FLORIDA DEPARTMENT

OF TRANSPORTATION

Exhibit C - Tractor Storage Shed Specifications

GENERAL REQUIREMENTS AND TECHNICAL SPECIAL PROVISIONS For FDOT DISTRICT ONE ARCADIA AND SEBRING TRACTOR AND STORAGE SHEDS

Financial Project Number
435395-1-52-01 and 435399-1-52-01

FDOT "FCO" Program

Prepared By:

URS

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FLORIDA DEPARTMENT OF TRANSPORTATION

GENERAL REQUIREMENTS AND TECHNICAL SPECIFICATIONS

For

FDOT DISTRICT ONE ARCADIA AND SEBRING TRACTOR AND STORAGE SHEDS

FDOT "FCO" Program

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FLORIDA DEPARTMENT

OF TRANSPORTATION

TECHNICAL SPECIAL PROVISIONS
For

FDOT DISTRICT ONE

ARCADIA AND SEBRING

TRACTOR AND STORAGE SHEDS

Financial Project Number

435395-1-52-01 and 435399-1-52-01

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SECTION 01 73 29
CUTTING AND PATCHING

PART 1.00 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall be responsible for all cutting, fitting and patching existing construction affected by and required to complete this work to include, but not be limited to:

1. Make its several parts fit together properly.

2. Uncover portions of the work to provide for installation of ill-timed work.

3. Remove and replace defective work.

4. Remove and replace work not conforming to requirements of the Contract Documents.

5. Provide penetrations of non-structural surfaces for installation of connections and electrical conduit.

PART 2.00 - PRODUCTS

2.01 MATERIALS

A. Comply with specifications and standards for each specific product(s) involved.

PART 3.00 - EXECUTION

3.01 INSPECTION

A. Inspect existing conditions of the project, including elements subject to damage or to movement during cutting and patching.

B. After uncovering work, inspect conditions affecting installation of products, or performance of work.

C. Report unsatisfactory or questionable conditions to the Department and/or Architect. Do not proceed with work until the Department and/or Architect has provided further instructions.

3.02 PREPARATION

A. Provide adequate temporary support as necessary to assure structural value to integrity of affected portion of the work.

B. Provide devices and methods to protect other portions of project from damage.

C. Provide protection from elements for that portion of the project which may be exposed by cutting and patching work.

3.03 PERFORMANCE

A. Execute cutting and demolition by methods which will prevent damage to other work and will provide proper surfaces to receive installation of repairs.

B. Fit and adjust products to provide a finished installation to comply with specified products, functions, tolerances, and finishes.

C. Restore work which has been cut or removed; install new products to provide completed work in accordance with the requirements of the Contract Documents.

D. Replace surfaces airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.

E. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes.

END OF SECTION 01 73 29

SECTION 03 01 00
CONCRETE WORK

PART 1.00 - GENERAL

1.01 DESCRIPTION

A. Scope:

1. The extent of concrete work is shown on the Drawings.

1.02 RELATED WORK

A. EARTHWORK: Section 31 20 00.

1.03 QUALITY ASSURANCE

A. Codes and Standards: Conform to provisions of the following, except as otherwise indicated or specified:

1. American Concrete Institute (ACI):

a. ACI 301 Specifications for Structural Concrete for Buildings.

b. ACI 304 Guide for Measuring, Mixing, Transporting, and Placing Concrete.

c. ACI 305 Hot Weather Concreting.

d. ACI 306 Standard Specification for Cold Weather Concreting.

e. ACI 315 Manual of Standard Practice for Detailing Reinforced Concrete Structures.

f. ACI 318 Building Code Requirements for Reinforced Concrete.

g. ACI 347 Recommended Practice for Concrete Formwork.

h. ACI 504R-90 Guide to Sealing Joints in Concrete Structures.

2. American Society for Testing and Materials (ASTM):

a. Referenced Standards.

3. Concrete Reinforcing Steel Institute (CRSI):

a. Manual of Standard Practice.

4. U.S. Army Corps of Engineers (CE):

   a. CE CRD-C 513 Specification for Rubber Waterstop.

   b. CE CRD-C 572 Specification for Polyvinyl-Chloride Waterstops.

5. United States Department of Commerce, National Institute of Standards and Technology; Product Standards (PS):

   a. PS-1 U.S. Product Standard for Construction and Industrial Plywood.

B. Concrete Testing Service:

1. Materials and installed work may require testing and retesting, as directed by the Engineer, at any time during progress of work. Contractor shall retain an independent testing laboratory to perform testing.

1.04 SUBMITTALS

A. Product Data: Submit product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, and others as requested by the Engineer.

B. Shop Drawings, Reinforcement: Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Conform to ACI 315, showing bar schedules, stirrup spacing, diagrams of bent bars, arrangement of concrete reinforcement. Include special reinforcement required and formed openings through concrete structures.

C. Laboratory Test Reports: Submit copies of laboratory test reports for concrete materials and mix design test as specified.

D. Material Certificates: It is preferable to provide copies of materials certificates in lieu of materials laboratory test reports when permitted by the Engineer. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

PART 2.00 - PRODUCTS

2.01 FORM MATERIALS

A.. The design and removal of all formwork is solely the responsibility of the Contractor.

B. Forms for Exposed Finish Concrete: Unless otherwise indicated, construct formwork, for exposed concrete surfaces with plywood, metal, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Cardboard tube forms are not acceptable. Furnish in largest practicable sizes to minimize number of joints. Provide form material with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.

1. Use medium density overlay (MDO) plywood conforming to PS-1 M.D. Overlay, Group 1, Exterior Grade.

C. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 mg/l volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

2.02 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

B. Steel Wire: ASTM A 82, plain, cold-drawn steel.

C. Welded Wire Fabric: ASTM A 185, welded steel wire fabric.

D. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports conforming to CRSI Specifications, unless otherwise acceptable.

1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.

2.03 CONCRETE MATERIALS

A. General:

1. Portland Cement: ASTM C 150, Type I or II.

2. Aggregates: ASTM C 33, except as modified herein. Furnish aggregates for exposed concrete surfaces from one source. Aggregates shall not contain any substance which may be deleteriously reactive with the alkalies in the cement.

3. Water: Potable, or free from foreign material in amounts harmful to concrete and embedded steel.

4. Admixtures: Provide admixtures for concrete that contain not more than 0.1-percent of chloride ions.

5. Slag, Fly Ash, and Other Pozzolanic Materials: ASTM C 618, Type C or Type F.

6. The materials used in concrete shall contain no hardened lumps, crusts, or frozen matter and shall not be contaminated with dissimilar material.

B. Types of Cement: Unless a specific type of cement is designated elsewhere, cement used in concrete shall be Type I, Type IP, Type IS, Type IP(MS), Type II, or Type III.

C. Fly Ash, Slag, and Other Pozzolanic Materials: Fly ash, slag, or other pozzolanic materials may be used as a cement replacement or as an admixture in concrete when Type I, Type II, or Type III cement is used.

D. Mixing Different Coarse Aggregates: Substitution of aggregate of the same type and grade from a different source in an approved concrete mix may be permitted at the discretion of the Engineer.

E. Admixtures:

1. Air Entraining Admixture: ASTM C 260.

2. Water Reducing Admixture: ASTM C 494, Type A, and contain not more than 0.1 percent chloride ions.

3. High Range Water Reducing Admixture (Superplasticizer): ASTM D 495, Type D, and contain no more than 0.1 percent chloride ions.

4. Water Reducing Non-Chloride Accelerator Admixture: ASTM C 494, Type D, and contain not more than 0.1 percent chloride ions.

5. Water Reducing Retarding Admixture: ASTM C 494, Type D, and contain not more than 0.1 percent chloride ions.

6. Chemical admixtures or additives containing calcium chloride shall not be permitted. Provide admixture manufacturer=s written certification that chloride ion content is negligible.

2.04 RELATED MATERIALS

A. Non-shrink, Nonmetallic Grout: Factory packaged nonstaining grout conforming to ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

1. Products: Provide one of the following products:

a. "Euco-NS"; Euclid Chemical Co.

b. "Vibropruf #11"; Lambert Corp.

c. "Masterflow 928"; Master Builders Technologies, Inc.

d. "Sonogrout 14"; Sonneborn Building Products-Chemrex Inc.

C. Hardener/Sealer/Dustproofer: (Apply to all floor surfaces not receiving floor covering)

1. Products: Provide one of the following products:

a. "Burk-O-Lith"; The Burke Co.

b. "Surfhard"; Euclid Chemical Co.

c. "Saniseal"; Master Builders Technologies, Inc.

d. "Lapidolith"; Sonneborn Building Products-Chemrex, Inc.

D. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd., conforming to AASHTO M 182, Class 2.

E. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.

1. Waterproof paper.

2. Polyethylene film.

3. Polyethylene-coated burlap.

F. Liquid Membrane Forming Curing Compound: Liquid type membrane-forming curing compound conforming to ASTM C 309, Type 1-D. Moisture loss not more than 0.55 gr./sq. cm. when applied at 200 sq. ft./gal. Compound to be clear and colorless at time of application and not change to a yellow or amber color over time and exposure.

1. Products: Provide one of the following products:

a. "Clear Seal"; Tamms Div., LaPorte Construction Chemicals.

b. "Masterkure 200W"; Master Builders Technologies, Inc.

c. "Klearseal"; Setcon Industries.

d. "Kure-N-Seal"; Sonneborn Building Products-Chemrex, Inc.

G. Bonding Compound: ASTM C 1059. Where concrete placement will be protected (interior) or delayed, use rewettable Type 1 bonding agent. Where concrete will be placed immediately after application of bonding agent, use non-rewettable acrylic Type II.

1. Products, Rewettable Type: Provide one of the following products:

a. "Euco Weld"; Euclid Chemical Co.

b. "Hibond"; Lambert Corp.

c. "Everweld"; L&M Construction Chemicals, Inc.

2. Products, Non-Rewettable Type: Provide one of the following products:

a. "Acrylic Bondcrete"; The Burke Co.

b. "SBR Latex"; Euclid Chemical Co.

c. "Acrylbond"; Lambert Corp.

d. "Sonocrete"; Sonneborn Building Products-Chemrex, Inc.

H. Epoxy Adhesive: ASTM C 881, Type IV, two component 100 percent solids material suitable for use on dry or damp surfaces. Provide material grade and class to suit project requirements.

1. Products: Provide one of the following products:

a. "Burke Epoxy M.V."; The Burke Co.

b. "Euco Epoxy System #452 or #620"; Euclid Chemical Co.

c. "Sikadur 32 Hi-Mod"; Sika Chemical Corp.

I. Joint Filler Material: Preformed strips of asphalt saturated fiberboard, conforming to ASTM D 1751.

2.05 PROPORTIONING AND DESIGN OF MIXES

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method, use an independent testing agency acceptable to Engineer for preparing and reporting proposed mix designs.

1. Do not use the same testing agency for field quality control testing.

2. Limit use of fly ash to not exceed 20 percent of cement content by weight.

B. Submit written reports to the Engineer of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by the Engineer.

C. Design mixes to provide normal weight concrete with the following properties, as indicated on Drawings.

D. Slump Limits: proportion and design mixes to result in concrete slump at point of placement as follows:

1. Ramps, slabs, and sloping surfaces: Not more than 3-inches.

2. Reinforced foundation systems: Not less than 1-inch and not more than 3-inches.

3. Concrete containing high-range water-reducing admixture (superplasticizer): Not more than 8-inches after adding admixture to site-verified 2-to3-inch slump concrete.

4. Other concrete: Not more than 6-inches.

E. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; as accepted by the Engineer. Laboratory test data for revised mix design and strength results must be submitted to and accepted by the Engineer before using in work.

F. The maximum concrete temperature at the time of placement shall not exceed 90 degrees F unless hot weather provisions are provided.

2.06 ADMIXTURES

A. Use water reducing admixture of high range water reducing admixture (super plasticizer) in concrete as required for placement and workability.

B. Use accelerating admixture in concrete slabs placed at ambient temperatures below 50 degrees F.

C. Use high-range water-reducing admixture in pumped concrete, heavy-use slabs, architectural concrete, concrete required to be watertight, and concrete with water-cement ratios below 0.50.

D. Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add air-entraining admixture at manufacturer=s prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus or minus 1-1/2 percent within the following limits:

   1. Concrete not exposed to freezing, thawing, or hydraulic pressure, or to receive a surface hardener: 2 percent to 4 percent air.

E. Use admixtures for water reduction and set accelerating or retarding in strict compliance with manufacturer=s directions.

PART 3.00 - EXECUTION

3.01 PLACING REINFORCEMENT

A. Comply with CRSI's recommended practice for “Placing Reinforcing Bars,” for details and methods of reinforcement placement and supports, and as herein specified.

B. Clean reinforcement of loose rust and mill scale, earth, and other materials which reduce or destroy bond with concrete.

C. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.

D. Place reinforcement as called for on Drawings. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.02 JOINTS

A. Construction Joints: Locate and install construction joints, as indicated, or, if not indicated, locate so as not to impair strength and appearance of the structure, as acceptable to the Engineer.

B. Isolation Joints in Slabs-On-Ground: Construct isolation joints in slabs-on-ground at points of contact between slabs on ground and vertical surfaces, such as column pedestals, foundation walls, grade beams and elsewhere as indicated. Construct isolation joints using joint filler material herein specified and sealant materials specified in Section 07900 - JOINT SEALANTS. Maintain top of strips of filler material at 1/4 inch + (maximum) below top of finish slab.

3.03 INSTALLATION OF EMBEDDED ITEMS

A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto.

B. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.

3.04 CONCRETE PLACEMENT

A. Preplacement Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other trades sufficiently in advance, to permit installation of their work; cooperate with other trades in setting such work. All aforementioned work must be completed and the Engineer and/or Department notified at least 24 hours prior to concrete placement to allow time for adequate inspection. Moisten wood forms immediately before placing concrete where form coating is not used.

1. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel.

B. General: Conform to ACI 304 and as specified.

1. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.

C. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.

1. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Bring slab surfaces to correct level with straightedge and strike off. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

3. Maintain reinforcing in proper position during concrete placement operations.

D. Cold Weather Placement: Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 degrees F., uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F and not more than 80 degrees F at point of placement.

2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

3. Do not use salt or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs. Do not use calcium chloride.

E. Hot Weather Placement: When hot weather conditions exist that would impair quality and strength of\ concrete, place concrete complying with ACI 305.

1. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.

2. Fog spray forms, reinforcing steel, and subgrade just before placing concrete.

3. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Engineer.

3.05 MONOLITHIC SLAB FINISHES

A. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified.

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. Check and level surface plane so that depressions between high spots do not exceed 1/4-inch under a 10-foot straight edge. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

B. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, paint, tile, 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.

2. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance and with a level surface plane so that depressions between high spots do not exceed 1/8 inch under a 10 foot straightedge. Grind smooth surface defects which would telegraph through applied floor covering system.

C. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete flatwork, steps, and ramps, and elsewhere as indicated.

1. Immediately after trowel finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with the Engineer before application.

3.06 CONCRETE CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.

2. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days pursuant to ACI 301 procedures. Avoid rapid drying at end of final curing period.

B. Curing Methods: Perform curing of concrete by curing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as herein specified.

1. Provide moisture curing by following methods:

a. Keep concrete surface continuously wet by covering with water.

b. Continuous water-fog spray.

c. Covering concrete, surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4 inch lap over adjacent absorptive covers.

2. Provide moisture-cover curing as follows:

a. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

C. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of appropriate curing method.

1. Final cure concrete surfaces to receive liquid floor sealer/dustproofer/hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.

2. Provide curing compound to exposed interior slabs and to exterior slabs, walks, and curbs; as follows:

a. Apply specified curing compound to concrete slabs as soon as final finishing operations are complete (within 2-hours). Apply uniformly in continuous operation by power-spray

or roller in accordance with manufacturer's directions. Re-coat areas subjected to heavy rainfall within 3-hours after initial application. Maintain continuity of coating and repair damage during curing period.

b. Do not use membrane curing compounds or a sealer on surfaces which are to be covered with coating material applied directly to concrete such as liquid floor hardener, waterproofing, damproofing, membrane roofing, flooring (such as ceramic tile, glue-down carpet), painting, and other coatings and finish materials, unless otherwise acceptable to the Engineer.

3.07 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

B. Equipment Bases and Foundations: Provide machine and equipment bases and foundations. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.

1. Grout base plates and foundations, using specified non-shrink grout. Use non-metallic grout for exposed conditions, unless otherwise indicated.

3.08 CONCRETE SURFACE REPAIRS

A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to the Engineer.

1. Cut out honeycomb, rock pockets, voids, over 1/4 inch in any dimension, down to solid concrete but, in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water and brush-coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.

2. Patch holes left by tie rods and bolts with a mixture of sand and cement which, after curing, closely matches the appearance of the surrounding wall surface.

B. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of the Engineer. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets; fins and other projections on surface; and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar, or precast cement cone plugs secured in place with bonding agent.

1. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.

C. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify the surface plane to tolerance specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having required slope.

1. Repair finished unformed surfaces that contain defects which affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.01 inch wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.

2. Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days.

3. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to the Engineer.

D. Repair defective areas, except random cracks and single holes not exceeding 1 inch diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type of class as original concrete. Place, compact and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

E. Repair isolated random cracks and single holes not over 1 inch in diameter by dry-pack method. Groove top of cracks and cut-out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry pack after bonding compound has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.

F. Perform structural repairs with prior approval by the Engineer for method and procedure, using specified epoxy adhesive and mortar.

G. Repair methods not specified above may be used, subject to acceptance of the Engineer.

3.09 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. The Contractor shall employ a testing laboratory to perform tests and to submit test reports.

B. Sampling and testing for quality control during placement of concrete may include the following, as directed by the Engineer.

