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END OF DIRECTORY

SECTION 01010 SUMMARY OF WORK

PART 1 - GENERAL

1.01 SUMMARY:

- A. The work of this contract consists of: site safety; demolition and replacement of the existing metal roof, gutter and downspout replacement, exterior lightning replacement, roof vent removals and replacements, skylight demolition, purlin reinforcement installation, replacement of any systems affected by demolition on the upper and lower roof sections, gutter and downspout replacement in kind of existing systems, replacement in kind of affected exterior lighting, removal of existing surface mounted conduit, installation of new conduit for data lines, and site restoration, including regrading and resodding. This Work shall be performed at The City of Pompano Public Works Building "B", located at 1201 NE 5th Avenue, Pompano Beach, Broward County, Florida.
- B. Related Section
 - 1. Project Coordination - 01040
- C. Type of Contract: The type of contract is lump sum.

1.02 SEQUENCING AND SCHEDULING:

- A. Demolition: The exi
- B. Safety: Protective measurements need to be in place before any work starts, since the City of Pompano Beach Public Works Department operations and services shall be maintained throughout construction and with minimal interruptions by the contractor's work. Nighttime and weekend construction is not anticipated.
- C. Civil Work:
- D. Related Work:
- E. Construction Phasing:
- F. Work performed on holidays or weekends shall be at no additional expense to the City of Pompano, except when approved by the City
- G. Work Restriction:
 - 1. Demolition:
 - a. Perform demolition in a manner to minimize noise, dust, time of disruption, and safety hazards.
 - b. Perform demolition during hours agreed to by the City of Pompano
 - c. Check for power lines
 - 2. Safety: Supply and maintain safety signage, barriers, and construction aids. Conduct work to maintain the safety of the building occupants.
 - 3. Schedule work with the City of Pompano and the Engineer.
 - 4. At the end of each work day, leave the facilities in an operational condition.

1.03 CONTRACTOR'S USE OF PREMISES:

- A. During construction activities, the CONTRACTOR shall be responsible for maintaining all access roads in good condition, including grading and drainage. See General Terms & Conditions.

1.04 COPIES OF DOCUMENTS: See General Terms & Conditions

1.05 LIST OF DRAWINGS:

A. Contract Drawings:

1. Each sheet of the Contract Drawings bears the following general title: Building "B" Re-Roof / City of Pompano Beach Public Works
2. Individual sheet numbers and titles are as stated on the index sheet listing provided on "Contract Drawing G-1"
3. The total number of drawings is as follows:
 - Cover Sheet
 - G-1 Drawing Index, Scope of Work, General Notes, and Special Conditions
 - S-1 Symbols and Abbreviations
 - S-2 General Structural Notes
 - S-3 Structural Inspection Plan
 - S-4 Roof Framing Plans and Notes
 - S-5 Roof Demo Plans and Notes
 - S-6 Building "B" South and East Elevations
 - S-7 Building "B" North and West Elevations
 - S-8 Roof Overhangs Sections and Details

END OF SECTION

SECTION 01015 DEFINITIONS AND STANDARDS

PART 1 - GENERAL

1.01 SCOPE:

A. Definitions:

1. A substantial amount of specification language constitutes definitions for terms found in other areas of Contract Documents including drawings which must be recognized as diagrammatic in nature and not completely descriptive of requirements indicated.
2. Certain terms used in the Contract Documents are defined in the General Terms & Conditions. Definitions and explanations are not necessarily either complete or exclusive but are general for the work.
3. The term "OWNER", as defined in the General Terms & Conditions and used in these specifications, is further defined as the OWNER or OWNER's authorized representative, which may include, but is not limited to, the Design Engineer or Construction Manager.

B. General Requirements: General requirements are the provisions or requirements of Division 1 sections which apply to the entire work of the Contract.

1.02 FORMAT AND SPECIFICATION EXPLANATIONS:

A. Format Explanation: The format of principal portions of these specifications can be described as follows, although other portions may not fully comply and no particular significance will be attached to such compliance or noncompliance.

1. Sections and Divisions: For convenience, basic unit of specification text is a "section", each unit of which is named and numbered. These are organized into related families of sections, and various families of sections are organized into "divisions", which are recognized as the present industry consensus on uniform organization and sequencing of specifications. The section title is not intended to limit meaning or content of section, nor to be fully descriptive of requirements specified therein, nor to be an integral part of text.
2. Section Numbering: Used for identification and to facilitate cross-references in contract documents. Sections are placed in numeric sequence; however, numbering sequence is not complete, and listing of sections in Table of Contents at beginning of Contract Documents must be consulted to determine numbers and names of specification sections in these Contract Documents.
3. Page Numbering: Numbered independently for each section. Section number is shown with page number at bottom of each page to facilitate location of text.
4. Parts: Each section of these specifications generally has been subdivided into three (3) basic parts for uniformity and convenience (Part 1 "General", Part 2 "Products", and Part 3 "Execution"). These parts do not limit the meaning of text within. Some sections may not contain all three parts when not applicable, or may contain more than three parts to add clarity to organization of section.
5. Imperative Language: Used generally in specifications. Except as otherwise indicated, requirements expressed imperatively are to be performed by the CONTRACTOR. For clarity of reading, at certain locations contrasting subjective language is used to describe responsibilities which must be fulfilled indirectly by the CONTRACTOR or, when so noted, by others.
6. Specialists, Assignments: In certain instances, specification text requires that specific work be assigned to specialists or expert entities who must be engaged for performance of those units of

work. These must be recognized as special requirements over which the CONTRACTOR has no choice or option. These assignments must not be confused with, and are not intended to interfere with, normal application of regulations, union jurisdictions and similar conventions. Nevertheless final responsibility for fulfillment of the entire set of requirements remains with the CONTRACTOR.

7. Trades: Except as otherwise specified or indicated, the use of titles such as "carpentry" in specification text, implies neither that the work must be performed by an accredited or unionized tradesperson of corresponding generic name (such as "carpenter"), nor that specified requirements apply exclusively to work by tradespersons of that corresponding generic name.
- B. Specification Content: Because of methods by which this project specification has been produced, certain general characteristics of contents and conventions in use of language are explained as follows:
1. Specifying Methods: The techniques or methods of specifying requirements varies throughout text, and may include "prescriptive", "compliance with standards", "performance", "proprietary", or a combination of these. The method used for specifying one unit of work has no bearing on requirements for another unit of work.
 2. Overlapping and Conflicting Requirements: Where compliance with two (2) or more industry standards or sets of requirements is specified, and overlapping of those different standards or requirements establishes different or conflicting minimums or levels of quality, notify the OWNER for a decision as specified in the General Terms & Conditions.
 3. Abbreviations: Throughout the Contract Documents are abbreviations implying words and meanings which will be appropriately interpreted. Specific abbreviations have been established, principally for lengthy technical terminology, and in conjunction with coordination of specification requirements, with notations on drawings and in schedules. These are normally defined at first instance of use. Organizational and association names and titles of general standards are also abbreviated.
- 1.03 DRAWING SYMBOLS: Except as otherwise indicated, graphic symbols used on Drawings are those symbols recognized in the construction industry for purposes indicated. Refer instances of uncertainty to the OWNER for clarification.
- 1.04 INDUSTRY STANDARDS - APPLICABILITY: Applicable standards of construction industry have the same force and effect, and are made a part of Contract Documents by reference, as if copied directly into the Contract Documents, or as if published copies were bound herewith. Referenced standards referenced directly in the Contract Documents or by governing regulations have precedence over non-referenced standards which are recognized in industry for applicability to work.

END OF SECTION

SECTION 01020 MEASUREMENT AND PAYMENT

PART 1 - GENERAL

- 1.01 **LUMP SUM CONTRACT:** Unless indicated on the Contract Documents, all work indicated on the Contract Drawings and specified in the Bid Documents and Contract shall be included in the Contract Sum indicated on the Bid Form. The following is a description of the Work listed in the Bid Form and is not intended to be complete and all-inclusive of the required work items. The Work shall include all miscellaneous and ancillary items necessary to construct a complete and functional Project.
- A. Bid Item A. City of Pompano Beach Public Works Building “B” site safety and the general construction for the removal and replacement of a lightly sloped metal roof, including all necessary ventilation. All existing skylights will be replaced by typical metal roof, and all existing roof mounted light fixtures will be replaced in kind. This Work shall be performed at The City of Pompano Public Works Building “B”, located at 1201 NE 5th Avenue, Pompano Beach, Broward County, Florida.
- 1.02 **BASIS FOR PAYMENTS:** The above descriptions generally outline the scope of work required for those elements of the Work to be paid for under each lump sum item listed in the Bid Form. Those lump sum amounts shall be further distributed in accordance with subvalues identified in the approved Schedule of Values specified in GENERAL TERMS & CONDITIONS.
- A. The CONTRACTOR shall submit the initial Schedule of Values in electronic spreadsheet (Microsoft Excel) format prior to commencing work. The Schedule of Values activities shall match the Contract Schedule activities. Each activity in the Schedule of Values shall also indicate the material quantity, unit price and total price as described in SECTION 01310.
- B. The CONTRACTOR shall have ninety (90) business days after CONTRACT execution, to produce the required Insurance Declaration Page of Policy for the insurance requirements set forth in the General Terms & Conditions, and the Insurance Requirements Checklist. OWNER may refuse to make whole or part of any payment if the CONTRACTOR fails to submit the required Insurance Policy Declaration Page as stated in the CONTRACT.
- 1.03 **PAYMENTS:** Payments shall be in accordance with the provisions of the GENERAL TERMS & CONDITIONS.

END OF SECTION

SECTION 01025 SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 SUMMARY:

A. Related Section:

1. 01310 Construction Schedule Critical Path Method (CPM).

1.02 SUBMITTALS

A. Immediately after contract award and before preconstruction meeting, submit a proposed Schedule of Values to the Engineer.

1. Determine with Engineer additional data, if any, required to be submitted.
 - a. Provide copies of the subcontracts or other data acceptable to the Engineer, substantiating the sums described.
2. Schedule of Values shall be compatible with and related to Section 01310 - Construction Schedule Critical Path Method (CPM).
 - a. Tasks shall be cost loaded, organized, and coded to allow schedule to be summarized according to the Construction Specifications Institute (CSI) 16 division format.
 - b. Provide a detailed breakdown of the Contract Amount showing values assigned to each of the various parts of the Work coded and organized by area of work according to Section 01310.
3. Provide separate labor and material values of, but not limited to, the following:
 - a. Each major and minor construction stage, and trade operation of work sequence identified by project specification section number, name of operation, and trade.
 - b. Subcontractors, and suppliers individually broken down.
 - c. Monthly applications for payments in relation to the CPM.
4. Secure the Engineer's approval of the Schedule of Values before submitting first requisition for payment.

PART 2 - NOT USED

PART 3 - NOT USED

END OF SECTION

SECTION 01040 COORDINATION

PART 1 - GENERAL

1.01 BUILDING CODE INSPECTIONS:

- A. The Building code inspectors (BCI) will make periodic inspections.
- B. BCI will inspect specific construction phases as noted in the General Conditions and at any other times as often as decided by the inspectors.

1.02 ENGINEER:

- A. References in the General Conditions to Engineer refer to the firm of;
URS Corporation
7800 Congress Avenue, Suite 200
Boca Raton, FL 33487

1.03 SURVEYOR'S AFFIDAVIT:

- A. Furnish a Florida registered land surveyor's affidavit verifying the location of the project and elevation of components are according to Construction Documents.

1.04 COORDINATION OF DRAWINGS AND SPECIFICATIONS:

- A. Where discrepancies occur between the Drawings and specifications, between large scale Drawings and small scale Drawings, or within a document itself, the use of the item or arrangement of better quality, greater quantity, or higher cost shall be decided by the Engineer.
- B. If any such discrepancies occur in the Drawings or specifications, notify Engineer and the City of Pompano for interpretations or decisions before proceeding with the Work. Engineer interpretations or decisions shall be final.
- C. Drawings are diagrammatic and show general arrangement of systems and work included in the Contract.
 - 1. Coordinate Drawings and verify dimensions before laying out work and be responsible for conflicts.
 - 2. Comply with Drawings in laying out Work and coordinate drawings of various trades involved in the project to verify spaces receiving work.
 - 3. Notify Engineer if space conditions appear inadequate before proceeding.
 - a. If directed by Engineer, make reasonable modifications in layout as needed to prevent conflict with work of various trades or for proper execution of Work without extra charge.

1.05 UTILITY SHUT-OFF:

- A. Notify the CLIENT, by letter through the Engineer, at least 2 weeks before required shut-off of any utilities, security, fire protection, or energy management systems or equipment.
 - 1. Letter shall state date, time, and duration of shut-off.
 - 2. Protection of water and heat-using equipment shall comply with the following:

- a. Immediately before water shut-off, coordinate with the City of Pompano the electrical shut-off to water heaters, boilers, and other equipment to prevent damage by lack of water.
- b. Upon restoration of water supply, coordinate with the City of Pompano re-energizing water and heat-using equipment.
 - i. Make immediate shut-off without notice if life or property are endangered.
3. Emergency Shut-Off: In case of a need for emergency cutoff during evenings, weekends, holidays, or other times when Engineer or City of Pompano are not immediately available, contact the utility provider directly.

1.06 WORK ACTIVITIES:

- A. If areas of work required under this Contract are next to school activities, establish a work procedure acceptable to the City of Pompano.
 1. Arrange, with the City of Pompano and Engineer, for:
 - a. Site access and deliveries.
 - b. Construction staging and proper storage and protection of materials and equipment.
 - c. Removals of any type from site and premises.
 - d. Protection of life and property.

1.07 JOB MEASUREMENTS:

- A. When measurements are affected by new or existing conditions, verify job measurements and consult Engineer for final decision.

1.08 SECURITY:

- A. If Contractor or the City of Pompano determine protection of property is necessary, provide a watchman's service or other means of security accepted by the City of Pompano.

1.09 VENTILATION AND AIR-CONDITIONING OF BUILDINGS:

- A. Provide necessary temporary ventilation fans, power, temporary heat, or place air-conditioning systems in operation to provide proper humidity and temperature conditions for installation or application of flooring, paint, coatings, acoustical ceilings, and any other items requiring climate control at appropriate locations or any other means acceptable to Engineer.

1.10 TEMPORARY LIGHT AND POWER:

- A. After installation of temporary power connections provide the following:
 1. Temporary Lighting: As the building is enclosed, provide temporary lighting as required or according to Engineer's direction consisting of one 100-watt lamp for each 250 square feet of area, but not less than 1 lamp per area.
- B. Temporary Power Outlets: Provide as required for execution of the Work.

PART 2 - NOT USED

PART 3 - EXECUTION

3.01 CLEANING:

- A. In addition to removal of rubbish and leaving buildings "Broom Clean":
 - 1. Replace broken glass.
 - 2. Remove paint spots and smears, stains, marks, and dirt to provide clean surfaces.
 - 3. Clean glass, hardware, fixtures, casework, and equipment.
 - 4. Vacuum carpeting.
 - 5. Wash concrete surfaces, tile floors, tile walls and any other impervious floor and wall surfaces.

3.02 CONSTRUCTION DOCUMENTS:

- A. The Drawings listed in the following Index of Drawings are a part of the Construction Documents:
 - 1. Cover Sheet
 - 2. G-1 Drawing Index, Scope of Work, General Notes, and Special Conditions
 - 3. S-1 Symbols and Abbreviations
 - 4. S-2 General Structural Notes
 - 5. S-3 Structural Inspection Plan
 - 6. S-4 Roof Framing Plans and Notes
 - 7. S-5 Roof Demo Plans and Notes
 - 8. S-6 Building "B" South and East Elevations
 - 9. S-7 Building "B" North and West Elevations
 - 9. S-8 Roof Overhangs Sections and Details

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY:

- A. Section Includes: General procedures for mechanical and electrical work and equipment of other divisions. Provide ventilation, mechanical, plumbing, fire protection, and electrical systems to form complete operating systems.
 - 1. Furnish labor, supervision, energy, materials, tools, transportation, equipment, permits (if required), insurance, taxes, temporary protection, and correction necessary to provide the work shown and specified.
 - 2. Provide apparatus, appliances, materials, and work not shown on drawings but mentioned in specifications, or vice versa. Include incidental accessories necessary for proper installation and operation, even if not specified or shown, without additional expense to the City of Pompano.
 - 3. Apparatus referred to in singular numbers, shall include as many such items required to complete the work.
 - 4. Provide piping, wiring, sheet metal connections, and miscellaneous accessories and materials necessary for a complete installation. Complete connections of supplied special traps, control valves, and other equipment furnished by the City of Pompano, if any, and by other trades.
- B. Work Not Included: Equipment and wiring provided by local telephone and power utilities The OWNER's building code inspectors (BCI) will make periodic inspections.

1.02 DRAWINGS:

- A. Drawings are diagrammatic and show general arrangement of systems and work.
 - 1. Do not scale drawings.
 - 2. Consult drawings, shop drawings, and details for locations of fixtures, thermostats, and equipment. If not definitely located, obtain locations as required from Engineer in writing before rough-in.
- B. Comply with drawings in laying out the work.
 - 1. Coordinate with the drawings of other trades to verify installation locations.
 - 2. Maintain maximum headroom clearances and space conditions at all locations as required by codes and regulations.
 - 3. Where headroom or space conditions appear inadequate, obtain instructions from Engineer before proceeding with installation.
- C. Make reasonable modifications in layout to prevent conflict with work of other trades or for proper execution of work, without extra charge to the City of Pompano.
- D. Engineering Drawings are schematic for equipment since exact dimensions and rough-in requirements may vary with different manufacturers.

