shall be inert, stable to atmospheric conditions, sunfast, weather resistant, alkali resistant, water insoluble, and free of fillers and extenders, as manufactured by ChemSystems, Inc., Davis Colors, Solomon Grind-Chem Service, Inc., or Architect approved equal.

2.3 MASONRY STRENGTH

- A. Ultimate compressive strength of masonry as required by design and determined by prism tests shall not be less than 1,800 psi, unless stated otherwise in Structural Drawings.

PART 3 - EXECUTION

3.1 FORMS AND SHORES

- A. Provide forms and shores sufficiently strong and rigid as required to support soffits, beams, and lintels during construction.

- B. Build forms to conform to shape, line, and dimension of masonry members as detailed, substantial and sufficiently tight to prevent leakage of mortar, grout or concrete. Properly brace or tie together so as to maintain position and shape.

3.2 PREPARATION OF MATERIALS

- A. Concrete Masonry Units:
1. Where cutting is required, masonry shall be cut with a sharp masonry saw.
 2. Ensure concrete masonry units to receive sand fill are ready for filling and cutouts are protected from material spillage.
- B. Mortar and Grout:
1. Use suitable containers for material measurement. Measuring sand by the shovel is not acceptable.
 2. Thoroughly machine mix a minimum of five (5) minutes after all materials are in mixer.
 3. Consistency will completely fill all spaces intended to receive grout.
 4. Use within 2-1/2 hours of initial mixing.
 5. Mortar or grout shall not be used if curing has progressed to yield a stiff consistency.
- C. Reinforcement:
1. Reinforcement shall be free from loose rust and other coatings that would reduce the bond.
 2. Cut accurately to length and bend by such methods as will prevent injury to the material.
 3. Straighten out kinks or bends.
- D. Membrane Flashing:
1. Locations: Install in exterior walls to divert moisture within walls to exterior surfaces. Install flashing over heads of openings, under sills of openings, as cap flashing at exterior masonry, around perimeter of building as base flashing at all exterior cavity walls and other locations indicated on the drawings or required.
 2. Bed Joints: Coordinate work with Division 4, Masonry. Install flashings between two (2) thin layers of masonry mortar without increasing thickness of mortar joint. Keep outer edge of flashing material back from face of masonry.
 3. Adjacent Work: Protect work by masking, covering, or other precautionary methods. Remove protection when no longer necessary.

3.3 INSTALLATION

- A. General:
1. Do not use chipped or cracked concrete masonry units (CMU) where exposed to view.
 2. Use masonry saws to cut and fit exposed units.
 3. Exposed masonry at exterior corners shall be solid units.
 4. Clean surface of masonry smooth and free from projections which might puncture or otherwise damage flashing material.
 5. Place through-wall flashing as described below.
 6. Lay masonry units plumb, true to line, and with level courses accurately spaced within allowable tolerances.
 7. Do not furrow bed joints.
 8. Stop off horizontal run by racking back in each course; toothing is not permitted.

9. Adjust units to final position while mortar is soft and plastic.
 10. If units are displaced after mortar has stiffened, remove, clean joints and units and re-lay with fresh mortar.
 11. When joining fresh masonry to set or partially set masonry:
 - a. Remove loose masonry units and mortar
 - b. Clean and lightly wet exposed surface of set masonry prior to laying fresh mortar.
- B. Metal Door Frames: Fill jamb frames solid with mortar. Build in anchors.
- C. Lintels and Bond Beams: Provide reinforced unit type, except where steel lintels are shown. Use reinforcing bars as shown on the drawings. Completely fill in lintel block and bond beams with grout. Provide 8 inch bearing at end of lintels.
- D. Corners: Connect corners with No. 9 galvanized wire or corrugated tie using one tie for each 4 inches of nominal wall thickness.
- E. Partition Tops: Allow space at top of horizontal spanning walls for compressible joint back-up and sealant as specified in Sealant section. Anchor top of walls to deck or structure.
- F. Mortar Beds:
 1. Place mortar in a manner which will result in the development of adequate bond between the masonry and the reinforcement.
 2. Lay units with full mortar coverage on horizontal and vertical joints in all courses.
 3. Provide sufficient mortar on ends of masonry unit to fill head joints.
 4. Rock closures into place with head joints thrown against two adjacent masonry units in place.
 5. Do not pound corners or jambs to fit stretcher units after setting in place.
 6. Where adjustment to corners or jambs must be made after mortar has started to set, remove mortar and replace with fresh mortar.
- G. Mortar Joints and Patterns:
 1. Lay CMU in running one-half (1/2) bond pattern, unless noted otherwise.
 2. Provide flush joints where concealed from view and where dampproofing is scheduled.
 3. Provide standard concave tooled joint where masonry is exposed to view for CMU, typically.
 4. All mortar joints to be of consistent size.
 5. All horizontal joints shall be concave tooled joint at face of units, unless noted otherwise.
- H. Reinforcement, Anchor and Tie Systems:
 1. General:
 - a. Completely embedded in mortar or grout.
 - b. All reinforcement consisting of bars or wire 1/4 inch or less in diameter embedded in the horizontal mortar joints shall have no less than 5/8 inch mortar coverage from the exposed face.
 - c. Veneer anchors at exterior sheathed covered metal stud exterior walls shall be attached on outside face of sheathing using cadmium plated sheet metal screws. Spacing shall be same as stud spacing o.c. horizontally and 16 inches o.c. vertically.
 - d. At intersection of all perpendicular masonry walls provide two (2) vertical rows of ladder type reinforcing at 16 inches o.c. vertically.

- e. Weld veneer anchors to structural steel in accordance with manufacturer's recommendations. Touch-up steel shop paint and galvanized coating on anchor with proper touch-up paint to match damaged coating in accordance with manufacturer's recommendations.
 - f. In cavity walls with CMU back-up, embed truss type horizontal reinforcement with integral adjustable pintle wall ties every 16 inches o.c. vertically.
 - g. Splices in reinforcement: Splices may be made only at such points and in such manner that the structural strength of the member will not be reduced. Lapped splices shall be eight (8) inches. Welded or mechanical connection shall develop the strength of the reinforcement.
 - h. Corrugated strap ties shall not be used as veneer anchors at exterior or where subject to moisture. Their use in interior, dry conditions are acceptable.
 - i. Place joint reinforcement in the first two (2) bed joints above and the first two (2) bed joints below masonry openings. Extend extra reinforcing two (2) feet beyond jambs.
 - j. Provide masonry ties at floor and roof decks as indicated.
- I. Membrane Flashing: Per Architectural Drawings and Specifications
- J. Laying Masonry: Lay units plumb, level, and true to line with full head and bed joints. Butter ends of masonry with sufficient mortar to fill head joints. Do not furrow bed joints. Slope top of bed joint toward center of wall to minimize amount of mortar forced into grout space. Remove mortar, protruding from joints into grout space, before pouring grout.
- K. Reinforcing Bars:
- 1. Hold vertical bars in position at top and bottom and at intervals not exceeding four 4 feet-0 inches with a minimum clearance of 1/4 inch from masonry and not less than one (1) bar diameter between bars.
 - 2. When a foundation dowel is not in alignment with a vertical block cell or pilaster, slope it not more than one (1) horizontal in six (6) vertical to bring it into proper alignment before grouting.
 - 3. Place horizontal reinforcing bars in continuous masonry courses, consisting of bond-beam or trough block units, and solidly grout in place.
 - 4. Use straight reinforcing bars except for bends around corners and where bends or hooks are detailed on plans.
 - 5. Lap reinforcing steel 40 bar diameters minimum where spliced and wire together.
- L. Grouting: Where detailed place grout in reinforced masonry beams, walls, columns, and pilasters. All cells and spaces containing reinforcing bars shall be filled with grout. Wherever possible grouting shall be done from inside face of masonry. Exercise extreme care to prevent grout from staining face of masonry. Immediately remove any spilled grout from face and top of masonry.
- 1. Prior to grouting clean space so that all spaces to be filled with grout do not contain mortar projections greater than 1/2 inch, mortar droppings or other foreign material. Grout shall be placed so all spaces designated to be grouted shall be filled with grout and grout shall be confined to those specific spaces.
 - 2. Grout materials and water content shall be controlled to provide adequate fluidity for placement, without segregation of constituents and shall be mixed thoroughly.
 - 3. Between grout pours a horizontal construction joint shall be formed by stopping all wythes at the same elevation and with grout stopping a minimum of 1-1/2

- inches below a mortar joint, except at top of wall. Where bond beams occur, stop grout pour a minimum of 1/2 inch below top of masonry.
4. Reinforcement shall be placed prior to grouting. Bolts shall be accurately set with templates or by approved equivalent means and held in place to prevent movement.
 5. Segregation of grout materials and damage to masonry shall be avoided during the grouting process. Adequately brace masonry to prevent displacement or cracking during grouting operations.
 6. Grout shall be consolidated by mechanical vibrator during placing, before loss of plasticity, in a manner to fill grout space. Grout pours greater than 12 inches shall be reconsolidated by mechanical vibration to minimize voids due to water loss. Grout pours 12 inches or less in height shall be mechanically vibrated, or puddled.
 7. Grout shall not be handled nor pumped utilizing aluminum equipment.
 8. Size and height limitations of grout space or cell shall be as follows:

GROUT TYPE	GROUT POUR MAX. HEIGHT (FEET)	LEAST CLEAR DIMENSIONS		CLEANOUTS REQUIRED
		Width of Grout Space (In.)	CMU Cell Dim. Dims. (In. x In.)	
Fine	1	3/4	1-1/2 x 2	No
Fine	5	1-1/2	1-1/2 x 2	No
Fine	4	1-1/2	1-1/2 x 3	Yes
Coarse	1	1-1/2	1-1/2 x 3	No
Coarse	5	2	2-1/2 x 3	No
Coarse	4	2	3 x 3	Yes

- a. Clear dimension is the cell or grout space width less mortar projections.
 - b. Grout space width shall be increased by the horizontal projection of the diameters of horizontal bars within the cross section of the grout space.
9. Place grout in lifts not exceeding 4 feet-0 inches.
- M. Concreting: Supervise placing of concrete in cores of masonry beams and lintels and over masonry soffits where structural concrete is detailed. Report discrepancies or procedures which may adversely affect performance of masonry work.
- N. Weepholes:
1. Provide weepholes above all thru-wall flashings where weepholes occur at the base of the wall. The mason shall coordinate the location of the thru-wall flashings with the location of the sidewalks on the civil engineering drawings. Both weepholes and thru-wall flashings shall be above the first course of block above the sidewalks. Pay particular attention to areas near exterior doors.
 2. Ensure cavity drainage protection is properly installed.
 3. Leave head joint free and clean of mortar. Provide a temporary strip of rope at each weep to be removed upon completion of panel.
 4. Spacing: 24 inches on center for block, unless shown otherwise.
 5. Keep weepholes and area above flashing free of mortar droppings.
 6. Coordinate weep holes to be located above sidewalks and paving.
- O. Sealant Joints:

1. Allow for sealant joints around outside perimeters of exterior doors, window frames and other wall openings.
2. Uniform depth: 3/4 inch.
3. Uniform width: As shown on the drawings but not less than 1/4 inch.
4. Provide sample for Architect's approval.
5. Refers to drawing for locations and details of accent joints.

P. Movement Joints (Expansion Joints and Control Joints):

1. Locate expansion and control joints as shown on drawings, or if not shown, comply with the following:
 - a. General:
 - 1) Vertical expansion joints shall be placed in the veneer wythe and control joints shall be placed in the concrete masonry wythe, although they do not necessarily have to be aligned.
 - 2) Mortar and joint reinforcement shall not bridge movement joints.
 - 3) Mortar joints which stop at the expansion joint cavity shall be struck flush with the masonry unit, producing a continuous flat surface for the sealant to adhere to.
 - b. Vertical Expansion Joints:
 - 1) Locate expansion joints on long straight walls without openings maximum 25 feet-0 inches.
 - 2) Locate expansion joints at the corner of walls perpendicular to one another. In instances, where the joint is not desired at the corner, the expansion joint shall be located within 10 feet-0 inches of the corner in either wall, but not necessarily both. The spacing of expansion joints around a corner shall not exceed the spacing of expansion joints in a straight wall. For example, if the spacing between expansion joints on a straight wall is 25 feet-0 inches, then the spacing of expansion joints around a corner could be 10 feet-0 inches on one side of the corner and 15 feet-0 inches on the other side. Joint reinforcement may be added around wall corners to provide added tensile strength to the corner, but joint reinforcement shall not bridge the expansion joint.
 - c. Offsets and Setbacks:
 - 1) Locate expansion joints at 10 feet-0 inches maximum on one side of the offset or setback. The spacing of expansion joints around an offset or setback shall not exceed the spacing of expansion joints in a straight wall. See expansion joints at corners of perpendicular walls to one another above for example of spacing.
 - d. Openings (Doors and Windows):
 - 1) Locate vertical expansion joints along the edge or jamb of the opening of windows and doors. Single opening windows and doors under 6 feet-0 inches in width shall have expansion joint on one (1) side of the edge or jamb of the opening as determined by the Architect, unless shown otherwise on drawings. Windows and doors 6 feet-0 inches and over in width shall have expansion joints on both sides of the edge or jamb of the opening.
 - 2) Where masonry above an opening is supported by shelf angles attached to the structure, a vertical expansion joint shall be located alongside the opening, continuing through the horizontal support.