1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.

   a. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.

   b. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231 pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.

c. Concrete Temperature: Test hourly when air temperature is 40 degrees F and below, and when 80 degrees F and above; and each time a set of compression test specimens is made.

d. Compression Test Specimen: ASTM C 31; one set of four standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field cure test specimens are required.

e. Compressive Strength Tests: ASTM C 39; one set for each day's pour; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.

2. When frequency of testing will provide less than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.

3. When total quantity of a given class of concrete is less than 50 cubic yards, Engineer may waive strength test if adequate evidence of satisfactory strength is provided.

4. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.

5. Strength level of concrete will be considered satisfactory if averages of sets of three (3) consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi.

C. Test results will be reported in writing to the Engineer, ready-mix producer, and Contractor within 24 hours that tests are made. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day test and 28-day tests.

D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

E. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Engineer. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

END OF SECTION 03 01 00

SECTION 05 12 00
STRUCTURAL STEEL

PART 1.00 - GENERAL

1.01 WORK INCLUDED

A. Extent of structural steel work is shown on the Drawings, including schedules, notes and details to show size and location of members, typical connections, and type of steel required.

B. Structural steel is that work defined in AISC "Code of Standard Practice for Steel Buildings and Bridges" and as otherwise shown on Drawings.

1.02 RELATED WORK

A. CONCRETE WORK: Section 03 01 00.

B. METAL FABRICATIONS: Section 05 50 00.

1.03 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the following, except as otherwise indicated or specified:

1. American Institute of Steel Construction (AISC):

a. AISC Code of Standard Practice for Steel Buildings and Bridges.

b. AISC Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings, including "Commentary" and Supplements.

c. AISC Specifications for Structural Joints using ASTM A 325 or A 490 Bolts; approved by the Research Council on Structural Connections (RCSC).

2. American Society for Testing and Materials (ASTM):

a. Referenced Standards.

3. American Welding Society (AWS):

a. AWS D1.1 Structural Welding Code - Steel.

B. Qualifications for Welding Work:

1. Qualify welding processes and welding operators in accordance with AWS “Standard Qualification Procedure.”

2. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests within previous twelve (12) months.

a. If re-certification of welders is required, re-testing will be Contractor's responsibility.

C. All structural steel work and material is subject to inspection and testing. The expense of removing and replacing any structural steel for testing purposes shall be borne by the Contractor if it is found to be unsatisfactory. Remove and replace work found to be defective and provide new acceptable work at no additional expense to the Department.

1.04 SUBMITTALS

A. Shop Drawings:

1. Submit shop drawings including complete details and schedules for fabrication and assembly of structural steel members procedures and diagrams.

a. 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.

b. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed by others.

B. Product Data:

1. Submit producer's or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).

a. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.

b. High-strength bolts (each type), including nuts and washers.

c. Shrinkage-resistant grout.

C. Welding Certificates:

1. Submit copies of certificates for welding procedures and personnel.

2. Contractor shall submit certificates to the Engineer for review.

1.05 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 to not delay work.

B. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

C. 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 cost to the Department.

PART 2.00 - PRODUCTS

2.01 MATERIALS

A. Metal Surfaces, General:

1. 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. Structural Steel Shapes, Plates and Bars: As noted on Drawings; galvanized.

C. Structural Steel Pipes: ASTM A 53, Type S, Grade B, Schedule 40, galvanized.

D. Anchor Bolts: ASTM A 307 or ASTM A 36, galvanized.

E. High-Strength Threaded Fasteners:

1. Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers, as follows:

a. Quenched and tempered medium-carbon steel bolts, nuts and washers, complying with ASTM A 325.

F. Electrodes for Welding: Comply with AWS Code E70XX.

G. Galvanizing Repair Paint: High zinc dust content paint for re-galvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035A (SH) or SSPC-Paint 20.

H. Non-Metallic Shrinkage-Resistant Grout:

1. Pre-mixed, non-metallic, non-corrosive, non-staining product containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water reducing agents, complying with ASTM C 1107, Type A.

2. Products: Subject to compliance with specified requirements, provide one of the following:

a. "Euco N.S."; Euclid Chemical Co.

b. "Crystex"; L&M Construction Chemicals, Inc.

c. "Masterflow 713"; Master Builders Technologies, Inc.

2.02 FABRICATION

A. Shop Fabrication and Assembly:

1. Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on approved shop drawings. Provide camber in structural members where indicated.

B. Splice members only where indicated and accepted on shop drawings.

C. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.

D. 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.

E. Welded Connections:

1. All shop connections shall be seal welded for exposed structural steel.

F. Bolt field connections, except where welded connections or other connections are indicated.

1. Provide high-strength threaded fasteners for principal bolted connections.

G. Bolted Connection:

1. Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" (RCSC).

H. Welded Construction:

1. Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.

I. Assemble and weld built-up sections by methods which will produce true alignment of axes without warp.

J. Holes for Other Work:

1. Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members, as shown on approved shop drawings.

K. Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work.

L. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

2.03 FINISHES

A. General:

1. Comply with NAAMM “Metal Finishes Manual” for recommendations relative to application and designation of finishes.

2. Finish metal fabrications after assembly.

B. Galvanizing: For those items indicated for galvanizing, apply zinc coating by the hot-dip process in compliance with the following requirements:

1. ASTM A 153 for galvanizing iron and steel hardware.

2. ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products.

PART 3.00 - EXECUTION

3.01 ERECTION

A. Surveys:

1. Employ a registered professional land surveyor in the State of Florida for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Engineer. Do not proceed with erection until the surveyor's report has been submitted, corrections have been made, or until compensating adjustments to structural steel work have been agreed upon with Engineer.

B. Temporary Shoring and Bracing:

1. Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds. Provide temporary planking and working platforms as necessary to effectively complete work.

C. Anchor Bolts:

1. Furnish anchor bolts and other connectors required for securing structural steel to foundations and other in-place work.

D. Furnish templates and other devices as necessary for presetting bolts and other anchors to accurate locations.

E. Setting Bases and Bearing Plates:

1. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.

F. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.

G. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.

H. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.

1. For proprietary grout materials, comply with manufacturer's instructions.

I. Field Assembly:

1. Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

J. Level and plumb individual members of structure within specified AISC tolerances.

K. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.

L. Splice members only where indicated and accepted on shop drawings.

M. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

N. Do not enlarge unfair holes in members by burning or by use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts only after notification and acceptance by the Engineer.

O. Gas Cutting:

1. Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members which are not under stress, as acceptable to Engineer. Finish gas-cut sections equal to a sheared appearance when permitted.

3.02 FIELD QUALITY CONTROL

A. Department will engage an independent testing and inspection agency to visually inspect all of the high-strength bolted connections and welded connections and to perform tests and prepare test reports.

1. Perform a magnetic particle test on 25 percent of all fillet welds. If more than 20 percent of welds made by a welder contain defects identified by testing, then all welds made by that welder shall be tested at Contractor's expense.

2. Provide a minimum ten (10) day notice to the testing agency prior to commencement of erection work.

B. Testing agency shall conduct and interpret tests and state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.

C. Provide access for testing agency to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished.

D. Testing agency may inspect structural steel at plant before shipment; however, Engineer reserves right, at any time before final acceptance, to reject material not complying with specified requirements.

E. At Contractor's expense, correct deficiencies in structural steel work which inspections and laboratory tests reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as may be necessary to re-confirm any non-compliance of original work, and as may be necessary to show compliance of corrected work.

3.03 CLEAN-UP

A. Remove from time to time as directed, all rubbish and debris resulting from his work and upon completion of the work, remove all unused materials, equipment, scaffolding, and similar construction related items, and perform such final cleaning services as may be necessary to leave job in a condition acceptable to the Department.

END OF SECTION 05 12 00

SECTION 05 50 00
METAL FABRICATIONS

PART 1.00 - GENERAL

1.01 WORK INCLUDED

A. Furnish and install all metal fabrications as indicated on the Drawings and/or specified herein.

2. Miscellaneous metal work shall include, but not be limited to, the following:

a. Pipe Bollards.

b. Miscellaneous Steel Framing and Supports.

1.02 RELATED WORK

A. CONCRETE WORK: Section 03 01 00.

B. STRUCTURAL STEEL: Section 05 12 00.

1.03 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the following, except as otherwise indicated or specified:

1. American Institute of Steel Construction (AISC):

a. AISC Code of Standard Practice for Steel Buildings and Bridges.

b. AISC Specification for Structural Buildings Allowable Stress Design and Plastic Design with Commentary.

2. American National Standards Institute (ANSI):

a. Referenced Standards.

3. American Society for Testing and Materials (ASTM):

a. Referenced Standards.

4. American Welding Society (AWS):

a. AWS D1.1 Structural Welding Code - Steel.

B. All welding shall be performed pursuant to AWS D1.1. All welding shall be performed by welders with current certificates for the type of weld being done. Special care shall be taken to keep welding electrodes free of moisture.

C. Field measurements shall be taken prior to preparation of shop drawings and fabrication, where possible. Trimming and fitting shall be allowed for wherever taking field measurements before fabrication might delay the work.

D. Items shall be preassembled in the shop to greatest extent possible to minimize field splicing and assembly. Units shall be disassembled only as necessary for handling and shipping limitations. Disassembled units shall be clearly marked for reassembly.

1.04 SUBMITTALS

A. Shop Drawings:

1. Submit shop drawings for fabrication and erection of metal fabrications. Include plans, elevations, details of sections and connections, anchorages and accessory items. Provide templates for anchor and bolt installations.

1.05 PRODUCT DELIVERY AND STORAGE

A. Materials shall be delivered to the Site undamaged and shall be stored and protected from the elements by covering in plastic. All material damaged prior to substantial completion shall be removed from the Site and replaced at no additional cost to the Department.

PART 2.00 - PRODUCTS

2.01 MATERIALS

A. Metal Surfaces, General:

1. For metal fabrications work which will be exposed to view, only materials which are smooth and free of surface blemishes such as pitting, seam marks, roller marks, rolled trade names and roughness shall be used.

B. The following shall be used except where otherwise specified or required:

1. Steel plates, shapes and bars: As noted on Drawings; galvanized.

2. Steel pipe shall conform to ASTM A 53, Type S, Grade B, Schedule 80, galvanized.

2.02 FASTENERS

A. General:

1. Zinc-coated fasteners shall be used for exterior locations or where built into exterior walls wherever possible.

2. Fasteners and connections shall be welded wherever possible.

B. Nuts and bolts shall be regular hexagon type conforming to ASTM A307, Grade A.

C. Lag bolts shall be square head type conforming to ANSI B18.2.1.

D. Machine screws shall be cadmium plated steel conforming to ANSI B18.6.3.

E. Wood screws shall be flat head carbon steel conforming to ANSI B18.6.1.

F. Washers shall be round, carbon steel conforming to ANSI B18.22.1.

G. Masonry anchorage devices shall be expansion shields and epoxy set anchors (as indicated) conforming to ASTM E 488.

H. Toggle bolts shall be tumble-wing type conforming to Federal Specification (FS) FF-B-588, type, class and style as required.

I. Lock washers shall be helical spring-type carbon steel conforming to ANSI B18.21.1.

2.03 PAINT

A. Galvanizing Repair Paint: High zinc dust content paint for re-galvanizing welds in galvanized steel, with dry firm containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035A (SH) or SSPC-Paint-20.

B. Dissimilar Metals Coating: Provide Scotch-Clad Brand Protective Coating No. 1706 as manufactured by 3M Corp., or approved equal.

2.04 FINISHES

A. General:

1. Comply with NAAMM AMetal Finishes Manual@ for recommendations relative to application and designation of finishes.

2. Finish metal fabrications after assembly.

B. Galvanizing: For those items indicated for galvanizing, apply zinc coating by the hot-dip process in compliance with the following requirements:

1. ASTM A 153 for galvanizing iron and steel hardware.
2. ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products.

2.05 FABRICATION

A. Pipe Bollards:

1. Fabricate pipe bollards from Schedule 80 steel pipe, galvanized, in sizes indicated on Drawings. Fill with concrete and round-off top.

B. Miscellaneous Steel Framing and Supports:

1. Provide miscellaneous steel framing and supports which are not a part of structural steel framework, as required to complete the Work. Fabricate miscellaneous units to size, shapes and profiles indicated or, if not indicated, of required dimensions to receive adjacent other work to be retained by framing. Except as otherwise indicated, fabricate structural steel shapes, plates, and steel bars of welded construction, using mitered joints for field connection. Cut, drill and tap units to receive hardware and similar items.

2. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units are required to be installed after concrete is placed. Except as otherwise indicated, space anchors 24 inches on center.

PART 3.00 - EXECUTION

3.01 INSPECTION

A. Examine the areas and conditions under which the metal fabrications are to be installed. Do not proceed until the unsatisfactory conditions have been corrected in an acceptable manner.

3.02 INSTALLATION

A. Materials of type, size and thickness shown shall be used, or if not shown, of required size and thickness to produce adequate strength and durability in the finished product. Metal shall be well formed to shape and size with sharp lines and angles.

B. Exposed work shall be formed true to line and level with accurate angles and surfaces and straight sharp edges. Exposed edges shall be eased to a radius of 1/32 inch unless otherwise shown. Bent metal corners shall be formed to the smallest radius possible without causing grain separation, or otherwise impairing work.

C. All corners and seams shall be welded continuously, complying with AWS recommendations. At exposed connections, exposed welds shall be ground smooth and flush to match and blend with adjoining surfaces.

D. Shearing and punching shall leave clean, true lines and surfaces. Curved work shall be evenly sprung.

E. Exposed connections shall be formed with hairline joints, flush and smooth, using concealed fasteners wherever possible. Exposed fasteners shall be of the type shown or, if not shown, Phillips flat-head (countersunk) screws or bolts shall be used.

F. Anchoring devices shall be fabricated and spaced to provide adequate support for the intended use.

G. Metal fabrications shall be cut, reinforced, drilled and tapped, as required, to receive finish hardware and similar items.

H. All steel fabrications to be installed in exterior locations shall be galvanized as specified.

I. All metal fabrications shall be installed as shown on the Drawings, and adjusted to satisfactorily fulfill the use for which such is intended.

3.03 ADJUST AND CLEAN

A. All exposed surfaces shall be left clean and free from all blemishes or discolorations after erection.

END OF SECTION 05 50 00

SECTION 07 11 10
UNDER-SLAB VAPOR BARRIER

PART 1.00 - GENERAL

1.01 WORK INCLUDED

A. Furnish and install an under-slab vapor barrier located under all concrete floor slabs, including walks within building line, as indicated on the Drawings and specified herein.

1.03 RELATED WORK

A. CONCRETE WORK: Section 03 31 00.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's published descriptive literature, including typical details and installation instructions, for vapor barrier membrane and mastic.

B. Samples: Submit three (3) 12 inch by 12 inch samples of vapor barrier membrane.

1.05 DELIVERY AND STORAGE

A. Packaged Materials: Deliver materials in bundles, rolls, and sealed containers bearing the manufacturer's original labels. Store materials in an enclosed area free from contact with soil and weather, and maintain at not less than 50 degrees F for at least 24 hours before use. If material is dated for use or "shelf life" is indicated on the labels, all outdated material shall be removed from the Site.

PART 2.00 - PRODUCTS

2.01 VAPOR BARRIER MATERIALS

A. Vapor Barrier Membrane: Comply with the following:

1. Membrane Material: Flexible plastic or plastic laminate membrane, minimum 8.0 mils in thickness.

B. Mastic: Comply with the following:

1. Provide mastic compound as recommended by the membrane manufacturer.

PART 3.00 - EXECUTION

3.01 INSPECTION

A. Examine the areas and conditions under which the under-slab vapor barrier is to be installed. Do not proceed with vapor barrier work until unsatisfactory conditions have been corrected.

3.02 APPLICATION

A. Apply directly to compacted earth base, under concrete slabs, one layer of the vapor barrier membrane. Maintain 6 inch side laps and 9 inch end laps; turn down membrane 12 inches at slab/wall intersections.

B. Laps shall be fully sealed with mastic in strict accordance with manufacturer's published instructions for application procedures and limitations for temperature and setting time.

C. Additional strips shall be used at penetrations of membrane to close openings in membrane. Set in mastic.

D. Extreme care and precaution shall be exercised after membrane has been applied to prevent punctures, tears, and other abuses. Should such vapor barrier damage occur, repair the membrane by application of a membrane patch, sized to lap 9 inches on all sides of the damaged area, and set in a full bed of mastic.

END OF SECTION 07 11 10

SECTION 07 41 10
METAL ROOF PANELS

PART 1.00 - GENERAL

1.01 SUMMARY

A. This Section includes the following:

1. Factory-formed and field-assembled, exposed-fastener, lap-seam metal roof panels.

1.02 RELATED SECTIONS

A. STRUCTURAL STEEL: Section 05 12 00.

B. METAL WALL PANELS: Section 07 41 20.

C. JOINT SEALANTS: Section 07 90 00.

1.03 PERFORMANCE REQUIREMENTS

A. General: Provide metal roof panel assemblies capable of withstanding structural movement, wind uplift, thermally induced movement, and exposure to weather without failure or infiltration of water into the building interior, and in compliance with governing codes and regulations.

1.04 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal roof panel and accessory.

B. Shop Drawings: Show fabrication and installation layouts of metal roof panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work.

1. Accessories: Include details of flashing and trim, gutters, and downspouts.

C. Samples for Verification: For each type of exposed finish required, prepared on samples of size indicated below:

1. Metal Roof Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal roof panel accessories.

2. Translucent Panels: 12 inches long by actual panel width.

3. Trim and Closures: 12 inches long. Include fasteners and other exposed accessories.

D. Qualification Data: For Installer.

E. Warranties: Special warranties specified in this Section.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An employer or workers trained and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, metal roof panels and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection against damage during transportation and handling.

B. Unload, store, and erect metal roof panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal roof panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness, with positive slope for drainage of water. Do not store metal roof panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.