1.03 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLE SUBMITTALS:

- A. Submit shop drawings, edited catalog cuts of components, product data, or samples for the following:
 - 1. Names, sizes, and catalog numbers of specialty equipment, fixtures, valves, and other similar items.

2. Equipment connections.
 3. Details of grills, platforms, pads, hangers, and machine and equipment supports.
 4. Details of typical pipe and duct supports.
 5. Fabrication shop drawings for ductwork, interior air supply, and exhaust systems, including details of louvers and other components.
 6. Wiring diagrams for operating controls, temperature control systems, pneumatic piping diagrams, interlock wiring, security systems, and alarm systems including fire alarm and communications systems.
 7. Details and description of temperature control system.
 8. Shop drawings of switchgear, switchboards, panelboards, transformers, lighting fixtures, wiring and cable raceways and wireways, outlet boxes, pull boxes, junction boxes, wiring devices, disconnect switches, fuses, circuit breakers, lightning protection, and other electrical items.
 9. Submit layout drawings for main electrical equipment spaces such as closets, switchgear rooms, major conduit bank runs, and vaults. Submit layout drawings for review before installation of the work.
 10. Complete data and details of fans and motors, air handling units, and similar equipment including performance curves.
 11. Irrigation system and site lighting wiring, panels, switches, and controls.
 12. Locations of sleeves for piping and ductwork passing through concrete slabs and concrete or steel structure. Do not place slabs or concrete fireproofing before submittal has been accepted.
- B. Submit catalog cuts and related shop drawings at the same time. Catalog cuts without shop drawings or vice versa are not acceptable.

1.04 COORDINATION WITH OTHER TRADES:

- A. To ensure full coordination between trades, furnish information necessary to impacted trades to allow work of all trades to be installed satisfactorily and with the least possible interference or delay.
- B. Correct, without extra charge to the City of Pompano, mechanical or electrical work causing interference, unacceptable clearances, or accessibility problems among the work of mechanical, electrical, and other trades caused by lack of coordination.

1.05 INSPECTIONS BEFORE CITY OF POMPANO'S ACCEPTANCE INSPECTION:

- A. Arrange and schedule as many inspections of the work as necessary. Notify Engineer, in writing, of safety-to-life systems functioning according to specifications.
- B. During the entire period scheduled for these inspections, Contractor and Contractor's superintendent of mechanical and electrical trades shall be present.
- C. Notify Engineer of the following test and balance procedures:
 1. Test and balance work has been initially performed by the City of Pompano's contracted test and balance agency.
 2. Completion of necessary corrective work.
 3. Final test and balance work has been performed by test and balance agency.
 4. Balance report has been completed.

1.06 CERTIFICATES:

- A. Upon completion of the Work, obtain certification of compliance or approval from authorities having jurisdiction over the Work and deliver certification to the Engineer.
- B. See Section 01700 - Contract Closeout for additional certification requirements.

1.07 MANUFACTURERS' NAMEPLATES:

- A. Each major component of equipment shall have the manufacturer's name, address, model number, and rating on a metal plate securely affixed in a conspicuous place.
- B. ASME code ratings or other data die-stamped into surface of equipment shall be in a conspicuous place.
- C. Nameplates of distributing agents are not allowed.

1.08 ACCEPTANCE:

- A. Operation of mechanical and electrical work by Contractor does not constitute acceptance of work. Acceptance will occur after Contractor has adjusted equipment, demonstrated equipment satisfies requirements of drawings and specifications, has corrected defects, and furnished required certification.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT:

- A. Materials and equipment required for the work shall be new, of good quality, furnished, delivered, erected, connected, finished, and arranged to fit properly into building spaces. Provide accessibility for maintenance and replacement of equipment without need for removing adjacent equipment or piping. If no specific type or quality of material is given, provide materials accepted by Engineer.
- B. Equipment shall be of type and capacity shown on drawings, specification equipment schedules, and by manufacturers designated in specifications.
- C. Use the same manufacturer of equipment for parts replacement and maintenance.
- D. Equipment, materials, and components shall be new and current products of manufacturers engaged in production of such equipment and be manufacturer's latest design conforming to Construction Documents. Components by the same manufacturer shall be mechanically and electrically consistent with ratings of installed apparatus. Acceptance or approval is required by authority having jurisdiction. Materials used in fire rated construction and in electrical work shall be UL listed.
- E. Hardware and accessory fittings shall be standard sizes designed, intended, or appropriate for the use. Furnish with corrosion protection suitable for the installed atmosphere.
- F. Equipment of a similar nature shall be by the same manufacturer.
- G. Coordinate space requirements, mounting arrangements, and service connections when substitute equipment is furnished.
 - 1. Before ordering, verify equipment fits assigned spaces and can be moved into position without interference from door clearances, ceiling heights, crane access, and other construction.
 - 2. Be responsible for expenses caused by substitution of equipment used as a basis for design.
 - 3. Maintain clearances for electrical equipment as required by the National Electrical Code 2008 (NEC).

PART 3 - EXECUTION

3.01 EQUIPMENT INSTALLATION:

3.02 FABRICATION AND INSTALLATION:

- A. Workers: Use trained and experienced workers, knowledgeable with the items to be installed and manufacturer's current recommended methods of installation for actual fabrication, installation, and testing of work specified.
- B. Welding: Perform welding by certified welders.
 - 1. Perform electric arc welding conforming to American Welding Society standards.
 - 2. Clean each weld layer.
 - 3. Chip out trapped slag and unfused areas before applying next bead.
 - 4. Visually inspect finished weld for cracks, porosity, or imperfections.
 - 5. If weld contains any defects, repair to satisfaction of Engineer.
- C. Set equipment level, properly aligned, and assembled. Secure equipment and materials firmly in place. Screws, bolts, nuts, clamps, fittings, and other fastening devices shall be tight.
- D. Repair to a new condition or replace materials damaged during delivery, storage, or installation. Touch-up scratched or marred finishes on equipment to match original finish or completely refinish.
- E. Make connections for air-conditioning and ventilating equipment and controls. Furnish individually mounted starters, thermostats, firestats, and other control devices as specified.
- F. Install and connect starters, contactors, and other similar components including wiring requirements as determined by control wiring diagrams furnished under the Work.
- G. Do not cut, weld, or otherwise weaken building structure to ease installation of mechanical or electrical equipment and materials.
- H. Support electrical raceways, conduits, light fixtures, piping, and HVAC ducts from overhead structure. Support shall not be from ducts, pipes, conduits or other similar non-structural components.
- I. Design and coordinate to safely support suspended electrical and mechanical items on combined support systems.

3.03 SUPPORT ACCESSORIES:

- A. Provide inserts, anchors, bolts, boxes, sleeves, and hangers for foundations, supports, pads, bases, and piers required for support of equipment, piping, pumps, tanks, compressors, motors, transformers, panels, racks, and other equipment specified.

3.04 SLEEVE BLOCKOUTS, CUTTING AND PATCHING, AND CORING AND DRILLING

- A. Sleeves:
 - 1. Provide pipes passing through concrete slabs with sleeves constructed of galvanized sheet steel with lock seam joints of the following minimum gages. a. 22 gage for pipes 3 inches and smaller. b. 20 gage for pipes larger than 3 inches to 6 inches. c. 18 gage for pipes over 6 inches.
 - 2. Provide pipes passing through interior concrete or masonry walls and partitions with Schedule 40 steel pipe sleeves.

3. At pipes subject to expansion and contraction, provide sleeves of sufficient diameter to allow free movement of pipe. Where pipes are insulated, sleeves shall be of sufficient diameter to pass pipe insulation. Measure floor and wall construction and finishes to determine the proper length of sleeves for various locations. Actual lengths shall comply with the following:
 - a. Terminate sleeves flush with walls and ceilings and 2 inches above the finished floor in areas where the pipes are concealed.
 - b. Extend pipe sleeves 1/4" above finished floor in areas where the pipes are exposed.
 - c. Pipes passing through concrete slabs resting on earth or fill shall be integral with the concrete.
 4. Extend sleeves according to NFPA, in mechanical equipment rooms and areas provided with fire protection sprinkler systems.
 5. The annular space between the pipe or pipe covering in sleeves set in fire walls or floors shall be packed according to the recommendations of NFPA.
- B. Blockouts:
1. Blockout areas of concrete or masonry to allow passage of ducts or installation of boxes.
 2. Provide extra reinforcement at sides and corners of concrete in size, quantity, and location not impairing structural performance of wall or slab.
 3. Refer to Drawings for lintels above masonry wall blockouts, or if not indicated, consult with Engineer.
- C. Provide shafts and chases where indicated or needed under work of other Sections.
- D. Cutting and Patching:
1. Cut and patch as needed for installation of mechanical and electrical equipment. Perform finish patching according to specifications for each finish, by workers skilled in each type of finish.
 2. Install work so no undue cutting and patching will be required in building construction. Do no cutting capable of impairing strength of building construction.
 3. Cut and patch as needed for pipes if sleeves and inserts were not installed, or where incorrectly located.
 4. Provide for access through structural steel webs by noting number, size, and locations on shop drawing submittal and only as accepted by Engineer. Reinforce holes as directed by Engineer.
- E. Coring and Drilling:
1. If a sleeve is omitted, core drill to allow insertion of a pipe sleeve with sufficient clearance to allow grouting in place with specified backer rod and sealant between the hole and sleeve.
 2. When core drilling or cutting duct holes in foundations, walls, beams, columns, or structural slabs, determine the location of reinforcement and tendons before coring.
 - a. Core or cut to provide 1-1/2" minimum cover over reinforcing steel or tendons below grade, at exterior or wet locations.
 - b. Leave 3/4" minimum cover in dry or interior locations.
 - c. If cutting tool comes in contact with reinforcement or a tendon, move to a location where steel will not be cut and patch to provide specified concrete coverage over reinforcement.
 - d. Drill overhead concrete slabs from underside.
 3. Drill structure as needed to install hangers, anchors, and other supporting devices or fasteners only if inserts have been omitted from the concrete.
 4. Holes, except for small screws, shall not be drilled in beams or other structural members, without obtaining prior approval of Engineer.

3.05 COVERING OF WORK:

- A. Do not cover, or otherwise hide from view, ducts, piping, fittings, or any other work before such work has been examined or approved by Engineer or other authority having jurisdiction.
- B. Remove discovered defective work and replace or correct at no additional cost to the OWNER.

3.06 BELT AND COUPLING GUARDS:

- A. Provide guards for belt-driven units and at chains, gears, couplings, keys, projecting set screws, and other similar rotating or moving parts.
- B. Belt guards shall enclose pulleys and belts on exposed sides.
- C. Provide coupling guards on direct-connected units. Design guards for easy service removal.
- D. Provide UL listings.

3.07 PIPING, DUCTWORK, AND RACEWAY INSTALLATION

- A. Provide clearances under beams and over windows for maximum headroom. Verify locations of lines and types of fittings used to obtain these clearances.
- B. Coordinate piping, ductwork, raceway, and lighting trades with each other and with other equipment trades. Where insufficient headroom is provided for work above suspended ceilings or in vertical shafts, obtain clarification and instruction from Engineer before installing work.
- C. Lines and Levels: Each trade is responsible for calculating and installing levels and slopes of ductwork and piping based on Contractor's reference lines and bench marks.

3.08 WATERPROOFING AND ROOFING

- A. Where mechanical or electrical work penetrates building envelope or waterproofed construction, the method of installation shall prevent transmission of water, heat, cold, and drafts.
- B. Follow details, including architectural, establishing types of waterproofing construction for each penetration condition.
- C. Where a detail suitable to an encountered condition is lacking, request written instructions from Engineer.
- D. Provide necessary sleeves, sealing, and flashing required to make openings watertight.

3.09 PAINTING AND COATINGS

- A. Except for pipe and pipe fittings, deliver equipment not galvanized, copper, bronze, or with a factory applied final finish, to the job site with a factory applied prime coat of paint per manufacturer's standard specifications.
- B. Apply one coat of asphaltum or other moisture resistant coatings to coil housings and drip pans. Coat insides of drip pans with 2 coats of asphaltum.
- C. Provide buried steel pipes and conduit with 2 coats of asphaltum.

3.10 EXISTING CONDITIONS

- A. Work shall be according to the specifications and Drawings and to the complete satisfaction of the OWNER and Engineer. Materials and patching required to make project complete shall match existing where applicable. Leave alterations and construction in new condition.

- B. Items to be reused according to Construction Documents, temporarily removed, or de-energized shall be accomplished without damage. Equipment shall be maintained, if required, and returned to its original operating condition.
- C. Perform alterations, demolition, removal, cutting and patching, and other work necessary for construction without additional cost to the OWNER. This includes removal, rerouting, etc. of electrical items required to complete installation.
- D. Patch or replace damaged floors, walls, ceilings, and other finished surfaces altered to accommodate the new construction. Patched surfaces shall match existing adjacent surfaces.
- E. Coordinate cutting, patching, demolition, repairing, or replacement of work.
- F. Where alterations take place in occupied areas, clean up daily. Keep noise to a minimum.
- G. Do not disrupt services to existing buildings in any way except with the written permission of the OWNER.
- H. Reroute conduits and extend or replace circuits as required.
- I. Execute Work to avoid interference with the use of passage to and from adjoining buildings or areas.
- J. Be fully responsible for any damage to existing buildings and contents including machinery, furniture, and equipment due to operations. Repair or replace any damages with the direction of Engineer at no additional cost to the OWNER.
- K. Connection to existing structures shall be made as quickly as possible, and coordinated fully with the OWNER in connection with the convenience and safety of all persons involved, including employees.

END OF SECTION

SECTION 01045 CUTTING AND PATCHING

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. Definition: "Cutting and patching" includes cutting into existing construction to provide for the installation or performance of other work and subsequent fitting and patching required to restore surfaces to their original condition.
 - 1. Cutting and patching is performed for coordination of the work, to uncover work for access or inspection, to obtain samples for testing, to permit alterations to be performed or for other similar purposes.
 - 2. Cutting and patching performed during the manufacture of products, or during the initial fabrication, erection or installation processes is not considered to be "cutting and patching" under this definition. Drilling of holes to install fasteners and similar operations are also not considered to be "cutting and patching."
- B. Refer to other sections of these specifications and the Drawings for specific cutting and patching requirements and limitations applicable to individual units of work.
 - 1. Unless otherwise specified, requirements of this section apply to mechanical and electrical work.
 - 2. Refer to Division 15 and Division 16 sections for additional requirements and limitations on cutting and patching of mechanical and electrical work.

1.02 SUBMITTALS:

- A. Procedural Proposal for Cutting and Patching: Where prior approval of cutting and patching is required, submit proposed procedures for this work well in advance of the time work will be performed and request approval to proceed. Include the following information, as applicable, in the submittal:
 - 1. Describe nature of the work and how it is to be performed, indicating why cutting and patching cannot be avoided.
 - 2. Describe anticipated results of the work in terms of changes to existing work, including structural, operational and visual changes as well as other significant elements.
 - 3. List products to be used and firms that will perform work.
 - 4. Give dates when work is expected to be performed.
 - 5. List utilities that will be disturbed or otherwise be affected by work, including those that will be relocated and those that will be out-of-service temporarily.
 - a. Indicate how long utility service will be disrupted.
 - 6. Where cutting and patching of structural work involves the addition of reinforcement, submit details and engineering calculations to show how that reinforcement is integrated with original structure to satisfy requirements.
- B. Approval by the OWNER to proceed with cutting and patching work does not waive the OWNER'S right to later require complete removal and replacement of work found to be cut and patched in an unsatisfactory manner.

1.03 QUALITY ASSURANCE:

- A. Requirements for Structural Work: Do not cut and patch structural work in a manner that would result in a reduction of load-carrying capacity or of load-deflection ratio.

- B. Operational and Safety Limitations: Do not cut and patch operational elements or safety related components in a manner that would result in a reduction of their capacity to perform in the manner intended, including energy performance, or that would result in increased maintenance, or decreased operational life or decreased safety.
- C. Visual Requirements: Do not cut and patch work exposed on the building's exterior or in its occupied spaces, in a manner that would, in the OWNER'S opinion, result in lessening the building's aesthetic qualities.
 - 1. Do not cut and patch work in a manner that would result in substantial visual evidence of cut and patch work.
 - 2. Remove and replace work judged by the OWNER to be cut and patched in a visually unsatisfactory manner.
 - 3. Retain the original installer or fabricator if possible, or another recognized experienced and specialized firm for cutting and patching.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. General: Except as otherwise indicated, or as directed by the OWNER, use materials for cutting and patching that are identical to existing materials.
- B. If identical materials are not available or cannot be used, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect.
- C. Use materials for cutting and patching that will result in equal-or-better performance characteristics.

PART 3 - EXECUTION

3.01 INSPECTION:

- A. Before cutting, examine the surfaces to be cut and patched and the conditions under which the work is to be performed. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding with the work.
- B. Coordinate layout of the work and resolve potential conflicts before proceeding with the work.