- 3) Where masonry above the opening is supported by loose lintels (unattached to the structure), special detailing and construction is required. If the expansion joint runs along side the opening, the loose steel lintel shall be allowed to expand independently of the masonry. To accomplish this, form a slip plane with flashing located above and below the angle. A backer rod and sealant shall be installed in front of the toe of the angle, and space shall be left at the end of the angle. Thus, a pocket will be formed which will allow movement of the steel angle within the masonry work. If the joint cannot be built in this manner, then the vertical expansion joint shall not be located alongside the opening, but rather, with Architect's prior approval, the joint shall be located halfway between the openings.
- e. Intersections and Junctions:
 1. Locate expansion joints at intersections of masonry walls and walls which serve different functions. If the masonry is not required to be bonded at the intersection, an expansion joint shall be incorporated. Walls which intersect at other than right angles are also vulnerable to cracking at the intersection.
 2. Locate expansion joint to separate adjacent walls of different heights to avoid differential movement, especially if the difference is very large.
- f. Parapets:
 1. All vertical expansion joints shall be carried through the parapets.
 2. Additional expansion joints shall be halfway between those running full height, unless the parapet is reinforced. These additional expansion joints shall continue down to a horizontal expansion joint, or continue to the base of the wall.
- g. Horizontal Expansion Joints:
 1. Locate horizontal expansion joints at shelf angles supporting block masonry.
- h. Control Joints:
 1. Locate CMU control joints directly over concrete slab control joints.
 2. Whenever possible, lay out CMU so that control joint will coincide with CMU module (25 feet-0 inch maximum spacing between control joints), unless noted otherwise on drawings.
 3. Locate control joints at structural columns to isolate movement from continuing or intersecting walls and columns.
 4. Install premolded control joints with backer rod and sealant in accordance with manufacturer's instructions.
- Q. Block Insulation: (As shown or required)
 1. Rigid Core Inserts: Fill concrete masonry unit cells completely with insulation in accordance with manufacturer's instructions.
 2. Loose Core Fill: Fill concrete masonry unit cells shown or required completely with loose core fill. Ensure concrete masonry units to receive loose core fill are ready for filling and cutouts are protected from material spillage. Place signs on filled walls stating "Do Not Cut Openings or Drill In This Wall" once fill is placed.
 3. Foamed-In Place Block Insulation: Make sure concrete masonry units to receive foamed in place block insulation are ready for drilling and filling. Drill holes and fill concrete masonry unit cells completely with insulation in accordance with

- manufacturer's instructions. Plug holes with cement mortar and leave surface smooth in accordance with manufacturer's instructions.
4. Sand Fill: Fill concrete masonry unit cells shown or required completely with sand. Ensure concrete masonry units to receive sand fill are ready for filling and cutouts are protected from material spillage. Place signs on filled walls stating "Do Not Cut Openings or Drill In This Wall" once fill is placed.

3.4 ALLOWABLE TOLERANCES

- A. Maximum Variation from Plumb:
 1. In lines and surfaces of columns, walls and at rises:
 - a. 1/4 inch in 10 feet (1:480)
 - b. 3/8 inch in 20 feet (maximum)
 - c. 1/2 inch in 40 feet (1:960)
 2. For external corners, expansion joints and other conspicuous lines:
 - a. 1/4 inch in 20 feet (maximum)
 - b. 1/2 inch in 40 feet (1:960)
- B. Maximum variation from level:
 1. 1/4 inch in any bay or 20 feet
 2. 1/2 inch in 40 feet (1:960)

3.5 REMOVAL OF FORMS AND SHORES

- A. Do not remove shores and forms under reinforced masonry beams, lintels, and soffits until members have hardened sufficiently to carry their own weight and other super imposed loads. Providing that sufficient curing has taken place, leave forms and shores in place as follows:
 1. Beam and lintels: Minimum ten (10) days.
- B. Allow 16 hours to elapse after completion of masonry columns and walls before placing floor or roof construction loads on them. Allow an additional 48 hours before applying concentrated loads such as trusses, girders, and beams.

3.6 REPAIRING, POINTING AND CLEANING

- A. All holes in exposed masonry shall be pointed, and defective joints shall be cut out and re-pointed with mortar.
- B. All exposed unglazed masonry shall be thoroughly cleaned using water and stiff brushes. If stiff brushes and water do not suffice surface of unglazed masonry, on which no green efflorescence appears, shall be thoroughly wetted with clean water and scrubbed with a solution of not more than one (1) part hydrochloric (muriatic) acid to nine (9) parts water or other cleaning agent approved by Architect, followed immediately by a thorough rinsing with clear water. Before applying any cleaning agent to the entire wall, it shall be applied to a sample wall area of approximately 20 square feet, in a location approved by Architect. No further cleaning work may proceed until the sample area has been approved by Architect, after which, the same cleaning materials and method shall be used on remaining wall area. If masonry is cleaned with an acid solution all sash, metal lintels and other corrodible parts shall be thoroughly protected. Green efflorescence shall be removed in accordance with block manufacturer's recommendations.
- C. All surfaces of glazed units, if any, shall be washed with soap powder and warm water, applied with a scrubbing brush and then rinsed thoroughly with clear water. Metal

cleaning tools and brushes or abrasive powders shall not be used. When necessary, ceramic glazed units may be scrubbed with a solution of no more than one (1) part hydrochloric acid to 25 parts clean water.

3.7 REPAIR OR REPLACEMENT OF DAMAGED WORK

- A. Imperfect or damaged work, or any material damaged or determined to be defective before final completion and acceptance of the entire job, shall be satisfactorily replaced at Contractor's expense and in conformity with all requirements of drawings and specifications. Removal and replacement of masonry work shall be performed in such a manner as not to impair the appearance or strength of the structure in any way.

3.8 CLEAN-UP AND PROTECTION

- A. Clean up all debris caused by work of this Section, keeping the area clean and neat at all times.
- B. Cover all unfinished work at night against the elements with plastic sheeting, building paper, heavy canvas or other material approved by Architect to prevent water from entering cavities.
- C. Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

3.9 FIELD QUALITY CONTROL AND TESTING

- A. Inspection and Testing Laboratory services shall be in accordance with Section 01115, Inspection and Testing Laboratory Services.

END OF SECTION

SECTION 04 27 31

REINFORCED UNIT MASONRY

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Concrete Block.
- B. Mortar and Grout.
- C. Reinforcement and Anchorage.
- D. Flashings.
- E. Lintels.
- F. Accessories.

1.2 RELATED REQUIREMENTS

- A. Section 04 05 11 – Masonry Mortaring and Grouting.
- B. Section 05 50 00 – Metal Fabrications: Loose steel lintels.
- C. Section 06 10 00 – Rough Carpentry: Nailing strips built into masonry.
- D. Section 06 10 54 – Wood Blocking and Curbing: Nailing strips built into masonry.
- E. Section 07 90 05 – Joint Sealers and Sealants: Backing rod and sealant at control and expansion joints.
- F. Section 04 20 00 – Unit Masonry: Commercial and Structural Block.

1.3 REFERENCE STANDARDS

- A. ACI 530/ASCE 5/TMS 402 – Building Code Requirements for Masonry Structures; American Concrete Institute International; 2008.
- B. ACI 530.1/ASCE 6/TMS 602 – Specification For Masonry Structures; American Concrete Institute International; 2008.
- C. ASTM A 82/A 82M – Standard Specification for Steel Wire, Plain, for Concrete Reinforcement; 2007.
- D. ASTM A 653/A 653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2009.
- E. ASTM C 91 – Standard Specification for Masonry Cement; 2005.
- F. ASTM C 270 – Standard Specification for Mortar for Unit Masonry; 2007a.

- G. ASTM C 476 – Standard Specification for Grout for Masonry; 2008.

1.4 SUBMITTALS

- A. See Section 01 33 00 – Administrative Requirements, for submittal procedures.

1.5 QUALITY ASSURANCE

- A. Comply with provisions of ACI 530/ASCE 5/TMS 402 and ACI 530.1/ASCE 6/TMS 602, except where exceeded by requirements of the contract documents.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry unit by means that will prevent mechanical damage and contamination by other materials.

PART 2 PRODUCTS

2.1 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
1. Size: Standards units with nominal face dimensions of 16 x 8 inches and nominal depths as indicated on the drawings for specific locations.
 2. Special Shapes: Provide non-standard blocks configured for corners.

2.2 MORTAR AND GROUT MATERIALS

- A. Mortar and Grout: As specified in Section 04 05 11 – Mortaring and Grouting.

2.3 REINFORCEMENT AND ANCHORAGE

- A. Manufacturers of Joint Reinforcement and Anchors:
1. Dur-O-Wal: www.dur-o-wal.com.
 2. Hohman & Barnard, Inc.: www.h-b.com.
 3. Masonry Reinforcing Corporation of America: www.wirebond.com
 4. Substitutions: See Section 01 25 13 – Product Requirements.

2.4 FLASHINGS

- A. Metal Flashing Materials: Per Architectural Specs.

2.5 ACCESSORIES

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.

2.6 LINTELS

2.7 PRECONSTRUCTION TESTING

- A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01 45 23.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.2 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
- B. Clean reinforcement of loose rust.
- C. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.3 COURSING

- A. Establish lines, levels, and coursing indicated. Protect form displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units.

3.4 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- D. Remove excess mortar as work progresses.
- E. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

3.5 REINFORCEMENT AND ANCHORAGE

- A. Reinforcement Bars: Secure at locations indicated and to avoid displacement during grouting. Minimum spacing between bars or to masonry surfaces shall be one bar diameter.

- B. Wall Ties: Install wall ties at locations indicated, spaced at not more than 24 inches on center horizontally and 16 inches on center vertically, unless otherwise indicated on drawings.
- C. Reinforced Hollow Unit Masonry: Keep vertical cores to be grouted clear of mortar, including bed area of first course.
 - 1. Bond Beams: At bond beams or other locations for horizontally reinforced masonry, provide special masonry unit or saw to accommodate reinforcement.

3.6 MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
 - 1. Extend flashing full width at such interruptions and at least 4 inches into adjacent masonry or turn up at least 4 inches to form watertight pan at non-masonry construction.
 - 2. Remove or cover protrusions or sharp edges that could puncture flashing.

3.7 GROUTING

- A. Use either high-lift or low-lift grouting techniques, at's option, subject to other limitations of contract documents.
- B. Low-Lift Grouting:
 - 1. Limit height of pours to 12 inches.
 - 2. Limit height of masonry to 16 inches above each pour.
 - 3. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.
 - 4. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.
- C. High-Lift Grouting:
 - 1. Verify that horizontal and vertical reinforcement is in proper position and adequately secure before beginning pours.
 - 2. Place grout for spanning elements in single, continuous pour.

3.8 CONTROL AND EXPANSION JOINTS

- A. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- B. Size control joint in accordance with Section 07 90 05 for sealant performance.

3.9 TOLERANCES

- A. Maximum Variation from Plumb: ¼ inch per story non-cumulative; ½ inch in two stories or more.
- B. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.
- C. Maximum Variation from Cross Sectional Thickness of Walls: ¼ inch,

3.10 CLEANING

- A. Remove excess mortar and mortar smears as work progresses.

- B. Use non-metallic tools in cleaning operations.

3.11 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

SECTION 05 12 00

STRUCTURAL STEEL

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Labor, materials, services, equipment, and appliances required in connection with or incidental to furnishing, fabricating, delivering, and erecting structural steel complete, as described in this Section, shown on Drawings, or reasonably implied therefrom, including, but not limited to:
 - 1. Structural steel columns, girders, beams, and angles
 - 2. Angle frames for openings in floors and roofs
 - 3. Steel plates and miscellaneous deck support angles
 - 4. Connections and component parts
 - 5. Qualification of welders employed on the Project
 - 6. Galvanizing of items
 - 7. Shop prime coat painting and field touch-up painting
 - 8. Grouting of base plates
 - 9. Temporary bracing of construction
 - 10. Fabrication/erection inspection and testing
- B. Extent of structural steel work is shown on the Structural Drawings, including schedules, notes and details to show sizes and locations of members, typical connections and types of steel required.
- C. Include all supplementary parts and members necessary to complete the structural steel work, regardless of whether such parts and members are definitely shown or specified, and furnish all such gussets, plates, bolts, nuts, washers, welds, etc. as may be required for the proper assembly of all items. Include miscellaneous deck support angles as required for the proper support of metal floor deck around columns, gussets, openings and obstructions, and proper support of metal roof deck around openings, obstructions, and where required.