1.07 PROJECT CONDITIONS

A. Weather Limitation: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal roof panels to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Verify location of structural members and roof opening dimensions by field measurements before metal roof panel fabrication and indicate measurements on shop drawings.

1.08 COORDINATION

A. Coordinate metal roof panel assemblies with construction of adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.09 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal roof panel assemblies that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures, including rupturing, cracking, or puncturing.

b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finish: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

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

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.

b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.

c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

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

PART 2.00 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers: Provide metal roof panels by one of the following manufacturers:

1. Berridge Manufacturing Company.

2. MBCI.
3. Morin Corporation.

4. Petersen Aluminum Corp.

5. Steelox Systems Inc.

2.02 ROOF PANEL METALS AND FINISHES

A. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

1. Surface: Smooth, flat finish.

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

1. Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color

topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2605.

2. Provide fluoropolymer two-coat system for all exposed exterior and interior roof panel surfaces.

2.03 MISCELLANEOUS MATERIALS

A. Secondary Framing: Manufacturer's standard secondary framing members, including purlins, girts, and other miscellaneous structural members. Fabricate framing from zinc-coated steel sheet.

1. Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653, Structural Steel, Grades 33 through 80; with G60 coating designation; mill phosphatized.

2. Thickness: Minimum 0.0598 inch.

3. Depth: As required to comply with performance requirements.

B. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal roof panels by means of plastic caps or factory-applied coating.

1. Fasteners for Roof Panels: Self-drilling or self-tapping 410 stainless or zinc-alloy steel hex washer head, with EPDM or PVC washer under heads of fasteners bearing on weather side of metal roof panels.
2. Non-High-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A, carbon-steel, hex-head bolts; ASTM A 563 carbon-steel hex nuts; and ASTM F 844 plain (flat) steel washers. Hot-dip zinc coating finish, complying with ASTM A 153.

C. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15 mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.04 EXPOSED-FASTENER, LAP-SEAM METAL ROOF PANELS

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

B. Tapered-Rib-Profile, Exposed-Fastener Metal Roof Panels: Formed with trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced between major ribs.

1. Material: Aluminum sheet, 0.032 inch thick.

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

3. Major Rib Spacing: 12 inches.

4. Panel Coverage: 36 inches.

5. Panel Height: 1.25 inches.

2.05 ACCESSORIES

A. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including trim, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels, unless otherwise indicated.

B. Flashing and Trim: Formed from 0.0179 inch thick, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal roof panels.

C. Gutters: From 0.032 inch thick, aluminum sheet prepainted with coil coating. Provide complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96 inch long sections, sized according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced 36 inches o.c., fabricated from same metal as gutters. Provide aluminum wire ball strainers at outlets. Finish gutters to match metal roof panels.

D. Downspouts: Formed from 0.032 inch thick aluminum sheet prepainted with coil coating. Fabricate in 10 foot long sections, complete with formed elbows and offsets. Finish downspouts to match metal roof panels.

E. Translucent Roof Panels:

1. Fire-Test-Response Characteristics: Provide translucent roof panels with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

a. Flame-Spread Index: 25 or less.

b. Smoke-Developed Index: 450 or less.

2. Polycarbonate Panels: Corrugated polycarbonate sheets. Match profile of adjacent metal wall panels.

a. Light Transmittance: Not less than 52 percent according to ASTM D 1003.

b. Color: Opal.

c. Basis of Design: "Rooflite MB"; Co-Ex Corporation.

d. Other Acceptable Products/Manufacturers:

1) "Suntuf SunSky"; Suntuf Inc.

3. Accessory Materials: As recommended by translucent panel manufacturer for complete weathertight installation.

F. Roof Ventilator: Gravity type, complete with hardware, flashing, closures, and fittings.

1. Continuous or Sectional-Ridge Type: Factory-engineered and –fabricated, continuous unit; fabricated from minimum 0.032 inch thick aluminum sheet prepainted with coil coating; finished to match metal roof panels. Fabricated in minimum 10 foot long sections. Provide throat size and total length indicated, complete with side baffles, ventilator assembly, end caps, splice plates, and reinforcing diaphragms.

a. Bird Screening: Aluminum, ½ inch square mesh, 0.063 inch wire.

b. Dampers: Manually operated, spring-loaded, vertically rising type; chain and worm gear operator; with chain of length required to reach within 36 inches above floor.

c. Throat Size: 9 or 12 inches, as standard with manufacturer, and as required to comply with ventilation requirements.

2.06 FABRICATION

A. General: Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

B Provide panel profile for full length of panel.

C Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

2.07 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3.00 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements indicated for installation tolerances, metal roof panel supports, and other conditions affecting performance of work.

1. Examine roof framing to verify that rafters, purlins, angles, channels, and other secondary structural panel support members and anchorage have been installed to meet requirements of metal roof panel manufacturer, including alignment tolerances.

2. Do not proceed with metal roof panel installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Promptly remove protective film, if any, from exposed surfaces of metal panels. Strip with care to avoid damage to finish.

3.03 ERECTION OF FRAMING

A. Secondary Framing: Erect framing true to line, level, plumb, rigid, and secure. Fasten secondary to primary structural steel framing using clips with field connections using non-high-strength bolts.

3.04 METAL ROOF PANEL INSTALLATION, GENERAL

A. General: Provide metal roof panels of full length from eave to ridge. Anchor metal roof panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Field cutting of metal roof panels by torch is not permitted.

2. Install panels perpendicular to purlins.

3. Rigidly fasten eave end of metal roof panels and allow ridge end free movement due to thermal expansion and contraction. Predrill panels.

4. Provide metal closures at peaks and each side of ridge caps.

5. Locate and space fastenings in uniform vertical and horizontal alignment.

6. Install ridge caps as metal roof panel work proceeds.

7. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.

B. Fasteners: Use stainless steel fasteners for all surfaces.

C. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, sealants indicated or, if not otherwise indicated, types recommended by metal roof panel manufacturer.

1. Seal metal roof panel end laps with double beads of tape or sealant, full width pf panel. Seal side joints where recommended by panel manufacturer.

2. Prepare joints and apply sealants to comply with requirements of Section 07 90 00 - JOINT SEALANTS.

3.05 FIELD-ASSEMBLED METAL ROOF PANEL INSTALLATION

A. Lap-Seam Metal Roof Panels: Fasten metal roof panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Apply panels and associated items for neat and weathertight enclosure. Avoid “panel creep” or application not true to line.

2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal roof panels.

3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.

4. Install screw fasteners with power tools having controlled torqued adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

5. Provide sealant tape at lapped joints of metal roof panels.

6. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps, and on side laps of panels; and elsewhere as needed to make panels weatherproof to driving rains.

7. At panel splices, nest panels with minimum 6 inch end lap, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates.

3.06 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel assembly including trim, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

C. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 4 feet o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

D. Downspouts: Join sections with 1-1/2 inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.

1. Provide elbows at base of downspouts to direct water away from building.

E. Translucent Roof Panels: Provide end laps of not less than 6 inches and side laps of not less than 1-1/2-inch corrugations. Align horizontal laps with adjacent translucent roof panels. Seal intermediate end laps and side laps of translucent panels with translucent mastic.

3.07 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal roof panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 41 10

SECTION 07 41 20
METAL WALL PANELS

PART 1.00 - GENERAL

1.01 SUMMARY

A. This Section includes the following:

1. Factory-formed and field-assembled, exposed-fastener, lap-seam metal wall panels.

1.02 RELATED SECTIONS

A. STRUCTURAL STEEL: Section 05 12 00.

B. METAL ROOF PANELS: Section 07 4 110.

C. JOINT SEALANTS: Section 07 90 00.

1.03 PERFORMANCE REQUIREMENTS

A. General: Provide metal wall panel assemblies capable of withstanding structural movement, thermally induced movement, and exposure to weather without failure or infiltration of water into the building interior, and in compliance with governing codes and regulations.

1.04 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal wall panel and accessory.

B. Shop Drawings: Show fabrication and installation layouts of metal wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work.

C. Samples for Verification: For each type of exposed finish required, prepared on samples of size indicated below:

1. Metal Wall Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal wall panel accessories.

2. Trim and Closures: 12 inches long. Include fasteners and other exposed accessories.

D. Qualification Data: For Installer.

E. Warranties: Special warranties specified in this Section.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An employer or workers trained and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, metal wall panels and other manufactured items so as not to be damaged or deformed. Package metal wall panels for protection against damage during transportation and handling.

B. Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal wall panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal wall panels to ensure dryness, with positive slope for drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Protect strippable protective covering on metal wall panels from exposure to sunlight and high humidity, except to extent necessary for period of metal wall panel installation.

1.07 PROJECT CONDITIONS

A. Weather Limitation: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal wall panels to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Verify location of structural members and wall opening dimensions by field measurements before metal wall panel fabrication and indicate measurements on shop drawings.

1.08 COORDINATION

A. Coordinate metal wall panel assemblies with construction of adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.09 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal wall panel assemblies that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures, including rupturing, cracking, or puncturing.

b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finish: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

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

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.

b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.

c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

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

PART 2.00 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers: Provide metal wall panels by one of the following manufacturers:

1. Berridge Manufacturing Company.

2. MBCI.
3. Morin Corporation.

4. Petersen Aluminum Corp.

5. Steelox Systems Inc.

2.02 WALL PANEL METALS AND FINISHES

A. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755.

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653, G90 coating designation; structural quality.

2. Surface: Smooth, flat finish.

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

1. Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color

topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2605.

2. Provide fluoropolymer two-coat system for all exposed exterior and interior wall panel surfaces.

2.03 MISCELLANEOUS MATERIALS

A. Secondary Framing: Manufacturer's standard secondary framing members, including girts, studs, and other miscellaneous structural members. Fabricate framing from zinc-coated steel sheet.

1. Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653, Structural Steel, Grades 33 through 80; with G60 coating designation; mill phosphatized.

2. Thickness: Minimum 0.0598 inch.

3. Depth: As required to comply with performance requirements.

B. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal wall panels by means of plastic caps or factory-applied coating.

1. Fasteners for Wall Panels: Self-drilling or self-tapping 410 stainless or zinc-alloy steel hex washer head, with EPDM or PVC washer under heads of fasteners bearing on weather side of metal wall panels.

2. Non-High-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A, carbon-steel, hex-head bolts; ASTM A 563 carbon-steel hex nuts; and ASTM F 844 plain (flat) steel washers. Hot-dip zinc coating finish, complying with ASTM A 153.

2.04 EXPOSED-FASTENER, LAP-SEAM METAL WALL PANELS

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

B. Tapered-Rib-Profile, Exposed-Fastener Metal Wall Panels: Formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced between major ribs.

1. Material: Zinc-coated (galvanized) steel sheet, 0.0209 inch thick.

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

3. Major-Rib Spacing: 12 inches.

4. Panel Coverage: 36 inches.

5. Panel Height: 1.25 inches.

2.05 ACCESSORIES

A. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including trim, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.

B. Flashing and Trim: Formed from 0.0179 inch thick, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal wall panels.

C. Translucent Roof Panels:

1. Fire-Test-Response Characteristics: Provide translucent roof panels with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

a. Flame-Spread Index: 25 or less.

b. Smoke-Developed Index: 450 or less.

2. Accessory Materials: As recommended by translucent panel manufacturer for complete weathertight installation.

2.06 FABRICATION

A. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

1. Form panel lines, breaks, and angles to be sharp and true, with surfaces free from warp and buckle.

2. Fabricate wall panels with panel stiffeners as required to maintain fabrication tolerances and to withstand design loads.

B. Fabricate metal wall panels with joints between panels designed to form weathertight seals.

C. Provide panel profile for full length of panel.

D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

2.07 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3.00 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements indicated for installation tolerances, metal wall panel supports, and other conditions affecting performance of work.

1. Examine wall framing to verify that girts, angles, and other secondary structural panel support members and anchorage have been installed to meet requirements of metal wall panel manufacturer, including alignment tolerances..

2. Do not proceed with metal wall panel installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Coordinate metal wall panels with rain drainage work; flashing; trim; and construction of roofing and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

B. Promptly remove protective film, if any, from exposed surfaces of metal panels. Strip with care to avoid damage to finish.

3.03 ERECTION OF FRAMING

A. Secondary Framing: Erect framing true to line, level, plumb, rigid, and secure. Fasten secondary framing to primary steel framing using clops with field connections using non-high-strength bolts.

3.04 METAL WALL PANEL INSTALLATION, GENERAL

A. General: Comply with metal wall panels in orientation, sizes, and locations indicated on Drawings. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Field cutting of metal wall panels by torch is not permitted.

2. Shim or otherwise plumb substrates receiving metal wall panels.

3. Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction. Pre-drill panels.

4. Locate and space fastenings in uniform vertical and horizontal alignment.

5. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.

6. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated or, if not indicated, as necessary for waterproofing.

B. Fasteners: Use stainless steel fasteners for all surfaces.

C. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal wall panel assemblies. Provide types of gaskets, fillers, sealants indicated or, if not otherwise indicated, types recommended by metal wall panel manufacturer.

1. Seal metal wall panel end laps with double beads of tape or sealant, full width pf panel. Seal side joints where recommended by panel manufacturer.

2. Prepare joints and apply sealants to comply with requirements of Section 07900 - JOINT SEALANTS.

3.05 FIELD-ASSEMBLED METAL WALL PANEL INSTALLATION

A. Lap-Seam Metal Wall Panels: Fasten metal wall panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Apply panels and associated items for neat and weathertight enclosure. Avoid “panel creep” or application not true to line.

2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal wall panels.

3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.

4. Install screw fasteners with power tools having controlled torqued adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

5. Provide sealant tape at lapped joints of metal wall panels.

6. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps, and on side laps of nesting-type panels; and elsewhere as needed to make panels weatherproof to driving rains.

7. At panel splices, nest panels with minimum 6 inch end lap, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates.

3.06 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal wall panel assembly including trim, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

3.07 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal wall panel installation, clean finished surfaces as recommended by metal wall panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 41 20

SECTION 07 90 00
JOINT SEALANTS

PART 1.00 - GENERAL

1.01 SUMMARY

A. This Section includes the furnishing and installation of joint sealants as indicated on the Drawings and as specified herein.

1.02 RELATED WORK

A. METAL ROOF PANELS: Section 07 41 10.

B. METAL WALL PANELS: Section 07 41 20.

C. PAINTING: Section 09 90 00.

1.03 QUALITY ASSURANCE

A. Installer Qualifications: The Installer shall have a minimum of five (5) years continuous documented experience in the application of the types of materials required, and approved or licensed by the manufacturer to install elastomeric sealants required for this Project.

B. Product Testing: Obtain test results for test reports required as submittals from a qualified testing agency based on testing current sealant formulations within a 36 month period preceding commencement of the Work.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.

2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.

3. Test other joint sealants for compliance with requirements indicated by referencing standard specification and test methods.

C. Performance Requirements: Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

1.04 SUBMITTALS

A. Product Data: Submit complete manufacturer's technical data for each manufactured item. Include the following:

1. Certification that each product to be furnished is recommended for the application shown.

2. Complete instructions for handling, storage, mixing, priming, installation, curing, and protection of each type of sealant.

B. Samples: Submit the following samples:

1. One tube, in original sealed container, of each sealant specified.

2. 12-inch length of each joint filler specified.

C. Qualification Data: For Installer and testing agency.

D. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants.

2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

1.05 PRODUCT DELIVERY AND STORAGE

A. All products shall be delivered to the site undamaged, and in the manufacturer's original packing. Products shall be stored within the manufacturer's published temperature tolerances.

1.06 ENVIRONMENTAL CONDITIONS

A. Do not install joint sealant materials when the ambient and substrate temperatures are below 40 degrees F, unless the manufacturer specifically recommends application of materials at lower temperatures. If Project progress or any other condition requires installations when ambient and substrate temperatures are below 40 degrees F (or below the minimum installation temperature recommended by the manufacturer), consult the manufacturer's representative and establish the minimum provisions required to ensure satisfactory work. Record in writing to the manufacturer, with a copy to the Engineer, the conditions under which such installation must proceed, and the provisions made to ensure satisfactory work.

B. Do not proceed with installation of bulk compounds during inclement weather unless the full compliance with all requirements and manufacturer's published instructions. Do not proceed with the installation of elastomeric sealants under extreme temperature conditions which would cause joint openings to be at either maximum or minimum width, or when such extreme temperatures or heavy wind loads are forecast during the period required for initial or nominal cure of elastomeric sealants. Whenever possible, schedule the installation and cure of elastomeric sealants during periods of mean temperatures (nominal joint width shown) so that subsequent stresses upon the cured sealants will be minimized.

1.07 WARRANTY

A. Special Project Warranty: Provide a written warranty, signed by the installer and Contractor, against defects materials and workmanship for joint sealants which fail to perform as airtight or watertight joints; or fail in joint adhesion, cohesion, abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, or general durability; or appear to deteriorate in any other manner not clearly specified in joint sealant manufacturer's published data as an inherent quality of the material for the exposure indicated.

1. Warranty Period: Five years from the date of Final Acceptance.

PART 2.00 - PRODUCTS

2.01 GENERAL

A. Hardnesses indicated and specified are intended to indicate the general range necessary for overall performance. The manufacturer's technical representative shall determine the actual hardness recommended for the conditions of installation and use. Except as otherwise indicated or recommended, compounds shall be provided within the range of hardness (Shore A, Fully cured, at 75 degrees F) of 25 to 40.

B. Prior to installation of each specified sealant, the Contractor shall confirm its compatibility with the joint surfaces, joint fillers, and other materials in the joint system. Only materials that are known to be fully compatible with the actual installation conditions, as shown by manufacturer's published data or certification, shall be provided.

2.02 SEALANTS

A. Exterior Sealants: Sealants for exterior locations and all interior and exterior expansion joints shall be cold-applied elastomeric joint sealant, two-part polyurethane sealant complying with ASTM C 920.