3.02 PREPARATION:

- A. Temporary Support: To prevent failure, provide temporary support of work to be cut.
- B. Protection: Protect other work during cutting and patching to prevent damage. Provide protection from adverse weather conditions for that part of the project that may be exposed during cutting and patching operations.
 - 1. Avoid interference with use of adjacent facilities or interruption of free passage to adjacent facilities.
 - 2. Take precautions not to cut existing pipes, conduits or ducts serving the building but scheduled to be relocated until provisions have been made to by-pass them. Coordinate with the OWNER.

3.03 PERFORMANCE:

- A. General: Employ skilled workmen to perform cutting and patching work. Except as otherwise indicated or as approved by the OWNER, proceed with cutting and patching at the earliest feasible time and complete work without delay.

- B. Cutting: Cut the work using methods that are least likely to damage work to be retained or adjoining work. Where possible, review proposed procedures with the original installer; comply with original installer's recommendations.
 - 1. General: Use hand or small power tools designed for sawing or grinding, not hammering and chopping, where cutting is required. Use of gasoline-powered tools will not be permitted in enclosed spaces.
 - 2. Cut through concrete and masonry using a cutting machine such as a carborundum saw or core drill to insure a neat hole.
 - 3. Cut holes and slots neatly to size required with minimum disturbance of adjacent work.
 - 4. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 5. Temporarily cover openings when not in use.
- C. By-pass utility services such as pipe and conduit, before cutting, where such utility services are shown or required to be removed, relocated or abandoned.
- D. Cut off conduit and pipe in walls or partitions to be removed. After by-pass and cutting, cap, valve or plug and seal tight remaining portion of pipe and conduit to prevent entrance of moisture or other foreign matter.
- E. Patching: Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.
 - 1. Inspect and test patched areas to demonstrate integrity of work where feasible.
 - 2. Restore exposed finishes of patched areas and where necessary extend finish restoration into retained adjoining work in a manner which will eliminate evidence of patching and refinishing.
 - 3. Patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance where removal of walls or partitions extends one finished area into another finished area.
 - 4. If necessary to achieve uniform color and appearance, remove existing floor and wall coverings and replace with new materials.
 - 5. Extend final paint coat over entire unbroken surface containing patch, after patched area has received prime and base coat where patch occurs in a smooth painted surface.
 - 6. Patch, repair or re-hang existing ceilings as necessary to provide an even plane surface of uniform appearance.

3.04 CLEANING:

- A. Thoroughly clean areas and spaces where work is performed or used as access to work. Remove completely paint, mortar, oils, putty and items of similar nature.
- B. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied.
- C. Restore damaged pipe covering to its original condition.

END OF SECTION

SECTION 01065 PERMITS AND FEES

PART 1 - GENERAL

- 1.01 Unless otherwise specified, the CONTRACTOR shall obtain and pay for any permits and licenses related to his work as provided for in the General Terms & Conditions, except as otherwise provided herein.
- 1.02 The CONTRACTOR will be issued copies of all permits obtained by the OWNER at the pre-construction conference. A copy of the permits shall be posted at the site at all times during construction. The CONTRACTOR shall be responsible for familiarizing himself with the permits and shall abide by the permit conditions at all times.
- 1.03 Work shall be conducted, and shall result in construction of the improvements of this project, in full accordance with the conditions of the permits granted for the project.

END OF SECTION

SECTION 01071 STANDARD REFERENCES

Wherever used in the project manual, the following abbreviations will have the meanings listed:

AA	Aluminum Association Incorporated 818 Connecticut Avenue, N.W. Washington, D.C. 20006
AABC	Associated Air Balance Council 1518 K Street N.W. Washington, D.C. 20005
AAMA	American Architectural Manufacturers Association 2700 River Road, Suite 118 Des Plaines, IL 60018
ABMA	American Bearing Manufacturers Association 1101 Connecticut Avenue, N.W. Suite 700 Washington, D.C. 20036
ACI	American Concrete Institute P. O. Box 19150 Detroit, MI
AEIC	Association of Edison Illuminating Companies 51 East 42nd Street New York, NY 10017
AFBMA	Anti-Friction Bearing Manufacturers Association
AGA	American Gas Association 8501 East Pleasant Valley Road Cleveland, OH 44131
AGMA	American Gear Manufacturer's Association 1330 Massachusetts Avenue, N.W. Washington, D.C.
AHA	American Hardboard Association 520 N. Hicks Road Palatine, IL 60067
AISC	American Institute of Steel Construction 101 Park Avenue New York, NY 10017
AISI	American Iron and Steel Institute 1000 16th Street, N.W. Washington, D.C. 20036
AITC	American Institute of Timber Construction 333 West Hampden Avenue Englewood, CO 80110

ALSC	American Lumber Standards Committee P. O. Box 210 Germantown, MD 20874
AMCA	Air Movement and Control Association, Inc. 30 West University Drive Arlington Heights, IL 60004
ANSI	American National Standards Institute, Inc. 1430 Broadway New York NY 10018
APA	American Plywood Association 1119 A Street Tacoma, WA 98401
API	American Petroleum Institute 1801 K Street N.W. Washington, D.C. 20006
ARI	Air-Conditioning and Refrigeration Institute 1814 North Fort Myer Drive Arlington, VA 22209
ASCE	American Society of Civil Engineers 345 East 47th Street New York, NY 10017
ASCII	American Standard Code for Information Interchange United States of America Standards Institute 10 East 40th Street New York, NY 10016
ASE	American Standard Safety Code for Elevators, Code Dumbwaiter and Escalators American National Standards Institute 1430 Broadway New York, NY 10018
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers United Engineering Center 345 East 47th Street New York, NY 10017
ASME	American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017
ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103
AWPA	American Wood Preservers Association 1625 Eye Street Washington, D.C. 20006

AWPB	American Wood Preservers Bureau 7962 Conell Court P. O. Box 5283 Lorton, VA 22079
AWPI	American Wood Preservers Institute 2750 Prosperity Avenue, Suite 550 Fairfax, VA 22031-4312
AWI	Architectural Woodwork Institute 1952 Isaac Newton Square West Reston, VA 20190
AWS	American Welding Society 2501 N.W. 7th Street Miami, FL 33125
BHMA	Builders Hardware Manufacturers Association 355 Lexington Avenue, 17 th Floor New York, NY 10017
BOCA	Building Officials and Code Administrators 17926 Halstead Homewood, IL 60430
CBM	Certified Ballast Manufacturers 2120 Keith Building Cleveland, OH 44115
CRSI	Concrete Reinforcing Steel Institute 180 North La Salle Street Chicago, IL 60601
CSA	Canadian Standards Association 178 Rexdale Boulevard Rexdale, Ontario, M9W 1R3, Canada
DEMA	Diesel Engine Manufacturer's Association 122 East 42nd Street New York, NY 10017
DHI	Door Hardware Institute 7711 Old Springhouse Road McLean, VA 22102
DIS	Division of Industrial Safety California Department of Industrial Relations 2422 Arden Way Sacramento, CA 95825
EI	Edison Electric Institute 90 Park Avenue New York, NY 10016

EIA	Electronic Industries Association 2001 Eye Street, N.W. Washington, D.C. 20006
EJMA	Expansion Joint Manufacturer's Association 25 North Broadway Tarrytown, NY 10591
EPA	Environmental Protection Agency Region 4 Sam Nunn Atlanta Federal Center 61 Forsyth Street, SW Atlanta, GA 30303-3104
ESO	Electrical Safety Order, California Administrative Code, Title 8, Chap. 4, Subarticle 5 Office of Procurement, Publications Section P. O. Box 20191 8141 Elder Creek Road Sacramento, CA 95820
FAC	Florida Administrative Code
FBC	Florida Building Code
FEDSPEC	Federal Specifications General Services Administration Specification and Consumer Information Distribution Branch Washington Navy Yard, Bldg. 197 Washington, D.C. 20407
FEDSTDS	Federal Standards (see FEDSPECS)
FM	Factory Mutual Research 1151 Boston-Providence Turnpike Norwood, MA 02062
GANNA	Glass Association of North America 2301 Tower Road Austin, TX 78703
HEI	Heat Exchange Institute 122 East 42nd Street New York, NY 10017
HI	Hydraulic Institute 1230 Keith Building Cleveland, OH 44115
HPMA	Hardwood Plywood Manufacturers Association 1825 Michael Faraday Drive P. O. Box 2789 Reston, VA 22090-2789

IAPMO	International Association of Plumbing and Mechanical Officials 5032 Alhambra Avenue Los Angeles, CA 90032
ICBO	International Conference of Building Officials 5360 South Workman Mill Road Whittier, CA 90601
ICEA	Insulated Cable Engineers Association P. O. Box P South Yarmouth, MA 02664
ICRI	International Concrete Repair Institute 3166 S. River Road, Suite 132 Des Plaines, IL 60018
IEEE	Institute of Electrical and Electronics Engineers, Inc. 345 East 47th Street New York, NY 10017
IES	Illuminating Engineering Society c/o United Engineering Center 345 East 47th Street New York, NY 10017
ISA	Instrument Society of America 400 Stanwix Street Pittsburgh, PA 15222
ISO	International Organization for Standardization 1, ru de Varembé, Case postale 56 CH-1211 Genna 20, Switzerland
JIC	Joint Industrial Council 7901 Westpark Drive McLean, VA 22101
MFMA	Metal Framing Manufacturers Association 111 E. Wacker Drive Chicago, IL 60601
MILSPEC	Military Specifications Naval Publications and Forms Center 5801 Tabor Avenue Philadelphia, PA 19120
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. 127 Park Avenue, N.E. Vienna, VA 22180
NAAMM	National Association of Architectural Metal Manufacturers 100 South Marion Street Oak Park, IL 60302

NACE	National Association of Corrosion Engineers P. O. Box 986 Katy, TX 77450
NEC	National Electrical Code National Fire Protection Association 470 Atlantic Avenue Boston, MA 02210
NECA	National Electrical Contractors Association 3 Bethesda Metro Center, Suite 1100 Bethesda, MD 20814
NELMA	Northeastern Lumber Manufacturers Association, Inc. 272 Turtle Road P. O. Box 87A Cumberland Center, ME 04021
NEMA	National Electrical Manufacturer's Association 155 East 44th Street New York, NY 10017
NESC	National Electric Safety Code American National Standards Institute 1430 Broadway New York, NY 10018
NETA	InterNational Electrical Testing Association P. O. Box 687 Morrison, CO 80465
NFP	National Forest Products Association (Formerly National Lumber Manufacturer's Association) 1619 Massachusetts Avenue Washington, DC 20036
NFPA	National Fire Protection Association Batterymarch Park Quincy, MA 02269
NHLA	National Hardwood Lumber Association P. O. Box 34518 Memphis, TN 38184-0518
NIST	National Institute of Standards and Technology 100 Bureau Drive, Suite 1070 Gaithersburg, MD 20899-1070
NSF	National Sanitation Foundation 3475 Plymouth Road P. O. Box 1468 Ann Arbor, MI 48106

OSHA	Occupational Safety and Health Act U.S. Department of Labor Occupational and Health Administration San Francisco Regional Office 450 Golden Gate Avenue, Box 36017 San Francisco, CA 94102
PPIC	The Plumbing & Piping Industry Council, Inc. 510 Shatto Place, Suite 402 Los Angeles, CA 90020
RIS	Redwood Inspection Service California Redwood Association 405 Enfrente Dr., Suite 200 Novato, CA 94949
RLM	Reflector and Lamp Manufacturers Standard Institute
RMA	Rubber Manufacturers Association 1400 K Street Washington, D.C. 20005
SBC	Standard Building Code Published by SBCCI
SMC	Standard Mechanical Code Published by SBCCI
SBCCI	Southern Building Code Congress International 1116 Brown-Marx Building Birmingham, AL 35203
SCMA	Southern Cypress Manufacturers Association 805 Sterick Bldg. Memphis, TN 38103
SDI	Steel Door Institute 712 Lakewood Center N. 14600 Detroit Avenue Cleveland, OH 44107
SMACNA	Sheet Metal and Air Conditioning Contractors National Association, Inc. 8224 Old Courthouse Road Tysons Corner Vienna, VA 22180
SPC	Society for Protective Coatings 40 24 th Street, 6 th Floor Pittsburgh, PA 15222
SPI	Society of the Plastics Industry, Inc. 1275 K Street NW, Suite 400 Washington, D.C. 20005

SPIB Southern Pine Inspection Bureau
4709 Scenic Highway
Pensacola, FL 32504

SSPC Steel Structures Painting Council
4400 Fifth Avenue
Pittsburgh, PA 15213

SSPWC Standard Specifications for Public Works Construction
Building News, Inc.
3055 Overland Avenue
Los Angeles, CA 90034

TEMA Tubular Exchanger Manufacturer's Association
331 Madison Avenue
New York, NY 10017

UL Underwriters Laboratories Inc.
207 East Ohio Street
Chicago, IL 60611

USBR Bureau of Reclamation
U.S. Department of Interior
Engineering and Research Center
Denver Federal Center, Building 67
Denver, CO 80225

USCOE United States Corps of Army Engineers
Jacksonville District
P. O. Box 4970
Jacksonville, FL 32232-0019

WCLIB West Coast Lumber Inspection Bureau
6980 SW Varns Street
P. O. Box 23145
Portland, OR 97223

WWPA Western Wood Products Association
(Formerly called: West Coast Lumbermen's Association (WCLA))
Yeon Building
Portland, OR 97204

END OF SECTION

SECTION 01200 PROJECT MEETINGS AND REPORTS

PART 1 - GENERAL

1.01 SUMMARY: This Section includes the following administrative and procedural requirements:

- A. Project Meetings:
 - 1. Preconstruction conference
 - 2. Progress meetings
- B. Schedules and Reports:
 - 1. Initial coordination submittals
 - 2. Construction progress schedule (See SECTION 01310 Construction Schedules)
 - 3. Special reports

1.02 PROJECT MEETINGS:

- A. Pre-construction Conference
 - 1. The OWNER will administer a meeting within 10 days after the Effective Date of the Agreement, to review items stated in the following agenda and to establish a working understanding between the parties as to their relationships during conduct of the Work.
 - 2. Preconstruction conference shall be attended by:
 - a. CONTRACTOR and his superintendent
 - b. Representatives of principal Subcontractors and Suppliers
 - c. Engineer and his Resident Project Representative if any
 - d. OWNER or his representative
 - e. Other affected parties determined by the OWNER
 - 3. Agenda:
 - a. Projected construction schedules
 - b. Critical Work sequencing
 - c. Designation of responsible personnel
 - d. Project coordination
 - e. Procedures and Processing of:
 - i. Field decisions
 - ii. Substitutions
 - iii. Submittals
 - iv. Change Orders
 - v. Applications for payment
 - f. Procedures for testing
 - g. Procedures for maintaining record documents
 - h. Use of Premises:

- i. Office, work and storage areas
 - ii. OWNER'S requirements
 - i. Construction facilities, controls, and construction aids
 - j. Temporary utilities
 - k. Safety and first aid
 - l. Security
 - m. Requirements of any permits obtained by the OWNER
4. Location of Meeting: Determine at the pre-construction conference.

B. Progress Meetings:

1. The OWNER will administer a meeting a minimum of twice each month (every two weeks) and at other times requested by the OWNER. CONTRACTOR, Engineer and all Subcontractors active on the site shall be represented at each meeting. CONTRACTOR may request attendance by representatives of his Suppliers and other Subcontractors, or other entities concerned with current program or involved with planning, coordination or performance of future activities. All participants in the meeting shall be familiar with the Project and authorized to conclude matters relating to the Work.
2. CONTRACTOR and each Subcontractor shall be prepared to discuss the current construction progress report, any anticipated future changes to the schedule, and advise if their current progress or future anticipated schedules are compatible with the Work.
3. If one Subcontractor is delaying another, CONTRACTOR shall direct such changes as are necessary for those involved to mutually agree on schedule changes in the best interest of construction progress.
4. Agenda
 - a. Review of construction progress since previous meeting
 - b. Field observations, interface requirements, conflicts
 - c. Problems which impede construction schedule
 - d. Off-site fabrication
 - e. Delivery schedules
 - f. Submittal schedules and status
 - g. Site utilization
 - h. Temporary facilities and services
 - i. Hours of Work
 - j. Hazards and risks
 - k. Housekeeping
 - l. Quality and Work standards
 - m. Change orders
 - n. Documentation of information for payment request
 - o. Corrective measures and procedures to regain projected schedule if necessary
 - p. Revisions to construction schedule
 - q. Progress and schedule during succeeding Work period

- r. Review proposed changes for:
 - i. Effect on construction schedule and on completion date
 - ii. Effect on other contracts of the Project
 - s. Other business
5. Location of Meetings: Determine at the pre-construction conference.
 6. Reporting: After each meeting, minutes of the meeting will be distributed to each party present and to parties who should have been present.
- C. Special Reports:
1. When an event of an unusual and significant nature occurs at the site, a special report shall be prepared and submitted. List the chain of events, persons participating, response by CONTRACTOR'S personnel, an evaluation of the results or effects, and similar pertinent information. Advise the OWNER in advance when such events are known or predictable.

END OF SECTION

SECTION 01300 SUBMITTALS

PART 1 - GENERAL

1.01 SUMMARY:

- A. This Section includes definitions, descriptions, transmittal, and review of "Compliance" and "Miscellaneous" Submittals.