1.2 RELATED REQUIREMENTS

- A. Section 01 45 23 - Testing and Inspecting Services

1.3 RELATED WORK

- A. Section 03 30 00 - Cast-In-Place Concrete: Installation of anchor bolts
- B. Section 04 20 00 - Unit Masonry: Furnishing masonry anchors to be attached to structural steel.
- C. Section 05 21 00 - Open Web Steel Joists and Joist Girders
- D. Section 05 31 00 - Steel Deck
- E. Section 05 40 00 - Light Gauge Steel Framing
- F. Section 05 50 00 - Miscellaneous Metals
- G. Section 07 81 00 - Sprayed Fireproofing

H. Section 09 91 00 - Painting and Staining: Finish painting of exposed structural steel.

1.4 REFERENCES

- A. American Society for Testing and Materials (ASTM)
1. A 6, Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
 2. A 36, Standard Specification for Carbon Structural Steel
 3. A 53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
 4. A 108, Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
 5. A 123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 6. A 153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 7. A 307, Standard Specification for Carbon Steel Bolts and Studs 6000 psi Tensile
 8. A 325, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
 9. A 490, Standard Specification for Structural Bolts, Steel, Heat-Treated, 150 ksi (1035 Mpa) Tensile Strength
 10. A 500, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
 11. A 578, Standard Specification for Straight-Beam Ultrasonic Examination of Plain and Clad Steel Plates for Special Applications
 12. A653, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process
 13. A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
 14. A897, Standard Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on each surface
 15. A 992, Standard Specification for Structural Steel Shapes
- B. American Institute for Steel Construction (AISC)
1. Code of Standard Practice for Steel Buildings and Bridges
 2. Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings, latest edition
 3. Specifications for Structural Joints Using ASTM A 325 or A 490 Bolts, approved by the Research Council on Structural Connections of the Engineering Foundation
 4. Specification for Architecturally Exposed Structural Steel
 5. Structural Welding Guide, AWS D1.1
- C. American National Standards Institute (ANSI)
1. Standards
- D. American Welding Society (AWS)
1. D1.1 Structural Welding Code
- E. Corps of Engineers (CE)
1. CRD-C 621
- F. Industrial Fasteners Institute (IFI)

1. Handbook on Bolt, Nut, and Rivet Standards

H. Steel Structures Painting Council (SSPC)

1. Painting Manual, Volume 1, Good Painting Practice
2. Painting Manual, Volume 2, Systems Specifications

1.5 QUALITY ASSURANCE

- A. All standards referenced in this Section shall apply, as applicable to the work, unless noted otherwise. In case of conflict between the Contract Documents and a referenced standard, the Contract Documents shall govern. In case of conflict between the Contract Documents and the Building Code, the more stringent requirement shall govern.
- B. Contractor shall furnish fabrication/erection inspection and testing of all welds in accordance with AWS D1.1, Chapter 6. Submit records of inspections and tests to Owner's testing laboratory for their review.
- C. Testing Laboratory Services for Verification of Quality: Refer to Section 01 45 23, Testing and Inspecting Services.
- D. All materials, fabrication procedures and field are subject to verification inspection and testing by the Owner's testing laboratory, in both shop and field. Such inspections and tests will not relieve the Contractor of his responsibility for providing materials and fabrication procedures in compliance with specified requirements. Owner reserves the right to use ultrasonic or radiographic inspection to verify the adequacy of all welds. Testing procedures and acceptance criteria shall be as specified in AWS D1.1. Promptly remove and replace materials or fabricated components which do not comply.
- E. Qualifications for Welding Work: Contractor shall be responsible for qualifying welding operators employed on the Project in accordance with AWS Standard Qualification Procedure. Provide certification to Owner's testing laboratory that welder's have satisfactorily passed AWS qualification tests in the previous 12 months. Retesting and recertification of welders, if required, is the Contractor's responsibility.
- F. Qualifications for Welding Procedures: Contractor shall provide the testing laboratory with welding procedures which are to be used in executing this work. Welding procedures shall be qualified prior to use in accordance with AWS D1.1, Part B.
- G. Comply with provisions of referenced codes, specifications, and standards, in addition to the Building Code.
- H. Fabricator's Qualifications:
 1. Company specializing in the fabrication of structural steel for buildings with minimum of five (5) years experience and currently certified by AISC or IAS Quality Certification Program.

1.6 DESIGN

- A. Connections: Shall be designed in accordance with the requirements on the Structural Drawings.
- B. Fabricator shall be responsible for all errors of detailing, fabrications, and for correct fitting of structural steel members.

1.7 SUBMITTALS

- A. **Product Data:** Submit producer's or manufacturer's specifications and installation instructions, including laboratory test reports and other data, to show compliance with Specifications for the following products:
1. Structural steel primer and touch-up paint.
 2. Shrinkage-resistant grout.
- B. **Mill Certificates:** Submit manufacturer's mill analysis, for Architect's record, showing compliance with Specifications for the following products:
1. Structural steel (each type)
 2. High-strength bolts (each type), including nuts and washers.
- C. **Shop Drawings:**
1. Submit design calculations for the connections designed by the Contractor, prior to or with the shop drawings. Calculations shall bear the seal of a Registered Professional Engineer, licensed in the State of Texas. Shop drawings containing connections for which calculations have not been received will be returned unchecked as an incomplete submittal. Design Calculations will be retained for the Architect's file, and will not be approved or returned. Design calculations shall include the following:
 - a. All structural steel beam connections not specifically detailed on the Structural Drawings shall be designed by the Contractor, under the direct supervision of a Registered Professional Engineer, licensed in the State of Texas. Connections shall be designed to resist the forces specified on the Structural Drawings and shall be shown in detail on the shop drawings.
 - b. **Wind Brace Connections:** Calculations shall be given for each different wind brace connection used and detailed on the shop drawings. Each connection calculation shall identify the location or locations for which the connection applies by indicating the following:
 - 1) the wind brace mark(s) from the Structural Drawings;
 - 2) the piece mark(s) from the shop drawings;
 - 3) the member size, and
 - 4) the design loading(s)
 2. Submit shop drawings prepared under the supervision of a Registered Professional Engineer, licensed in the State of Texas, including complete details and schedules for fabrication and shop assembly of members, erection plans, details, procedures, and diagrams showing sequence of erection. Include details of cuts, connections, camber holes, and other pertinent data. Indicate welds by standard AWS symbols, and show size, length, and type of each weld. Shop drawings shall not be produced by using reproductions of Contract Documents.
 - a. Structural steel members for which shop drawings have not been reviewed shall not be fabricated. Architect's review shall cover general locations, spacings, and details of design. Omission from shop drawings of any materials required by the Contract Documents shall not relieve the Contractor of his responsibility for furnishing and installing such materials, even though such shop drawings may have been reviewed and returned.
 - b. **Substitutions:** Submit substitutions of sections or modifications of details, or both, and the reasons therefore, along with shop drawings for Architect's approval. Submitted substitutions must be clearly identified

and noted as such. Approved substitutions, modifications, and necessary changes in related portions of the work shall be coordinated by the fabricator and shall be accomplished at no additional expense to the Owner.

- D. Setting Drawings and Templates: Submit setting drawings, templates, and directions for installation of anchor bolts and other anchorages installed by other trades.
- E. Certifications:
 - 1. Submit evidence of current AISC or IAS plant certification. Refer Fabricator's Qualifications under Quality Control.
 - 2. Submit welder's certification to Owner's testing laboratory. Refer Qualifications for Welding Work under Quality Control.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time so as to not delay that work.
- B. Deliver packaged materials in the manufacturer's original unopened packaging., store and handle steel joists in accordance with SJI recommendations. Protect packaged materials from corrosion and deterioration.
- C. Store materials to permit easy access for inspection and identification. Keep steel members off the ground, using pallets, platforms, or other means of support. Protect steel members from corrosion and deterioration.
- D. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed at no additional expense to Owner.
- E. Support cambered members during shipment and handling in a manner which will not result in loss of camber.

1.9 PROJECT CONDITIONS

- A. Coordinate erection of structural steel with work of other trades.
- B. Do not install columns which have anchor bolts in concrete, until concrete members have attained their 28 day compressive strength.

1.10 PRE-INSTALLATION CONFERENCE

- A. Refer to Section 01 31 00 – Project Coordination.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. Specifications are based on the named product(s) and manufacturer(s). Except where specifically stated as no substitutions, other products must be by a manufacturer having a minimum of five (5) years experience manufacturing product(s) meeting or exceeding

the specifications, comply with requirements of this Section, and Division 1 requirements for substitutions in order to be considered.

2.2 MATERIALS (As shown or required)

- A. Metal Surfaces, General: For fabrication of work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and application of surface finishes.
- B. Steel:
1. Wide Flange (W) Shapes and Tees: ASTM A 992 (50 ksi yield).
 2. Other Rolled Shapes, Plates, and Bars: ASTM A 36 (36 ksi yield).
 3. Cold Formed Steel Tubing: ASTM A 500, Grade B (46,000 psi yield).
 4. Steel Pipe: ASTM A 501, Type E or S, Grade B.
- C. Bolts, Nuts, and Washers:
1. Bolts: Anchor bolts and erection bolts shall conform to ASTM A 307 Grade A, and to the requirements for regular hexagon bolts and nuts of ANSI B18.2.1 and ANSI B18.2.2.
 2. High-strength bolts for connections shall conform to ASTM A 325 or ASTM A 490. Dimensions of bolt heads and nuts shall conform to requirements for heavy hexagon nuts of ANSI B18.2.1 and ANSI B18.2.2.
 3. Washers: Circular washers shall be flat and smooth, shall conform to requirements of Type A washers in ANSI B23.1. Beveled washers for "S" shapes and channels shall be square or rectangular, shall taper in thickness, and shall be smooth. Washers for use with high-strength bolts shall be hardened.
 4. Tension Control Bolts: May, at Contractor's option, be used in lieu of conventional high-strength bolts. Bolts shall be furnished by one (1) of the following:
 - a. LeJeune Bolt Company, Lakeville, Minnesota
 - b. Lohr Structural Fasteners, Inc., P. O. Box 1387, Humble, Texas.
 5. Drilled Anchor Bolts: Shall be one (1) of the following (No substitutions):
 - a. Wej-it Bolt, Wej-it Corporation, Tulsa, Oklahoma
 - b. Kwik Bolt, Hilti Fastening Systems, Tulsa, Oklahoma
 - c. Trubolt, Ramset Fastening Systems, Paris, Kentucky
- D. Welding Electrodes: Shall conform to the requirements and specifications of AWS. Use E70 electrodes. For high-strength, low-alloy steel, provide electrodes, welding rods, and filler metals equal in strength and compatible in appearance with parent metal joined.
- E. Shear Studs: Shall be shear connectors with proper ferrules and accessories, especially designed to create composite deck action between concrete deck and the supporting beam. Steel for studs shall conform to ASTM A108, Grades 1015-1020, with a minimum tensile strength of 60,000 psi. Studs shall be of uniform diameter, heads shall be concentric and normal to shaft and the weld end shall be chamfered, welds shall be solid flux.
- F. Primer and Touch-Up Paint:
1. For Standard Shop Coat: Red oxide primer, meeting the requirements of SSPC-Paint 25. Refer to items below which shall not receive paint/primer. Zinc Chromate not permitted.
 2. For Architecturally Exposed Steel Members: First coat Tnemec-Zinc 90-97 and second coat Tnemec Series 66, Hi-Build Epoxoline; or PPG No. 97-670 Zinc

- Primer with second coat of PPG No. 97-130 HB Epoxy; or Architect approved equal; in color selected by Architect.
3. For Field Touch-Up: Same paint as specified for shop primer coat.
 4. Galvanizing: When galvanized steel is required, conform to the following:
 - a. Steel: Provide zinc-coating to conform to ASTM A 123.
 - b. Threaded Products: Provide zinc-coating to conform to ASTM A 153, Class C.
 - c. Steel Sheet: Provide zinc-coating to conform to ASTM A 897.
- G. Galvanizing Repair Paint: ZRC Cold Galvanizing Compound or Galvilite manufactured by ZRC Worldwide, Marshfield, MA; Galvax Zinc-rich Cold Galvanizing Coating manufactured by Alvin Products, Inc., Lawrence, MA; or paint complying with military specification MILP-21035A, Type I or II. Apply repair paint in accordance with ASTM A780.
- H. Slide Bearings: Reinforced teflon, factory pre-bonded to steel plates with initial static coefficient of friction not exceeding 0.06 at the interface, over a working stress range of 500 to 2000 psi. Bearing shall be one (1) of the following:
 1. "Fluorogold" slide bearings manufactured by the Fluorocarbon Company, Pine Brook, New Jersey.
 2. "Con-Slide" slide bearings manufactured by Con-Serv, Inc. East Hampton, New Jersey.
- I. Shrinkage-Resistant Grout:
 1. Type: Premixed, nonshrink, nonmetallic grout, ASTM C1107.
 2. Applicable Standards: Corps of Engineers CRD-C 621, with the following exceptions:
 - a. Provide a maximum initial set time of 1 hour at 73.4F (+ 5F) and 50% RH.
 - b. Minimum compressive strength at 28 days shall be 8,000 psi when placed at fluid consistency.
 - c. Expansion shall not be formed by gas liberation.
 3. Approved Manufacturers: Specifications are based on first named manufacturer. Other approved manufacturers must meet or exceed this standard.
 - a. "Supreme", Gifford-Hill & Company, Inc., Dallas, Texas 75247 (214) 258-7000.
 - b. "Masterflow 713", Master Builders Division of Martin Marietta, Cleveland, Ohio 44122 (216) 831-5500.
 - c. "Saureisen F-100", Sauereisen Cements Co., Pittsburgh, Pennsylvania 15238 (412) 963-0303.

2.3 FABRICATION

- A. Shop Fabrication and Assembly:
 1. Fabricate and assemble structural assemblies in the shop to the greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings.
 2. Provide camber in members where indicated. Specified camber applies as at jobsite, just prior to erection, lying down flat so that member weight has no effect. Contractor shall take necessary precautions to prevent or compensate for camber loss during shipment. Measured camber in members up to 50 feet-0 inches long shall be within a tolerance of minus 1/2 inch to plus zero from the amount specified. For members greater than 50 feet-0 inches long, both positive and negative tolerance may increase 1/8 inch for every 10 feet-0 inches of length

- in excess of 50 feet-0 inches. Members with a field measured camber outside of the specified tolerance shall be returned to the shop.
3. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
 4. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
 5. Splicing of structural steel members is prohibited without prior approval of Architect. Any member having a splice not shown or detailed on approved shop drawings will be rejected.
 6. Plates shall be free of gross internal discontinuities such as ruptures and delaminations. Plates shall comply with ASTM A 578, Level 1.
 7. Mill Tolerances: Comply with ASTM A 6.
 8. Fabrication Tolerances: Comply with AISC Code of Standard Practice.