1. Products, Horizontal Joints: Provide one of the following Type M (multicomponent), Class 25, Use T (traffic) sealants:

a. Urexpan NR-200"; Pecora Corporation.

b. Vulkem 245"; Tremco.

c. Sonolastic SL 2"; Sonneborn, Div. Of ChemRex Inc.

2. Products, Vertical Joints: Provide one of the following Type M (multicomponent), Class 25, Use NT (nontraffic) sealants:

a. Dynatrol II; Pecora Corporation.

b. Vulkem 227"; Tremco.

c. Sonolastic NP 2"; Sonneborn, Div. of ChemRex Inc.

2.03 MISCELLANEOUS MATERIALS

A. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by the sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

C. Backer Rods: Provide closed-cell, expanded polyethylene backer rods. The size and shape of the rod shall be that which will control the joint, form optimum shape of sealant bead on the back side, and provide a highly compressible backer to minimize the possibility of sealant extrusion when the joint is compressed.

1. Basis of Design: AEthafoam@; Dow Chemical Company.

2.04 COLORS

A. For concealed joints, provide manufacturer's standard color that has the best overall performance qualities for the application shown. For exposed joints, the Engineer will select colors from the manufacturer's standard or non-standard colors.

PART 3.00 - EXECUTION

3.01 INSPECTION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance.

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

3.02 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer’s written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean concrete and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming of blowing out joints with oil-free compressed air.

3. Remove laitance and form-release agents from concrete.

4. Clean metal and similar nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates, where recommended in writing by joint sealant manufacturer, based on prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.03 JOINT SEALANT INSTALLATION

A. General: Comply with joint sealant manufacturer's published instructions, unless more stringent requirements are shown or specified, or the manufacturer's technical representative recommends otherwise.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Prime or seal joint surfaces as indicated or recommended by the sealant manufacturer. Do not spill or allow primers or sealers to migrate onto adjoining surfaces.

D. Install sealant backer rods for all elastomeric sealants, unless indicated to be omitted or recommended to be omitted by sealant manufacturer for the application shown.

E. Install bond breaker tape where required by manufacturer's recommendations to ensure that elastomeric sealants will perform properly, or as indicated on the Drawings.

F. Employ only proven installation techniques that will ensure sealants are deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of the joint bond surfaces equally on opposite sides. Unless otherwise indicated, fill sealant joints to a slightly concave surface and slightly below adjoining surfaces. Where horizontal joints occur between a horizontal surface and a vertical surface, fill joints to form a slight cove, so that the joint will not trap moisture and dirt.

1. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

G. Install sealants to depths indicated, or if not indicated, as recommended by the sealant manufacturer, but within the following general limitations measured at the center (thin) section of the bead.

1. For sidewalks, pavements, and similar joints sealed with elastomeric sealants and subject to traffic and other abrasion and indentation exposure, fill joints to a depth equal to 75 percent of the joint width, but neither more than 5/8 inch deep nor less than 3/8 inch deep.

2. For normal moving joints sealed with elastomeric sealants, but not subject to traffic, Fill joints to a depth equal to 50 percent of joint width, but not more than 3/8 inch nor less than 1/4 inch.

3. For joints sealed with non-elastomeric sealant compounds, fill joints to a depth in the range of 75 percent to 115 percent of the joint width.

H. Do not permit join sealant materials (primers, sealers, or sealants) to spill onto adjoining surfaces, or be allowed to migrate into the voids of adjoining surfaces including rough textures. Use masking tape or other precautionary devices to prevent staining of adjoining surfaces.

I. Promptly remove excess sealant from surfaces adjacent to joints as the work progresses. Clean adjoining surfaces as necessary to eliminate evidence of spillage, without damage to the adjoining surfaces or finishes.

K. Do not plug weep holes (if occurring) built into aluminum framing.

3.04 CURE AND PROTECTION

A. Cure sealants in compliance with the manufacturer's published instructions and current recommendations to obtain high early bond strength, internal cohesive strength, and surface durability.

B. The installer shall advise the Contractor of procedures required for the curing and protection of sealants compounds during the construction period, so that they will be without deterioration or damage (other than normal wear and weathering), at the time of Final Acceptance.

END OF SECTION 07 90 00

SECTION 09 90 00
PAINTING

PART 1.00 - GENERAL

1.01 WORK INCLUDED

A. This Section includes the surface preparation and application of painting and related work in locations indicated on the Drawings and specified herein.

1.02 RELATED WORK

A. METAL FABRICATIONS: Section 05 50 00.

B. METAL ROOF PANELS: Section 07 41 1.

C. METAL WALL PANELS: Section 07 41 20.

D. JOINT SEALANTS: Section 07 90 00.

1.03 QUALITY ASSURANCE

A. All surfaces of fabricated items that are left unfinished by the requirements of other Sections shall be painted under this Section. All work specified in this Section shall be in addition to shop and mill coats, priming and field coats which are specified in other Sections.

B. Perform all touching up of shop coats and field coats of paint on structural steel and miscellaneous steel or iron as required and/or specified.

C. Remove and re-finish or otherwise correct in a manner approved by Engineer all work under this Section which peels, crazes, blisters, fails to adhere or otherwise fails to properly serve its intended purpose at no additional cost to the Department.

1.04 PRODUCT DELIVERY AND STORAGE

A. All materials shall be delivered to the Project site in manufacturers' sealed packages, with labels intact.

1.05 SUBMITTALS

A. Product Data: Submit manufacturer’s product data for each type of product used.

B. Samples: Submit three (3) sets of full color chip line for each type of paint specified, for color selection(s) by the Engineer.

C. Draw Downs: Provide three (3) stepped draw downs, defining each separate coat, including block fillers and primers, for each color and material to be applied.

PART 2.00 - PRODUCTS

2.01 MATERIALS

A. All ready-mixed paints shall be first-line (best quality grade) retail products. The use of lead-containing paint is NOT permitted.

B. Thinners and additives shall be of types recommended by the paint manufacturer.

C. Products: Provide paint products by one of the following manufacturers:

1. Benjamin Moore.
2. ICI Dulux.
3. Porter Paints.
4. PPG Architectural Finishes, Inc.
5. Pratt & Lambert.
6. Sherwin-Williams.

PART 3.00 - EXECUTION

3.01 INSPECTION

A. Examine the areas and conditions under which painting is to be applied. Do not proceed with painting work until unsatisfactory conditions have been corrected.

3.02 COLORS

A. The Engineer will select all colors and provide a schedule of colors and finishes as approved by the Department. Colors shall closely match those indicated on Drawings.

B. Each coat of paint shall be applied in varying shades, with the final coat matching the approved color selected.

3.03 PREPARATION FOR PAINTING

A. Surfaces to be painted shall be clean, smooth, free from scratches and dust and thoroughly dry.

B. Concrete surfaces shall be cleaned, grouted, rubbed and pointed, water flushed clean and free of all dust, oily grease and laitance, and allowed to dry prior to painting.

C. Steel and iron shall be free from grease, rust, scale and dust. Touch up any chipped or abraded places on items that have been shop coated. Where steel and iron have heavy coating of scale, it shall be removed by wire brush or sand blasting necessary to produce a satisfactory surface for painting.

3.04 PROTECTION

A. Adjacent fixtures and hardware shall be removed during the painting application.

B. Particular care shall be taken by the use of clean drop cloths, masking and other suitable means, to protect adjoining surfaces, fixtures, and materials of all kinds. Painting applicator shall be held responsible for, and shall repair, all damages resulting from the painting operation.

C. All ceiling and soffit overhead painting shall be applied only while the floor is completely and continuously covered with drop cloths.

3.05 APPLICATION

A. Paints shall be applied in the colors and minimum number of coats scheduled herein and at the square foot coverage as stated in the paint manufacturer's printed specifications. It is intended that paint so applied shall cover to the satisfaction of the Engineer or additional coats shall be applied until approval is obtained.

B. Paints shall not be applied to surfaces which show a moisture content greater than 15 percent as determined by an electronic moisture meter.

C. Paints shall not be applied when the temperature falls below 45 degrees F., in damp, rainy weather, or when the relative humidity exceeds 85 percent.

D. Paint shall be evenly spread and well distributed. The finish coats shall be free from any noticeable laps, brush marks, streaks, runs, sags, wrinkles, and shiners.

3.06 DESTROYING WASTE

A. At the end of each day, all cloths and waste materials that have been used in preparation and application of inflammable paint materials shall be destroyed or placed in closed metal containers. Under no circumstances shall any waste be emptied into plumbing fixtures, drains, or clean-outs of the plumbing systems of the building. Waste shall not be allowed to accumulate on the Site.

3.07 TOUCH UP AND CLEANING

A. Upon completion, all touching-up as required shall be applied and any paint shall be removed from all surfaces that are not specified to receive paint.

3.08 PAINTING SCHEDULE

A. The following surfaces shall be finished with the designated number of coats (in addition to shop or manufacturer's coats) with the respective designated products of Sherwin Williams (SW), with a Dry Film Thickness (DFT) of not less than indicated:

B. Trade Names used are only to set a standard of quality desired.

C. Omit primer on items with shop coat primer. All shop coats shall be touched up with the same kind of paint as the shop coat and allowed to dry before application of finish coats.

EXTERIOR

1. Metal, Galvanized: Gloss Finish.

    a. 1-coat SW Water Based Catalyzed Epoxy Primer: 3.0 - 5.0 DFT

    b. 2-coats SW Corothane II: 2.0 - 4.0 DFT each coat.

    c. Total 7.0 - 13.0 DFT.

2. Metal, Ferrous: Gloss Finish.

    a. 1-coat SW Tile-Clad High Solids: 2.5 - 4.0 DFT

    b. 2-coats SW Corothane II : 2.0 - 4.0 DFT each coat.

    c. Total 6.5 - 12.0 DFT.

END OF SECTION 09 90 00

SECTION 13 12 20
PRE-ENGINEERED METAL BUILDING SYSTEM

PART 1.00 - GENERAL

1.01 DESCRIPTION

A. Provide all materials, labor, equipment, and services to engineer, fabricate and erect pre-engineered, rigid-frame-type metal building system including structural supports and foundations as indicated on the Drawings and specified herein.

1. Roof and wall consists of manufacturer's standard pre-formed insulated panels.

1.02 RELATED WORK

A. CONCRETE WORK: Section 03 31 00.

B. STRUCTURAL STEEL:

C. ELECTRICAL: Division 16.

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications:

1. Provide pre-engineered metal building system manufactured by a firm experienced in manufacturing metal building systems that are similar to those indicated for this Project and have a record of successful in-service performance.

B. Installer's Qualifications:

1. Engage an experienced installer to erect the pre-engineered metal building system who has specialized in the erection and installation of types of metal building systems similar to that required for this Project and who is certified in writing by the metal building system manufacturer as qualified for erection of the manufacturer's products.

C. Single-Source Responsibility:

1. Obtain the metal building system components, including structural framing, roof covering, and accessory components, from one source, from a single manufacturer.

D. System Performance Requirements:

1. Engineer, design, fabricate and erect the pre-engineered metal building system to withstand loads from winds, gravity, structural movement including movement thermally induced, and to resist in-service use conditions that the structure will

experience, including exposure to the weather, without failure.

2. Design each member to withstand stresses resulting from combinations of loads that produce the maximum allowable stresses in that member as prescribed in Metal Building Manufacturers' Association (MBMA's) "Design Practices Manual."

3. Roofing and wall panel assembly must comply with the Florida Building Code 2004 Edition with amendments and have been tested per UL 580.

E. Design Loads:

1. Basic design loads, as well as auxiliary and collateral loads, are indicated on the Drawings.

a. Basic design loads include live load and wind load, in addition to the dead load.

b. Collateral loads include additional dead loads over and above the weight of the metal building system such as lighting systems.

F. Reference Standards:

1. Florida Building Code:

a. Latest Adopted Edition, as amended.

2. Metal Building Manufacturers Association (MBMA):

a. "Design Practices Manual."

3. American Institute of Steel Construction (AISC):

a. "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings."

4. American Iron and Steel Institute (AISI):

a. "Specifications for the Design of Cold Formed Steel Structural Members."

b. "Design of Light Gage Steel Diaphragms."

5. American Welding Society (AWS):

a. "Standard Code for Arc and Gas Welding in Building Construction."

6. American Society for Testing and Materials (ASTM):

a. Reference Standards.

7. American Concrete Institute (ACI):

a. ACI Reference Standards.

8. Concrete Reinforcing Steel Institute (CRSI):

a. Manual of Standard Practice.

1.04 SUBMITTALS

A. Product Data:

1. Submit product data consisting of metal building system manufacturer's product information for building components and accessories.

B. Structural Calculations:

1. Submit structural calculations for pre-engineered metal building system including column reactions for each footing to verify foundation sizes. Structural calculations shall be prepared by or under the supervision of a Professional Engineer registered in the State of Florida, and shall verify that the structural framing and covering panels meet indicated loading requirements and codes of authorities having jurisdiction. Submit two (2) sets of these design calculations sealed by the licensed professional engineer.

C. Shop Drawings:

1. Submit shop drawings for metal building structural framing system, roofing panels, wall panels, concrete foundations, and other metal building system components and accessories.

a. Structural Framing: Furnish complete erection drawings prepared by or under the supervision of a Professional Engineer registered in the State of Florida. Include details showing fabrication and assembly of the metal building system. Show anchor bolts. Include transverse cross-sections.

b. Roofing Panels: Provide layouts of panels on roofs, details of edge conditions, joints, corners, profiles, supports, anchorages, trim, flashings, closures, insulation, joints with wall panels and special details. Include transverse cross-sections.

c. Wall Panels: Provide layouts of panels of walls, details of edge conditions, joints, corners, profiles, supports, anchorages, trim, flashings, closures, insulation, joints with roof panels and special details. Include transverse cross-sections.

d. Structure Accessory Components: Provide details of metal structure accessory components to clearly indicate methods of installation including the following:

(1) Sheet Metal Accessories: Provide layouts at 1/4-inch scale. Provide details of sheet metal accessories at not less than 1-1/2 inch scale showing profiles, methods of joining, and anchorages.

(2) Samples for Verification Purposes: Provide samples of roofing panels, 12-inch long by actual panel width, in the profile, style, color, and texture indicated. Include clips, battens, fasteners, closures, and other panel accessories.

(3) Installer Certificate: Provide Installer certificates signed by metal building manufacturer certifying that the installer complies with requirements included under 1.02 QUALITY ASSURANCE, Paragraph B., of this section.

e. Concrete Foundation Work:

(1) Mix Design/Product Data: Submit concrete mix design. Include product data for proprietary materials and items such as reinforcement and forming accessories, admixtures, patching compounds, curing compounds, and others as requested by the Engineer.

(2) Shop Drawings, Reinforcement: Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Conform to ACI 315, showing bar schedules, stirrup spacing, diagrams of bent bars, arrangement of concrete reinforcement. Include special reinforcement required and formed openings through concrete structures.

(3) Laboratory Test Reports: Submit copies of laboratory test reports for concrete materials and mix design test as specified.

(4) Material Certificates: It is preferable to provide copies of materials certificates in lieu of materials laboratory test reports when permitted by the Engineer. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver prefabricated components, sheets, panels, and other manufactured items so they will not be damaged or deformed. Package roof and wall panels for protection against transportation damage.

B. Exercise care in unloading, storing, and erecting roof and wall covering panels to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weathertight ventilated covering. Store metal roof and wall panels so that water accumulations will drain freely. Do not store panels in contact with other materials that might cause staining, denting or other surface damage.

1.06 WARRANTY

A. Roofing and Wall Panel Finish Warranty:

1. Furnish the roofing and wall panel manufacturer's written warranty, covering failure of the factory-applied exterior finish on metal roof and wall panels, and related accessories within the warranty period.

2. Warranty period for factory-applied exterior finishes on roof and wall panels is twenty (20) years after the date of Final Acceptance.

PART 2.00 - PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: American Buildings Company. Subject to compliance with specification requirements, manufacturers offering pre-engineered metal canopy systems that may be incorporated into the Work include, but are not limited to, the following:

1. Butler Manufacturing Co.

2. Ceco Buildings Division.

3. Star Buildings Division, H. H. Robertson Co.

4. Varco-Pruden Buildings.

2.02 MATERIALS

A. Hot-Rolled Structural Steel Shapes: Comply with ASTM A 36 or A 529.

B. Steel Tubing or Pipe: Comply with ASTM A 500, Grade B, ASTM A 501, or ASTM A 53.

C. Steel Members Fabricated from Plate or Bar Stock: Provide 42,000 psi minimum yield strength. Comply with ASTM A 570, or ASTM A 572.

D. Steel Members Fabricated by Cold Forming: Comply with ASTM A 607, Grade 50.

E. Cold-Rolled Carbon Steel Sheet: Comply with ASTM A 366 or ASTM A 568.

F. Hot-Rolled Carbon Steel Sheet: Comply with ASTM A 568 or ASTM A 569.

G. Structural Quality Zinc-Coated (Galvanized) Steel Sheet: Comply with ASTM A 446 with G90 coating complying with ASTM A 525.

H. Bolts for Structural Framing: Comply with ASTM A 307 or ASTM A 325 as necessary for design loads and connection details.

I. Paint and Coating Materials:

1. Shop Primer for Ferrous Metal: Fast-curing, lead-free, abrasion-resistant, rust-inhibitive primer selected by the manufacturer for compatibility with substrates with types of alkyd finish paint systems indicated and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure. Comply with Federal Specification (FS) TT-P-86, Types I, II, or III.

2. Shop Primer for Galvanized Metal Surfaces: Zinc dust-zinc oxide primer selected by the manufacturer for compatibility with the substrate. Comply with FS TT-P-641.

2.03 PROPORTIONING AND DESIGN OF CONCRETE MIXES

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method, use an independent testing agency acceptable to Engineer for preparing and reporting proposed mix designs.