1.02 GENERAL INFORMATION:

A. Definitions:

1. Compliance Submittals include shop drawings, product data, and samples which are prepared by the CONTRACTOR, Subcontractor, manufacturer, or Supplier and submitted by the CONTRACTOR to the OWNER as a basis for approval of the use of Equipment and Materials proposed for incorporation in the Work or needed to describe installation, operation, maintenance, or technical properties.
 - a. Shop drawings include custom-prepared data of all types including drawings, diagrams, performance curves, material schedules, templates, instructions, and similar information not in standard printed form applicable to other projects.
 - b. Product data includes standard printed information on materials, products and systems not custom-prepared for this Project, other than the designation of selections from available choices.
 - c. Samples include both fabricated and unfabricated physical examples of materials, products, and Work; both as complete units and as smaller portions of units of Work; either for limited visual inspection or (where indicated) for more detailed testing and analysis. Mock-ups are a special form of samples which are too large to be handled in the specified manner for transmittal of sample Submittals.
2. Miscellaneous Submittals are those technical reports, administrative Submittals, certificates, and guarantees not defined as shop drawings, product data, or samples.
 - a. Technical reports include laboratory reports, tests, technical procedures, technical records, CONTRACTOR'S design analysis and CONTRACTOR'S survey field notes for construction staking, before cross-sections and after cross-sections.
 - b. Administrative Submittals are those nontechnical Submittals required by the Contract Documents or deemed necessary for administrative records. These Submittals include maintenance agreements, workmanship bonds, Project photographs, physical work records, statements of applicability, copies of industry standards, as-constructed data, security/protection/safety data, and similar type Submittals.
 - c. Certificates and guarantees are those Submittals on Equipment and Materials where a written certificate or guarantee from the manufacturer or Supplier is called for in the Specifications.
 - d. Reports as required by Contract describing CONTRACTOR'S means and methods for items such as dewatering, earth and water retaining, erosion/turbidity control, and safety plans.
3. Refer to ARTICLE 1.03 of this Part for detailed lists of documents and specific requirements.

B. Quality Requirements:

1. Submittals such as shop drawings and product data shall be of the quality for legibility and reproduction purposes. Every line, character, and letter shall be clearly legible. Drawings such as reproducibles shall be useable for further reproduction to yield legible hard copy.

2. Documents submitted to the OWNER that do not conform to these requirements shall be subject to rejection by the OWNER, and upon request by OWNER, CONTRACTOR shall resubmit conforming documents. If conforming Submittals cannot be obtained, such documents shall be retraced, redrawn, or photographically restored as may be necessary to meet such requirements. CONTRACTOR'S (or his Subcontractor's) failure to initially satisfy the legibility quality requirements will not relieve CONTRACTOR (or his Subcontractors) from meeting the required schedule for Submittal of shop drawings and product data.
- C. Language and Dimensions:
1. All words and dimensional units shall be in the English language.
 2. Metric dimensional unit equivalents may be stated in addition to the English units.
- D. Submittal Completeness:
1. Submittals shall be complete with respect to dimensions, design criteria, materials of construction, and other information specified to enable the OWNER to review the information effectively.
 2. Where standard drawings are furnished which cover a number of variations of the general class of equipment, each such drawing shall be individually annotated to describe exactly which parts of the drawing apply to the equipment being furnished. Use hatch marks to indicate variations that do not apply to the Submittal. The use of "highlighting markers" is not an acceptable means of annotating Submittals. Such annotation shall also include proper identification of the Submittal permanently attached to the drawing.
 3. Reproduction or copies of Contract Drawings or portions thereof will not be accepted as complete fabrication or erection drawings. The Contractor may use a reproduction of the OWNER-prepared Contract Drawings for erection drawings such as to indicate information on erection or to identify detail drawing references. Where the drawings are revised to show this additional CONTRACTOR information, the OWNER'S title block shall be replaced with a CONTRACTOR'S title block and the OWNER'S professional seal shall be removed from the drawing. The CONTRACTOR shall revise these erection drawings for subsequent OWNER revisions to the Contract Drawings.

1.03 COMPLIANCE SUBMITTALS:

- A. Items shall include, but not be limited to, the following:
1. Manufacturer's specifications
 2. Catalogs, or parts thereof, of manufactured equipment
 3. Shop fabrication and erection drawings
 4. General outline drawings of equipment showing overall dimensions, location of major components, weights, and location of required building openings and floor plates
 5. Detailed equipment installation drawings, showing foundation details, anchor bolt sizes and locations, baseplate sizes, location of OWNER'S connections, and all clearances required for erection, operation, and disassembly for maintenance.
 6. Schematic diagrams for electrical items, showing external connections, terminal block numbers, internal wiring diagrams, and one-line diagrams
 7. Bills of material and spare parts list
 8. Instruction books and operating manuals
 9. Material lists or schedules
 10. Performance tests on equipment by manufacturers

11. Samples and color charts
12. All drawings, catalogs or parts thereof, manufacturer's specifications and data, samples, instructions, and other information specified or necessary:
 - a. For OWNER to determine that the Equipment and Materials conform with the design concept and comply with the intent of the Contract Documents.
 - b. For the proper erection, installation, operation and maintenance of the Equipment and Materials which the OWNER will review for general content but not for substance.
 - c. For the OWNER to determine what supports, anchorages, structural details, connections, and services are required for the Equipment and Materials, and the effects on contiguous or related structures and Equipment and Materials.

B. Schedule and Log of Compliance Submittals:

1. Prepare for the OWNER, a schedule and log for submission of all Compliance Submittals specified or necessary for OWNER'S review of the use of Equipment and Materials proposed for incorporation in the Work or needed for proper installation, operation or maintenance. Submit the schedule and log with the procurement schedule and Work progress schedule. Schedule submission of all Compliance Submittals to permit review, fabrication, and delivery in time so as to not cause a delay in the Work of CONTRACTOR or his Subcontractors or any other contractors as described herein.
2. In establishing schedule for Compliance Submittals, allow 15 working days in OWNER'S office for reviewing original Submittals and 10 working days for reviewing resubmittals.
3. The schedule shall indicate the anticipated dates of original submission, and shall be based upon at least one resubmission of each item.
4. Schedule all Compliance Submittals required prior to fabrication or manufacture for submission within 30 days of the Notice to Proceed. Schedule Compliance Submittals pertaining to storage, installation and operation at the site for OWNER'S acceptance prior to delivery of the Equipment and Materials.
5. Resubmit Compliance Submittals the number of times required for OWNER'S "Submittal Accepted." However, any need for resubmittals in excess of the number set forth in the accepted schedule, or any other delay in obtaining acceptance of Submittals, will not be grounds for extension of the Contract Time, provided the OWNER completes its reviews within the times stated above.

C. Transmittal of Compliance Submittals:

1. All Compliance Submittals of Equipment and Materials furnished by Subcontractors, Manufacturers, and Suppliers shall be submitted to the OWNER by CONTRACTOR.
2. After checking and verifying all field measurements, transmit all Compliance Submittals to the OWNER for acceptance as follows:
 - a. Identify each Compliance Submittal by Submittal Number, Project name and number, Contract title and number, and the Specification Section and article number marked thereon or in the letter of transmittal. Unidentifiable Submittals will be returned for proper identification.
 - b. Check and stamp Compliance Submittals of Subcontractors, Suppliers, and Manufacturers with CONTRACTOR'S approval prior to transmitting them to the OWNER. CONTRACTOR'S stamp of approval shall constitute a representation to the OWNER that CONTRACTOR has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data, or he assumes full responsibility for doing so, and that he has coordinated each Compliance Submittal with the requirements of the Work and the Contract Documents.

- c. At the time of each submission, call to the attention of OWNER in the letter of transmittal any deviations from the requirements of the Contract Documents.
- d. Make all modifications noted or indicated by OWNER and return revised prints, copies, or samples until accepted. Direct specific attention in writing, or on revised Submittals, to changes other than the modifications called for by the OWNER on previous Submittals. After Submittals have been accepted, submit copies thereof for final distribution. Prints of accepted drawings transmitted for final distribution will not be further reviewed and are not to be revised. If errors are discovered during manufacture or fabrication, correct the Submittal and resubmit for review.
- e. Following completion of the Work and prior to final payment, furnish those Drawings necessary to indicate "as constructed" conditions, including field modifications, in the number of copies specified. Furnish additional copies for insertion in equipment instruction books as required. All such copies shall be clearly marked "AS CONSTRUCTED."
- f. Work requiring a Compliance Submittal shall not be commenced or shipped until the Submittal has been stamped "Submittal Accepted" or "Submittal Accepted as Noted" by the OWNER.
- g. Keep a copy or sample of each Compliance Submittal in good order at the site.

3. Quantity Requirements:

- a. Except as otherwise specified, transmit all manufacturer's or fabricator's Shop Drawings in the quantity as follows:
 - i. Initial Submittal: Seven copies including one reproducible to OWNER. Two copies will be returned to CONTRACTOR.
 - ii. Resubmittals: Seven copies including one reproducible to OWNER. Two copies will be returned to CONTRACTOR.
 - iii. Submittal for Final Distribution: Four copies to OWNER.
 - iv. As-Constructed Prints: Three copies including one reproducible to OWNER.
- b. Transmit Submittals of product data as follows:
 - i. Initial Submittal: Seven copies to OWNER. Two copies will be returned to CONTRACTOR.
 - ii. Resubmittals: Seven copies to OWNER. Two copies will be returned to CONTRACTOR.
 - iii. Submittal for Final Distribution: Four copies to OWNER.
- c. Transmit Submittals of material Samples, color charts, and similar items as follows:
 - i. Initial Submittal: Six to OWNER.
 - ii. Resubmittal: Six to OWNER.
 - iii. Upon approval, one Sample will be returned to CONTRACTOR.
- d. Transmit Submittals of equipment instruction books as follows:
 - i. Initial Submittal: Three copies to OWNER. One copy will be returned to CONTRACTOR.
 - ii. Resubmittals: Three copies to OWNER. One copy will be returned to CONTRACTOR.
 - iii. Submittal for Final Distribution: Three copies to OWNER.
- e. Transmit Submittals for Reference Only: Three copies to OWNER.

4. Copies of the equipment contractor's erection drawings and other Compliance Submittals required for the installation of equipment furnished by others under separate contract for installation under this Contract will be transmitted to CONTRACTOR by the OWNER in the final distribution of such Submittals.
 5. Information to Manufacturer's District Office: Manufacturers and Suppliers of Equipment and Materials shall furnish copies of all agreements, drawings, specifications, operating instructions, correspondence, and other matters associated with this Contract to the manufacturer's district office servicing the OWNER. Insofar as practicable, all business matters relative to Equipment and Materials included in this Contract shall be conducted through such local district offices.
- D. OWNER'S Review:
1. The OWNER will review and return Compliance Submittals to CONTRACTOR with appropriate notations via OWNER. Instruction books and similar Submittals will be reviewed by the OWNER for general content but not for substance.
 2. The OWNER'S acceptance of Compliance Submittals will not relieve CONTRACTOR from his responsibility as stated in the GENERAL TERMS & CONDITIONS.
- E. Compliance Submittal Action Stamp:
1. The OWNER'S review action stamp, appropriately completed, will appear on all Compliance Submittals of CONTRACTOR when returned by the OWNER. Review status designations listed on OWNER'S action stamp are defined as follows:
 - a. "ACCEPTED AS SUBMITTED": Signifies Equipment or Material represented by the Submittal conforms with the design concept and complies with the intent of the Contract Documents and is acceptable for incorporation in the Work. CONTRACTOR is to proceed with fabrication or procurement of the items and with related Work. Copies of the Submittal are to be transmitted to the OWNER for final distribution.
 - b. "ACCEPTED AS NOTED": Signifies Equipment and Material represented by the Submittal conforms with the design concept and complies with the intent of the Contract Documents and is acceptable for incorporation in the Work subject to the condition that as constructed it shall be in accordance with all notations and/or corrections indicated. CONTRACTOR is to proceed with fabrication or procurement of the items and with related Work in accordance with OWNER'S notations.
 - c. "RETURNED FOR REVISION": Means that deviations from the requirements of the Contract Documents exist in the submittal. CONTRACTOR is to resubmit revised information responsive to OWNER'S annotations on the returned Submittal or written in the letter of transmittal. Fabrication or procurement of items represented by the Submittal and related Work is not to proceed until the Submittal is approved.
 - d. "NOT ACCEPTABLE (SUBMIT ANEW)": Signifies Equipment and Material represented by the Submittal does not conform with the design concept or comply with the intent of the Contract Documents and is disapproved for use in the Work. CONTRACTOR is to submit Compliance Submittals responsive to the Contract Documents.
 - e. "PRELIMINARY SUBMITTAL": Signifies Submittals of such preliminary nature that a determination of conformance with the design concept or compliance with the intent of the Contract Documents must be deferred until additional information is furnished. CONTRACTOR is to submit such additional information to permit layout and related activities to proceed.
 - f. "FOR REFERENCE ONLY": Signifies Submittals which are for supplementary information only; pamphlets, general information sheets, catalog cuts, standard sheets, bulletins and similar data, all of which are useful to the OWNER in design, operation, or

maintenance, but which by their nature do not constitute a basis for determining that items represented thereby conform with the design concept or comply with the intent of the Contract Documents. The OWNER reviews such Submittals for general content but not for substance.

- g. "DISTRIBUTION COPY (PREVIOUSLY ACCEPTED)": Signifies Submittals which have been previously accepted and are being distributed to CONTRACTOR, OWNER, Resident Project Representative, and others for coordination and construction purposes.

F. Instruction Books / Operation & Maintenance Manuals:

1. Equipment instruction books and manuals shall be prepared by the manufacturer and shall include the following:
 - a. Index and tabs
 - b. Instructions for installation, start-up, operation, inspection, maintenance, parts lists and recommended spare parts, and data sheets showing model numbers
 - c. Applicable drawings
 - d. Name of contact person, phone number, and address of the nearest authorized service facility
 - e. Attached to the above shall be a notice of the exact warranty effective dates, beginning and ending.
 - f. All additional data specified
2. Information listed above shall be bound into hard-back binders of three-ring type. Sheet size shall be 8-1/2 x 11. Binder color shall be yellow for Electrical and Electronics and brown for Miscellaneous Equipment. Capacity shall be a minimum of 1-1/2-inch, but sufficient to contain and utilize sheets with ease.
 - a. The following information shall be imprinted, inserted, or affixed by label on the binder front cover:
 - i. Equipment name
 - ii. Manufacturer's name
 - iii. Project name
 - iv. Contract number
 - v. Reference to applicable Drawing No. & Technical Specifications Section
 - b. The following information shall be imprinted, inserted, or affixed by label on the binder spine:
 - i. Equipment name
 - ii. Manufacturer's name
 - iii. Project Name
 - iv. Contract number
 - v. Reference to applicable Drawing No. & Technical Specifications Section
 - c. Format: The overall manual should be constructed around certain types of structures or equipment in the project, and not merely assembled by technical specification section, so that all pertinent data needed by personnel to operate or maintain the equipment or structure is in one binder (as far as is practical). The CONTRACTOR shall coordinate with the OWNER as to how the manuals are to be assembled.

G. Samples:

1. Office samples shall be of sufficient size and quantity to clearly illustrate the following:
 - a. Functional characteristics of the product, with integrally related parts and attachment devices
 - b. Full range of color, texture, and pattern

1.04 MISCELLANEOUS SUBMITTALS:

A. Miscellaneous Submittals are comprised of technical reports, administrative Submittals, and guarantees which relate to the Work, but do not require OWNER'S approval prior to proceeding with the Work. Miscellaneous Submittals may include but are not limited to (at OWNER'S discretion):

1. Welder qualification tests
2. Welding procedure qualification tests
3. X-ray and radiographic reports
4. Field test reports
5. Concrete cylinder test reports
6. Certification on Materials:
 - a. Steel mill tests
 - b. Paint lab tests
 - c. Cement tests
7. Soil test reports
8. Temperature records
9. Shipping or packing lists
10. Job progress schedules
11. Equipment and Material delivery schedules
12. Progress photographs
13. Warranties and guarantees
14. Fire protection and hydraulic calculations
15. Surveying field notes
16. Pump tests
17. Traffic control plan

B. Transmittal of Miscellaneous Submittals:

1. All Miscellaneous Submittals furnished by Subcontractors, manufacturers, and Suppliers shall be submitted to OWNER by CONTRACTOR unless otherwise specified.
 - a. Identify each miscellaneous Submittal by Project name and number, Contract title and number, and the specification section and article number marked thereon or in the letter of transmittal. Unidentifiable Submittals will be returned for proper identification.
 - b. At the time of each submission, call to the attention of the OWNER in the letter of transmittal any deviations from the requirements of the Contract Documents.
2. Quantity Requirements:
 - a. Technical reports and administrative Submittals except as otherwise specified: Four copies to OWNER

- b. Written Certificates and Guarantees: Two copies to OWNER
- 3. Test Reports:
 - a. Responsibilities of CONTRACTOR and OWNER regarding tests and inspections of Equipment and Materials and completed Work are set forth elsewhere in these Contract Documents.
 - b. The party specified responsible for testing or inspection shall in each case, unless otherwise specified, arrange for the testing laboratory or reporting agency to distribute test reports as follows:
 - i. OWNER: Two copies
 - ii. Resident Project Representative: One copy
 - iii. CONTRACTOR: Two copies
 - iv. Manufacturer or supplier: One copy
- C. OWNER'S Review:
 - 1. OWNER will review Miscellaneous Submittals for indications of Work or material deficiencies.
 - 2. OWNER will respond to CONTRACTOR on those Miscellaneous Submittals which indicate Work or material deficiency.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

- 3.01 SUBMITTAL LOG: CONTRACTOR shall maintain an accurate Submittal Log and a Distribution List for the duration of the Work, showing current status of all Submittals and Distributees at all times in a form acceptable to the OWNER. CONTRACTOR shall make the Submittal Log available to the OWNER for its review on request, and shall bring a copy of the Submittal Log to all Progress Meetings.