B. Connections:

1. Weld or bolt shop connections as indicated on the Drawings.
2. Bolt field connections, except where welded connections or other connections are indicated. Provide specified threaded fasteners for all principle bolted connections. Holes for bolted connections shall be drilled or punched at right angles to member. The slope of surfaces under the bolt head and nut shall not exceed 1:20. Provide beveled washers where slopes exceed 1:20. Bolt holes shall have a diameter not greater than 1/16 inch larger than the nominal bolt diameter. Do not flame cut holes or enlarge holes by burning. Provide washers over all slotted holes in an outer ply.
3. High-Strength Bolted Construction: Install high-strength threaded fasteners in accordance with AISC, "Specifications for Structural Joints Using ASTM A 325 or A 490 Bolts", approved by the Research Council on Structural Connections of the Engineering Foundation.
4. Welded Construction: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work. Assemble and weld built-up sections by methods which will produce true alignment of axis without warp. Welds not specified shall be continuous fillet welds designed to develop the full strength of member. No combination of bolts and welds shall be used for stress transmission at the same face of any connections.
5. Clean completed welds prior to inspection. Slag shall be removed from all completed welds and the weld and adjacent base metal shall be cleaned by brushing or other suitable means. Tightly adherent splatter remaining after the cleaning operation is acceptable unless its removal is required for the purpose of nondestructive testing.
6. For high-strength, low-alloy steels, follow welding procedures recommended by steel producer for exposed and concealed connections.
7. Base Plates: Hole sizes for anchor bolts may be oversized to facilitate erection as follows:
 - a. Bolts 3/4 inch to 7/8 inch Diameter: 5/16 inch oversize
 - b. Bolts 1 inch to 2 inches Diameter: 1/2 inch oversize
 - c. Bolts over 2 inches Diameter: 1 inch oversize

Use oversize or plate washers under nut at all oversized holes in base plates. Washers must be large enough to cover the entire hole. Washer thickness shall be at least 1/8 of bolt diameter.

- C. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Shop weld shear connectors, shaped as shown, to beams and girders in composite construction which do not support metal deck. Use automatic end welding of headed stud shear connectors in accordance with manufacturer's printed instructions.
 - 1. Installation of Shear Connectors: Shear studs shall be automatically end welded in the shop in accordance with Article 31 of the AWS Structural Welding Code and the specifications of the shear stud manufacturer. After installation, each ceramic ferrule shall be removed prior to placement of concrete. Adequate welding power must be available for studs being welded.
 - 2. All areas to which studs are to be attached shall be cleaned of all rust, oil, grease, and paint. When the mill scale is sufficiently thick to cause difficulty in obtaining proper welds, it shall be removed by grinding or sand blasting.

- D. Holes for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on final shop drawings. Provide threaded nuts welded to framing and other specialty items as indicated to receive other work. Cut, drill or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

- E. Galvanized (Zinc-Coating): All structural steel pieces, exposed to weather or moisture, in permanent contact with soil, or accessible to salt intrusion shall be hot dipped galvanized in accordance with ASTM A123, including, but not limited, to the following:
 - 1. Exterior exposed steel columns and beams.
 - 2. Exterior non-conditioned exposed steel under cover.
 - 3. Masonry shelf angles.
 - 4. Exterior exposed railings.
 - 5. Miscellaneous structural metals placed in concrete.
 - 6. Items shown on Drawings or required.

- F. Architecturally Exposed Structural Steel: All exposed structural steel shall be straight and true. Select or straighten members to meet permissible variations of ASTM A6, subject to tolerances of AISC Code of Standard Practice, Chapter 10. Exposed surfaces shall be smooth, free of embedded scale, trademarks, roll imperfection marks, and other irregularities. Fill depressions of whatever kind with weld metal of the same composition as the parent metal. Grind welds and raised marks smooth and flush with adjacent surfaces.

2.4 SHOP PAINTING

- A. General: Shop paint structural steel, those members or portions of members except as follows:
 - 1. to receive a galvanized coating,
 - 2. to be embedded in concrete or mortar,
 - 3. surfaces which are to be welded,
 - 4. to receive sprayed-on fireproofing, and
 - 5. specifically noted as not shop prime painted

- B. Surface Preparation: After inspection and before shipping, clean steel work to be painted. Remove loose rust, loose mill scale, splatter, and slag or flux deposits. Clean steel in accordance with SSPC recommendations as follows:
 - 1. For exposed steel in conditioned spaces: SP-3, "Power Tool Cleaning".
 - 2. For exterior exposed steel: SP-6, "Commercial Blast Cleaning".

- C. Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions and a rate to provide following dry film thickness. Use painting methods which result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. For Standard Shop Coat: Apply specified primer to 2.0 mils.
 - 2. For Architecturally Exposed Steel Members: Apply first coat specified primer to 3.5 mils and second coat specified primer to 4 to 6 mils.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Erector must examine areas and conditions under which structural steel work is to be installed, and notify Contractor of conditions detrimental to proper and timely completion of work.

3.2 ERECTION

- A. General: Comply with AISC Specifications and Code of Standard Practice, and as herein specified.
- B. Temporary Shoring and Bracing:
 - 1. Provide adequate shoring and bracing to safely withstand all loads to which the structure may be subjected during the construction process, including wind loads, dead loads, construction material, and equipment loads. Such bracing shall remain in place as long as required for safety.
 - 2. As the erection progresses, make a sufficient number of permanent welded or bolted connections to withstand erection stresses and maintain stability.
 - 3. The design of temporary shoring and bracing shall be the responsibility of the Contractor.
- C. Temporary Planking: Provide temporary planking and platforms, as necessary, to effectively complete the work.
- D. Anchor Bolts: Furnish anchor bolts and other connectors required for securing structural steel to foundations and other in-place work. Furnish templates and other devices necessary for presetting bolts and other anchors in accurate locations. Refer to Section 03300, Cast-In-Place Concrete for anchor bolt installation requirements in concrete, and Section 04200, Unit Masonry for anchor bolt installation requirements in masonry.
- E. Field Assembly:
 - 1. Set structural frames accurately to the lines and elevations indicated.
 - 2. Align and adjust various members forming a part of a complete frame or structure before permanently fastening members together.
 - 3. Clean bearing surfaces and other surfaces before assembly which will be in a permanent contact, before assembly.
 - 4. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 5. Level and plumb individual members to structure within tolerances defined by AISC Code for Standard Practice, unless closer tolerances are required for proper fitting of adjoining or enclosing materials, in which case the most stringent shall apply.
 - 6. Set horizontal members with their natural camber (or specified camber) up.

7. Splice members only where indicated and accepted on final shop drawing.
 8. Where parts cannot be assembled or fitted properly, as a result in errors in fabrication or of deformation due to handling or transportation, such condition shall be immediately reported to the Architect, along with proposed method of correction. The straightening of bends or warps shall be performed by approved methods. Bent or damaged heat-treated parts will be rejected.
 9. Do not enlarge unfair holes in members by burning or by the use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts and weld connection continuously.
 10. Do not use gas-cutting torches in the field for correcting fabrication errors in the structural framing, except on secondary members, which are not under stress. Finish gas-cut sections equal to a sheared appearance.
- F. Erection Bolts:
1. On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces.
 2. On non-exposed welded construction, erection bolts shall be tightened securely and left in place, or if removed, the holes shall be filled with plug welds.
- G. Bolted Connections:
1. High-strength bolts shall be installed in accordance with AISC, "Specifications for Structural Joints Using ASTM A 325 or A 490 Bolts".
 2. ASTM A 307 bolts and high-strength (ASTM A 325 and ASTM A 490) bolts noted to be "snug-tight" shall be tightened using a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench, bringing the plies into snug contact.
 3. Bolted parts shall fit solidly together when assembled. All joint surfaces shall be free of burrs, dirt and other foreign material that would prevent solid seating of the parts.
 4. Hardened washers shall be placed over slotted holes in an outer ply. Hardened beveled washers shall be used where outer face of bolted parts has a slope greater than 1:20 with respect to bolt axis.
- H. Field Welding:
1. Comply with AWS D1.1 and AISC Specifications for Structural Steel Buildings. Pay particular attention to surface preparation, preheating, sequence, and continuity of welds.
 2. Where heavy shapes are to be welded, comply with all special requirements contained in the AISC Specifications and AWS D1.1.
 3. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
- I. Unfair Holes:
1. Do not enlarge holes in members, by burning or by use of drift pins, except in secondary bracing members.
 2. Ream holes that require enlarging to admit bolts.
- J. Gas Cutting:
1. Do not use gas cutting torches in field for correcting fabrication errors in structural framing
 2. Cutting will be permitted only on secondary members which are not under stress, as acceptable to the Architect.

3. Finish gas-cut sections equal to a sheared appearance when permitted.
- K. Setting Bases and Bearing Plates:
1. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean the bottom surface of base and bearing.
 2. Set loose and attached base plates and bearing plates for structural members on wedges, or other adjustable devices.
 3. Tighten the anchor bolts after the supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the base or bearing plate prior to placing grout.
 4. Mix and place grout in accordance with the manufacturer's instructions.
 5. Place grout solidly between bearing surfaces and bases or plates to ensure that no voids remain.
 6. Finish exposed grout surfaces.
 7. Protect installed materials, and allow grout to cure in accordance with manufacturer's instructions.
- L. Field Touch-Up Painting:
1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint.
 2. Apply paint to exposed areas with same materials as used for shop painting.
 3. Apply by brush or spray, to provide a minimum dry film thickness of 2.5 mils for each coat.

3.3 CLEANING

- A. Clean up all debris caused by the Work of this Section, keeping the area clean and neat at all times.

END OF SECTION

SECTION 05 50 00

MISCELLANEOUS METALS

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Miscellaneous metal items and their related components, which are not necessarily individually described, shall be furnished and installed in accordance with the intent of the drawings and specifications and as required to complete the work.
- B. The Work of this Section is governed by Section 05 12 00, Structural Steel, except where more stringent requirements are contained herein or on the Structural Drawings. If a conflict exists, notations on the Structural Drawings take precedence.

1.2 REFERENCES

- A. Conform to the following reference standards as applicable to the work:
 - 1. American Institute of Steel Construction (AISC), Code of Standard Practice for Steel Buildings and Bridges, latest edition.
 - 2. American Institute of Steel Construction (AISC), Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings, latest edition.
 - 3. American Iron and Steel Institute (AISI)
 - 4. ASTM International (ASTM)
 - a. A36, Standard Specification for Carbon Structural Steel
 - b. A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
 - c. A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - d. A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
 - e. A307, Standard Specification for Carbon Steel Bolts and Studs 60,000 psi Tensile Strength
 - f. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
 - g. B210, Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes
 - h. B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
 - 5. American Welding Society (AWS)
 - a. D1.1 Structural Welding Code
 - 6. Steel Structures Painting Council (SSPC)
 - a. Painting Manual, Volume 1, Good Painting Practice
 - b. Painting Manual, Volume 2, Systems Specifications
 - 7. National Ornamental & Miscellaneous Metals Association (NOMMA)
 - a. Guideline 1 – Joint Finishes.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. For off-the-shelf items: Show all layouts, sizes, methods of construction and installation, including sizes and types of all fastening devices.

2. For custom fabricated items: Submit design calculations for the materials and their connections designed by the Contractor, prior to or with the shop drawings. Calculations shall bear the seal of a Registered Professional Engineer, licensed in the State of Texas. Shop drawings containing connections for which calculations have not been received will be returned unchecked as an incomplete submittal. Design Calculations will be retained for the Architect's file, and will not be approved or returned.

- B. Samples: As noted.

1.4 CONTRACTOR'S RESPONSIBILITIES

- A. As scope and performance documents, the Drawings and Specifications do not necessarily indicate or describe all the work required for the performance and completion of the Work. Contracts will be let on the basis of such documents with the understanding that the Contractor shall furnish and install the items required for proper completion of the Work without adjustment to price or schedule. Work shall be of sound, quality construction and the Contractor shall be solely responsible for the inclusions of adequate labor and materials to cover the proper and timely fabrication and installation of the miscellaneous metal items indicated, described, or implied.
- B. As a performance specification, the criteria for the solution of structurally sound miscellaneous metal items indicated on the Drawings or specified herein are the sole purpose of defining the design intent and performance requirements. The details shown are intended to emphasize the acceptable profiles and performance requirements for this Project. To avoid any misunderstanding or lack of interpretation, the Contractor is hereby advised that the responsibility for the miscellaneous metal items are totally his and that designs and resolutions proposed in the Contractor's shop drawings, structural calculations, and related documentation shall be demonstrated throughout the Work and warranty period specified or required.
- C. Design proposal submissions which follow exactly the details indicated on the Drawings, will not relieve the Contractor of his responsibility for the design, fabrication, erection, or performance of the Work of this Section.
- D. In the event of a controversy over the design, the decision of the Architect will take precedence.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Structural Steel: Comply with ASTM A36.
- B. Welding:
 1. Comply with American Welding Society (AWS) Code.
 2. Comply with National Ornamental & Miscellaneous Metals Association (NOMMA Guideline 1: Joint Finishes) for joint finishes in the following locations:
 - a. Finish #1: Interior handrails and guardrails
 - b. Finish #2: Typical ornamental metals exposed to view, interior and exterior, except as indicated above. (canopies, exterior railings and guardrails, non-accessible sculptural fabricated metal, etc.)