1. Do not use the same testing agency for field quality control testing.

2. Limit use of fly ash to not exceed 20 percent of cement content by weight.

B. Refer to Drawings for concrete design strength and details.

C. Submit written reports to the Engineer of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by the Engineer.

2.04 STRUCTURAL FRAMING

A. Rigid Frames:

1. Fabricate from hot-rolled structural steel shapes. provide factory-welded, shop painted, built-up "I-beam"-shape or open-web-type frames consisting of tapered or parallel flange beams and tapered columns. Furnish frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly.

2. Provide length of span and spacing of frames indicated. Slight variations in length of span and frame spacing may be acceptable if necessary to meet manufacturer's standard.

B. Secondary Framing: Provide the following secondary framing members:

1. Roof Purlins: "C"-or "Z"-shaped roll-formed steel sections, shop-painted. Purlin spacers shall be fabricated from cold-formed galvanized steel sections.

2. Eave Struts: Unequal flange "C"-shaped sections formed to provide adequate backup for roof panels. Fabricate from shop-painted roll-formed steel.

3. Flange and Sag Bracing: 1-5/8- by 1-5/8 inch angles fabricated from shop-painted roll-formed steel.

4. Base or Sill Angles: Fabricate from cold-formed galvanized steel sections.

D. Wind Bracing:

1. Use rigid frames as shown on Drawings for lateral loads in short direction. X-bracing is permitted in longitudinal direction at center bay only.

E. Bolts:

1. Provide shop-painted bolts except where structural framing components are in direct contact with roofing and siding panels. Provide zinc-plated or cadmium-plated bolts when structural framing components are in direct contact with roofing and siding panels.

F. Shop Painting:

1. Clean surfaces to be primed of loose mill scale, rust, dirt, oil, grease, and other matter precluding paint bond. Follow procedures of SSPC-SP3 for power-tool cleaning, SSPC-SP7 for brush-off blast cleaning, and SSPC-SP1 for solvent cleaning.

a. Prime structural steel primary and secondary framing members with the manufacturer's standard rust-inhibitive primer.

b. Prime galvanized members after phosphoric acid pretreatment, with manufacturer's standard zinc dust-zinc oxide primer.

2.05 ROOFING PANELS

A. Face Sheets:

1. Fabricate roof panel face sheets to manufacturer’s standard profile or configuration from structural quality, Grade C, zinc-coated steel sheets.

B. Standing Seam Roof Panels:

1. Manufacturer's standard factory-formed lap-seam roof panel system to match existing adjacent metal building roof panel profiles and designed for mechanical

attachment of panels to roof purlins with exposed fasteners. Form panels of Grade C, zinc-coated steel sheets.

C. Fasteners:

1. Self-tapping screws, bolts, nuts, self-locking rivets, self-locking bolts, end-welded studs, and other suitable fasteners designed to withstand design loads.

2. Provide metal-backed neoprene washers under heads of fasteners bearing on weather side of panels.

3. Use stainless steel fasteners.

4. Locate and space fastenings in true vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of neoprene washer.

5. Provide fasteners with heads matching color of roofing sheets by means of plastic caps or factory-applied coating.

D. Accessories:

1. Provide the following sheet metal accessories factory-formed of the same material in the same finish as roof and wall panels:

a. Flashings.

b. Fillers.

c. Metal Expansion Joints.

d. Fascias.

e. Flexible Closure Strips:

2. Closed-cell, expanded cellular rubber, self-extinguishing flexible closure strips. Cut or premold to match configuration of roofing sheets. Provide closure strips where indicated or as required to ensure weathertight construction.

E. Sealing Tape:

1. Pressure-sensitive 100 percent solids grey polyisobutylene compound sealing tape with release paper backing. Provide a permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

F. Joint Sealant:

1. One-part elastomeric polyurethane, polysulfide, or silicone rubber sealant as recommended by system building manufacturer.

G. Fluoropolymer Finish:

1. Provide shop-applied fluoropolymer finish to galvanized steel roofing panels, and related trim and accessory elements.

2. Clean galvanized steel with an alkaline compound, then treat with a zinc phosphate conversion coating and seal with a chromic acid rinse.

3. Apply a 2-coat fluoropolymer coating system to pretreated steel. Coating shall consist of a specially formulated inhibitive primer applied to a dry film thickness of 0.15 mil to 0.25 mil and a fluorocarbon color coat containing not less than 70 percent polyvinylidene fluoride resin by weight applied to a dry film thickness of 0.80 mils to 1.3 mils.

4. Color shall match existing adjacent metal buildings as approved by the Engineer and Department prior to fabrication and/or installation.

2.06 WALL PANELS

A. Face Sheets:

1. Fabricate wall panel face sheets to manufacturer’s standard profile or configuration from structural quality, Grade C, zinc-coated steel sheets.

B. Wall Panels:

1. Manufacturer's standard factory-formed lap-seam wall panel system to match existing adjacent metal building wall panel profiles and designed for mechanical attachment of panels to wall girts with exposed fasteners. Form panels of Grade C, zinc-coated steel sheets.

C. Fasteners:

1. Self-tapping screws, bolts, nuts, self-locking rivets, self-locking bolts, end-welded studs, and other suitable fasteners designed to withstand design loads.

2. Provide metal-backed neoprene washers under heads of fasteners bearing on weather side of panels.

3. Use stainless steel fasteners.

4. Locate and space fastenings in true vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of neoprene washer.

5. Provide fasteners with heads matching color of wall sheets by means of plastic caps or factory-applied coating.

D. Accessories:

1. Provide the following sheet metal accessories factory-formed of the same material in the same finish as roof and wall panels:

   a. Flashings.

   b. Fillers.

   c. Metal Expansion Joints.

   d. Fascias.

   e. Flexible Closure Strips:

2. Closed-cell, expanded cellular rubber, self-extinguishing flexible closure strips. Cut or premold to match configuration of roofing sheets. Provide closure strips where indicated or as required to ensure weathertight construction.

E. Sealing Tape:

1. Pressure-sensitive 100 percent solids grey polyisobutylene compound sealing tape with release paper backing. Provide a permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

F. Joint Sealant:

1. One-part elastomeric polyurethane, polysulfide, or silicone rubber sealant as recommended by system building manufacturer.

G. Fluoropolymer Finish:

1. Provide shop-applied fluoropolymer finish to galvanized steel wall panels, and related trim and accessory elements.

2. Clean galvanized steel with an alkaline compound, then treat with a zinc phosphate conversion coating and seal with a chromic acid rinse.

3. Apply a 2-coat fluoropolymer coating system to pretreated steel. Coating shall consist of a specially formulated inhibitive primer applied to a dry film thickness of 0.15 mil to 0.25 mil and a fluorocarbon color coat containing not less than 70 percent polyvinylidene fluoride resin by weight applied to a dry film thickness of 0.80 mils to 1.3 mils.

4. Color shall match existing adjacent metal buildings as approved by the Engineer and Department prior to fabrication and/or installation.

2.07 SHEET METAL ACCESSORIES

A. General:

1. Provide coated steel sheet metal accessories with coated steel roofing and wall panels.

2.08 FABRICATION

A. General:

1. Design prefabricated components and necessary field connections required for erection to permit easy assembly and disassembly.

2. Fabricate components in such a manner that once assembled, they may be disassembled, repackaged, and reassembled with a minimum amount of labor.

3. Clearly and legibly mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.

B. Structural Framing:

1. Shop-fabricate framing components to size and section per approved shop drawings with base plates, bearing plates, and other plates required for erection, welded in-place. Provide holes for anchoring or connections shop-drilled or punched to template dimensions.

2. Shop Connections: Provide power riveted, bolted, or welded shop connections.

3. Field Connections: Provide bolted field connections.

4. Finish: Provide manufacturer's shop applied rust-inhibitive primer per Item 2.04, Paragraph F of this Section.

PART 3.00 - EXECUTION

3.01 CONCRETE FOUNDATIONS

A. Concrete foundations shall be level and true, and shall be inspected and approved before the structural steel work is started. Anchor bolts shall be installed while the concrete work is in progress; templates or other gaging devices shall be used to assure accurate spacing of the anchor bolts.

B. Defects or errors in the fabrication of building components shall be corrected in an approved manner. Defects or errors in fabrication of components, which can not be corrected in an approved manner, shall be replaced by nondefective members at no additional cost.

C. Columns and rigid frames shall be plumbed in both directions, guyed and stayed, and all framing elements shall be accurately spaced to assure the proper fitting of roof panels.

3.02 BUILDING STRUCTURE ERECTION

A. Framing: Erect framing true to line, level, plumb, rigid, and secure. Level base plates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use a nonshrinking grout to obtain uniform bearing and to maintain a level base line elevation. Moist cure grout for not less than seven (7) days after placement.

B. Purlins and Girts: Provide rake or gable purlins with tight-fitting closure channels and fascias. Secure purlins and girts to structural framing and hold rigidly to a straight line by sag rods.

C. Framed Openings: Provide shapes or proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work.

3.05 ROOF AND WALLS

A. General:

1. Arrange and nest sidelap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "Panel creep" or application not true to line. Protect factory finishes from damage.

2. Field cutting of exterior panels by torch is not permitted.

3. Flash and seal roof panels at eave and rake with rubber, neoprene, or other closures to exclude weather.

4. Fasten roof panels to purlins with self-drilling, exposed fasteners in accordance with manufacturer's instructions. Fasten wall panels to girts with self-drilling, exposed fasteners in accordance with manufacturer’s instructions.

5. At end laps of panels, install tape calk between panels.

C. Sheet Metal Accessories:

1. Install sheet metal accessories in accordance with manufacturer's recommendations for positive anchorage to building and weathertight mounting. Adjust operating mechanism for precise operation.

3.06 ELECTRICAL

A. Refer to Drawings for concrete and electrical work to be included.

3.07 CLEANING AND TOUCH-UP

A. Clean component surfaces of matter that could preclude paint bond. Touch-up abrasions, marks, skips, or other defects to shop-primed surfaces with same type material as shop primer.

END OF SECTION 13 12 20

SECTION 26 05 00
GENERAL ELECTRICAL REQUIREMENTS

PART 1.00 - GENERAL

1.01 WORK INCLUDED

A. This Section specifies general requirements for all Division 26 Specification Sections.

B. The electrical system required for this work is indicated on the Drawings and specified herein. The work includes, but is not necessarily limited to, the following:

1. Electrical service to the new tractor and storage shed.

2. Panelboard with main and branch circuit breakers in new tractor and storage shed.

3. Complete branch circuit wiring system for lighting fixtures, wall switches and receptacles.

4. All other electrical equipment and services needed to complete a usable and operable facility in accordance with all pertinent codes and regulations.

C. The Electrical Drawings are diagrammatic and shall be followed as closely as actual construction of the building and the work of other trades will permit. All changes from Drawings necessary to make the work of other trades shall be performed at the Contractor's expense.

D. Unless explicitly stated to the contrary, furnish and install each item of equipment or material hereinafter specified, complete with all necessary fittings, supports, trim, piping, and related components, as required for a complete and operating installation.

1.02 RELATED WORK

A. EARTHWORK: Section 31 20 00.

1.03 QUALITY ASSURANCE

A. Supervisory Qualifications:

1. The electrical work on the Project shall be under the direct supervision of a licensed master electrician.

B. Qualifications of Installers:

1. For the actual fabrication, installation, and testing of the work of this Section, use only thoroughly trained and experienced personnel who are completely familiar with the requirements of this work and with the installation recommendations of the manufacturers of the specified items.

1.04 SHOP DRAWINGS

A. The approval of shop or working drawings by the Engineer shall not relieve the Contractor of responsibility for erroneous or inconsistent dimensions, notations, omissions or other errors, or for the proper functioning of the completed installation.

1.05 CODES AND STANDARDS

A. The installation shall comply with all laws applicable to the electrical installations which are enforced by the regulations of the currently adopted edition of the National Electrical Code, the latest edition of the Florida Building Code, the latest editions of the ANSI National Electrical Safety Code and NFPA Life Safety Code, all local codes, the Americans with Disabilities Act (ADA), NEMA, ANSI, and UL Standards.

B. Where, in any specific case, different sections of any of the aforementioned codes or these Drawings and Technical Special Provisions specify different materials, methods of construction or other requirements, the most restrictive shall govern.

C. All materials shall be listed by UL as conforming to its standards, where such a standard has been established for the particular type of material in question.

D. Where the Contract Document requirements are in excess of code requirements and are permitted under the code, the Contract Documents shall govern.

1.06 PROTECTION OF MATERIALS, EQUIPMENT, AND WORK

A. Materials shall be stored so as to ensure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, shall be subject to re-inspection prior to their use in the work. Coordinate the storage of all materials with the Department's Authorized Representative.

B. Protect electrical raceway, cable, lighting fixtures and associated support systems against damage from movement of equipment and material, welding, flame cutting, and other construction damage. Raceway and supporting structures for raceway and lighting fixtures shall not be used as access scaffolding at any time. Whenever welding or flame cutting operations occur above or near raceways, cables or lighting fixtures not shielded from such operations by concrete floor or other protective covers, protect the raceways, cables, and lighting fixtures from damage by means of fireproof boards or blankets. Damaged materials shall be repaired or replaced, by and at the Contractor's expense, subject to the Engineer's discretion and acceptance.

C. Surfaces of most equipment, such as panelboards, outlet boxes, and cabinets, are finished at the factory. Great care shall be exercised to prevent damage to this original finish during installation of the equipment and during construction work. If the factory finish is damaged during the course of construction, the entire surface of the damaged component shall be refinished by and at the expense of the Contractor.

1.07 CONCRETE WORK

A. Furnish all equipment anchor bolts and be responsible for their proper installation and accurate location.

1.08 IDENTIFICATION

A. Provide nameplates for wiring systems and equipment as called for herein. All nameplates shall have beveled edges and 1/2 inch lettering. If equipment is smaller than 10 inches by 6 inches, 1/4 inch lettering may be used. Smaller lettering may be used with permission of the Engineer.

B. Nameplates shall be three-layer laminated phenolic plastic, black front and back with white core, with lettering etched through the outer covering. White engraved letters on black background. Attach nameplates with 4-40 stainless steel self-tapping screws, or rivets. Where conditions do not warrant piercing the enclosure "LOCTITE" brand adhesive can be used with permission of the Engineer.

C. Panelboard shall be identified with nameplates. The nameplate shall include as a minimum, the following:

1. Equipment Name.

2. Voltage Rating.

3. Source Panel.

1.09 EXCAVATING, TRENCHING AND BACKFILLING

A. Perform excavating necessary for underground work and backfill trenches and excavations and compact after work has been inspected. Care shall be taken in excavating that walls and footings and adjacent load bearing soils are not disturbed in any way, except where lines must cross under a wall footing. Where a line must pass under a footing, the crossing shall be made by the smallest possible trench to accommodate the conduit. Excavation shall be kept free from water. No greater length of trench shall be left open in advance of conduit laying than that authorized by the Department's Representative.

1. Refer to Section 31 20 00 - EARTHWORK for additional requirements for excavation, backfilling, and compaction.

1.10 WATERPROOFING

A. Where any work pierces waterproofing including waterproof concrete, the method of installation shall be as approved by the Engineer before work is done.

B. Provide all necessary sleeves, caulking and flashing required to make openings absolutely watertight. Waterproof flashing materials shall be compatible with base materials.

PART 2.00 - PRODUCTS

Not used.

PART 3.00 - EXECUTION

3.01 TESTS AND INSPECTIONS

A. Include all tests and inspections specified and/or required under laws, rules and regulations of all departments having jurisdiction. Tests shall be performed as indicated herein and other Sections of Specifications.

B. Notify the Engineer at least 72 hours in advance of all tests. Furnish all necessary instruments, gauges and other equipment required for tests. Make preliminary tests prior to giving notice of final tests.

C. All parts of the work and associated equipment shall be tested and adjusted to work properly and be left in perfect operating condition.

D. Correct defects disclosed by these tests without any additional cost to the Department. Repeat tests on repaired or replaced work.

E. Maintain separate log of all tests being conducted and have it available for review by Engineer. Log to indicate date, type of tests, duration and defects noted and when corrected.

3.02 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Bound Instructions: Before final payment is made, furnish six (6) sets of bound operation and maintenance manuals to the Department. The manuals shall consist of catalog cuts, bulletins, shop drawings, wiring diagrams, schedules, parts lists, procedures and other data showing the equipment installed and shall include the following:

1. Approved wiring and control diagrams, with data to explain the detailed operation and control of each component.

2. Operating and maintenance instructions for each piece of equipment.

3. Parts lists and recommended spare parts.

4. Other data and instructions as specified under the various Sections.

B. All data furnished shall conform to the installation as constructed. Cuts showing other equipment and data not applicable to the installation shall be crossed out and where practical shall be omitted from the manual. The assembly of the manual shall be in a logical manner and each section shall be indexed in the Table of Contents.

C. Each manufacturer shall outline and furnish a maintenance procedure for his equipment installed to the Contractor, who shall then compile these procedures in a logical manner to provide a procedure for the operating personnel of the Department to follow in their day-to-day operation of the facility.

D. The materials shall be permanently bound into each booklet between rigid plastic or cloth binding covers. The instruction booklets shall be approximately 9-inches by 12-inches and the diagram booklet large enough to contain the drawing without excessive folding so that they may be easily opened.

E. The booklets shall be neatly entitled with a descriptive title, the name of the job, the location, year of installation, Department, manufacturer, Contractor and Engineer. Copies of drawings shall be in black and white background and shall be easily legible. The arrangements of the booklets, the method of binding, materials to be included and the composite text shall all be reviewed and approved by the Engineer.

3.03 OPERATIONS INSTRUCTION TO DEPARTMENT

A. Provide a minimum of 1 hour of instruction or as indicated to representatives of Department in operation and maintenance of all installed electrical systems and equipment.