END OF SECTION

SECTION 01310 CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.01 SCOPE:

- A. Construction Progress Schedule: The CONTRACTOR shall submit a detailed work progress schedule showing all work in a graphic format suitable for displaying scheduled and actual progress. The Owner will review and comment on the schedule. Upon agreement, the CONTRACTOR shall furnish the Owner prints of the accepted schedule. The CONTRACTOR shall not change the accepted work progress schedule without prior concurrence of the OWNER. The schedule shall show actual progress and any proposed changes in the schedule of the remaining work.
- B. The WORK under this contract will be planned, scheduled, executed, and reported by the CONTRACTOR using a cost-loaded CPM (Critical Path Method) schedule with a coding structure specified by the OWNER. The CONTRACTOR will adhere to established technical standards for CPM scheduling using a computerized precedence diagram method. The CONTRACTOR is required to provide baseline and status data in hard copy and electronic (CD) format as specified herein.
- C. The CONTRACTOR is responsible for coordinating its own schedules (including subcontractors) as well as the construction activities of others as required to fully execute the Work. The OWNER'S goal is to maintain the overall Construction Program Schedule, of which the CONTRACTOR'S Construction Schedule will be a part.

1.02 SOFTWARE/INTERFACE REQUIREMENTS:

- A. The CONTRACTOR shall use CPM scheduling software to produce the contract schedules and reports as specified herein. This software shall be Primavera Enterprise Scheduling Software (P3e/c) or a compatible format such as Primavera Contractor. To assure this compatibility, the OWNER will provide an electronic database file that contains the required coding structure(s). This file will be provided to the CONTRACTOR upon award.
- B. Within ten (10) calendar days of the Notice of Award, the CONTRACTOR shall submit, for review and approval by the OWNER, descriptive information on the proposed CPM software to be used.

1.03 QUALITY ASSURANCE:

- A. The CONTRACTOR shall perform the work covered by this Section with personnel having substantial experience in the use of computer based scheduling programs on construction projects for the development and maintenance of the schedule throughout the project duration.
- B. It is the responsibility of the CONTRACTOR to work with each subcontractor and supplier to obtain information pertinent to the planning and updating of their respective activities in the schedules.

1.04 DEALING WITH SUBSTITUTES:

- A. All versions of the CONTRACTOR'S schedule (including Construction Schedule Revisions) shall be based solely on the WORK as awarded, and shall exclude any substitute proposals, even if the CONTRACTOR pursues a substitution in accordance with the provisions of the Contract.
- B. The OWNER'S final determination on any proposed substitutions may not be made until after the CONTRACTOR'S Construction Schedule is prepared and accepted. Accepted proposed substitutions shall be handled in the schedule as change orders.

1.05 USE OF FLOAT:

- A. Total Float is the amount of time a scheduled activity can be delayed without delaying the completion of the Work beyond the contractually required end date. Contract Float is the number of days between the CONTRACTOR'S anticipated date for early completion of the WORK, or specified part, and the corresponding Contract Time. Total Float and Contract Float belong to the project and are not for the exclusive benefit of any party. They shall be available to the OWNER, their consultants, or the CONTRACTOR to accommodate changes in the WORK or to mitigate the effect of events which may delay performance or completion. The OWNER will monitor and optimize the use of float for the benefit of the Project.
- B. The CONTRACTOR shall adjust or remove any float suppression techniques (e.g., preferential sequencing, crew movements, equipment use, form reuse, etc.), extended durations, imposed dates and others, as a prerequisite to a request for an increase in Contract Price or Contract Time. Use of constraints should be minimized and require approval by the OWNER.

1.06 EARLY COMPLETION:

- A. An early completion schedule is one which anticipates completion of all or a specified part of the work ahead of the corresponding Contract Time. Since Contract float belongs to the project, the CONTRACTOR shall not be entitled to any extension in Contract Time or recovery for any delay incurred because of extensions in an early completion date until all contract float is used or consumed and performance or completion of the WORK extends beyond the Contract Time.

1.07 NON-COMPLIANCE:

- A. The OWNER shall refuse to recommend/authorize progress payment if, in the OWNER'S opinion, the CONTRACTOR'S failure, refusal or neglect to provide the required schedule information precludes the proper evaluation of the CONTRACTOR'S progress. Remedies for the CONTRACTOR'S failure, neglect or refusal to comply with the requirements of this Section are in addition to, and not in limitation of, those provided under other sections of the Contract.

PART 2 - PRODUCTS

2.01 GENERAL CRITERIA:

- A. All Construction Schedules shall be prepared by the CONTRACTOR and reflect the CONTRACTOR'S plans, means and methods, techniques and sequences for performing of the work.
- B. The Contract Schedules shall break down the work into distinct activities with interdependencies to the extent required to clearly depict the planned approach for completion of the WORK and to effectively manage the execution of the Work. The contract Schedules shall divide the WORK into manageable and logical segments and specify the progression from the Notice to Proceed to Final Acceptance within Contract Time. The Construction Schedule is to include appropriate time allowances for submittals, procurement, coordination with others, construction, start-up and performance testing. Site-related activities shall not reflect a combination of work located in separate structures, work corresponding to different divisions of the specifications, work performed by first and second tier subcontractors or rough in and finish work of the same trade.
- C. The CONTRACTOR'S Construction Schedule shall reflect the timely delivery of all permanent materials. Procurement activities should include preparation, review and acceptance of shop drawings, material fabrication and material deliveries.
- D. The CONTRACTOR shall schedule any requirements (such as submittal reviews) of the OWNER, the DESIGN CONSULTANT and others (performing work for the OWNER) indicated in, or required by

the Contract Documents. The Construction Schedule shall incorporate appropriate activities and work sequences based on the Contract Documents.

2.02 COST LOADING:

- A. Each activity in the Contract Schedules shall be assigned a dollar value in accordance with the physical value of that work in relationship to the Schedule of Values. The total budget value of all activities shall equal the Contract Price as broken down by the Schedule of Values. The CONTRACTOR shall also indicate the estimated duration for each construction activity and material quantities for all activities such as the following classifications of work:

CY	Cast in Place Concrete
CY or LF	Earthwork (Excavation)
CY or LF	Earthwork (Embankment)
TONS	Reinforcement Steel
SF	Concrete Formwork
EA	Mechanical and Process Equipment
AC	Clearing
AC	Grassing
SY	Geo-grid
DAYS	Dewatering

Schedules not containing such breakdown will not be accepted.

- B. If the WORK includes items covered by allowances, the CONTRACTOR shall cause that work to be done within the limits of the Contract Time. The Construction Schedule shall incorporate the CONTRACTOR'S best estimate of the activities and logic associated with the allowances.

2.03 CONSTRUCTION SCHEDULE SUBMITTAL:

- A. The Construction Schedule submittal is to consist of a Detailed Construction Schedule Graphic Report, Schedule Narrative report, and an electronic copy of the schedule data.
- B. The Schedule Narrative Report shall consist of a written description of how the work will be accomplished in accordance with the planned Construction Schedule. The Schedule Narrative accompanying each Schedule Update shall, at a minimum, compare current early dates against baseline dates for all milestones and discussions of progress and/or delays. It shall provide sufficient detail to allow the OWNER to verify the progress of the WORK, compare actual versus planned activities, identify assumptions made in scheduling change order work, describe actual or potential delays and related causes, define steps taken to mitigate delay impacts and itemize any proposed changes in network activities and logic. The CONTRACTOR shall direct specific attention, in writing, to adjustments or corrections made, either in response to the OWNER'S comments on the previous submittal or otherwise.
- C. The Schedule Narrative shall include cost data on monthly and cumulative totals for all items depicted in the Schedule of Values as statuses in the current revision of the Construction Contract Schedule. There shall be an additional report required to account for stored materials utilizing the specified Stored Materials Report form.
- D. The Construction Schedule Graphic Report shall be in bar chart format, plotted on a time-scaled calendar. This report will expressly identify Contract Time, milestones, critical path(s), and all activities not completed as of the previous report submission. Activities shall display early dates and total float. Whether on the same sheet or on different sheets, this report shall identify both predecessor and successor driving or critical relationships. Activity data shown on the graphic report shall include a short description of the work, activity duration, remaining duration (for monthly schedule updates),

activity start and finish dates, budget and actual earned value, and be sorted in an order that facilitates reading and following the progress of the scheduled work.

- E. Prior to each schedule update submittal the OWNER and the CONTRACTOR will agree upon the physical progress of the WORK (Percent Complete of each activity) and the value of the scheduled work in place.
- F. The CONTRACTOR shall provide six copies of each Construction Schedule Submittal. The CONTRACTOR'S Construction Schedule shall bear the CONTRACTOR'S stamp of approval signed by the CONTRACTOR. The CONTRACTOR'S stamp of approval shall constitute a representation to the OWNER that the CONTRACTOR has determined or verified all data on that CONTRACTOR'S Construction Schedule and assumes full responsibility for having done so. The OWNER will review and return to the CONTRACTOR two copies of the CONTRACTOR'S Construction Schedule stamped as either "Returned For Revision", "Accepted As Noted", or "Accepted As Submitted". The OWNER'S review shall not extend to the CONTRACTOR'S means, methods, or techniques, the correctness of which shall remain the sole responsibility of the CONTRACTOR.
- G. All schedules shall be in accordance with the Contract Time requirements of the contract. Neither the OWNER'S review of a schedule, nor the OWNER'S statement of "Accepted As Submitted", will relieve the CONTRACTOR from responsibility for complying with Contract Time requirements, adhering to those sequences of work indicated in or required by the contract documents, or from completing any omitted work within the Contract Time.
- H. Acceptance by the OWNER of the Construction Contract Schedule and Construction Schedule Updates shall be a CONDITION PRECEDENT to the processing of Applications for Payment after the first 30 days of the Contract.

2.04 INITIAL AND REVISED CONSTRUCTION CONTRACT SCHEDULE:

- A. Within 45 days of Notice of Award or 30 days of Notice to proceed, whichever is earlier, the CONTRACTOR shall submit their Initial Construction Contract Schedule Submittal to the OWNER for review and acceptance. It will be reviewed for constructability and conformance to the requirements of the Contract Documents. If the schedule is not accepted and requires revisions, the CONTRACTOR will, within 14 calendar days, revise this Initial Construction Contract Schedule and resubmit it for review and acceptance.
- B. Once the Initial Construction Contract Schedule is reviewed and accepted, it becomes the CONTRACTOR'S Revision 0 Construction Contract Schedule and it becomes the baseline schedule for the WORK and is the basis for monitoring the CONTRACTOR'S progress against milestones and Contract Time, and the evaluation and reconciliation of extensions in Contract Time. From then on, all activities and their relationships may not be changed, added, or deleted without the prior consent of the OWNER. The CONTRACTOR'S Revision 0 Construction Contract Schedule must be revised when it is no longer useful as a status and control mechanism as determined by the OWNER. All changes must be coordinated with and approved by the OWNER. Contract Time (including all contracted milestones) cannot be changed without a formal Change Order approved by the OWNER. Each subsequent accepted Revised Construction Contract Schedule will be numbered sequentially higher by one (1), with the first revision being the Revision 1 Construction Contract Schedule.
- C. When the time comes that Revision # Construction Contract Schedule is required, a new revised Construction Contract Schedule will be submitted in accordance with change procedures, for review and acceptance by the OWNER. Construction Schedule Revisions shall accurately reflect all approved Change Orders including the exact duration and cost. It will be reviewed for constructability and conformance to the requirements of the Contract Documents as amended by Change Orders. If the schedule is not accepted and requires revisions, the CONTRACTOR will, within 10 business days, revise this Initial Construction Schedule and resubmit it for review and acceptance. Re-submittals shall use the same revision number followed by letters as "A", "B", etc., as needed to distinguish the submittal as revised from the previous.

2.05 SCHEDULE UPDATES:

- A. A Schedule Update is submitted by the CONTRACTOR each month based upon the current accepted revision of the Construction Contract Schedule. It will indicate actual performed work and work forecast through project completion. The actual schedule data shall record when work was performed. Forecast data will be calculated by the schedule and indicate how the CONTRACTOR intends to complete the remaining Work within Contract Time. The Schedule Update submittal will be in the form explained above.

PART 3 - EXECUTION

3.01 MONTHLY UPDATE CYCLE:

- A. Schedule Update Submittals are due monthly on the 28th day of the month with a data date of the 27th and are to be attached to each Application for Payment.

3.02 CHANGES:

- A. Within ten (10) days after a schedule problem is identified by either contractor or OWNER, or at any time the percentage of the dollar value for completed work is 10 percent or more or less than the value of the scheduled work, the CONTRACTOR shall submit a Construction Contract Schedule Revision that identifies the cause of the Change and any actions required by the CONTRACTOR to recover the schedule and complete the Work within Contract Time. The CONTRACTOR shall promptly undertake appropriate action, at no additional cost to the OWNER, to recover the schedule whenever the current schedule shows that the CONTRACTOR did not or can not achieve a milestone established in the Contract.
- B. Appropriate recovery actions include, but are not limited to, assignment of additional labor, subcontractors, equipment, shift or overtime work, expediting of submittal or deliveries, or any combination of thereof. Overlapping of activities or sequencing changes shall be deemed appropriate only if properly substantiated in the submittal. Recovery plans that require a change in the Construction Contract Schedule must be submitted as a Revision in accordance with this specification.
- C. The CONTRACTOR'S refusal, failure or neglect to take appropriate recovery action or to submit a written recovery statement shall constitute reasonable evidence that the CONTRACTOR is not prosecuting the WORK, or separable part, with the diligence that will ensure its completion within the Contract Time. Such lack of action shall constitute sufficient basis for the OWNER to recommend the withholding of some or all of any payment due and/or shall be considered grounds for termination of the contract by the OWNER in accordance with the General Terms & Conditions.

END OF SECTION

SECTION 01320 CONSTRUCTION VIDEO AND PHOTOGRAPHS

PART 1 - GENERAL

1.01 SUMMARY:

- A. This Section specifies administrative and procedural requirements for construction photographs.

1.02 SUBMITTALS:

- A. Submit prints as specified in SECTION 01300 Submittals and in PART 3, this Section.

1.03 QUALITY ASSURANCE:

- A. Photographs and video shall be clear and sufficient to show significant detail, not blurred, or taken in shadow, nor too distant. The City of Pompano may require that the photographs or video be retaken should the quality be insufficient. Costs for such re-takes are the contractor's responsibility at no extra cost to the City of Pompano.

PART 2 - PRODUCTS

- 2.01 PHOTOGRAPHIC REQUIREMENTS: Specified in PART 3, this Section.

PART 3 - EXECUTION

3.01 COLOR AUDIO VIDEO TAPING OF CONSTRUCTION AREA:

- A. Prior to beginning any construction, the CONTRACTOR shall prepare a color audio video recording of all the areas to be affected by construction in digital video format.
- B. The audio video recording shall be done within the two-week period prior to placement of materials or equipment on the construction area and furnished one week prior to the start of construction. The audio video recording shall be done with a City of Pompano Representative present.
- C. To preclude the possibility of tampering or editing in any manner, all video recordings shall, by electronic means, generate and display continuously and simultaneously on the screen digital information to include the date and time of recording. The time information shall consist of hours, minutes and seconds, separated by colons (i.e., 10:35:18).
- D. The audio video recording shall consist of one video and one audio track which shall be recorded simultaneously. All tracks shall consist of original live recordings and thus shall not be copies of other audio and video recordings. The audio track shall contain the narrative commentary.
- E. The rate of speed in the general direction of travel of the conveyance used during recording shall be controlled to provide a usable image. Panning rates and zoom-in, zoom-out rates shall be controlled sufficiently such that playback will produce clarity of the object viewed.
- F. All recording shall be done during times of good visibility. No recording shall be done during periods of visible precipitation, unless otherwise authorized by the City of Pompano.
- G. The City of Pompano shall have the authority to designate what areas may be omitted or added for audio video coverage.
- H. When conventional wheeled vehicles are used, the distance from the camera lens to the ground shall not be less than eight feet to insure perspective.

- I. In some instances, audio video coverage will be required in areas not accessible by conventional wheeled vehicles. Such coverage shall be obtained by walking or special conveyance by the City of Pompano.
- J. Areas covered shall include offsite roadways that will be subjected to heavy usage such as for haul routes or delivery of heavy components or equipment.

3.02 PROGRESS SITE PHOTOGRAPHS:

- A. The CONTRACTOR shall be responsible for photographs of the site to show the existing and general progress of the Work. The City of Pompano will advise as to which views are of interest. Photographs shall be taken of the following areas and at the following times.
 - 1. Existing site conditions before site work is started. Number of views shall be adequate to cover the site.
 - 2. Progress of the Work from beginning and throughout construction. Progress photos must be provided with each pay request. Pay requests will not be considered acceptable until photographs are provided. Number of views shall be adequate to cover the site.
 - 3. Finished Project after completion of Work. Number of views shall be adequate to show the finished Work.
 - 4. If Project is not completed during the Contract Time, or authorized extensions, photographs shall continue to be taken at no increase in Contract Price.
- B. Photographs shall be taken with digital media (3 megapixel minimum resolution).
- C. Prints shall be color, smooth glossy finish, 8" x 10" inserted into archival quality polypropylene photographic binder pages punched for insertion into 3-ring binder. Provide three prints of each view.
- D. Identify all prints on back of each view with a label as to the name and Contract number of Project, name of CONTRACTOR, description of view, and date photograph was taken. Prints shall also bear the photographer's name or trademark.
- E. Provide a CD containing all photographic images in JPG format. Label CD as in Item 3.02.D.
- F. Deliver prints and CD to the City of Pompano with pay applications.