- c. Finish #3: Miscellaneous metals exposed interior non-public spaces, and exterior miscellaneous metals, except as indicated above. (ladders, bollards, etc.)
 - d. Concealed welding: no requirement, unless otherwise indicated or required for safety or conformance with requirements of other portions of the work.
- C. Bolts:
 - 1. Comply with ASTM A307.
 - 2. Size: 3/4 inch, unless otherwise noted.
- D. Anchors:
 - 1. Expansion bolts:
 - a. 1/4 inch or less, Rawl Calk-Ins or Arrow Series 4000.
 - b. Greater than 1/4 inch: Rawl Multi-Calks. Top shall be 1/2 inch below concrete surface.
 - 2. Molly screw anchors:
 - a. In walls 1/16 inch to 5/8 inch thick, use "S" length
 - b. In walls 5/8 inch to 1/4 inch thick, use "L" length
 - c. In walls 1-1/4 inch to 1-3/4 inch thick, use "XL": length.
 - 3. Nelson stud anchors:
 - a. Comply with ASTM A108.
 - b. Concrete Embed: Headed, low carbon steel, non-threaded, galvanized, standard ferrule as required
- E. Shop Priming:
 - 1. Shop coat any ungalvanized ferrous metal with primer, except for those to receive application of spray-applied fireproofing shall be free of primer and paint.
 - 2. Clean iron and metal to be primed of scale, dirt and dust by steel scrapers, wire brushers or sandblasting. Remove oil and grease with petroleum naphtha.
 - 3. Thoroughly work paint into all joints by brush. Overall application of brush or spray coat of red oxide primer in accordance with SSPC - Paint 25.
 - 4. Give any painted built-in portions one field coat of primer on all abraded parts after installation.
- F. Galvanized Metal:
 - 1. Comply with ASTM A123.
 - 2. General: Galvanize all steel sections which are fully or partially exposed to weather, regardless if they are scheduled to receive a finish coat of paint or not.
 - 3. Galvanized items to be painted shall be primed as outlined in Painting and Staining Section.
 - 4. Hot-dip galvanized after fabrication.
 - 5. Silicone protective coating shall not be used at galvanized items scheduled to receive paint.
 - 6. Galvanizing Repair Paint: ZRC cold galvanizing compound or Galvilite manufactured by ZRC Worldwide, Marshfield, MA; Galvax Zinc-rich Cold Galvanizing Coating manufactured by Alvin Products, Inc., Lawrence, MA; or paint complying with military specification MILP-21035A, Type I or II. Apply repair paint in accordance with ASTM A780.
- G. Stainless Steel:
 - 1. General: Comply with ASTM Standards as applicable to the work.
 - 2. Type: Type 302 or 304 as applicable to the work.
 - 3. Finish:

- a. Concealed: No. 2D finish
 - b. Exposed: No. 4, unless noted otherwise.
- H. Aluminum:
- 1. General: Comply with ASTM Standards as applicable to work.
 - 2. Type: 6061 or 6063 as applicable to work.
 - 3. Finish:
 - a. Concealed: Mill finish
 - b. Exposed: Mill finish, or Anodized or Kynar 500 or Hylar 5000 finish as specified in color selected by Architect from manufacturer's standard colors.

2.2 MISCELLANEOUS METAL ITEMS

- A. The following is a list of the principal miscellaneous metal items to be furnished under this Section. This list is offered only as a guide and Contractor shall thoroughly check drawings for other miscellaneous metals. All items exposed to the exterior shall be hot-dip galvanized after fabrication.
- 1. Guard Post (Bollards): Provide 6.625 inch O.D. Schedule 40 hot-dip galvanized steel pipe guard post (bollards) as detailed on the drawings. Fill with 2,500 PSI concrete after installation and round off concrete top. Place in concrete footing as detailed on drawings. Galvanize pipe after fabrication. Paint as directed by Architect in accordance with Section 09900.
 - 2. Removable Guard Post (Bollards): Provide 5.047 inch I.D. Schedule 40 hot-dip galvanized steel pipe sleeve with 1-1/2 inch by 1-1/2 inch by 1/4 inch by 2 inch steel angle with 1/2 inch diameter hole for lock welded to pipe as detailed on the drawings. Plug bottom of pipe to keep from filling with concrete from footing. Place in concrete footing as detailed on drawings. Provide 4.50 inch O.D. Schedule 40 hot-dip galvanized steel pipe insert with 1-1/2 inch by 1-1/2 inch by 1/4 inch by 2 inch steel angle with 1/2 inch diameter hole for lock welded to pipe as detailed on the drawings. Fill smaller diameter pipe with 2,500 PSI concrete after installation and round off concrete top. Hot-dip galvanize all components after fabrication. Paint as directed by Architect in accordance with Section 09900.
 - 3. Handrails and Brackets:
 - a. Steel Pipe Handrails and Brackets: Furnish and install 1-1/2 inch O.D. Schedule 40 steel pipe rails for outdoor stairs and ramps, unless noted otherwise. Brackets shall be wall type. Include all other components required for finished installation. All work shall comply with local codes and Texas Accessibility Standards (TAS). Hot dip galvanized all components after fabrication.
 - b. Aluminum Handrails and Brackets: Furnish and install 1-1/2 inch O.D. aluminum pipe rails for indoor stairs and ramps, unless noted otherwise. Brackets shall be wall type. Include all other components required for finished installation. All work shall comply with local codes and Texas Accessibility Standards (TAS).
 - 5. Steel Ladders: Fabricate from 2-1/2 inch by 3/8 inch flat bar steel stringer with 3/4 inch steel rod rungs let into stringers, welded and ground smooth. Provide all angle supports and anchoring devices for bolting to wall, floor, or structure as required. Hot-dip galvanize after fabrication.
 - 6. Steel Ships Ladders: Fabricate from steel shapes as shown, weld joints and grind smooth. Provide cages where shown. Hot-dip galvanize after fabrication. Masonry Anchors (At steel columns): Fabricate from 5/16 inch dia. steel, galvanized after fabrication; field weld to columns, space not more than 24

- inches o.c. vertically to coincide with horizontal mortar joint elevations. Refer to Structural Drawings.
7. Loose Lintels: Fabricate from steel shapes as shown on drawings, weld joints and grind smooth. Hot-dip galvanize after fabrication.
 8. Frame Supports: Construct above ceiling frame supports for aluminum entrances and storefronts, hollow metal frames of channels and/or tubes, with all anchorage devices as detailed or required.
 9. Below and Above-Ceiling Supports: Construct of UNISTRUT members or as approved by Architect to size and shaped detailed. All work shall be accurate to 1/8 inch plus or minus. Provide supports complete with fastenings to structure for overhead equipment.
 10. Shelf Angles for Masonry: Sizes and shapes as detailed. Use specified galvanized steel for angles on exterior walls. Paint exposed surfaces in accordance with section 09900.
 11. Access Doors: Provide one (1) 2 feet-0 inches by 2 feet-0 inches at each restroom plumbing chase wall. If not shown on drawings, locate as indicted by Architect's field representative. Approved Manufacturers: Bar-Co., Cesco Products, J. L. Industries, Karp Associates, Milcor Inc., Nystrom Inc., and The Williams Brothers Corp. Provide painted finish.
 12. Foot Scrapers: Fabricate from steel shapes as shown on drawings, weld joints and grind smooth. Hot dip galvanize after fabrication.
 13. Bicycle Racks: Provide and install (3) Single entry bicycle racks. Design Basis for bicycle racks is Porter model number 00391-000. Bicycle Racks shall consist of unitized welded spreader frame constructed from galvanized steel. The unit is approximately 10'-6" long by 3'-6" wide and each shall be constructed to hold (10) bicycles. All hardware and labor shall be provided to anchor the units to the concrete sidewalk as depicted in the drawings.
- B. Other Miscellaneous Items: Miscellaneous metal items and their related components are not necessarily individually described. Miscellaneous items not described shall be furnished and installed in accordance with the intent of the drawings and specifications and as required to complete the work.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Separate all dissimilar metals.
- B. Welded Joint Finishes: Where welding is exposed to view, welds shall be executed neatly then ground smooth. Pits and blemishes are not acceptable. Provide joints as stated above in accordance with NOMMA Guideline 1.
- C. For manufactured items, adhere to printed manufacturer's installation instructions.
- D. Refer to painting section for items that are to receive paint.

END OF SECTION

SECTION 13 34 19

METAL BUILDING SYSTEMS

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Pre-engineered, shop-fabricated structural steel building frame, roof and wall panels.
- B. Exterior doors, windows, skylights, overhead doors, and louvers.

1.02 REFERENCES REQUIREMENTS

- A. Section 05 50 00 – Miscellaneous Metals

1.03 REFERENCE STANDARDS

- A. AISC 360 – Specification for Structural Steel Buildings; American Institute of Steel Construction, Inc.; 2005.
- B. ASTM A 153/A 153M – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2005.
- C. ASTM A 307 – Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength; 2007b.
- D. ASTM A 325 – Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2009.
- E. ASTM A 325M – Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Tensile Strength (Metric); 2009.
- F. ASTM A 500/A 500M – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2007.
- G. ASTM A 501 – Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2007.
- H. ASTM A 529/A 529M – Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality; 2005.
- I. ASTM A 653/A 653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2009.
- J. ASTM A 992/A 992M – Standard Specification for Structural Steel Shapes; 2006a.
- K. ASTM C 1107/C 1107M – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2008.
- L. AWS A2.4 – Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 2007.
- M. AWS D1.1/D1.1M – Structural Welding Code – Steel; American Welding Society; 2010.
- N. SSPC-Paint 20 – Zinc-Rich Primers (Type I, “inorganic,” and Type II, “Organic”); Society for Protective Coatings; 2002 (Ed. 2004).
- O. UL 580 – Standard for Tests for Uplift Resistance of Roof Assemblies; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.04 DESIGN REQUIREMENTS

- A. Design members to withstand dead load, applicable snow load, and design loads due to pressure and suction of wind calculated in accordance with applicable code.
- B. Design members to withstand UL 580 Uplift Class 60.
- C. Exterior wall and roof system shall withstand imposed loads with maximum allowable deflection of (per plan) of span.
- D. Provide drainage to exterior for water entering or condensation occurring within wall or roof system.
- E. Permit movement of components without buckling, failure of joint seals, undue stress on fasteners, or other detrimental effects, when subject to temperature range of 100 degrees F°.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Meeting: Convene one week before starting work of this section.

1.06 SUBMITTALS

- A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on profiles, component dimensions, fasteners.
- C. Shop Drawings: Indicate assembly dimensions, locations of structural members connections; wall and roof system dimensions, panel layout, general construction details, anchorages and method of anchorage, installation; framing anchor bolt settings, sizes, and locations from datum, foundation loads; indicate welded connections with AWS A2.4 welding symbols; indicate net weld lengths; provide professional seal and signature.
- D. Samples: Submit two samples of precoated metal panels for each color selected, 6"x6" inch in size illustrating color and texture of finish.
- E. Manufacturer's Instructions: Indicate preparation requirements, anchor bolt placement.
- F. Erection Drawings: Indicate members by label, assembly sequence, and temporary erection bracing.
- G. Project Record Documents: Record actual locations of concealed components and utilities.

1.07 QUALITY ASSURANCE

- A. Design structural components, develop shop drawings, and perform shop and site work under direct supervision of a Professional Structural Engineer experienced in design of the work.
 - 1. Design Engineer Qualifications: Licensed professional engineer, register to practice in the State of Texas.
 - 2. Conform to applicable code for submission of design calculations as required for acquiring permits.
 - 3. Cooperate with regulatory agency or authority and provide data as requested.
- B. Perform work in accordance with AISC 360 – Specification for Structural Steel Buildings.
 - 1. Maintain one copy on site.
- C. Perform welding in accordance with AWS D1.1.
- D. Manufacturer Qualifications: Company specializing manufacturing the Products specified in this section with minimum three years documented experience.
- E. Erector Qualifications: Company specializing in performing the work of this section approved by manufacturer.

1.08 WARRANTY

- A. See Section 01 78 00 – Closeout Submittals, for additional warranty requirements.

- B. Correct defective Work within a five year period after Date of Substantial completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Pre-engineered buildings:
1. Southern Steel Fabricators: www.southernsteelfabricators.com.
 2. Butler Manufacturing Company: www.butlermfg.com.
 3. Substitutions: See Section 01 60 00 – Product Requirements.

2.02 PRE-ENGINEERED BUILDING

- A. Single span rigid frame.
- B. Wall System: Preformed metal panels of horizontal profile, with sub-girt framing/ anchorage assembly, and accessory components.
- C. Roof System: Preformed metal panels oriented parallel to slope, with sub-girt framing/ anchorage assembly, insulation, and liner panels, and accessory components.
- D. Roof Slope: Per architectural drawings.