B. Provide maintenance manual and acquaint Department's representative with its contents during instruction.

C. Furnish letter naming Department's personnel receiving instruction and dates when instruction was given.

D. Provide name, address and telephone number of the manufacturer's representative and service company, for each piece of equipment so that service or spare parts can be readily obtained.

END OF SECTION 26 05 00

SECTION 26 12 00
WIRES AND CABLES

PART 1.00 - GENERAL

1.01 WORK INCLUDED

A. The work included under this Section consists of furnishing and installing the system of conductors for power and lighting service, including all related system and accessories as shown on the Drawings and hereinafter specified.

1.02 RELATED WORK

A. RACEWAYS: Section 26 13 00.

PART 2.00 - PRODUCTS

2.01 CONDUCTORS

A. All conductors shall be copper of 98% conductivity with 600-volt insulation.

B. Conductor sizes specified are AWG up to 4/0, and circular mils above 4/0.

C. Conductors used for secondary distribution shall be as follows:

1. Conductors No. 10 and smaller shall be solid, No. 8 and larger, stranded.

2. Conductors shall be NEC standard type, "THHN-THWN" and UL Labeled.

3. All wire and cable shall be of the same name brand, and shall be in the original wrapping.

4. Provide equipment grounding conductors with green type insulation.

2.02 SPLICES AND CONNECTORS

A. Splices, taps, termination devices and insulation systems shall be approved for use with the conductors on which they are installed.

B. Connections of all wires No. 8 and larger shall be made with copper compression or mechanical connectors, with rubber and friction or plastic tape insulation. For wires smaller than No. 8, use solderless connectors consisting of a copper sleeve applied with a pressure tool covered with a vinylite insulating cap.

1. Products: Provide connectors by one of the following manufacturers:

a. Buchanan.

b. Thomas and Betts.

C. Screw-on connectors shall not be used except for fastening lighting fixtures to the basic wiring system. The screw connectors for fastening lighting fixtures shall have nylon insulation and shall be Thomas & Betts "Piggy Pigtails".

D. All splices shall be made in pull boxes or wireways. No splices shall be permitted inside the conduit.

E. Tapes for splices and terminations shall comply with UL 510.

PART 3.00 - EXECUTION

3.01 INSTALLATION

A. Minimum size conductors installed shall be No. 12 AWG for all applications except where specifically noted otherwise for special system circuits.

B. All lighting and receptacle branch circuit conductors shall be color coded. Feeder cables and service entrance conductors shall be color coded by use of colored plastic tape applied within 6" of each conductor end. All color coding shall be with the same color as used with its respective phase or bus through the entire Project as follows:

<u>120/240 Volt System</u>

Phase A -	Black
Phase B -	Not Used in New Panelboard
Phase C -	Blue
Neutral -	White
Ground -	Green

C. Conductors shall be continuous from outlet to outlet and from outlet to junction box or pull box. All splices and joints shall be carefully and securely made to be mechanically and electrically solid with solderless pressure connectors and insulated with Scotch 33 tape, if insulation is not provided in pressure type connector used. Where connection is made to any terminal of more than 30 amperes capacity and where conductors larger than No. 10 are connected to any terminal, copper terminal lugs shall be bolted to the conductors. Where multiple connections are made to the same terminal, individual lugs for each connector shall be used.

D. All wires and cables for power, lighting, control and signal shall be continuous from origin to destination with proper splices as specified. At the end of these wires and cables only sufficient slack shall be left as may be required for making proper connections.

E. Where conductors are to be connected directly to the devices without the use of lugs, such as occurs at side connections of lighting switches and plug receptacles, the conductors shall be formed into suitable loops to fit around the terminal screws.

F. Where wires and cables are connected to metallic surfaces, the coated surfaces of the metal shall be polished before installing the mechanical connectors. The lacquer coating of conduits shall be removed where ground clamps are to be installed.

G. The conductors terminating at each wired outlet shall be left not less than 8 inches long at their outlet fitting to facilitate the installation of devices of fixtures. Where two or more pairs of conductors or circuits enter an outlet, the several pairs of conductors or circuits shall be neatly spliced and made mechanically and electrically secure to one or more single or multiple conductors which shall be not less than 8 inches long within the outlet.

H. Branch circuit wiring which supplies more than one fluorescent fixture through the wireway of other fixtures shall be approved for use at 90°C.

I. Wall switch outlets shall be wired to provide control of outlets indicated. All connections to single pole switches shall be so made that the off operation of the switch opens the ungrounded leg.

J. Each wire in a pull box, junction box or equipment wire chamber shall be labeled with the proper panel letter and circuit number identification, and where two or more wires are spliced each shall be labeled. Labels shall be printed numbers and letters on suitable plastic tape. Wires and cables shall be identified by suitable Brady or approved equal adhesive label tapes.

K. Pull conductors together where more than one is being installed in a raceway. Use pulling compound or lubricant, where necessary; compound must not deteriorate conductor or insulation. Use pulling means, including fish tape, cable or rope that cannot damage raceway.

L. Install splices and tapes that have mechanical strength and insulation rating equivalent-or-better than conductor. Use splice and tap connectors that are compatible with conductor material.

M. Pulling tensions shall be governed by recommended standard practices for straight pulls or bends. Manufacturer's recommended pulling tensions shall not be exceeded. The cable pull tension shall be monitored on every pull exceeding 300 feet in length. A lubricant approved by the cable manufacturer shall be used on all cable pulls exceeding 25 feet in length. At the request of the Engineer, calculate the expected pull tension or monitor the actual pull tension of the cable pull. The methods used shall be acceptable to the Engineer.

N. Bushing must be installed before any wire is pulled in; see Section 26 13 00 - RACEWAYS.

END OF SECTION 26 12 00

SECTION 26 13 00
RACEWAYS AND BOXES

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The work included under this Section consists of furnishing and installing the electrical conduit, wireway, and surface raceway system, including all related systems and accessories as shown on the Drawings and hereinafter specified.

1.02 RELATED WORK

A. WIRES AND CABLES: Section 26 12 00.

PART 2.00 - PRODUCTS

2.01 MATERIALS

A. Metallic Conduit:

1. Rigid galvanized steel conduit shall conform to ANSI Standard C80.1 and UL 6.

2. Galvanized steel tubing (Electrical Metallic Tubing - EMT) shall conform to ANSI Standard C80.3 and UL 797.

3. Flexible conduit shall be galvanized steel with polyvinyl jacket, liquid tight and shall conform to UL 360. Fittings shall conform to UL 514.

B. Non-Metallic Conduit:

1. Polyvinyl Chloride (PVC) Schedule 40 conduit shall conform to NEMA TC-2 and UL 651. Fittings shall conform to NEMA TC-3 and UL 514.

C. Connectors, Couplings and Fittings:

1. One coupling of the appropriate type shall be furnished with each length of conduit.

2. Rigid Conduit Fittings: Threaded, heavy steel, water and concrete tight. Grounding type nylon insulated bushings for connectors at cabinets, boxes, switchboards, gutters, panelboards, and disconnect switches.

3. Electrical Metallic Tubing Fittings: Compression type steel, water and concrete tight. Connectors with nylon insulated throats at cabinets, boxes and gutters. Indentor or set screw type fittings will not be allowed.

4. Flexible Metal Conduit Fittings: Squeeze or clamp type galvanized steel with nylon insulated throats. Set screw type will not be allowed.

5. Liquidtight Flexible Conduit Fittings: Galvanized steel with watertight gaskets, "O" ring and retainer and nylon insulated throats.

6. Condulet Fittings: Exposed conduit fittings shall be Ferris Condulet (cast metal) type for sharp turns, tees, and similar conditions.

7. Expansion Fittings: Expansion fittings, properly bonded, shall be installed in each conduit run that crosses an expansion joint, or where conduit is subjected to expansion/deflection.

   a. Products: Provide expansion fittings by one of the following manufacturers:

      (1) Appleton Electric Company.

      (2) Crouse-Hinds Electrical Co.

      (3) Carlon Power & Telecom Systems.

      (4) O.Z./Gedney.

8. Die-cast fittings are not permissible.

9. Watertight Fittings: Ferrous cast metal with flanges and glands to properly seal conduit wall penetration from water passage.

D. Joint Material Used in Connecting Two Pieces of Conduit:

1. For PVC conduit the material for the joints shall be slip-fit plastic couplings, designed specifically for such use. The bonding material shall be a solvent-type cement, which will assure a fully waterproof joint.

2. The joint material for rigid conduit shall be threaded couplings, of the same material as the conduit. The coupling shall be used with a pipe-threaded sealant that will assure a fully waterproof joint.

E. Surface Metal Raceways:

1. Provide surface metal raceways of sizes and channels indicated; in compliance with FS W-C-582; construct of galvanized steel with snap-on covers, with 1/8" mounting screw knockouts in base approximately 8" o.c. Provide fittings indicated which match and mate with raceway. Finish with manufacturer's standard prime coating suitable for painting.

PART 3 - EXECUTION

3.01 INSPECTION

A. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

B. Verify that the new electrical installation has been made in complete accordance with all pertinent codes and regulations, and the original design.

3.02 DISCREPANCIES

A. In the event of discrepancy, immediately notify the Engineer.

B. Do not proceed with the installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.03 PREPARATION

A. Coordinate the installation of electrical items with the schedules for work of other trades to prevent unnecessary delays in the total work.

B. Where lighting fixtures and other electrical items are shown in conflict with locations of structural members and mechanical or other equipment, furnish and install all required supports and wiring to clear the encroachment.

3.04 GENERAL REQUIREMENTS

A. Conduit exposed shall be galvanized rigid steel. Conduit installed underground in general outdoor areas shall be PVC schedule 40, or as indicated on the Drawings. PVC conduit encased in minimum of 3 inches of concrete shall be installed under any building or as required on the Drawings. Conduit 2" and smaller installed within building may be EMT, run above hung ceilings and within walls of metal stud construction.

B. Generally, all conduit shall be concealed above ceilings, within walls, underground, or as otherwise noted.

C. No conduit shall be installed less than 2 inches from piping installed by other trades or 8 inches if the pipe is to be insulated. Coordinate the conduit installation with all trades.

D. Certain conduits (rigid galvanized steel and Schedule 40 PVC only) are permitted to be embedded in structural concrete work. PVC schedule 40 conduit installed under asphalt roadways shall be encased in minimum of 3 inches of concrete. Rigid galvanized steel conduits shall be used within cells of masonry walls. PVC Schedule 40 conduits are allowed within cells of masonry walls only when cells are fully grouted. Coordinate with all trades to effect the following:

1. Reinforcing steel shall be securely anchored in place before installing conduit.

2. No steel reinforcing shall be displaced from plan dimensions without approval of the Engineer.

3. Conduit shall not be placed over top of reinforcing or under bottom of reinforcing.

4. Conduit and fittings shall not displace concrete in columns in excess of 4 percent of total cross-section area of column without approval of Engineer.

5. Conduits shall not be placed closer than 1 inch from side to side, so that 1 inch aggregate can pass between conduits.

E. Raceway floor and wall penetrations shall be sealed with approved fire resistive materials to meet the fire rating and load bearing capability of the surface penetrated. Fire stopping shall comply with the requirements of the Florida Building Code and ASTM E 119.

F. Provide rigid galvanized steel elbows for all PVC conduits; except, use PVC elbows for PVC conduit installed in salty soils or other conditions that may present a corrosive environment for galvanized steel. Conduit leaving elbow to final termination box, cabinet, device or stub-up shall be rigid galvanized steel conduit.

3.05 INSTALLATION OF RACEWAYS AND FITTINGS

A. All wires for power, lighting, miscellaneous systems and controls shall be installed in conduit. Conduit shall be of the sizes required to accommodate the number of conductors in accordance with the National Electrical Code, or as noted on the drawings. The sizes shown on the plans may be increased if desired to facilitate the pulling of conductors. The minimum conduit size shall be 3/4 inch, unless noted otherwise.

B. Steel conduit shall be continuous from outlet to outlet, from outlet to cabinet, junction box, or pull box. Conduit shall enter and be rigidly secured thereto in such a manner that the raceway system will be electrically continuous.

C. Conduit shall be installed so that not more than the equivalent of three (3) 90-degree bends occur in any one run. If a greater number of bends is required, a junction box or pull box shall be installed, unless approved by the Engineer.

D. Exposed conduit shall be run parallel with or at right angles to the structure and supported from the walls or structure with straps or clamps with machine screws for metal construction, and inserts and bolts or lead expansion anchors for masonry or concrete construction. Exposed conduit runs shall be supported at intervals of approximately five feet. Back straps or "stand-offs" shall be used to keep the conduit far enough away from supporting surfaces to allow painting and to prevent the accumulation of dirt and moisture.

E. Wherever conduit crosses an expansion joint an approved expansion fitting, for this type of installation, shall be installed in all conduits.

F. Conduit connection to a box that has no threaded hub for its reception shall be double locknutted with locknuts designed to bite into the metal. Provide an insulated bushing at each end of each conduit run. Use insulated bushings with separate locknuts on all conduit entering panel cabinet. All conduits entering outlet boxes, pull boxes and panel cabinets, shall be provided with either insulated throat connectors or separate locknuts and insulated bushing. Bushing must be installed before any wire is pulled in.

G. Rigid steel couplings and conduits shall be threaded so that they meet in the coupling. Right and left couplings shall not be used; conduit couplings of the Erickson type shall be used at locations requiring such joints.

H. Conduit shall be secured in place and protected to prevent damage to work during construction. The ends of all conduit runs shall be plugged with approved type plug to avoid filling with plaster, etc. Duct tape shall not be used. All conduit shall be blown out and/or swabbed clear of water and trash prior to pulling wire. Remove burrs.

I. Flexible metal conduit shall be used for connections to lighting fixtures, HVAC equipment, pumps, transformers, or where indicated on the Drawings. Liquid Tight flexible conduit shall be used for exterior installation.

J. Conduit connections from outlet boxes, junction boxes, conduit, switch boxes, or motor controller to rotating or vibrating machinery or equipment shall be made with flexible conduit, which shall be as short as possible with a maximum length of 24 inches. For connections to recessed ceiling lighting fixtures, maximum flexible conduit length shall be 60 inches.

K. All exterior elbow risers in underground duct shall be galvanized rigid steel conduit. Conduit leaving elbow shall be galvanized rigid steel.

L. All direct buried galvanized rigid steel conduit shall be given two (2) coats of asphaltic or Bitumastic paint for corrosion protection.

M. Provide polyester pull rope in all empty conduit raceways and provide tag at each end labeling destination of conduit.

N. Unless noted otherwise on Drawings, all exterior conduits run underground shall be a minimum of 36 inches below finish grade.

O. Field cut conduit shall be cleaned; ream or file conduit ends to remove rough edges. Field made threads shall be cleaned, wire brushed and sprayed with an acceptable cold galvanized compound.

END OF SECTION 26 13 00

SECTION 26 13 50
OUTLET BOXES AND FITTINGS

PART 1.00 - GENERAL

1.01 WORK INCLUDED

A. The work included under this Section consists of furnishing and installing outlet boxes, including all related systems and accessories as shown on the Drawings and hereinafter specified.

1.02 QUALITY ASSURANCE

A. Manufacturer: Firms regularly engaged in manufacture of electrical boxes and fittings, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 3 years.

B. ANSI/NEMA Standards Compliance: Comply with ANSI C 134.1 (NEMA Standards Pub No. OS 1) as applicable to sheet-steel outlet boxes, device boxes, covers and box supports.

PART 2.00 - PRODUCTS

2.01 FABRICATED MATERIALS

A. Outlet Boxes: Provide corrosion-resistant galvanized or cadmium plated cast-iron weatherproof outlet wiring boxes, of types, shapes and sizes, including depths of boxes, with threaded conduit ends, cast-metal face plates with spring-hinged waterproof caps suitably configured for each application, including face plate gaskets and corrosion-resistant fasteners.

B. Conduit Bodies: Provide galvanized cast-metal conduit bodies, of types, shapes and sizes, to suit respective locations and installation, construct with threaded conduit entrance ends, removable covers, and corrosion-resistant screws.

C. Bushing, Knockout Closures and Locknuts: Provide corrosion-resistant punched-steel box knockout closures, conduit locknuts and malleable iron conduit bushings, offset connectors, of types and sizes to suit respective uses and installation.

D. Outlet boxes for all exposed work shall be of the cast iron type.

E. Products, Cast Metal Outlet Boxes: Provide products by one of the following manufacturers:

1. Appleton Electric Company.

2. Crouse-Hinds Company.

PART 3.00 - EXECUTION

3.01 INSTALLATION OF ELECTRICAL BOXES AND FITTINGS

A. Install electrical boxes and fittings where indicated, complying with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standards of Installation", and in compliance with recognized industry practices to ensure that products fulfill requirements.

B. Coordinate installation of electrical boxes and fittings with wire/cable and raceway installation work.

C. Provide weatherproof outlets for interior and exterior locations exposed to weather or moisture.

D. Provide knockout closures to cap unused knockout holes where blanks have been removed.

E. Install boxes and conduit bodies in those locations to ensure ready accessibility of electrical wiring.

F. Avoid using round boxes where conduit must enter box through side of box, which would result in difficult and insecure connections when fastened with locknut or bushing on rounded surface.

G. Fasten boxes rigidly to substrates or structural surfaces to which attached, or solidly embed electrical boxes in concrete or masonry. Provide electrical connections for installed boxes.

END OF SECTION 26 13 50

SECTION 26 14 10
JUNCTION AND PULL BOXES

PART 1.00 - GENERAL

1.01 WORK INCLUDED

A. The work included under this Section consists of furnishing and installing junction and pull boxes, including all related systems and accessories as shown on the Drawings and hereinafter specified.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's product data for each type of box.

PART 2.00 - PRODUCTS

2.01 JUNCTION AND PULL BOXES

A. Boxes shall be sized in accordance with requirements of the National Electric Code with covers accessible at all times. Boxes on concealed conduit shall be set with covers flush with the finished concrete unless otherwise shown.