3.03 ADDITIONAL PHOTOGRAPHS:

- A. From time to time the City of Pompano may issue requests for additional photographs, in addition to periodic photographs specified. Additional photographs will be paid for by Change Order, and are not included in the Contract Price or an Allowance.
 - 1. The City of Pompano will give the photographer 3 days' notice, where feasible.
 - 2. In emergency situations, the photographer shall take additional photographs within 24 hours of the City of Pompano's request.
 - 3. Circumstances that could require additional photographs include, but are not limited to:
 - a. Substantial Completion of a major phase or component of Work.
 - b. City of Pompano's request for special publicity photographs.
 - c. Special events planned at Project site.
 - d. Immediate follow-up when on-site events result in construction damage or losses.
 - e. Photographs to be taken at fabrication locations away from Project site.
 - f. Extra record photographs at time of final acceptance.

END OF SECTION

SECTION 01410 TESTING AND QUALITY CONTROL

PART 1 - GENERAL

1.01 CONTRACTOR QUALITY CONTROL: The CONTRACTOR shall provide and maintain an effective quality control program that fulfills the requirements of Articles including but not limited to “*Warranty; Safety, Protection of Work and Property; Contract Payments; Withholding Payments to Contractor; Inspection/Rejection of Material and Workmanship*” of the GENERAL TERMS & CONDITIONS.

- A. Establish a quality control system to perform sufficient inspection of all items of Work, including that of Subcontractors, to insure conformance to the Specifications and Drawings with respect to the materials, workmanship, construction, equipment performance, and identification.
- B. The CONTRACTOR's job supervisory staff may be used for quality control, supplemented as necessary by additional personnel for surveillance or special technicians to provide capability for the controls required by the Technical Specifications. The CONTRACTOR's quality control plan must clearly identify the quality control leader and personnel organizational system. The leader must have the authority to direct the removal and replacement of work.
- C. After the Contract is awarded and before construction begins, the CONTRACTOR shall meet with the City of Pompano or its representative to discuss quality control requirements. The meeting shall develop mutual understanding relative to details of the system, including the CONTRACTOR's forms to be used for recording the quality control operations, inspections, administration of the system, and the interrelationship of CONTRACTOR and the City of Pompano inspection.
- D. All compliance inspections shall be recorded on appropriate forms, including but not limited to the specific items required in each section of the Technical Specifications. Those forms, including record of corrective actions taken, shall be furnished to the City of Pompano. The City of Pompano's quality control representative shall maintain a check off list of all deficiencies which are not corrected the same day as they are discovered.
- E. Should recurring deficiencies in an item or items indicate that the quality control system is not adequate, the CONTRACTOR shall take such corrective actions as may be directed by the City of Pompano.
- F. CONTRACTOR shall submit his written quality control plan for review, describing the activities and listing those inspection and testing activities that the CONTRACTOR will perform prior to beginning the Work. The CONTRACTOR's Quality Control Plan shall describe how he will communicate timely notification to allow for test and inspection activities performed by the City of Pompano, or its representatives, for on and off-site construction activities.

1.02 TRANSMITTAL OF TEST REPORTS:

- A. Any written reports of tests and /or engineering data furnished by CONTRACTOR shall be submitted as specified in SECTION 01300.

END OF SECTION

SECTION 01510 TEMPORARY UTILITIES AND FACILITIES

PART 1 - GENERAL

1.01 SUMMARY:

- A. This Section includes requirements of a temporary nature not normally incorporated into final Work. It includes the following:
 - 1. Utility services
 - 2. Construction and support facilities
 - 3. Construction aids
 - 4. Fire protection
- B. Related Work Specified Elsewhere:
 - 1. Barriers and Temporary Controls: SECTION 01530

1.02 REFERENCES:

- A. American National Standards Association (ANSI):
 - 1. A10 Series - Safety Requirements for Construction and Demolition
- B. National Electrical Contractors Association (NECA):
 - 1. Electrical Design Library - Temporary Electrical Facilities
- C. National Fire Protection Association (NFPA):
 - 1. NFPA 10 - Portable Fire Extinguishers
 - 2. NFPA 70 - National Electrical Code
 - 3. NFPA 241 - Safeguarding Construction, Alterations, and Demolition Operations
- D. National Electrical Manufacturers Association (NEMA)
- E. Underwriters Laboratories (UL)
- F. Florida Department of Transportation Standard Specifications for Road and Bridge Construction
- G. Florida Trench Safety Act (90-96, Laws of Florida)

1.03 SUBMITTALS:

- A. Site Plan: Submit to the City of Pompano a Site Plan indicating CONTRACTOR's facilities including:
 - 1. Trailers
 - 2. Equipment Yard
 - 3. Parking
 - 4. Traffic Control

1.04 QUALITY ASSURANCE:

- A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction, including but not limited to:

1. Building Code requirements
 2. Utility company regulations
 3. Police, Fire Department, and rescue squad rules
 4. Environmental protection regulations
- B. Standards:
1. Comply with NFPA 10 and 241, and ANSI A10 Series standards "Temporary Electrical Facilities."
 2. Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70.
- C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT:

- A. Provide new materials and equipment. If acceptable to the City of Pompano, undamaged previously used materials and equipment in serviceable condition may be used. Provide materials and equipment suitable for the use intended, of capacity for required usage, and meeting applicable codes and standards. Comply with requirements of DIVISIONS 2 through 16.
- B. Water: Provide potable water approved by local health authorities. Contractor is responsible for temporary water hookup and metering to approved hydrant.
- C. Water Hoses: Provide 3/4-inch (19-mm), heavy-duty, abrasion-resistant, flexible rubber hoses 100 feet (30 m) long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.
- D. Electrical Outlets: Provide properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120V plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.
- E. Electrical Power Cords: Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
- F. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide exterior fixtures where exposed to moisture.
- G. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.01 TEMPORARY UTILITIES:

- A. General:

1. Engage the appropriate local utility company to extend temporary electric and phone service to the Project area from nearby existing utilities. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.
2. Provide adequate utility capacity at each stage of construction. Prior to availability of temporary utilities at the site, or in remote areas without services, provide trucked-in services as required for start-up and construction operations.
3. Furnish, install and maintain temporary utilities required for adequate construction, safety and security. Modify, relocate and extend systems as Work progresses. Repair damage caused by installation or use of temporary facilities. Grade the areas of site affected by temporary installations to required elevations and grades, and clean the area. Remove on completion of Work or until service or facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
4. The types of temporary construction utilities and facilities required include, but are not limited to, potable drinking water, wastewater, drainage, dewatering equipment, enclosure of Work, ventilation, electrical power, lighting, hoisting facilities, stairs, ladders, and roads.
5. Inspect and test each service before placing temporary utilities in use. Arrange for required inspections and tests by governing authorities, and obtain required certifications and permits for use.
6. Materials used for temporary service shall not be used in the permanent system unless so specified or acceptable to the City of Pompano.

3.02 TEMPORARY ELECTRICITY AND LIGHTING:

A. New Service:

1. Arrange with utility company to extend existing electric service to temporary facilities.
2. Connect temporary service in a manner directed by utility company officials. Provide separate meter for metering of power used by all entities authorized to be at or perform Work at the Project site.
3. The electric service shall be of sufficient capacity and characteristics for the various construction tools, machinery, lights, heating and air conditioning, pumps, and other tools required by CONTRACTOR and his Subcontractors. In areas of the project where permanent or temporary power service from the local utility is not available, the CONTRACTOR shall supply and maintain engine-driven, power-generator sets.
4. Provide weatherproof, grounded, power distribution system sufficient to accommodate construction operations requiring power, use of power tools, electrical heating and lighting. Provide overload protection. Supply power for electric welding, if any, from engine-driven, power-generator sets.
5. Provide adequate artificial lighting for all areas of Work when natural light is not adequate for Work.
6. Sufficient light shall be provided for general construction areas, with additional sufficient lighting for specific tasks and to meet safety requirements.

B. Use of Permanent System:

1. Prior to use of permanent system to be installed by the power company for construction purposes, obtain written permission of the City of Pompano.
2. Maintain permanent system as specified for temporary facilities.

C. Costs of Installation and Operation:

1. Pay fees and charges for permits and applications.
2. Pay costs of installation, maintenance, removal of temporary services, and restoration of any permanent facilities used.
3. Pay costs of electrical power used (if applicable).
4. Pay costs of furnishing, operating, and maintaining engine-driven power-generator sets, where applicable.

3.03 TEMPORARY HEAT AND VENTILATION:

A. General:

1. Provide temporary heat, ventilation and cooling as required to maintain adequate environmental conditions in temporary office trailers and storage sheds and to facilitate progress of the Work, to meet specified minimum conditions for the installation of materials, and to protect materials and finishes from damage. Protect from adverse affects of low temperatures or high humidity, and to prevent hazardous accumulations of dust, fumes, vapors, or gases.
2. Methods of heating and fuel shall be suitable for particular purposes. Portable heaters shall be standard approved units with controls.

B. Costs of Installation and Operation:

1. Pay fees and charges for applications, permits, and inspections.
2. Pay costs of installation, operation, maintenance, removal of equipment, and restoration of existing or permanent facilities if used.
3. Pay cost of power and fuel used.

3.04 TEMPORARY TELEPHONE SERVICE:

A. General:

1. Arrange with local telephone service company to extend existing direct line telephone service to the CONTRACTOR's and City of Pompano's temporary facilities for the use of the City of Pompano and construction personnel and employees.
2. Telephone Service: Bell South - Phone # 561-780-2800.
3. Minimum Service Required: Direct lines for voice and data.
 - a. One direct line instrument in temporary facilities.
 - b. Adequate number of service lines and instruments for needs of trades.
 - c. Other instruments and pay telephone station(s) at the option of the CONTRACTOR, or as required by regulations.
 - d. Provide a dedicated telephone line for a fax machine in temporary facilities.
4. CONTRACTOR shall arrange with local cellular/mobile telephone service company to provide mobile telephone service for use by CONTRACTOR and so CONTRACTOR can be reached throughout the entire project area during normal working hours.

B. Costs of Installation and Operation:

1. Pay all costs for installation, maintenance and removal, and service charges for local calls. Toll charges shall be paid by the party who places the call.

3.05 TEMPORARY SANITARY FACILITIES:

A. CONTRACTOR-Furnished Facilities:

1. Furnish, install and maintain temporary sanitary facilities for use through construction period. Remove on completion of Work.
2. Provide for all construction workers under this Contract and representatives at the site.
3. Toilet facilities shall be of the chemical-aerated recirculation or combustion type, properly vented and fully enclosed with a glass- fiber-reinforced polyester shell or similar nonabsorbent material.

3.06 TEMPORARY CONSTRUCTION AIDS:

A. General:

1. Provide construction aids and equipment required by personnel, available for the City of Pompano observers' use, and to facilitate the execution of the Work; scaffolds, staging, ladders, stairs, ramps, runways, platforms, railings, hoists, cranes, chutes, and other such facilities and equipment.
2. Materials may be new or used, must be suitable for the intended purpose and meet the requirements of applicable codes, regulations and standards.
3. When platform stair framing is in place, provide temporary treads, platforms, and railings for use by construction personnel.

3.07 INSTALLATION AND REMOVAL:

- A. Relocation: Relocate construction aids as required by progress of construction, by storage or Work requirements, and to accommodate requirements of the City of Pompano and other Contractors at the site.
- B. Removal: Remove temporary materials, equipment and services when construction needs can be met and allowed by use of permanent construction, or at completion of the Project.
- C. Repair: Clean and repair damage caused by installation or by use of temporary facilities.
 1. Remove foundations and underground installations for construction aids.
 2. Grade the areas of the site affected by temporary installations to required elevations and clean the area.

END OF SECTION

SECTION 01530 TEMPORARY BARRIERS AND CONTROLS

PART 1 - GENERAL

1.01 SUMMARY:

- A. This Section includes General Requirements for:
 - 1. Protection of Work
 - 2. Protection of existing property
 - 3. Barriers
 - 4. Security
 - 5. Environmental controls
 - 6. Access roads and parking areas
 - 7. Traffic control and use of roadways

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 SAFETY AND PROTECTION OF WORK AND PROPERTY:

- A. General:
 - 1. Provide for the protection of the Work as set forth in GENERAL TERMS & CONDITIONS. Provide protection at all times against rain, wind, storms, frost, freezing, condensation, or heat so as to maintain all Work and Equipment and Materials free from injury or damage. At the end of each day all new Work likely to be damaged shall be appropriately protected.
 - 2. Notify the City of Pompano immediately at any time operations are stopped due to conditions which make it impossible to continue operations or to obtain proper results.
 - 3. Construct and maintain all necessary temporary drainage and do all pumping necessary to keep excavations, pits, and trenches dewatered sufficiently to permit continuous construction.
 - 4. Protect floors from damage by proper covering and care when handling heavy equipment, painting, or handling mortar or other such materials. Use proper cribbing and shoring to prevent overloading of floors while moving heavy equipment. Provide metal pans under pipe-threading machines and other machines that may leak oil and clean such pans daily, keeping oil off floors. Restore floors to former condition where damaged or stained.
 - 5. Restrict access to roofs except as required by the Work. Where access is required, provide protection with plywood, boards, or other suitable materials.
- B. Property Other than City of Pompano's:
 - 1. Provide for the protection of property as set forth in the GENERAL TERMS & CONDITIONS. Report immediately to the owners thereof and promptly repair damage to existing facilities resulting from construction operations.
 - 2. Names and telephone numbers of representatives of the power company having jurisdiction over power lines in the Work area can be obtained from the City of Pompano. CONTRACTOR shall contact the power company a minimum of 7 calendar days prior to performing Work within 500' of power transmission line property, right-of-way or easement lines.

3. The applicable requirements specified for protection of the Work shall also apply to the protection of existing property of others.
4. Restore all property affected by CONTRACTOR's operations to the original or better condition.

3.02 BARRIERS:

A. General:

1. Furnish, install, and maintain suitable barriers as required to prevent public entry, protect the public, and to protect the Work, existing facilities, trees, and plants from construction operations. Remove when no longer needed or at completion of Work.
2. Materials may be new or used, suitable for the intended purpose, but must not violate requirements of applicable codes and standards or regulatory agencies.
3. Barriers shall be of a neat and reasonable uniform appearance, structurally adequate for the required purposes.
4. Maintain barriers in good repair and clean condition for adequate visibility.
5. Relocate barriers as required by progress of Work.
6. Repair damage caused by installation and restore area to original or better condition. Clean the area.

3.03 ENVIRONMENTAL CONTROLS:

A. Dust Control:

1. If appropriate to the site location, and at the discretion of the City of Pompano, provide positive methods and apply dust control materials to minimize raising dust from construction operations.
2. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.
3. Schedule operations so that dust and other contaminants will not fall on wet or newly-coated surfaces.
4. Cover materials transported to and from site as necessary to prevent depositing material on offsite roadways or creating dust.

B. Debris Control and Clean-Up:

1. Keep the premises free at all times from accumulations of debris, waste materials, and rubbish caused by construction operations and employees. Responsibilities shall include:
 - a. Adequate trash receptacles about the site, emptied promptly when filled.
 - b. Periodic cleanup to avoid hazards or interference with operations at the site and to maintain the site in a reasonably neat condition.
 - c. The keeping of construction materials such as forms and scaffolding neatly stacked.
 - d. Immediate cleanup to protect the Work by removing splattered concrete, oil, paint, corrosive liquids, and cleaning solutions from walls, floors, and metal surfaces before surfaces are marred.
2. Prohibit overloading of trucks to prevent spillages on access and haul routes. Provide periodic inspection of traffic areas to enforce requirements.
3. Final cleanup is specified in SECTION 01700 Contract Closeout.

C. Pollution Control:

1. Provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere by the discharge of hazardous or toxic substances from construction operations.
2. Provide equipment and personnel and perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids. Excavate and dispose of any contaminated earth off-site in approved locations, and replace with suitable compacted fill and topsoil.
3. Take special measures to prevent harmful substances from entering public waters, sanitary, or storm sewers.
4. If hazardous materials are discharged, report to authorities as required by Law or Regulations and notify the City of Pompano.

3.04 TRAFFIC CONTROL AND USE OF ROADWAYS:

A. Traffic Control:

1. Provide, operate, and maintain equipment, services, and personnel, with traffic control and protective devices, as required to expedite vehicular traffic flow on haul routes, at site entrances, on-site access roads, and parking areas. This includes barricades and other devices or personnel as necessary to adequately protect the public. Prepare and submit Traffic Control Plan to the City of Pompano for acceptance.
2. Remove temporary equipment and facilities when no longer required. Restore grounds to original, better, or specified conditions.
3. Provide and maintain suitable detours or other temporary expedients if necessary.
4. Bridge over open trenches where necessary to maintain traffic.
5. Consult with governing authorities to establish public thoroughfares which will be used for site access. All operations shall meet the approval of owners or agencies having jurisdiction.