2.03 MATERIALS- FRAMING

- A. Structural Steel Members: ASTM A 572/A 572M, Grade 50.
- B. Structural Tubing: ASTM A 500, Grade B cold-formed.
- C. Plate or Bar Stock: ATM A 529/A 529M, Grade 50.
- D. Anchor bolts: ASTM A 307, galvanized to ASTM A 153/A 153M.
- E. Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, galvanized to ASTM A 153/A 153, Class C.
- F. Welding Materials: Type required for materials being welded.
- G. Primer: SSPC-Paint 20, zinc rich.
- H. Grout: ASTM C 1107/C 1107M, Non-shrink type, premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents, capable of developing minimum compressive strength of 2,400 psi in two days and 7,000 psi in 28 days.

2.04 COMPONENTS

- A. Doors and frames
- B. Frames
- C. Wall Louvers

2.05 FABRICATION- FRAMING

- A. Fabricate members in accordance with AISC Specification for plate, bar, tube, or rolled structural shapes.
- B. Anchor Bolts: Formed with bent shank, assembled with template for casting into concrete.

2.06 FABRICATION- GUTTERS AND DOWNSPOUTS

- A. Fabricate of same material and finish as roofing metal.
- B. Form gutters and downspouts of aluminum profile and size indicated to collect and remove water. Fabricate with connection pieces.

- C. Form sections in maximum possible lengths. Hem exposed edges. Allow for expansion at joints.
- D. Fabricate support straps of same material and finish as roofing metal, color as selected.

2.07 FINISHES

- A. Framing Members: Clean, prepare, and shop prime. Do not prime surfaces to be field welded.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position.

3.02 ERECTION- FRAMING

- A. Erect framing in accordance with AISC 360 – Specification for Structural Steel Buildings.
- B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as indicated.
- C. Set column base plates with non-shrink grout to achieve full plate bearing.
- D. Do not field cut or alter structural members without approval.
- E. After erection, prime welds, abrasions, and surfaces not shop primed.

3.03 ERECTION – WALL AND ROOF PANELS

- A. Install in accordance with manufacturer's instructions.
- B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.
- C. Fasten cladding system to structural supports, aligned level and plumb.
- D. Locate end laps over supports. End laps minimum 2 inches. Place side laps over bearing.
- E. Provide expansion joints where indicated.
- F. Use concealed fasteners.
- G. Install insulation and vapor retarder utilizing Purlins for attachment. Place wire mesh under vapor retarder for support between framing members.
- H. Install sealant and gaskets to prevent weather penetration.

3.04 ERECTION – GUTTERS AND DOWNSPOUTS

- A. Rigidly support and secure components. Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts.
- B. Apply bituminous paint on surfaces in contact with cementitious materials.
- C. Slope gutters minimum 1/8 inch/ft.
- D. Install splash pans under each downspout spilling into grade.

3.05 INSTALLATION – ACCESSORIES

- A. Install door frames, doors, and windows and glass in accordance with manufacturer's instructions.

- B. Seal wall and roof accessories watertight and weather tight with sealant in accordance with Section 07 9005.

3.06 TOLERANCES

- A. Framing Members: 1/4 inch from level; 1/8 inch from plumb.
- B. Siding and Roofing: 1/8 inch from true position.

END OF SECTION

SECTION 31 11 00

SITE CLEARING AND GRUBBING

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Clearing of site, consisting of removal and satisfactory disposal of trees, stumps, brush, roots, logs, vegetation, debris, rubbish and other objectionable weather from the entire project area.
- B. Grubbing of site, consisting of complete uprooting, removal and satisfactory disposal of all stumps, brush, roots, logs, etc. to full depth, from the project area. All roots, branches, etc. greater than or equal to 1-1/2 inches in diameter shall be removed from the site. Stump hole pits shall be cleared of refuse and loose earth.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 CONDITIONS AT SITE

- A. Execute all work in an orderly and careful manner with due consideration for any and all surrounding areas, planting or structures which are to remain. Periodically, water as required to allay dust and dirt. Protect any adjacent property and improvements from damage and replace any portions damaged through this operation.
- B. Coordinate and comply with the following:
 - 1. [Geotechnical Report.]
 - 2. Local ordinances and requirements of authorities having jurisdiction.
- C. The Contractor shall take proper precautions to protect adjacent or adjoining property from damage caused by clearing and grubbing activities. All damage shall be repaired or replaced at Contractor's expense.

3.2 DISPOSAL OF MATERIAL

- A. Unless otherwise specified, cleared and grubbed material becomes the property of the Contractor to be removed off-site. On site burning of combustible is not acceptable unless permission from Owner, City of County is granted. The Contractor shall be responsible for obtaining all permits required by State and local governing agencies. The Contractor shall provide adequate fire protection to adjacent property. The Contractor will be held responsible for fire damage to adjacent trees and property. Upon completion of the burning process, the ashes are to be removed and disposed of off-site. The burn pit or pits shall be cleared of all debris and backfilled. The laboratory shall verify the removal of debris, preparation of the pit for backfill and backfill operation. The laboratory shall provide the Architect with a report verifying the preparation and backfill of the pit.

The Contractor shall furnish to the Architect a location survey of the burn put or pits. This location survey shall be performed and certified by a Registered Professional Land Surveyor.

3.3 FINAL SITE PREPARATION

- A. Remove from the site all rubbish, debris, etc., resulting from Work of this Section, except as otherwise specified above.
- B. After clearing, grubbing and discing the project site, rake and pick the entire site to remove all material as outlined in Section 1.1, B above.

END OF SECTION

SECTION 31 23 16

EXCAVATION

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Excavation for footings, slabs-on-grade, and utilities within the building.

1.02 RELATED REQUIREMENTS

- A. Section 31 00 00 – Earthwork: Fill materials, filling, and compacting.

PART 2 PRODUCTS- NOT USED

PART 3 EXECUTION

3.01 PREPARATION

- A. Identify required lines, levels, contours, and datum locations.
- B. Locate, identify, and protect utilities that remain and protect from damage.

3.02 EXCAVATING

- A. Remove and discard existing top soil, subgrade, paving, and etc. to a depth indicated in the contract documents to a distance of 5 feet outside the building line.
- B. Excavate to accommodate new structures and construction operations.
- C. Notify the Architect of unexpected subsurface conditions and discontinue affected Work in are until notified to resume work.
- D. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.
- E. Do not interfere with 45 degree bearing splay of foundations.
- F. Correct areas that are over-excavated and load-bearing surfaces that are disturbed.
- G. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- H. Remove excavated material that is unsuitable for re-use from site.
- I. Remove excess excavated material from site.

3.03 EXCAVATION FOR FOUNDATION AFTER FILL AND BACKFILL

- A. Excavate foundation beam trenches and widened beam footings to indicated elevations and dimensions.
 - 1. Trim bottoms to required lines and grades to leave solid base to receive other work.
 - 2. Remove loose material from excavations and from within the foundation lines.
- B. Remove excavated materials from within the foundation lines.
- C. Cut utility trenches wide enough to allow inspection of installed utilities.
 - 1. Hand trim excavations. Remove loose matter.

3.04 EXCAVATION SLOPING AND BENCHING

- A. If excavation extends to or below a depth of 5 feet below construction grade, the General Contractor shall be required to develop a trench safety plan to protect personnel entering the excavation vicinity.

3.05 FIELD QUALITY CONTROL

- A. Quality Requirements, for general requirements for field inspection and testing.
- B. Provide for visual inspection of load-bearing excavated surfaces before placement of foundations.

END OF SECTION

SECTION 31 31 16

TERMITE CONTROL

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Chemical soil treatment
- B. Termite Shields

1.02 REFERENCE STANDARDS

- A. Title 7, United States Code, 136 through 136y – Federal Insecticide, Fungicide and Rodenticide Act; United States Code; 1947 (Revised 2001).

1.03 SUBMITTALS

- A. See Section 01 3000 – Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate toxicants to be used, composition by percentage, dilution schedule, intended application rate.
- C. Test Reports: Indicate regulatory agency approval reports when required.
- D. Manufacturer's Application Instructions: Indicate caution requirements.
- E. Manufacturer's Certificate: Certify that toxicants meet or exceed specifies requirements.
- F. Warranty: Submit warranty and ensure that forms have been completed in **City of Weslaco**.

1.04 QUALITY ASSURANCE

1.05 REGULATORY REQUIREMENTS

- A. Conform to applicable code for requirements for application, and comply with EPA regulations.
- B. Provide certificate of compliance form authority having jurisdiction indicating approval of toxicants.

1.06 WARRANTY

- A. See Section 01 78 00 – Closeout Submittals, for additional warranty requirements.
- B. Provide five year installer's warranty against damage to building caused by termites.

1.07 SUMMARY

- A. Provide soil treatment for termite control, as herein specified, prior to placement of vapor barrier under concrete work.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Manufacturers:
 - 1. Bayer Environmental Science Corp; Product_____: www.nobugs.com.
 - 2. FMC Professional Solutions; Product_____: www.fmcprosolutions.com.
 - 3. Syngenta Professional Products; Product_____: www.syngentaprofessionalproducts.com.
 - 4. Substitutions: See Section 01 6000 – Product Requirements.

- B. Toxicant Chemical: EPA approved; synthetically color dyed to permit visual identification of treated soil.
- C. Diluent: Recommended by toxicant manufacturer.
- D. Metal termite shields for structural components which come into contact with the ground below suspended concrete slabs (not applicable for slab-on-grade conditions).

PART 3 - EXECUTION

3.01 APPLICATION

- A. Comply with requirements of U.S. EPA and applicable state and local codes.
- B. Spray apply toxicant in accordance with manufacturer's instructions.
- C. Apply toxicant at following locations:
- D. Apply extra treatment to structure penetration surfaces such as pipe or ducts, and soil penetrations such as grounding rods or posts.
- E. Install metal termite shields on foundation walls and footings at crawl spaces and basement areas.
- F. Re-treat disturbed treated soil with same toxicant as original treatment.
- G. If inspection or testing identifies the presence of termites, re-treat soil and re-test.

3.02 PROTECTION

- A. Do not permit soil grading over treated work.

3.03 APPROVAL

- A. Completion of pesticide approval form attached hereto is required for the completion of job.

END OF SECTION

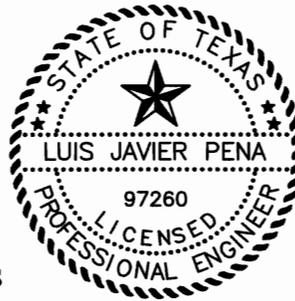
**Boys & Girls Club Recreation Center
Weslaco, Texas
Texas Parks and Wildlife Department
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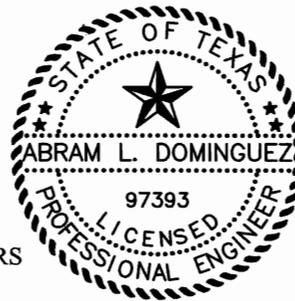
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Luis Javier Pena
03.01.2013

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03.01.2013

SECTION 13852 - DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Fire-alarm control unit.
 - 2. Manual fire-alarm boxes.
 - 3. System smoke detectors.
 - 4. Nonsystem smoke detectors.
 - 5. Heat detectors.
 - 6. Notification appliances.
 - 7. Magnetic door holders.
 - 8. Addressable interface device.
 - 9. Digital alarm communicator transmitter.

1.3 DEFINITIONS

- A. LED: Light-emitting diode.
- B. NICET: National Institute for Certification in Engineering Technologies.

1.4 SYSTEM DESCRIPTION

- A. Noncoded addressable system, with automatic sensitivity control of certain smoke detectors and multiplexed signal transmission, dedicated to fire-alarm service only.

1.5 SUBMITTALS

- A. General Submittal Requirements:
 - 1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect.
 - 2. Shop Drawings shall be prepared by persons with the following qualifications:
 - a. Trained and certified by manufacturer in fire-alarm system design.
 - b. NICET-certified fire-alarm technician, Level III minimum.
 - c. Licensed or certified by authorities having jurisdiction.
- B. Product Data: For each type of product indicated.

- C. **Shop Drawings:** For fire-alarm system. Include plans, elevations, sections, details, and attachments to other work.
1. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72.
 2. Include voltage drop calculations for notification appliance circuits.
 3. Include battery-size calculations.
 4. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
 5. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale and coordinating installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations.
 6. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
 7. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits.
- D. **Delegated-Design Submittal:** For smoke and heat detectors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. Drawings showing the location of each smoke and heat detector, ratings of each, and installation details as needed to comply with listing conditions of the detector.
 2. Design Calculations: Calculate requirements for selecting the spacing and sensitivity of detection, complying with NFPA 72.
- E. **Qualification Data:** For qualified Installer.
- F. **Field quality-control reports.**
- G. **Operation and Maintenance Data:** For fire-alarm systems and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," deliver copies to authorities having jurisdiction and include the following:
1. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
 2. Provide "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.
 3. Record copy of site-specific software.
 4. Provide "Maintenance, Inspection and Testing Records" according to NFPA 72 article of the same name and include the following:
 - a. Frequency of testing of installed components.
 - b. Frequency of inspection of installed components.
 - c. Requirements and recommendations related to results of maintenance.
 - d. Manufacturer's user training manuals.
 5. Manufacturer's required maintenance related to system warranty requirements.
 6. Abbreviated operating instructions for mounting at fire-alarm control unit.
 7. Copy of NFPA 25.