B. All junction and pull boxes shall be fabricated of galvanized steel or cast iron or polymer concrete (exterior use only). The dimensions of the box shall be sized to allow adequate working space and cable capacity. All junction boxes shall form a complete enclosure and shall be raintight and of adequate strength. The terminals used shall be constructed of a non-corrosive material. A removable front cover shall be provided, and installed such that when closed, it will be secured sufficiently to prevent accidental opening. Cable and conduit entrances and exits shall be made with appropriate connectors in such a manner that raintight integrity is retained. All conduit terminations within junction and pull boxes shall be made securely sealed "water tight" at both ends using a gun grade non-fungicidal silicone caulk. All future empty conduits shall be sealed with a galvanized threaded cap at both ends.

PART 3.00 - EXECUTION

3.01 INSTALLATION

A. Junction boxes and pull boxes shall be furnished and installed where such boxes may be necessary to facilitate the pulling or splicing of cables. Boxes must be made accessible. Conduits shall enter these boxes through tight fitting clearance holes.

B. Where required, suitable supports shall be provided in all pull boxes to support feeders passing through the boxes so that feeder conductors will not remain unsupported for a distance greater than 3 feet.

C. Junction boxes shall have only the holes necessary to accommodate the conduits at point of installation. All boxes shall have suitable provisions to secure covers.

D. Junction and pull boxes shall be securely attached to the building structure, in a manner approved by the Engineer.

E. Provide a pull box every 100 feet of conduit run and whenever an excessive number of bends necessitates a pull box for ease of wire installation.

F. Junction and Pull Box Identification:

1. Junction boxes, pullboxes and their covers shall be distinctively painted to identify their service. (A convenient way to facilitate this is to spray-paint the boxes and covers in groups before installation.)

2. Boxes shall be color coded to match those in existing building:

END OF SECTION 26 14 00

SECTION 26 15 00
WIRING DEVICES

PART 1.00 - GENERAL

1.01 WORK INCLUDED

A. The work included under this Section consists of furnishing and installing wiring devices, including all related systems and accessories as shown by the Drawings and hereinafter specified.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's product data for each type of wiring device.

PART 2.00 - PRODUCTS

2.01 WALL SWITCHES

A. Switches shall be totally enclosed, rated at 120/277 volts, ivory plastic handles, of the quiet type, full rated at 20 amperes.

B. Products: Provide products by one of the listed manufacturers for the following categories:

Switch	Hubbell	Arrow Hart	Leviton
Single Pole	1221-I	1991-I	1221-21

2.02 RECEPTACLES

A. Single and duplex receptacles shall be 20 ampere, 125 volts, back and side wired, with grounded pole, of ivory plastic color.

B. Products: Provide products by one of the listed manufacturers for the following categories:

Receptacle	Hubbell	Arrow Hart	Leviton	Taymac	Raco/Bell
Duplex GFIC	GF5362-I	GF5342-1	6898-I		
Weatherproof Safety Outlet Enclosure			5977-GY	20,000 Series	Rayntite II

C. Provide device plates for each and every outlet box requiring same, and of the type required for the service and device involved; furnish in gangs as necessary. Plates and screws shall be the product of the same manufacturer of the devices installed. Finish of the plates shall be 0.04 stainless steel, finish 302 satin unless otherwise noted.

D. Ground-Fault Interrupter: Provide heavy-duty duplex receptacles, ground-fault circuit interrupters; feed-thru type, capable of protecting connected downstream receptacles on single circuit, grounding type UL-rated Class A, Group 1, 20-amperes rating, 120-volts, 60 Hz; with solid-state ground-fault sensing and signaling; with 5 miliamperes ground-fault trip level; equip with 20-ampere plug configuration, NEMA 5-20R.

E. Receptacles installed outdoors or within 6'-0" from plumbing fixtures and waterpipes shall be ground fault circuit interrupter type.

PART 3.00 - EXECUTION

3.01 INSTALLATION OF WALL SWITCHES

A. Wall switches shall be installed in the vertical position.

B. Vertically operated switches shall be "On" in the upper position, except for 3-way switches.

C. Where more than one switch is shown at one outlet, they shall be installed under one plate in an order appropriate to the location of the outlets controlled, unless otherwise indicated on drawings.

D. Install wiring devices only in electrical boxes that are clean; free from excess building materials, dirt, and debris.

E. Install galvanized steel wall plates in unfinished spaces.

F. Delay installation of wiring devices until wiring work is completed.

G. Delay installation of wall plates until after painting work is completed.

3.02 PROTECTION OF WALL PLATES AND RECEPTACLES

A. Upon installation of wall plates and receptacles, advise Contractor regarding proper and cautious use of convenience outlets. At time of Final Acceptance, replace those items that have been damaged, including those burned and scored by faulty plugs.

3.03 GROUNDING

A. Provide electrically continuous, tight grounding connections for wiring devices, unless otherwise indicated.

3.04 TESTING

A. Prior to energizing circuitry, test wiring devices for electrical continuity and proper polarity connections. After energizing circuitry, test wiring devices to demonstrate compliance with requirements.

END OF SECTION 26 15 00

SECTION 26 16 00
PANELBOARDS

PART 1.00 - GENERAL

1.01 WORK INCLUDED

A. The work included under this Section consists of furnishing and installing of the panelboards, including all related systems and accessories as shown on the Drawings and hereinafter specified.

1.02 RELATED WORK

A. CIRCUIT BREAKERS: Section 26 18 20.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer’s product data for each type of panelboard.

B. Shop Drawings: Shop drawings for each panelboard shall show that all requirements as specified herein have been incorporated into each panel. The branch circuit breaker arrangement in each respective panel shall be as indicated in the panel schedules on the Drawings.

1. Any deviation for circuiting from the panel schedule must be identified in the Project Record Documents.

PART 2.00 - PRODUCTS

2.01 MATERIALS

A. Panelboards shall be of the dead-front type incorporating switching and protective devices of the number, rating and type specified herein or shown on the drawings. Panelboards shall have general purpose enclosures and shall be suitable for flush or surface mounting as indicated. All panelboards shall be rated for the intended voltage and shall be in accordance with the Underwriter's Laboratories, Inc. (UL) Standards UL 50 "Standard for Safety, Panelboards" and UL 67 "Standard for Safety, Cabinets and Boxes" and shall be so labeled where procedures exist. Panelboards shall also comply with NEMA PB 1 "Panelboards", National Electrical Code, and Federal Specification FS-W-P-115A "Power Distribution Panels" where applicable.

B. Products: Provide panelboards by one of the following manufacturers:

1. Square D Co.
2. Siemens ITE.
3. General Electric Company.
4. Cutler Hammer.

2.02 INTERIORS

A. All interiors shall be completely factory assembled with switching and protective devices, wire connectors, etc. All wire connectors, except screw terminals, shall be of the anti-turn solderless type and all shall be suitable for copper wire of the sizes indicated on the drawings.

B. Interiors shall be so designed that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors and shall be so designed that circuits may be changed without machining, drilling or tapping.

C. A nameplate shall be provided listing panel type, number of protective and switching devices and ratings.

D. Bus bars for the mains shall be copper sized in accordance with UL Standards. Unless otherwise noted, full-size insulated neutral and ground bus bars shall be included. Bus bar taps for panels with single pole branches shall be arranged for sequence phasing of the branch circuit devices. Bussing shall be braced throughout to conform to industry standard practice governing short circuit stresses in panelboards. Bracing shall be equivalent to, or compatible with, the rate interrupting capacity of the smallest overcurrent device in that panelboard.

E. Phase bussing shall be full height without reduction. Cross connectors shall be silver-plated copper.

F. Insulated neutral bussing shall have a suitable lug for each outgoing feeder requiring a neutral connection or shall utilize set-screws to bond the neutral wire to the neutral bus through holes drilled in the neutral bar. A neutral bus utilizing flathead screws to hold the neutral wires will be acceptable provided that ring type crimp-on connectors are used on the conductors that are to be connected to the neutral bus. A bonded ground bus shall be provided and bolted to the interior. Provide additional isolated ground bus only where indicated on Drawings.

G. Spaces for future installation of molded case circuit breakers on the job site may be permitted, if so required, to utilize the manufacturer's standard panelboard design. The spaces shall be complete with all bus and bus connectors such that future breakers can be installed without adding or changing bus connectors on the main bus. Bus connectors connected to the energized main bus shall be rigidly anchored at the other end with insulating bus supports or dummy breakers or spare breakers.

H. Circuit breakers shall be UL Series Rated such that 10,000 AIC branch breakers will withstand rating equivalent to or greater than the upstream feeder breaker which protects branch panel.

2.03 BOXES

A. Boxes shall be made from unpainted galvanized code gauge steel having multiple knockouts except where noted. Boxes shall be of sufficient size to provide a minimum gutter space of 4" on all sides, and to have a minimum width of 20". Where feeder cables supplying the mains of a panel are carried through its box to supply other electrical equipment, the box shall be so sized as to include this wiring space. This wiring space shall be in addition to the minimum gutter space specified above and the limiting width may be increased accordingly.

B. At least 4 interior mounting studs shall be provided.

C. Box identification number shall be on box.

2.04 TRIMS

A. Hinged doors covering all switching device handles shall be included in all panel trims, and shall not uncover any live parts in making switching device handles accessible. Doors shall have semi-flush-type cylinder lock and catch, except that doors over 48" in height shall have a vault handle and 3-point catch, complete with lock, arranged to fasten door at top, bottom and center. Door hinges shall be concealed. All locks shall be keyed alike. A directory frame and directory card having a transparent plastic cover shall be furnished on the inside face of each door.

B. The trims shall be fabricated from code gauge sheet steel.

C. All exterior and interior steel surfaces of the panelboard trim shall be properly cleaned and finished with grey ANSI-61 paint over a rust-inhibiting phosphatized coating.

D. Trims shall have the same width and height as the box. Trims shall be mountable by a screwdriver without the need for special tools.

PART 3.00 - EXECUTION

3.01 INSTALLATION

A. Panelboards shall be mounted on metal channel (Kindorf Channel) secured to masonry with expansion bolts or as indicated on Drawings.

B. Provide a black finish, white core bakelite nameplate for each panelboard with engraved letters 1/2" high. Nameplates shall be installed centered above trim doors and fastened with sheet metal screws or rivets.

C. Panelboards shall have a circuit directory card mounted in a frame with a plastic cover mounted on the inside of the door, and the directory card shall be completed with a typewriter by the electrical contractor to indicate areas and/or devices served by each circuit. Spares and spaces shall be marked in pencil. Circuits intended to serve future or N.I.C. loads shall have the names of those loads marked in pencil.

D. Panelboards shall be mounted with their centerlines approximately 5'-6" above the finished floor. Except that the highest breaker shall in no case be more than 6'-0" above the finished floor. Locate panelboards as indicated on the Drawings.

END OF SECTION 26 16 00

SECTION 26 16 50
IDENTIFICATION

PART 1.00 - GENERAL

1.01 WORK INCLUDED

A. The work included under this Section consists of furnishing and installing engraved nameplates or other means of identification on all major units of equipment.

PART 2.00 - PRODUCTS

2.01 MATERIALS

A. Equipment:

1. The following items shall be equipped with nameplates: panelboards and circuit breakers.

2. Nameplates shall adequately describe the function of the particular equipment involved. Where nameplates are detailed on the Drawings, inscription and size of letters shall be as shown and shop drawing shall be submitted for approval. Nameplates for panelboards shall include the panel designation, voltage phase of the supply, and source panel. For example, "Panel A, 120/208V, 3-phase, 4-wire Fed From Panel DP".

3. Nameplates for equipment on normal power only shall be laminated phenolic plastic, black front and back with white core, with lettering etched through the outer covering. White engraved letters on black background. Attach with plated self-tapping screws or brass bolts.

B. Empty Conduits:

1. Each end of each pull rope shall be tagged to identify the conduit system and the other end of the pull rope. Each tag shall contain, but not be limited to, the following information:

a. Conduit system name (e.g. "CCTV").

b. Device for which future connection is planned (e.g. "camera").

PART 3.00 - EXECUTION

Not used.

END OF SECTION 26 16 50

SECTION 26 18 20
CIRCUIT BREAKERS

PART 1.00 - GENERAL

1.01 WORK INCLUDED

A. The work included under this Section consists of furnishing and installing the circuit breakers, including related systems and accessories as shown on the Drawings and hereinafter specified.

1.02 RELATED WORK

A. PANELBOARDS: Section 26 16 00.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's product data for each type of circuit breaker.

PART 2.00 - PRODUCTS

2.01 CIRCUIT BREAKERS

A. All circuit breakers shall be UL labeled and shall be thermal and magnetic, molded case type, quick-make and quick-break both on manual and on automatic operation and shall be bolted to the panel bus. Breakers shall be the over-the-center toggle operating type, with the handle going to a position between "On" and "Off" to indicate automatic tripping. All multi-pole breakers shall be internal common trip. The breakers to be furnished shall, in each instance, be determined by the specifications, the ampacity and poles in schedules or as indicated, and by the minimum UL labeled RMS symmetrical amperes interrupting capacity at circuit voltage as indicated by the schedules but in no case less than 10,000 RMS symmetrical amperes. However, the minimum interrupting rating of circuit breakers used as feeders and branches shall be in accordance with prescribed UL recognized series connected circuit breakers combinations. All electrical equipment using these UL recognized circuit breaker combinations shall be clearly marked indicating same. NEMA ratings are not acceptable in lieu of UL ratings. Breakers shall be labeled as required by the NEC. Provide with mechanical screw type removable connector lugs, AL/CU rated.

B. Circuit breakers shall be positively identified and panels properly marked.

C. Products: Provide circuit breakers by one of the following manufacturers:

1. Square D Co.
2. Siemens ITE.
3. General Electric Company.
4. Cutler Hammer.

PART 3.00 - EXECUTION

3.01 INSTALLATION

A. Install overcurrent protective devices as indicated, in accordance with the manufacturer's written instructions and with recognized industry practices to ensure that protective devices comply with requirements. Comply with NEC and NEMA standards for installation of overcurrent protective devices.

B. Fasten circuit breakers without mechanical stresses, twisting or misalignment being exerted by clamps, supports, or cables.

C. Inspect circuit-breaker operating mechanisms for malfunctioning and, where necessary, adjust units for free mechanical movement.

END OF SECTION 26 18 20

SECTION 26 19 00
SUPPORTING DEVICES

PART 1.00 - GENERAL

1.01 WORK INCLUDED

A. Extent of supports, anchors, sleeves and seals is indicated on the Drawings and specified in other Electrical sections, or as required by other equipment installation.

B. Types of supports, anchors, sleeves and seals specified in this section include the following:

1. Riser clamps.
2. I-beam clamps.
3. Two-hole conduit straps.
4. Round steel rods.
5. Lead expansion anchors.
6. Toggle bolts.
7. Wall and floor seals.

1.02 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of supporting devices, of types, sizes, and ratings required, whose products have been in satisfactory use in similar service for not less than three years.

PART 2.00 - PRODUCTS

2.01 MANUFACTURED SUPPORTING DEVICES

A. General: Provide supporting devices, complying with manufacturer's standard materials, design and construction in accordance with published product information, and as required for a complete installation, and as herein specified.

B. Supports: Provide supporting devices of types, sizes and materials indicated, and having the following construction features:

1. Riser Clamps: For supporting two-inch and larger rigid metal conduit; black steel; with two bolts and nuts, and four-inch ears; approximately 510 pounds per 100 units.

2. Reducing Couplings: Steel rod reducing coupling, 1/2" x 5/8"; black steel; approximately 16 pounds per 100 units.

3. I-Beam Clamps: Black steel, 1-1/4" x 3/16" stock; 3/8" cross bolt; flange width 2"; approximately 52 pounds per 100 units.

4. Two-Hole Conduit Straps: For supporting 3/4" rigid metal conduit, galvanized steel; 3/4" strap width; and 2-1/8" between center of screw holes. Strap shall have back plate to hold conduit 1/4" from the wall.

5. Hexagon Nuts: For 3/8" rod size; galvanized.

6. Round Steel Rod: Black steel; 3/8" diameter; approximately 30 pounds per 100 feet.

7. Offset Conduit Clamps: For supporting 2" rigid metal conduit; black steel; approximately 200 pounds per 100 units.

8. Anchors: Provide anchors of types, sizes and materials indicated; and having the following construction features.

   a. Lead Expansion Anchors: 1/2"; approximately 38 pounds per 100 units.

   b. Toggle Bolts: Springhead; 3/16" x 4", approximately five pounds per 100 units.

C. Sleeves and Seals: Provide sleeves and seals, of types, sizes and materials indicated; and having the following construction features:

1. Wall and Floor Seals: Provide factory-assembled watertight wall and floor seals, of sizes required; suitable for sealing around conduit, pipe, or tubing passing through concrete floors and walls. Construct with steel sleeves, malleable iron body, neoprene sealing grommets and rings, metal pressure rings, pressure clamps, and cap screws.

PART 3.00 - EXECUTION

3.01 INSTALLATION OF SUPPORTING DEVICES

A. Install hangers, anchors, sleeves and seals as indicated, in accordance with manufacturer's written instructions and with recognized industry practices to insure supporting devices comply with requirements. Comply with requirements of NECA, NEC and ANSI/NEMA for installation of supporting devices.

B. Coordinate with other electrical work, including raceway and wiring work, as necessary to interface installation of supporting devices with other work.

C. Install hangers, supports, clamps and attachments to support conduit properly from building structure. Arrange for grouping of parallel runs of horizontal conduits to be supported together on trapeze type hangers where possible. Install supports with maximum spacings indicated.

END OF SECTION 26 19 00

SECTION 26 43 13
SURGE-PROTECTIVE DEVICES, 1 KV OR LESS

PART 1.00 - GENERAL

1.01 WORK INCLUDED

A. Provide and install all materials, labor and auxiliaries required to furnish and install complete Surge Protective Devices (SPDs) for the protection of building electrical from the effects of line induced transient voltage surge and lightning discharge as indicated on drawings or specified in this section for power systems with voltages between 120VAC to 240VAC (single phase).