B. Maintenance of Roadways:

1. Repair off-site roads, water control or any other structures damaged by operations. Keep traffic areas as free as possible of demolition materials and maintain in a manner to eliminate dust, mud, and hazardous conditions.
2. All operations and repairs shall meet the approval of owners or agencies having jurisdiction.

3.05 SECURITY:

- A. The CONTRACTOR is solely responsible for initiating and maintaining security at the construction site. CONTRACTOR shall take all necessary precautions for the security of, and shall provide the necessary protection to:
1. Materials and equipment incorporated into the work, or stored on-site prior to incorporation into the work.
 2. Temporary facilities and sheds, and their contents.
 3. Plant and equipment including any equipment furnished for use by the City of Pompano.
- B. The CONTRACTOR shall replace, in kind, any materials or equipment lost, damaged or destroyed at its own expense.

END OF SECTION

SECTION 01580 PROJECT IDENTIFICATION AND SIGNS

PART 1 - GENERAL

1.01 SUMMARY:

- A. This Section includes basic requirements for temporary Project identification and informational signs required during construction.
- B. Related Work Specified Elsewhere:
 - 1. SECTION 1300 Submittals.

1.02 QUALITY ASSURANCE:

- A. Design sign and structure to withstand wind and environmental conditions of locality. Provide with finish adequate to withstand weathering, fading, chipping, and peeling for duration of construction.

1.03 SUBMITTALS:

- A. Submit as specified in SECTION 01300.
- B. Includes, but not limited to, the following:
 - 1. Shop Drawings and product data as applicable.
 - 2. Show content, layout, lettering, colors, structure, and foundation.

PART 2 - PRODUCTS

2.01 IDENTIFICATION SIGNS:

- A. Project Identification:
 - 1. Construct structure and framing of wood or metal, structurally adequate to resist design requirements of locality.
 - 2. Construct sign surface of minimum 3/4-inch thickness exterior grade plywood with medium density overlay. Panels shall be of size to minimize joints. Overall size shall be 48 inches by 96 inches.
 - 3. Rough hardware shall be galvanized or aluminum.
 - 4. Coating: Paint shall suitable for outdoor applications and shall be resistant to weathering, peeling, chipping and fading. Sign colors shall be approved by the City of Pompano.
 - 5. Information Content:
 - a. Project title, logo, and name of the City of Pompano as shown on Contract Documents
 - b. Names and titles of authorities
 - c. Name and title of Design Engineer
 - d. Name of prime CONTRACTOR and major Subcontractors
- B. CONTRACTOR Identification: If not part of Project identification sign, provide and install CONTRACTOR's standard sign.
- C. Design Engineer Identification: Design Engineer will provide, install and maintain his own signs.

2.02 INFORMATIONAL SIGNS:

A. Construction:

1. This includes signs for traffic, construction workers, and general public in regards to directions, warnings, hazards, locations of areas, facilities, equipment, and others of a similar nature.
2. Provide signs of design, size, color, and lettering as required by regulatory agencies. Signs shall be painted metal, wood, plastic, or fiberglass and of materials suitable for the conditions in which it is placed, such as weathering and fading.
3. Construct structure and framing of wood or metal, structurally adequate to resist design requirements of area of Project.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Project and Contractor Identification Sign:

1. Install in a location acceptable to the City of Pompano. Install so as not to obstruct traffic or construction operations.
2. Erect on framing or foundation, and rigidly brace.
3. Maintain sign in good repair, in a clean and neat condition.
4. Remove upon completion of Project.

B. Informational Signs:

1. Install at appropriate locations and in sufficient quantities to assure visibility. Relocate as required by progress of Work.
2. Maintain signs in good repair, in a neat, clean, readable condition.
3. Remove all signs, framing, supports, and foundations upon completion of Project.

END OF SECTION

SECTION 01600 EQUIPMENT AND MATERIALS

PART 1 - GENERAL

1.01 SUMMARY: This section includes general requirements for Equipment and Material transportation and handling, delivery, storage, and protection of CONTRACTOR and the City of Pompano - furnished Equipment and Materials.

A. Related Work:

1. SECTION 01630 Product Options and Substitutions
2. SECTION 01300 Submittals

1.02 DEFINITIONS: Definitions used in this paragraph are not intended to negate the meaning of other terms used in the Contract Documents, including such terms as "systems," "structure," "finishes," "accessories," "furnishings," "special construction," and similar terms. Such terms are self-explanatory and have recognized meanings in the construction industry.

- A. Products: Items purchased for incorporation in the Work, regardless of whether they were specifically purchased for the Project or taken from the previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and other terms of similar intent.
- B. Equipment: A product with operational or non-operational parts, regardless of whether motorized, manually operated, or fixed. Equipment may require service connections such as wiring or piping.
- C. Materials: Products that must be substantially cut, shaped, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form parts of Work.

1.03 QUALITY ASSURANCE:

- A. Equipment and Material Incorporated into the Work: Provide products that comply with the requirements of the Contract Documents, are undamaged, and unless otherwise indicated, are unused at the time of installation. Provide products that are complete with all accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and for the intended use and effect.
- B. Standard Products: Where they are available and comply with Specifications, provide standard products of types that have been produced and used successfully in similar situations on other projects.
- C. Continued Availability: Where, because of the nature of its application, the City of Pompano is likely to need replacement parts or additional amounts of a product at a later date, either for maintenance and repair or replacement, provide standard products for which the manufacturer has published assurances that the products and its parts are likely to be available to the City of Pompano at a later date.
 1. Conform to applicable Specifications, codes, standards, and regulatory agencies.
 2. Comply with size, make, type, and quality specified, or as specifically approved in writing by the City of Pompano.
 3. Manufactured and Fabricated Products:
 - a. Design, fabricate, and assemble in accordance with the best engineering and shop practices.
 - b. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.
 - c. Equipment and Materials shall be suitable for service conditions intended.

- d. Equipment capacities, sizes, and dimensions indicated or specified shall be adhered to unless variations are specifically approved in writing.
 - e. Provide labels and nameplates where required by regulatory agencies or to state identification and essential operating data.
 - f. Two or more items of the same kind shall be identical, supplied by the same manufacturer.
4. Do not use equipment and material for any purpose other than that for which it is designed or is specified.
- D. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.
- E. Identification: Each item of equipment shall have permanently affixed to it a label or tag with its equipment number designated in this contract. Marker shall be stainless steel and shall be located so as to be easily visible.

1.04 TRANSPORTATION AND SHIPMENT:

- A. Shipment Preparation: CONTRACTOR shall require manufacturers and suppliers to prepare Equipment and Materials for shipment in a manner to facilitate unloading and handling, and to protect against damage or unnecessary exposure in transit and storage, for CONTRACTOR supplied equipment. Provisions for protection shall include the following:
- 1. Crates or other suitable packaging materials
 - 2. Covers and other means to prevent corrosion, moisture damage, mechanical injury, and accumulation of dirt in motors, electrical equipment, and machinery
 - 3. Suitable rust-preventive compound on exposed machined surfaces and unpainted iron and steel
 - 4. Grease packing or oil lubrication in all bearings and similar items
 - 5. Precast concrete components shall be transported, lifted and stored as specified by the precast supplier. Precast supplier shall provide written instructions to the CONTRACTOR as to the above. CONTRACTOR shall provide a copy to the City of Pompano.
- B. Marking: Each item of Equipment and Material shall be tagged or marked as identified in the delivery schedule or on Submittals. Complete packing lists and bills of material shall be included with each shipment. Each piece of every item need not be marked separately, provided that all pieces of each item are packed or bundled together and the packages or bundles are properly tagged or marked.

1.05 DELIVERY, STORAGE AND HANDLING:

- A. Delivery:
- 1. Arrange deliveries of Equipment and Materials in accordance with construction schedules, in ample time to facilitate inspection prior to installation, and to avoid delay of the Work.
 - 2. Deliver, store and handle Equipment and Materials in accordance with manufacturer's recommendations using means and methods that will prevent damage, deterioration, and loss, including theft.
 - 3. Control delivery schedules to minimize long term storage at the site and to prevent overcrowding of construction spaces. In particular, coordinate delivery and installation to ensure minimum holding or storage times for items known or recognized to be flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other sources of loss.
 - 4. Avoid conflict with Work of the City of Pompano or other contractors.

5. Deliver Equipment and Materials to the site in manufacturer's sealed containers or other packaging system with identifying labels and instructions for handling, storing, unpacking, protecting, and installing.
6. Mark deliveries of component parts of equipment to identify the equipment, to permit easy accumulation of parts, and to facilitate inspection and measurement of quantity or counting of units.
7. Immediately on delivery, inspect shipment to assure:
 - a. Product complies with requirements of Contract Documents and reviewed Submittals.
 - b. Quantities are correct.
 - c. Containers and packages are intact, labels are legible.
 - d. Equipment and Materials are properly protected and undamaged.

B. Storage:

1. Store Equipment and Materials immediately on delivery, and protect until completion of the Work. Store in accordance with manufacturer's instructions with seals and labels intact and legible.
2. Store Equipment and Materials in a manner that will not endanger the supporting construction.
3. Store Equipment and Materials that are subject to damage by elements in weathertight enclosures.
4. Maintain temperature and humidity within ranges required by manufacturer.
5. Protect motors, electrical equipment, plumbing fixtures, and machinery of all kinds against corrosion, moisture deteriorations, mechanical injury, and accumulation of dirt or other foreign matter.
6. Protect exposed-machined surfaces and unpainted iron and steel as necessary with suitable rust-preventive compounds.
7. Protect bearings and similar items with grease packing or oil lubrication.
8. Handle and store steel plate, sheet metal, and similar items in a manner to prevent deformation.
9. Exterior Storage:
 - a. Provide substantial platforms, blocking, or skids to support fabricated products aboveground; and to prevent soiling or staining. Cover products subject to discoloration or deterioration from exposure to the elements, with impervious sheet coverings. Provide adequate ventilation to avoid condensation.
 - b. Store loose granular materials on solid surface areas to prevent mixing with foreign matter.
 - c. Provide surface drainage to prevent flow or ponding of rainwater.
10. Equipment and Materials shall not show any pitting, rust, decay, or other deleterious effects of storage prior to final acceptance of Work.
11. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.

C. Handling:

1. Provide equipment and personnel necessary, to unload and handle Equipment and Materials, by methods to prevent damage or soiling to Equipment and Materials, or packaging.

2. Handle by methods to prevent bending or overstressing. Where lifting points are designated, lift components only at those points.
 3. Provide additional protection to surrounding surfaces as necessary to prevent damage.
- D. Maintenance of Storage:
1. Inspect stored Equipment and Materials on a scheduled basis.
 2. Verify that storage facilities comply with manufacturer's product storage requirements, including environmental conditions continually maintained.
 3. Verify that surfaces of products exposed to elements are not adversely affected; that any weathering of finishes is acceptable under requirements of Contract Documents.
 4. For mechanical and electrical equipment in long-term storage, provide manufacturer's service instructions to accompany each item, with notice of enclosed instructions on exterior of package. Service Equipment on a regularly scheduled basis.
- E. Protection after installation: Provide substantial coverings as necessary to protect installed Equipment and Materials from damage from subsequent construction operations. Remove when no longer needed or as specified.

1.06 EXISTING EQUIPMENT AND MATERIALS:

- A. Equipment and Materials to be reused: For Equipment and Materials specifically indicated or specified to be reused in the Work, use special care in removal, handling, storage, and reinstallation to assure proper function in the completed Work. Arrange for transportation, storage and handling of products which require off-site storage, restoration, or renovation and pay all costs for such Work. CONTRACTOR may at his option, furnish and install new items in lieu of those specified to be reused. Remove, relocate and reinstall the following Equipment and Materials:
1. None
- B. Equipment and Materials not to be reused: The following Equipment and Materials to be removed shall remain the City of Pompano's property and are not to be reused in the Work. Remove from its location, prepare for handling and storage, and deliver to the City of Pompano.
1. None
- C. Equipment and Materials designated to be removed but not reused or delivered to the City of Pompano, shall become the property of the CONTRACTOR and shall be removed from the site.

PART 2 - PRODUCTS

2.01 PRODUCTS AND MANUFACTURERS:

- A. Specified in each applicable Section of Specifications

2.02 PRODUCT SELECTION AND SUBSTITUTIONS:

- A. Specified in Instructions to Bidders and General Terms & Conditions

PART 3 - EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS:

- A. Installation:
1. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions if not a part of Submittals,

containers, or packaging to parties involved in the installation, including a copy to the City of Pompano.

2. Maintain one complete set of instructions at the job site during installation and until completion.
3. Handle, install, connect, clean, condition, and adjust products in accordance with such instructions and in conformance with specified requirements. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with the City of Pompano for further instructions.
4. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents, or approved in writing by manufacturer and the City of Pompano.
5. Accurately locate and align with other Work, and anchor Equipment and Materials securely in place except as required for proper movement and performance.
6. Clean and protect exposed surfaces as necessary to ensure freedom from damage and deterioration at time of acceptance.

END OF SECTION

SECTION 01630 PRODUCT OPTIONS AND SUBSTITUTIONS

PART 1 - GENERAL

1.01 SUMMARY: This Section covers the City of Pompano's review procedures for CONTRACTOR's requests of acceptable substitute items of material and equipment. All requests must be received by the City of Pompano's Procurement Division ten (10) days prior to the scheduled bid opening date. See applicable paragraph of the Instructions to the Bidders of this Contract Document. If the proposed substitution is approved, such approvals will be set forth in an addendum.

Requests received after the date established above or after the contract award, will not be considered unless one or more of the following conditions apply:

- A. The substitution must be required for compliance with final interpretation of code requirements or regulations.
- B. The substitution must be due to the unavailability of the specified products, through no fault of the CONTRACTOR.
- C. The substitution may be requested when subsequent information discloses the inability of the specified products to perform properly or to fit in the designated space.
- D. The substitution may be requested when in the judgment of the City of Pompano a substitution would be substantially to the City of Pompano's best interests in terms of cost, time or other considerations.

1.02 SUBSTITUTION REQUEST:

- A. Submit as required in SECTION 01300 Submittals:
 - 1. Complete data substantiating compliance of the proposed substitution with the Contract Document
 - a. Product identification including manufacturer's name and address
 - b. Manufacturer's literature including product description, performance and test data, and reference standards
 - c. Name and address of similar projects on which product was used and dates of installation
 - 2. Itemized comparison of proposed substitution with product or method specified
 - 3. Data relating to changes in the construction schedule
 - 4. For requests submitted after bids are received, accurate cost data on proposed substitution in comparison with product or method specified
- B. In submitting the request for substitution, the CONTRACTOR makes the following representations:
 - 1. The CONTRACTOR has investigated the proposed product and has determined that it is equal or superior in all respects to that specified.
 - 2. The CONTRACTOR will provide the same warranty or guarantee for the substitution as for the product specified.
 - 3. The CONTRACTOR will coordinate installation of the accepted substitution into the work, making such changes as may be required for the work to be completed in all respects.
 - 4. The CONTRACTOR waives all claims for additional costs related to substitution that subsequently becomes apparent.
 - 5. Cost data is complete and includes all related costs under the contract.

- 1.03 CITY OF POMPANO ENGINEER'S REVIEW: The City of Pompano, in evaluating the request for substitution, will consider all variations of the proposed substitute from that specified to determine the acceptability of the proposal. The City of Pompano may require the CONTRACTOR to furnish additional data about the proposed substitute necessary to make such a determination. The City of Pompano will be the sole judge of acceptability, and no substitute will be ordered or installed without the City of Pompano's prior written acceptance. The City of Pompano may require the CONTRACTOR to furnish, at the CONTRACTOR's expense, a special performance guarantee or other surety with respect to any substitute. Substitutions will not be considered if:
- A. Substitutions are indicated or implied on shop drawings or product data submittals without a request submitted in accordance with this section.
 - B. Acceptance will require substantial revision to the Contract Documents.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY:

- A. This Section includes administrative and procedural requirements for contract closeout including, but not limited to, the following:
 - 1. Inspection procedures
 - 2. Project record document submittal
 - 3. Operation and maintenance manual submittal
 - 4. Submittal of warranties
 - 5. Final cleaning
 - 6. CONTRACTOR'S Certification
- B. Closeout requirements for specific construction activities are included in the appropriate Sections in DIVISIONS 2 through 16.
- C. Related Work Specified Elsewhere:
 - 1. Prerequisites to Substantial Completion and Final Acceptance: GENERAL TERMS & CONDITIONS.
 - 2. SECTION 01300 Submittals

1.02 SUBSTANTIAL COMPLETION:

- A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, the CONTRACTOR shall satisfy the following:
 - 1. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents. Submit on CD in PDF format, and in hardcopy form.
 - 2. Obtain and submit releases enabling the City of Pompano unrestricted use of the Work and access to services and utilities. Include Certificates of Occupancy (C.O.), operating certificates, and similar releases, as required.
 - 3. Submit record drawings, maintenance manuals, project photographs, damage or settlement surveys, property surveys, and similar record information as specified in paragraph 1.04. All drawings shall be scanned and submitted on CD in PDF format, and in hard copy form, 24 inch by 36 inch plan size. Other documents shall be scanned and submitted on CD in PDF format along with the originals.
 - 4. Submit as-built drawings indicating that all electrical work has been completed with proper terminations, grounding, and lightning protection.
 - 5. Provide verification from the appropriate utility that commercial power has been connected.
 - 6. Deliver tools, spare parts, extra stock, and similar items.
 - 7. Complete start-up testing of systems in accordance with the contract specifications, by a manufacturer's representative if required. Ensure that all remote monitoring equipment is connected and communicating properly with the central facility (Control Room). Provide required training and instruction to the City of Pompano's operations and maintenance personnel.