1.6 QUALITY ASSURANCE

- A. **Installer Qualifications:** Installation shall be by personnel certified by NICET as fire-alarm Level III technician.
- B. **Electrical Components, Devices, and Accessories:** Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. **NFPA Certification:** Obtain certification according to NFPA 72 by an NRTL.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - 1. NOTIFIER; a Honeywell company.
 - 2. Siemens Building Technologies, Inc.; Fire Safety Division.
 - 3. Silent Knight; a Honeywell company.
 - 4. SimplexGrinnell LP; a Tyco International company.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

- A. **Fire-alarm signal initiation shall be by one or more of the following devices:**
 - 1. Manual stations.
 - 2. Heat detectors.
 - 3. Smoke detectors.
 - 4. Duct smoke detectors.
 - 5. Verified automatic alarm operation of smoke detectors.
 - 6. Automatic sprinkler system water flow.
 - 7. Heat detectors in elevator shaft and pit.
 - 8. Fire-extinguishing system operation.
 - 9. Fire standpipe system.
- B. **Fire-alarm signal shall initiate the following actions:**
 - 1. Continuously operate alarm notification appliances.
 - 2. Identify alarm at fire-alarm control unit.
 - 3. Transmit an alarm signal to the remote alarm receiving station.
 - 4. Unlock electric door locks in designated egress paths.
 - 5. Release fire and smoke doors held open by magnetic door holders.
 - 6. Activate voice/alarm communication system.
 - 7. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
 - 8. Activate smoke-control system (smoke management) at firefighter smoke-control system panel.
 - 9. Activate stairwell and elevator-shaft pressurization systems.
 - 10. Close smoke dampers in air ducts of designated air-conditioning duct systems.
 - 11. Recall elevators to primary or alternate recall floors.
 - 12. Activate emergency lighting control.
 - 13. Activate emergency shutoffs for gas and fuel supplies.
 - 14. Record events in the system memory.

- C. Supervisory signal initiation shall be by one or more of the following devices and actions:
1. Valve supervisory switch.
 2. Low-air-pressure switch of a dry-pipe sprinkler system.
 3. Elevator shunt-trip supervision.
- D. System trouble signal initiation shall be by one or more of the following devices and actions:
1. Open circuits, shorts, and grounds in designated circuits.
 2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
 3. Loss of primary power at fire-alarm control unit.
 4. Ground or a single break in fire-alarm control unit internal circuits.
 5. Abnormal ac voltage at fire-alarm control unit.
 6. Break in standby battery circuitry.
 7. Failure of battery charging.
 8. Abnormal position of any switch at fire-alarm control unit or annunciator.
 9. Fire-pump power failure, including a dead-phase or phase-reversal condition.
 10. Low-air-pressure switch operation on a dry-pipe or preaction sprinkler system.
- E. System Trouble and Supervisory Signal Actions: Initiate notification appliance and annunciate at fire-alarm control unit. Record the event on system printer.

2.3 FIRE-ALARM CONTROL UNIT

- A. General Requirements for Fire-Alarm Control Unit:
1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864 and listed and labeled by an NRTL.
 - a. System software and programs shall be held in flash electrically erasable programmable read-only memory (EEPROM), retaining the information through failure of primary and secondary power supplies.
 - b. Include a real-time clock for time annotation of events on the event recorder and printer.
 2. Addressable initiation devices that communicate device identity and status.
 - a. Smoke sensors shall additionally communicate sensitivity setting and allow for adjustment of sensitivity at fire-alarm control unit.
 - b. Temperature sensors shall additionally test for and communicate the sensitivity range of the device.
 3. Addressable control circuits for operation of mechanical equipment.
- B. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
1. Annunciator and Display: Liquid-crystal type, 2 line(s) of 40 characters, minimum.
 2. Keypad: Arranged to permit entry and execution of programming, display, and control commands and to indicate control commands to be entered into the system for control of smoke-detector sensitivity and other parameters.

- C. Circuits:
 - 1. Initiating Device, Notification Appliance, and Signaling Line Circuits: NFPA 72, Class A.
 - a. Initiating Device Circuits: Style D.
 - b. Notification Appliance Circuits: Style Z.
 - c. Signaling Line Circuits: Style 2.
 - d. Install no more than 50 addressable devices on each signaling line circuit.
 - 2. Initiating Device, Notification Appliance, and Signaling Line Circuits: NFPA 72, Class B.
 - a. Initiating Device Circuits: Style A.
 - b. Notification Appliance Circuits: Style W.
 - c. Signaling Line Circuits: Style 1.
 - d. Install no more than 50 addressable devices on each signaling line circuit.
- D. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke barrier walls shall be connected to fire-alarm system.
- E. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory, and print out the final adjusted values on system printer.
- F. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.
- G. Voice/Alarm Signaling Service: Central emergency communication system with redundant microphones, preamplifiers, amplifiers, and tone generators provided in a separate cabinet located in the fire command center.
 - 1. Indicated number of alarm channels for automatic, simultaneous transmission of different announcements to different zones or for manual transmission of announcements by use of the central-control microphone. Amplifiers shall comply with UL 1711 and be listed by an NRTL.
 - a. Allow the application of and evacuation signal to indicated number of zones and, at same time, allow voice paging to the other zones selectively or in any combination.
 - b. Programmable tone and message sequence selection.
 - c. Standard digitally recorded messages for "Evacuation" and "All Clear."
 - d. Generate tones to be sequenced with audio messages of type recommended by NFPA 72 and that are compatible with tone patterns of notification appliance circuits of fire-alarm control unit.
 - 2. Status Annunciator: Indicate the status of various voice/alarm speaker zones and the status of firefighters' two-way telephone communication zones.
 - 3. Preamplifiers, amplifiers, and tone generators shall automatically transfer to backup units, on primary equipment failure.
- H. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory signals shall be powered by 24-V dc source.

1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.
 - I. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.
 1. Batteries: Sealed lead calcium.
 - J. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.
- 2.4 MANUAL FIRE-ALARM BOXES
- A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
 1. Weatherproof Protective Shield: Factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm.
- 2.5 SYSTEM SMOKE DETECTORS
- A. General Requirements for System Smoke Detectors:
 1. Comply with UL 268; operating at 24-V dc, nominal.
 2. Detectors shall be four-wire type.
 3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
 4. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
 5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
 - B. Photoelectric Smoke Detectors:
 1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
 2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).
 - C. Duct Smoke Detectors: Photoelectric type complying with UL 268A.
 1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.

2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).
3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector.
4. Each sensor shall have multiple levels of detection sensitivity.
5. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
6. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.

2.6 HEAT DETECTORS

- A. General Requirements for Heat Detectors: Comply with UL 521.
- B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F (57 deg C) or a rate of rise that exceeds 15 deg F (8 deg C) per minute unless otherwise indicated.
 1. Mounting: Adapter plate for outlet box mounting.
 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
 3. Detector Cable: Rated detection temperature 155 deg F (68 deg C). NRTL listed for "regular" service and a standard environment. Cable includes two steel actuator wires twisted together with spring pressure, wrapped with protective tape, and finished with PVC outer sheath. Each actuator wire is insulated with heat-sensitive material that reacts with heat to allow the cable twist pressure to short-circuit wires at the location of elevated temperature.

2.7 NOTIFICATION APPLIANCES

- A. General Requirements for Notification Appliances: Individually addressed, connected to a signaling line circuit, equipped for mounting as indicated and with screw terminals for system connections.
- B. Chimes, Low-Level Output: Vibrating type, 75-dBA minimum rated output.
- C. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet (3 m) from the horn, using the coded signal prescribed in UL 464 test protocol.
- D. Visible Notification Appliances: Xenon strobe lights comply with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.
 1. Rated Light Output:

- a. 75 cd.
 - b. 15/30/75/110 cd, selectable in the field.
2. Mounting: Wall mounted unless otherwise indicated.
 3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
 4. Flashing shall be in a temporal pattern, synchronized with other units.
 5. Strobe Leads: Factory connected to screw terminals.
 6. Mounting Faceplate: Factory finished, red.

E. Voice/Tone Notification Appliances:

1. Appliances shall comply with UL 1480 and shall be listed and labeled by an NRTL.
2. High-Range Units: Rated 2 to 15 W.
3. Low-Range Units: Rated 1 to 2 W.

2.8 MAGNETIC DOOR HOLDERS

A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching doorplate.

1. Electromagnet: Requires no more than 3 W to develop 25-lbf (111-N) holding force.
2. Wall-Mounted Units: Flush mounted unless otherwise indicated.
3. Rating: 24-V ac or dc.
4. Rating: 120-V ac.

B. Material and Finish: Match door hardware.

2.9 ADDRESSABLE INTERFACE DEVICE

A. Description: Microelectronic monitor module, NRTL listed for use in providing a system address for alarm-initiating devices for wired applications with normally open contacts.

B. Integral Relay: Capable of providing a direct signal to elevator controller to initiate elevator recall.

2.10 DIGITAL ALARM COMMUNICATOR TRANSMITTER

A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632 and be listed and labeled by an NRTL.

B. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture one telephone line(s) and dial a preset number for a remote central station. When contact is made with central station(s), signals shall be transmitted. If service on line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.

C. Local functions and display at the digital alarm communicator transmitter shall include the following:

1. Verification that both telephone lines are available.
 2. Programming device.
 3. LED display.
 4. Manual test report function and manual transmission clear indication.
 5. Communications failure with the central station or fire-alarm control unit.
- D. Digital data transmission shall include the following:
1. Address of the alarm-initiating device.
 2. Address of the supervisory signal.
 3. Address of the trouble-initiating device.
 4. Loss of ac supply or loss of power.
 5. Low battery.
 6. Abnormal test signal.
 7. Communication bus failure.
- E. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

2.11 DEVICE GUARDS

- A. Description: Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection.
1. Factory fabricated and furnished by manufacturer of device.
 2. Finish: Paint of color to match the protected device.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72 for installation of fire-alarm equipment.
- B. Install wall-mounted equipment, with tops of cabinets not more than 72 inches (1830 mm) above the finished floor.
- C. Smoke- or Heat-Detector Spacing:
1. Comply with NFPA 72, "Smoke-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for smoke-detector spacing.
 2. Comply with NFPA 72, "Heat-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for heat-detector spacing.
 3. Smooth ceiling spacing shall not exceed 30 feet (9 m).
 4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Appendix A in NFPA 72.
 5. HVAC: Locate detectors not closer than 3 feet (1 m) from air-supply diffuser or return-air opening.
 6. Lighting Fixtures: Locate detectors not closer than 12 inches (300 mm) from any part of a lighting fixture.
- D. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct.

- E. Heat Detectors in Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location.
- F. Single-Station Smoke Detectors: Where more than one smoke alarm is installed within a dwelling or suite, they shall be connected so that the operation of any smoke alarm causes the alarm in all smoke alarms to sound.
- G. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.
- H. Audible Alarm-Indicating Devices: Install not less than 6 inches (150 mm) below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille.
- I. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches (150 mm) below the ceiling.
- J. Device Location-Indicating Lights: Locate in public space near the device they monitor.
- K. Fire-Alarm Control Unit: Surface mounted, with tops of cabinets not more than 72 inches (1830 mm) above the finished floor.
- L. Annunciator: Install with top of panel not more than 72 inches (1830 mm) above the finished floor.

3.2 CONNECTIONS

- A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Division 8 Section "Door Hardware." Connect hardware and devices to fire-alarm system.
 - 1. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.
- B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 3 feet (1 m) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
 - 1. Alarm-initiating connection to smoke-control system (smoke management) at firefighter smoke-control system panel.
 - 2. Alarm-initiating connection to stairwell and elevator-shaft pressurization systems.
 - 3. Smoke dampers in air ducts of designated air-conditioning duct systems.
 - 4. Alarm-initiating connection to elevator recall system and components.
 - 5. Alarm-initiating connection to activate emergency lighting control.
 - 6. Alarm-initiating connection to activate emergency shutoffs for gas and fuel supplies.
 - 7. Supervisory connections at valve supervisory switches.
 - 8. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.
 - 9. Supervisory connections at elevator shunt trip breaker.

3.3 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 16 Section "Electrical Identification."
- B. Install framed instructions in a location visible from fire-alarm control unit.

3.4 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

3.5 FIELD QUALITY CONTROL

- A. **Manufacturer's Field Service:** Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- B. **Perform tests and inspections.**
 - 1. **Manufacturer's Field Service:** Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- C. **Tests and Inspections:**
 - 1. **Visual Inspection:** Conduct visual inspection prior to testing.
 - a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
 - b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
 - 2. **System Testing:** Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
 - 3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
 - 4. Test audible appliances for the private operating mode according to manufacturer's written instructions.
 - 5. Test visible appliances for the public operating mode according to manufacturer's written instructions.
 - 6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
- D. **Reacceptance Testing:** Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
- E. Fire-alarm system will be considered defective if it does not pass tests and inspections.

- F. Prepare test and inspection reports.
- G. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.
- H. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

END OF SECTION 13852

SECTION 15010 - MECHANICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 GENERAL

- A. Drawings and general provisions of contract, including General and Supplementary Conditions, and Division 1 Specification Section apply to this and other sections of Division 15.
- B. Before submitting his proposal, each bidder shall examine all plans and specifications relating to the work, visit the site(s) of the proposed project, and become fully informed of the extent and character of the work required.

1.2 REFERENCE STANDARDS

- A. Perform all Division 15 work in strict accordance with the Laws and Regulations of the State of Texas, and County and City codes/ordinances having jurisdiction over the project.

1.3 COORDINATION

- A. Coordinate work under this Division to avoid conflicts and to attain satisfactory and complementary systems.
- B. Coordinate work under this Division with work under other Divisions to avoid conflicts and to allow for adequate installation, maintenance, and operating space. Obtain the Architect's approval for penetrations of other parts of the Work prior to affecting them.
- C. Prepare coordination drawings in accordance with Division 1 to a scale of $\frac{1}{4}''=1'-0''$ or larger; detailing major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the work.