B. Provide surge protective device (SPDs) for the panel located in tractor and storage shed as indicated on drawings.

C. It is understood that each manufacturer of the electronic equipment being protected has different circuit requirements; therefore this specification is a modified performance specification. Provide the best type SPD that matches these specifications and matches the equipment being protected.

D. Install SPDs on the outside of panelboards.

1.02 REFERENCES

A. UL 1449 3rd Edition listed

B. UL 1283 listed

C. ANSI/IEEE C62.41.1-2002, C62.41.2-2002, C62.45-2002

D. ANSI C84.1, American National Standard for Electric Power Systems and Equipment B Voltage Ratings (60 Hertz).

E. NFPA 70 - National Electrical Code (NEC), current adopted year. Article 285

F. American National Standards Institute (ANSI) approved ANSI/NETA Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems, 2009 edition (ANSI/NETA ATS-2009).

1.03 DEFINITIONS

A. ATS: Acceptance Testing Specifications

B. In: Nominal discharge current rating as required by UL 1449 third edition

C. MCOV: Maximum Continuous Operating Voltage

D. VPR: Voltage Protection Rating (Clamping voltage)

E. SCCR: Short Circuit Current Rating

F. SPD: Surge Protective Device

1.04 SUBMITTALS

A. Submit under provisions of the General Requirements of the Contract Documents and Section 26 05 00.

B. Product Data: For each type of product indicated. Include rated capacities, bill of materials of number of MOVs installed per phase with MOV part number and surge current rating, operating weights, operating characteristics, furnished specialties, and accessories.

C. Product Certificates: SPD submittals shall include Listing documentation, signed by product manufacturer certifying compliance with the following standards:

1. UL 1283 compliance verified information is posted at www.UL.com, under Certifications, searching using UL Category Code: FOKY.

2. UL 1449 3rd Edition certification listing and classification page, VPR,

3. MCOV, In, and Type 1 information is posted at www.UL.com, under

4. Certifications, searching using UL Category Code: VZCA. SCCRs are posted in manufacturer's UL docs.

5. NFPA 70, National Electrical Code – article 285 latest edition

D. Field quality-control test reports, including the following:

1. Test procedures used.

2. Measure the continuity of each conductor between the equipment being protected and the SPD. The maximum resistance is 1milliohm.

3. Failed test results and corrective action taken to achieve requirements.

E. Operation and Maintenance Data: For Surge protective Devices to include in emergency, operation, and maintenance manuals.

F. Warranties: Special warranties specified in this Section.

1.05 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance (O&M) data as called for in Section 260500.

B. O&M data to include:

1. All approved shop drawings, product data, and/or cutsheets.

2. Installation, connection, and maintenance information on each type of surge suppression.

3. Procedure and/or timetable for recommended periodic inspection of devices to determine continued usefulness, as applicable.

1.06 QUALITY ASSURANCE

A. All SPDs shall be manufactured by a company normally engaged in the design, development, and manufacture of such devices for electrical and electronics systems equipment for a minimum of five years.

1. Manufacturing facility shall operate a Quality System Certified as ISO 9001:2008 (or latest version) Compliant.

2. The SPD manufacturer shall provide requested technical assistance through support (including on-site as needed) by a factory-trained representative.

3. Source Limitations: Obtain SPDs and accessories through one source from a single manufacturer located in the United States.

4. Product Options: Drawings indicate size, dimensional requirements, and electrical performance of SPDs and are based on the specific system indicated.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Environment in Low-Voltage (1000 V and Less) AC Power Circuits",

D. IEEE C62.41.2-2002, "IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits", and test devices according to IEEE C62.45-2002, "IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000 V and Less) AC Power Circuits".

E.

1. Comply with UL 1283, "Electromagnetic Interference Filters," and UL

F. 1449 3rd Edition, "Surge protective Devices".

1. NFPA 70, National Electrical Code article 285 latest edition.

1.07 REGULATORY REQUIREMENTS

A. Equipment Certification: SPDs shall be listed by Underwriter Laboratories, shall bear the U.L. seal and be marked in accordance with referenced standard. SPDs shall be U.L. listed and labeled for intended use.

1.08 COORDINATION/PROJECT CONDITIONS

A. Verify proper grounding is in place.

B. Verify proper clearances, space, etc. is available for SPD.

C. Coordinate so that proper overcurrent device, as recommended by manufacturer, is installed to feed each surge suppression device.

1.09 WARRANTY

A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of SPD's that fail in materials or workmanship within five years from date of Substantial Completion.

B. Any SPD, that shows evidence of failure or incorrect operation during the warranty period (to include failure of visual failure indicators) shall be replaced or repaired by the manufacturer during the warranty period. The manufacturer shall provide replacement units to the Department for installation.

PART 2.00 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following. (Any product that meets or exceeds the performance of the following manufacturers will be considered.)

1. Advanced Protection Technologies

2. Liebert

3. L.E.A. International

4. Surge Suppression, Inc.

2.02 SURGE-PROTECTIVE DEVICE (SPD) FOR PANELBOARDS

G. Surge protective Device Description: Modular design incorporating sine-wavetracking type with the following features and accessories:

1. SPD shall be UL 1449 3rd Edition listed.

2. SPD shall be UL 1449 Third Edition, labeled as Type 1 intended for use without need for external or supplemental overcurrent controls. SPDs relying upon external or supplementary installed safety disconnectors do not meet the intent of this specification.

3. SPD shall be UL 1449 Third Edition labeled with 20kA nominal discharge current (In) (verifiable at UL.com).

4. Install external SPD to distribution equipment with installation leads as short and straight as possible.

5. SPD marked with a 200kA short-circuit current rating (SCCR).

6. Modes of Protection: Line to Neutral, Line to Ground, Line to Line, and Neutral to Ground

7. The SPD shall include visual LED indicator lights including a minimum of one green LED indicator per phase for power and protection status and one red service light.

8. Arrangement with wire connections to phase buses, neutral bus, and ground bus.

9. SPD shall include dry contacts indicating status for SCADA monitoring.

H. Minimum Surge Current Capability**: 200** kA per phase

I. Protection modes and UL 1449 3rd Edition VPRs for circuits with voltages of 120/240V, 1-Phase, 3-Wire shall not exceed:

1. Line to Neutral: 700V for 120/240V, 1PH, 3W

2. Line to Ground: 700V for 120/240V, 1PH, 3W

3. Neutral to Ground: 700V for 120/240V, 1PH, 3W

4. Line to Line: 1200V for 120/240V, 1PH, 3W

PART 3.00 - EXECUTION

3.01 GENERAL

A. Provide, install and connect an SPD at branch panelboard that serves tractor and storage shed. Branch breaker in the panelboard shall serve as the disconnecting means for the SPD.

B. Surge protection equipment must be selected by contractor to match the equipment being protected including wire sizes, operating volts, amps, and circuit impedance.

C. Installation of SPD equipment and its grounding must be in accordance with the manufacturer’s recommendations to assure short and proper ground paths.

D. Install external SPDs with a maximum of 24” length leads. Position the SPD as close to the circuit breaker used as possible. Utilize the breakers closest to the SPD mounting.

E. Install the leads slightly twisted together, but as short and straight as possible with no kinks or coils and an 8-inch minimum bending radius.

3.02 INSTALLATION OF SPDS

A. SPDs shall be close-nippled to the panelboard in a position nearest the neutral bus to minimize wire lead length between SPD and the buses to which the SPD connects. SPD leads shall not extend beyond the SPD manufacturer’s recommended maximum lead length without specific approval of the engineer.

3.03 PLACING SYSTEM INTO SERVICE

A. Before energizing any SPD, the installer shall measure the electrical system voltage and frequency and verify that each SPD is properly rated for use with measured voltage and frequency.

3.04 FIELD QUALITY CONTROL

A. Verify that electrical wiring installation complies with manufacturer's written installation requirements.

B. Testing: Perform the following field tests and inspections.

1. After installing surge protective devices, but before the electrical circuitry has been energized, measure the continuity of each lead. Measure between the equipment being protected and the point of connection to the SPD.

2. Complete startup checks according to manufacturer's written instructions.

3.05 DEMONSTRATION

A. Train Department’s maintenance personnel to adjust, operate, and maintain SPDs.

END OF SECTION 26 43 13

SECTION 26 45 00
GROUNDING

PART 1.00 - GENERAL

1.01 WORK INCLUDED

A. The work included under this Section consists of furnishing and installing the grounding Work as indicated on the Drawings and/or herein specified, except for items specifically indicated as "NIC ITEMS."

B. This Section includes basic materials and methods for all Division 26 - ELECTRICAL Sections and related electrical work.

1.02 RELATED WORK

A. “Not Used”.

1.03 QUALITY ASSURANCE

A. Reference Standards:

1. American Society for Testing and Materials (ASTM):

a. Referenced Standards.

2. Institute of Electrical and Electronic Engineers (IEEE):

a. IEEE 81 Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System.

b. IEEE-142 Recommended Practice for Grounding of Industrial and Commercial Power Systems.

3. National Electrical Code (NEC):

a. Article 250 Grounding.

4. Underwriters Laboratories (UL):

a. UL 467 Standard for Safety Grounding and Bonding Equipment.

1.04 SUBMITTALS

A. Submit manufacturer’s product data on ground rods, ground bas bar, exothermic welds.

B. Submit test reports.

PART 2.00 - PRODUCTS

2.01 MATERIALS

A. Ground Rods:

1. Ground rods shall be copper clad with a driving point on one end as indicated on the Drawings. Rods shall conform to ASTM A 207. Ground rods shall have a thick copper covering inseparably welded to a steel core. All contacts shall be copper to copper.

   a. Basis of Design: Copper Weld.

2. Grounding Accessories: Provide connectors, terminals, lugs and clamps for all indicated applications.

   a. Products: Provide grounding accessories by one of the following manufacturers:

      (1) Burndy.
      (2) Copper Weld.
      (3) Blackburn.

3. Ground rods shall be 3/4 inch x 20 feet long minimum, unless otherwise noted on the Drawings.

4. All equipment shall conform to UL 467 and shall be labeled for their intended usage.

PART 3.00 - EXECUTION

3.01 INSTALLATION

A. General:

1. End-to-end fixtures shall be continuously bonded.

2. Grounding contacts of receptacles shall be connected to a solidly grounded conduit system or to a system grounding conductor (not the system neutral) by a stranded copper wire not smaller than #12 AWG or shall be grounded in some other approved manner. The resistance between the contact and solid earth ground shall not exceed 3 ohms.

3. Bond all metal parts. Make equipment and bus connections with suitable lugs or clamps.

4. Bond all conduits stubbing under main panel and similar locations using bonding bushings.

5. Use PVC for sleeving grounding conductors except that where sleeves are subject to extreme injury, use rigid metal conduit bonded at both ends.

6. Ground all separately derived sources such as transformers to adjacent cold water metallic pipe or building steel in accordance with NEC Article 250.

7. All underground connections shall be made using exothermic welds. All ground rod connections shall be welded.

B. Circuit Grounding:

1. Metal conduit shall not be used as the circuit ground path on feeders to motors, panelboards and branch circuits. Provide pulled green ground wire.

2. Flexible conduit is not to be used for grounding. Provide pulled green ground wire as required by NEC Article 250.

3. Provide pulled green equipment ground wire inside all conduits for all power and lighting circuits.

4. Provide an isolated pulled green (with yellow tracer) ground wire for all branch circuits fed from the "Clean" generator power system.

C. Special Equipment Grounding:

1. The following items shall be grounded and provided with local ground rods:

a. Metal buildings.

b. Any other large metallic pieces of equipment.

3.02 TESTING

A. Each new ground rod shall be tested individually to ensure the maximum resistance-to-ground shall not exceed 10 ohms, and every rod that fails the test shall be driven deeper, using additional lengths of ground rod if necessary until the required resistance is achieved. Upon completion of installation of electrical grounding and bonding systems, test ground resistance-to-ground with ground resistance tester. Complete grounding system resistance-to-ground shall not exceed 3 ohms. Where tests show resistance-to-ground exceeds 3 ohms, take appropriate action to reduce resistance to 3 ohms, or less, by driving additional ground rods; then retest to demonstrate compliance. Install rods at least 8 feet apart.

B. Method for testing individual ground rods and overall grounding system shall be accomplished by the three point method. Test probes shall be placed minimum of 30 feet and 60 feet from rod being tested. Furnish written report of all test results for all ground rods.

END OF SECTION 26 45 00

SECTION 26 50 00
LIGHTING FIXTURES

PART 1.00 - GENERAL

1. 01 WORK INCLUDED

A. The work included under this Section consists of furnishing and installing the lighting fixtures, including all related systems and accessories, as shown on the Drawings and hereinafter specified.

1. 02 LIGHT FIXTURES

A. Products: Refer to Lighting Fixture Schedule on the Drawings for products.

B. Each lighting fixture shall have been tested and certified for proper operation by the fixture manufacturer for the type of environment and mounting on in which it is to be installed.

C. All LED lighting fixtures shall bear a UL Label and be approved for the intended use.

PART 2.00 – PRODUCTS

Not used.

PART 3.00 – EXECUTION

3.01 INSTALLATION

A. Lighting fixtures shall be installed as indicated on the Drawings.

B. No wiring splice or tap shall be located within an arm, stem, etc., used for support of lighting fixture. Wire shall be continuous from splice in outlet box to terminals.

C. Coordinate with other electrical work as appropriate to properly interface installation of interior lighting fixtures with other work.

D. Fasten fixtures securely to indicate structural support and check to ensure that fixtures are plumb.

3.02 ADJUST AND CLEAN

A. Clean interior lighting fixtures of dirt and debris upon completion of installation.

B. Protect installed fixtures from damage during remainder of construction period.

3.03 FIELD QUALITY CONTROL

A. Upon completion of installation of interior lighting fixtures, and after building circuitry has been energized, apply electrical energy to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then re-test to demonstrate compliance; otherwise, remove and replace with new units, and proceed with re-testing.

3.04 GROUNDING

A. Provide tight equipment grounding connections for each lighting fixture installation where indicated.

END OF SECTION 26 50 00

SECTION 31 20 00
EARTHWORK

PART 1.00 - GENERAL

1.01 WORK INCLUDED

A. Earthwork includes, but is not limited to, excavation, backfill, compaction and preparation of subgrade for the building as indicated on the Drawings and specified herein.

1.02 RELATED WORK

A. SOIL TREATMENT: Section 31 31 16.

1.03 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. All work shall conform to latest edition of Sections/Indexes of the Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction.

PART 2.00 - PRODUCTS

Not used.

PART 3.00 - EXECUTION

3.01 EARTHWORK AND COMPACTION

A. All earthwork and compaction under the building shall be in accordance with the specified FDOT Sections/Indexes.

END OF SECTION 31 20 00

SECTION 31 31 16
SOIL TREATMENT

PART 1.00 - GENERAL

1.01 WORK INCLUDED

A. Provide soil treatment for termite control at all concrete slabs and foundations to be developed into occupied areas, as herein specified.

1.02 RELATED WORK

A.
B. CONCRETE WORK: Section 03 30 10.

1.03 QUALITY ASSURANCE

A. Applicator’s Qualifications:

1. Engage a professional pest control operator, licensed in the State of Florida accordance with regulations of governing authorities for application of soil treatment solution.

B. Requirements of Regulatory Agencies:

1. All work shall comply with the Florida Building Code.

1.04 SUBMITTALS

A. Product Data:

1. Submit manufacturer's technical data, complete with written substrate preparation and soil treatment application instructions. Include EPA-Registered Label.

2. Submit Material Safety Data Sheets.

B. Applicator’s Qualifications:

1. Submit documented evidence of applicator’s qualifications.
2. Submit a copy of the applicator’s current state license.

C. Certificate of Compliance:

1. Submit a copy of the applicator’s Certificate of Compliance required by the Florida Building Code.

1.05 PROJECT CONDITIONS

A. Restrictions:

1. Do not apply soil treatment solution until excavating, filling and grading operations are completed, except as otherwise required in construction operations.

2. To ensure penetration, do not apply soil treatment to excessively wet soils or during inclement weather. Comply with handling and application instructions of the soil manufacturer and EPA-Registered Label requirements.

PART 2.00 - PRODUCTS

2.01 SOIL TREATMENT SOLUTION

A. General: Provide an EPA-Registered emulsifiable, concentrated termiticide that dilutes with water, specially formulated to prevent termite infestation. Termiticide shall be clearly labeled for use as a preventative treatment to new construction. Fuel oil will not be permitted as a diluent.

1. Dilute with water to concentration level compliant with manufacturer=s written instructions.

2. Use only soil treatment solutions that are not injurious to plants.

B. Products: Provide one of the following products:

1. “Dragnet FT” permethrine; FMC Corp.

2. “Prevail FT”; cypermethrine; FMC Corp.

3. “Demon TC” cypermethrine; Zeneca Professional Products.

4. “Prelude” permethrine; Zeneca Professional Products.

PART 3.00 - EXECUTION

3.01 APPLICATION

A. Surface Preparation: Remove foreign matter that could decrease effectiveness of treatment on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and foundations. Soil treatment solutions may be applied before placement of compacted fill under slabs, if recommended by soil treatment solution manufacturer.

B. Application Rates: Apply soil treatment solution in accordance with EPA-Registered Label directions. Distribute the treatment evenly.

C. Allow not less than 12 hours for drying after application, before beginning concrete placement or other construction activities.

D. Post signs in areas of application warning workers that soil treatment solutions have been applied. Remove signs when areas are covered by other construction.

E. Re-apply soil treatment solution to areas disturbed by subsequent excavation or other construction activities following application.

6. Protect treated areas from rainfall if left exposed for extended period.

END OF SECTION 31 31 16