1.4 DEFINITIONS

Specific meanings used in Division 15 (variant forms are inferred):

- A. Work: This project, or the reference part.
- B. Provide:
 - 1. Furnish and install, complete with necessary appurtenances.
 - 2. "Provide" is implied throughout this Division unless language is specific.
- C. Required: Required by the contract Documents.
- D. Necessary: Necessary in order to obtain a finished system in satisfactory operating condition, and meeting all requirements.
- E. Furnish: Procure and deliver, ready for installation, necessary and/or required.
- F. Install: Receive, place securely, ready for connection to work specified elsewhere, and bring into satisfactory operating condition, as necessary and/or required.
- G. Connect: Connect properly to mechanical work. This includes non-physical "connections" such as indirect waste drains.
- H. Architect, Project Architect or Architect/Engineer Team.

1.5 SCOPE OF WORK

- A. The work under this Division includes providing complete mechanical systems for the project.
- B. All items of labor, material or equipment not required in detail by the specifications or plans, but incidental to, or necessary for the complete installation and proper operation of all phases of work described herein, or reasonably implied in connection therewith, shall be furnished as if called for in detail by the Contract Documents.

1.6 WORKMANSHIP

- A. All labor shall be performed in a workmanlike manner by mechanics skilled in their particular trades. All installations shall be complete in both effectiveness and appearance whether finally enclosed or left exposed. The architect reserves the right to direct the removal or replacement of any item which in his opinion shall not present a reasonable neat or workmanlike appearance, providing that same can be properly installed in an orderly way.

1.7 MANUFACTURER'S INSTRUCTIONS

- A. All equipment and devices shall be installed in accordance with the plans and specifications, manufacturer's instructions and applicable codes. Contractor shall obtain written recommendations of installation and start-up instructions from material vendors and comply, unless otherwise required. Bring discrepancies between these instructions and project requirements to the attention of the Architect, and resolve prior to construction. Provide signed inspection report by manufacturer's representative at system start-up to verify all is in compliant for product warranty.

1.8 WARRANTY

- A. The contractor shall warranty his work against defective materials and workmanship for a period of 1-year from date of acceptance of the job.

1.9 TRAINING

- A. Upon completion of the work and at a time designated by the Owner's representative, provide a formal training session for the Owner's operating personnel to include location, operation, and maintenance of all mechanical equipment and systems.

1.10 PERMITS AND FEES

- A. Permits: Obtain special permits necessary for this portion of the Work.
- B. Fees: Pay any fees associated with permits, required inspections, and permanent utility connections to this part of the work.

1.11 LICENSES

- A. Work under this Division shall be performed by organizations and individuals holding a current license to perform such type of work by the authority having jurisdiction. "License" in this sense means any process, regardless of its appellation, which is normally mandated by the authority in order to perform such type of work within its jurisdiction. The stipulation of this paragraph

applies even if the work is located physically on property owned or controlled by a higher authority. E.G., to work within the city limits of Corpus Christi, Texas, on a Federal project, State of Texas and City of Corpus Christi licenses which would be mandated to work on a private project shall be required even though the City and State may have no jurisdiction over the higher government.

- B. In the event that the licensed organization loses its license or is unable to obtain one, or the licensed individual performing the work becomes unlicensed or departs the organization, notify Architect immediately in writing.

1.12 UTILITY COORDINATION

- A. Permanent: Provide all ancillary work necessary to obtain utility connections. Pay connection fees. Arrange for connection in a timely manner. Coordinate time and arrangement of other work with the serving utility, and comply with utility standards.
- B. Temporary: Refer to Division 1.
- C. General: The contractor shall verify to his own satisfaction the location, elevation and availability of all utilities and services required, and shall adequately inform himself as to their relation to the work. The contractor shall also verify location, conduct all necessary tests, inspections, coordinate with owner's representatives and utilities, and check or existing underground utilities and lines before ditching. Repair of any cut or damaged lines or utilities shall be the sole responsibility of the contractor.

1.13 LISTING AND LABELING

Materials required to be listed shall be listed and labeled for the particular service if a listing is available. Obtain and comply with the terms of listings. Listed material include.

- A. NSF: Potable water and sanitary waste systems components.
- B. UL: Electrical materials.
- C. AMCA: Air moving devices and related accessory items.
- D. ARI: HVAC equipment.
- E. FM or UL: Hazardous fluid and fire protection system components.
- F. FIA, FM or AGA: Fuel gas system components.

1.14 MATERIALS AND EQUIPMENT

- A. All materials and equipment shall be new. Products shall be currently manufactured.
- B. All materials and equipment shall be clearly marked, stamped or labeled for identification. Do not obscure nameplates. Where manufactures nameplates do not meet the requirements of the mechanical identification specification provide nameplates in accordance with the specification.
- C. All products of similar type shall be provided by a single manufacturer throughout the project.

1.15 SUBMITTALS AND REVIEW

- A. Contractor shall furnish to the Architect, within a reasonable time after award of contract, and prior to commencing any work, complete brochures in quadruplicate (plus quantity required by

the Contractor) of all materials and equipment which the contractor proposes to furnish on the project. Data shall include descriptive literature, performance data, diagrams, capacity information, etc., to substantiate that proposed equipment will meet all of the requirements of the plans and specifications.

- B. All data must be checked and any required changes noted thereon by the contractor, signed and dated prior to furnishing same to the Architect for approval. Contractor's attention is directed that it is mandatory that he thoroughly review data prior to furnishing same to assure that equipment is in accordance with plans and specifications and to assure prompt return of the data.
- C. Deviations: Specifically call to the attention of the Architect every proposed deviation from the Contract Document requirements. Failure to identify deviations as such constitutes a representation that all requirements are not met.
- D. Review: Review of submittals shall not be constructed as releasing the Contractor from responsibility, but rather as a means to facilitate coordination of the work and the proper selection and installation of the products. All work shall be subject to final acceptance by the Architect at the completion of the project.
- E. If above information is not provided complete as specified above and within the allocated time, all equipment shall be furnished exactly as specified without any substitutions.

1.16 SUBSTITUTIONS

- A. Refer to the Conditions of the Contract.
- B. Where one vendor is indicated for a product, it is to establish a level of quality and performance; provide a product equal to that product in all respects from a vendor of equivalent performance.
- C. Where multiple vendors are indicated for a product, any of those vendors meeting the requirements may be submitted.
- D. Some product specifications in this Division are of the Acceptable Manufacturer type. Vendors listed as Acceptable Manufacturers are acceptable as vendors. However, the product submitted is subject to review as being fully equivalent in detail to the basis of design.
- E. Where multiple vendors are listed with product model numbers, each model and vendor is acceptable, provide all requirements are met. Model numbers are indicated to the extent believe necessary to identify a type and are not necessary completely.
- F. The architectural/engineering team has designed the facility using requirements of the Basis of Design equipment. Any substitutions from the basis of design, which will require additional A/E design and/or coordination, shall include the cost of necessary redesign by professionals licensed in the respective disciplines and the approval of the professional of record.

1.17 DRAWINGS AND SPECIFICATIONS

- A. These specifications are accompanied by Drawings. The Drawings and Specifications are complementary each to the other, and what is called for by one shall be as binding as if called for by both.
- B. The Drawings are generally diagrammatic. Lay out work at the site to conform to existing conditions; architectural, structural, mechanical, and electrical conditions; to avoid all obstructions; and to conform to details of installation as required. Provide an integrated satisfactorily operating installation. All necessary offsets in piping, fittings, duct, etc., required to avoid interferences between piping, equipment, architectural, and structural elements shall be provided by the Contractor. Provide all necessary routing and offsets to avoid conflict.
- C. Verify and arrange that sufficient space is provided for the installation of proposed products and that adequate access will exist for service and maintenance of equipment. For this work, adequate access shall be defined as meaning that service personnel can access and maintain a piece of equipment without having to alter permanent construction. Further, for equipment located above ceilings, access shall be available within 3 feet of ceiling opening or lay-in ceiling.

1.18 COMPLEMENTARY DOCUMENTS

- A. Contract documents are complementary; requirements are not necessarily repetitively stated at each possible subject; consider that a requirement applies wherever applicable.
- B. In the event of conflicting requirements in different parts of the Documents, the more expensive shall be presumed to apply, unless the Architect clarifies the requirement in a less expensive manner and waives the more expensive requirement in writing.

Since codes and standards are incorporated by reference, a particular conflict may appear in that a reference may use language that implies that a particular requirement in the Construction Documents is waived under the reference. This is not the case, unless specifically so clarified by the Architect. Generally, the specific Drawings and Specifications take precedence over waivers in multi-purpose reference documents.

- C. Because of licensure and workmanship requirements, persons performing the work are presumed to be familiar with applicable codes, ordinances, laws, regulations and standards. Therefore, details of materials, methods, arrangements and size contained in such publications are not necessarily replicated in the Contract Documents. This in no way deletes the requirement of the Contractor to comply. In the event of an apparent conflict between such publications and the Contract Documents, request clarification from the Architect prior to construction.

1.19 PROTECTION

- A. All work, equipment and materials shall be protected at all times to prevent damage or breakage either in transit, storage, installation or testing. All openings shall be closed with caps or plugs during installation. All materials and equipment shall be covered and protected against dirt, water, chemicals or mechanical injury.

1.20 CUTTING AND PATCHING

- A. All subcontractors shall notify the General Contractor sufficiently ahead of construction of any floor, walls, ceiling, roof, etc., of any openings that will be required for his work. All necessary cutting of walls, floors, partitions, ceilings, etc., as required for the proper installation of the work under this Contract shall be done at the Subcontractor's expense in a neat and workmanlike manner.

1.21 DEMOLITION

- A. It shall be the responsibility of the contractor to see that all demolition and remodeling work involving his trade is accomplished in a manner and completeness to provide the appearance of new construction work.
- B. Coordinate with other divisions before commencing work.
- C. Abandoned air conditioning units shall be removed and disposed of off site in a legal manner.
- D. All abandoned and/or otherwise unused piping shall be securely capped using materials of the same composition as the original piping.

1.22 RECORD DOCUMENTS

- A. Drawings: The Contractor shall maintain and update daily a set of "blueline" prints in the Field Office for the sole purpose of recording "installed" conditions. Revise the drawings to reflect as-built conditions, including all addenda, change orders, final shop drawing reviews, and field routing. Underground utilities shall be dimensionally located relative to readily accessible and identifiable permanent reference points, with accurate slope and elevation indicated. Submit prints for review. Revise, certify accuracy, and provide two final sets to the Architect.
- B. Owner's Manual: Prior to final acceptance, provide two bound volumes to the Architect. Index by subject. Include corrected submittals and shop drawings that reflect final review comments; installation, operation and maintenance instructions, parts lists, wiring diagrams, and piping diagrams; warranties.

1.23 INSPECTION, OBSERVATION, AND TESTING

- A. Cooperate with Architect's representative and authorities having jurisdiction. Provide complete access to the work at reasonable times.
- B. Cover-up: Prior to covering up work, or conducting observed tests, request observation as appropriate. Provide adequate advance notice defined as a minimum of five working days. In some cases the Architect's representative may waive observation; otherwise arrange for observed construction and testing prior to cover-up. Should minimize required notice not to be provided and the contractor covers up work requiring observation, such work shall be uncovered at contractor's expense.
- C. Pre-Testing: Self-inspect, pre-test, and remedy work prior to performing observed test.
- D. Sectional Work: In circumstances where a requirement for phased construction or other considerations dictate sectional construction and/or testing, notify the Architect when

construction begins on the first section of a system, and when the first section will be ready for observed testing, as well as subsequent sections. Test in the largest practical sections.

1.24 WORK PERFORMED UNDER OTHER DIVISIONS

- A. Refer to Division 2 for piped utilities beyond 5 feet from the building.
- B. Refer to Division 16 for power wiring systems external to equipment and control panels; starters in motor centers; safety switches not integral to equipment or starters provided under Division 15.
- C. Refer to Division 14 for kitchen, laboratory, medical and like equipment.

1.25 REFERENCE TO OTHER DIVISIONS

- A. Refer to Division 16 for additional material requirements of electrical components provided under Division 15, such as loose starters, wiring and devices integral to equipment.
- B. Refer to Division 2 for additional requirements governing excavation and backfill, supplemental to the requirements stated in this Division 15.
- C. Comply with all requirements applicable to work required under this Division.

1.26 TESTING SERVICES

- A. **Additional Testing:** In addition to any specified testing, the Architect may cause additional testing to be performed by an independent testing laboratory or any other qualified party. If such testing reveals deficient work by the Contractor, the Contractor shall pay for both the testing and remedial work. If such testing does not reveal deficient work by the Contractor, the Owner shall pay for the testing and the cost of repairing any damage caused by such testing.
- B. **Specified Testing Services:** If independent testing services are specified regarding work under this Division, cooperate fully with the testing agency. Provide access to the work. Provide test holes and taps necessary. Remove work that is not tested on site, deliver to testing agency, and reinstall if undamaged; replace if damaged. Provide utilities, operational capability, and facilities for on-site testing as necessary.

1.27 WORK BY OWNER

- A. The owner will award contracts on work which includes:
 - 1. None.

1.28 OWNER FURNISHED PRODUCTS

- A. Products furnished to the site and paid for by the Owner.
 - 1. None.

END OF SECTION 15010