8. Provide a 10-day scheduling window to coordinate with the City of Pompano for adjustment, calibration, and programming of equipment where required.
 9. Discontinue and remove temporary facilities from the site, along with mockups, construction tools, and similar elements.
 10. Complete final cleanup requirements, including touch up painting.
 11. Touch up and otherwise repair and restore marred, exposed finishes.
- B. Inspection Procedures: On receipt of a request for inspection, the City of Pompano will either proceed with inspection or advise the CONTRACTOR of unfilled requirements. The City of Pompano will prepare the Certificate of Substantial Completion following inspection or advise the CONTRACTOR of work that must be completed or corrected before the certificate will be issued.
1. The City of Pompano will reschedule the inspection when in its opinion, the Work is substantially complete.

1.03 FINAL ACCEPTANCE:

- A. Preliminary Procedures: Submit certification by CONTRACTOR that Work has been completed in accordance with the Contract Documents to the knowledge of the CONTRACTOR. Before requesting final inspection, complete the following.
1. Submit the final payment request with releases and supporting documentation. Include insurance certificates for products and completed operations where required.
 2. Submit a certified copy of the City of Pompano's final inspection list of items to be completed or corrected. The certified copy of the list shall state that each item has been completed.
 3. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion.
 4. Submit consent of surety to final payment.
 5. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 6. Submit Release of Liens (from the Prime, and all Subcontractors, Vendors and Suppliers).
 7. Submit Maintenance Bond.
- B. Reinspection Procedure: The City of Pompano will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed.
1. Upon completion of reinspection, the City of Pompano will advise the CONTRACTOR of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
 2. If necessary, reinspection will be repeated.
- C. Return all keys furnished by the City of Pompano. The CONTRACTOR shall forfeit his key deposit for keys that are not returned.

1.04 RECORD DOCUMENT SUBMITTALS:

- A. General: Do not use record documents for construction purposes. Protect record documents from deterioration and loss in a secure, fire-resistant location. Provide access to record documents for the City of Pompano's reference during normal working hours.
- B. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark which drawing is most capable of

showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date. Call attention to each entry by drawing a "cloud" around the areas affected.

- C. The City of Pompano will make electronic copies of whatever electronic versions of the bid plans exist, available to the CONTRACTOR for Record Drawing purposes. CONTRACTOR must obtain the concurrence of the City of Pompano as to form and content of record information provided in electronic format prior to proceeding, but in general, information similar to that shown below needs to be similarly provided.
1. Record information concurrently with construction progress.
 2. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work. Mark each document "PROJECT RECORD" in neat, large, printed letters.
 3. Mark new information that is important to the City of Pompano but was not shown on Contract Drawings or Shop Drawings.
 4. Note related change-order numbers where applicable.
 5. Organize record drawing sheets into manageable sets. Bind sets with durable-paper cover sheets; print suitable titles, dates, and other identification on the cover of each set.
 6. Include the following:
 - a. Depths of various elements of foundation in relation to finish first floor datum.
 - b. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements (vertical and horizontal location of buried or encased piping, raceways, cables, etc.).
 - c. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of construction.
 - d. Where Submittals (like shop drawings) are used for mark-up, record a cross-reference at corresponding location on Drawings.
 - e. Field changes of dimension and detail.
 - f. Changes made by Change Order or other Modifications.
 - g. Details not on original Contract Drawings.
 - h. Record drawings shall include a plot of the actual excavation cross-sections plotted at the same station as and on top of the design cross-sections.
 - i. Record drawings shall include a plot of the actual levee and embankment cross-sections plotted at the same station as and on top of the design cross-sections.
 - j. Give particular attention to concealed elements that would be difficult or expensive to locate at a later date.
 - k. GPS coordinates of major structures using the format lat/long DD (decimal/degree) NAD83.
 7. Record Specifications: Maintain one complete copy of the Contract Documents including addenda. Include with the Contract Documents one copy of other written construction documents, such as Change Orders and modifications issued in printed form during construction.
 8. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications.

9. Give particular attention to substitutions and selection of options and information on concealed construction that cannot otherwise be readily discerned later by direct observation.
 10. Note related record drawing information and Product Data.
 11. Upon completion of the Work, submit record Specifications to the City of Pompano for the City of Pompano's records on CD in MS Word format.
 12. Include the following:
 - a. Manufacturer, trade name, catalog number, and Supplier of each product and item of equipment actually installed, including optional and substitute items
 - b. Changes made by Addendum, Change Order, or other Modifications
 - c. Related Submittals
 13. Affix the contractor's corporate seal on the cover sheet indicating the documents within are representative of the as-built condition of the project. The seal shall be signed by an officer of the company.
- D. Record Product Data: Provide one copy of each Product Data submittal. Note related Change Orders and markup of record drawings and Specifications.
1. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site and from the manufacturer's installation instructions and recommendations.
 2. Give particular attention to concealed products and portions of the Work that cannot otherwise be readily discerned later by direct observation.
- E. Record Sample Submitted: Immediately prior to Substantial Completion, the CONTRACTOR shall meet with the City of Pompano's personnel at the Project Site to determine which Samples are to be transmitted to the City of Pompano for record purposes. Comply with the City of Pompano's instructions regarding packaging, identification, and delivery to the City of Pompano.
- F. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion (unless otherwise specified), complete miscellaneous records and place in good order. Identify miscellaneous records properly, bind or file, and submit to the City of Pompano for the City of Pompano's records.
- G. Operation and Maintenance Manuals: Organize operation and maintenance data into suitable sets of manageable size and submit as specified in SECTIONS 01300.
- H. Warranties and Bonds: Submit original documents as specified in GENERAL TERMS & CONDITIONS, SUPPLEMENTAL CONDITIONS, SECTION 01300, and technical specifications.

1.05 SPARE PARTS:

- A. Products Required:
1. Provide to City of Pompano the quantities of products, spare parts, maintenance tools, and maintenance materials specified in individual Sections, in addition to that required for completion of Work.
 2. Products provided shall be identical to those installed in the Work. Include quantities required from Supplier or manufacturer of original purchase to avoid variations in manufacture.
- B. Storage, Maintenance:
1. Coordinate with the City of Pompano. Deliver and unload spare products to the City of Pompano at Project site or as directed by the City of Pompano, and obtain receipt.

2. For portions of Project accepted and occupied by City of Pompano prior to Substantial Completion, deliver the applicable spare products to the City of Pompano at time of acceptance of that element of the project. Obtain receipt.
3. Maintain spare products in original containers with labels intact and legible.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 CLOSEOUT PROCEDURES:

- A. Operation and Maintenance Instructions: For equipment requiring training, arrange for each Installer of equipment that requires regular maintenance to meet with the City of Pompano's personnel at Project site to provide instruction in proper operation and maintenance. Provide instruction by manufacturer's representatives if installers are not experienced in operation and maintenance procedures. Include a detailed review of the following items:
 1. Operation and maintenance manuals
 2. Record documents
 3. Spare parts and materials
 4. Tools
 5. Lubricants
 6. Identification systems
 7. Control sequences
 8. Hazards, hazardous chemicals data sheets
 9. Cleaning
 10. Warranties and bonds
 11. Maintenance agreements and similar continuing commitments
- B. As part of instruction for operating equipment, demonstrate the following procedures:
 1. Start-up
 2. Shutdown
 3. Emergency operations
 4. Noise and vibration adjustments
 5. Safety procedures
 6. Economy and efficiency adjustments
 7. Effective energy utilization

3.02 FINAL CLEANING:

- A. General: The GENERAL TERMS & CONDITIONS require general cleaning during construction. Regular site cleaning is included in SECTION 01530.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion.
 - a. Remove labels that are not permanent labels.
 - b. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition. Clean concrete floors to a "broom clean" condition. Clean transparent materials, including mirrors and glass in doors and windows, replace chipped, cracked or broken materials.
 - c. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean light fixtures and lamps.
 - d. Remove debris and surface dust from limited-access spaces including roofs, plenums, shafts, trenches, equipment vaults, manholes, and similar spaces.
 - e. Clean the site of rubbish, litter, and other foreign substances. Rake grounds that are neither paved nor planted to a smooth, even-textured surface.
 - f. Clean and polish plumbing fixtures, remove all stains.
 - g. Remove temporary structures, tools, equipment, supplies, and surplus materials.
 - h. Remove temporary protection devices and facilities which were installed to protect previously completed Work.
 - i. Special Cleaning: Cleaning for specific units of Work is specified in applicable Sections of Specifications.
- C. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.
- D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the City of Pompano's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of lawfully.
 1. Where extra materials of value remain after completion of associated Work, they become the City of Pompano's property. Dispose of these materials of no value to the City of Pompano as directed by the City of Pompano.
- E. Repairs:
 1. Repair damaged protective coated surfaces.
 2. Repair roads and other items damaged or deteriorated because of construction operations, including those which have been damaged, but are not located within the project limits.
 3. Restore all ground areas affected by construction operations.

END OF SECTION

SECTION 01740 WARRANTIES

PART 1 - GENERAL

1.01 SCOPE:

- A. Work Includes: General administrative and procedural requirements for manufacturers' standard or special warranties on products as specified.
- B. Related Sections:
 - 1. 01700 - Contract Closeout.
- C. Disclaimers and Limitations: Manufacturers' disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work incorporating the products, nor does it relieve suppliers, manufacturers, or subcontractors required to countersign special warranties with the Contractor.

1.02 DEFINITIONS:

- A. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the City of Pompano.
- B. Special Warranties are written warranties required by or incorporated in the Construction Documents, either to extend time limits provided by standard warranties or to provide greater rights for the City of Pompano.

1.03 WARRANTY REQUIREMENTS:

- A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work damaged because of such failure or that must be removed and replaced to provide access for correction of warranted Work, at no cost to the City of Pompano.
 - 1. Correction of work shall include shipping, labor, supervision, and related work involved in replacing defective parts or materials provided by manufacturers under their warranties.
- B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Construction Documents.
- D. The City of Pompano's Recourse: Written warranties made to the City of Pompano are in addition to implied warranties, and shall not limit the duties, obligations, rights, and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the City of Pompano can enforce other duties, obligations, rights, or remedies.
 - 1. Rejection of Warranties: The City of Pompano reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Construction Documents.

- E. Warranties made by subcontractors to the Contractor are a part of the Contractor's responsibility to the City of Pompano.
- F. The City of Pompano reserves the right to refuse acceptance of Work where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments have done so.

1.04 SUBMITTALS:

- A. Submit written warranties to the Engineer before the date certified for Substantial Completion. If the Engineer's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work or a designated portion of the Work, submit written warranties upon request of the Engineer.
 - 1. When a designated portion of the Work is completed and there is beneficial use of the new tower, submit properly executed warranties to the Engineer within 15 calendar days of completion for the designated portion of the Work.
- B. When a special warranty is required to be executed by the Contractor or the Contractor and a subcontractor, supplier, or manufacturer, prepare a written document containing appropriate terms and identification, ready for execution by the required parties. Submit a draft to the City of Pompano through the Engineer for approval before final execution.
- C. Form of Submittal: At Final Completion, compile 2 copies of each required warranty properly executed by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the specifications.
- D. Provide warranties in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders.
 - 1. Use thicknesses as necessary to accommodate contents and sized to receive 8-1/2" by 11" paper.
 - 2. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES," the Project title or name, and the name of the Contractor.
 - 3. Provide heavy paper dividers with celluloid covered abs for each separate warranty. Mark tabs to identify products or installations.
 - 4. Provide a typed description of the product or installation, including the name of the product.
 - 5. Give reference to the applicable specification section, and the name, address, and telephone number of the installer.

PART 2 - NOT USED

PART 3 - EXECUTION

3.01 SCHEDULE OF WARRANTIES:

- A. Schedule: Provide warranties on products and installations.

END OF SECTION

PART 1 - GENERAL**1.01 SUMMARY:**

- A. Section Includes: Removal of structures by demolition and disposition of debris legally off-site.

1.02 SUBMITTALS:

- A. Demolition Schedule: Include detailed schedule showing start and completion dates for each area of demolition and for completion of demolition work. Submit method of demolition and plan of removing work.
- B. Certification: Submit copy of demolition firm's current license to operate in Broward County, Florida.

1.03 QUALITY ASSURANCE:

- A. Organize and perform demolition work to avoid damage to construction intended to remain.
- B. Demolition and transportation of debris shall comply with applicable codes and regulations governing these operations. Fees shall be paid by the Contractor.
- C. Demolition and removal operations shall be conducted in an expedient manner, with precautions taken to prevent demolition site from being an "attractive nuisance".
- D. Notify the City of Pompano and of any conditions capable of affecting the safety of occupants of adjacent buildings, the normal use of these facilities, or the physical condition of the structures.
 - 1. In case of accidental disruption of utilities or the discovery of previously unknown utilities, stop work immediately and notify the City of Pompano and Engineer.
 - 2. Do not continue work until the City of Pompano, Engineer, and Contractor agree on a plan to correct the situation or identify utility service line.

1.04 SEQUENCING AND SCHEDULING:

- A. Scheduling: Areas next to demolition and removal work may be occupied and their activities cannot be interrupted or disturbed during normal working hours. Demolition schedule shall be according to drawings and as accepted by the City of Pompano and Engineer.
- B. Coordinate with applicable utility companies and the City of Pompano for utility line removal, capping, and utility shutdowns required by removal work.

1.05 PROJECT CONDITIONS:

- A. Existing work not specified for removal that is temporarily removed, damaged, exposed, or in any way disturbed or altered by removal work shall be repaired, patched, or replaced to the City of Pompano and Engineer's satisfaction at no additional cost to the City of Pompano.
- B. Provide barriers and warning devices to protect the public and users of adjacent facilities.
- C. Environmental Protection:
 - 1. Control amount of dust resulting from construction or demolition to prevent spread of dust to other buildings and to avoid creation of a nuisance in surrounding areas. Use of water to control dust will not be allowed when it will result in flooding or other objectionable or hazardous conditions.
 - 2. Use of explosives is not allowed.

3. Disposition of demolished materials by burning is not allowed.
- D. Traffic Maintenance:
1. Conduct removal operations to maintain traffic along existing streets and walks.
 2. Keep paved streets and walkways free of debris.
 3. Remove material and other matter tracked or fallen onto traffic surfaces.
- E. Disposition of Materials:
1. Title and responsibility to materials and equipment to be removed, excepting salvageable equipment to be retained by the City of Pompano, is vested in the Contractor upon receipt of Notice to Proceed.
 2. The City of Pompano will not be responsible for the condition, loss, or damage to such materials and equipment after the Notice to Proceed.

PART 2- NOT USED

PART 3- EXECUTION

3.01 DEMOLITION:

- A. Structures:
1. Demolish existing indicated structures according to accepted schedule.
 2. Indicated buildings shall be demolished completely, except foundation construction.
 3. Remove building to top of foundation walls. Do not damage foundation.
- B. Perform removal and demolition according to Demolition Schedule and take necessary precautions to protect existing adjacent buildings, furnishings, and equipments.
- C. Existing Utilities: Perform utility related work according to these specifications for the type of utility service involved.
- D. Removal:
1. Remove demolished construction materials and related debris from the site on a regular basis.
 2. Accumulation of debris on the site will not be allowed.
 3. Selling of salvageable building materials or equipment or furnishings is not allowed at the site.

3.02 CLEAN UP:

- A. Remove materials, including debris and dust, and dispose of legally off site. Use methods approved by Engineer before beginning cleanup operations. Use of blowers to distribute dust is not allowed.

END OF SECTION

SECTION 05060 WELDING

PART 1 - GENERAL

- 1.01 SCOPE: The CONTRACTOR shall provide all labor, equipment, and materials for all shop and field welding as required by the Drawings and/or Specifications.
- 1.02 STANDARD REFERENCES: The following standard specifications shall apply to the Work of this Section as indicated:
- A. American Welding Society, Structural Welding Code, (AWS)
 - B. American Institute of Steel Construction Manual for Steel Construction, 9th Edition, (AISC)
- 1.03 WELDERS QUALIFICATIONS: All welders, including tack welders, shall be qualified in accordance with Section 5, Part C of AWS D1.1. The CONTRACTOR shall certify by name, to the City of Pompano, the welders so qualified including the code and procedures under which the individual qualified.
- 1.04 WARRANTY:
- A. The MANUFACTURER shall warrant the EQUIPMENT, MATERIALS and PRODUCTS specified in this section against defective materials and workmanship with the MANUFACTURER'S standard warranty, but for no less than one year from the date of Substantial Completion, and as described in the General Terms and Conditions.
 - B. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in the General Terms and Conditions.

PART 2 - MATERIALS

- 2.01 WELD METAL: The chemical and mechanical properties of all deposited weld metal shall be compatible to the base metal and conform to AWS specifications for electrodes.
- 2.02 BASE METAL: The parent structural steel shall be a weldable grade with the chemical and mechanical properties to produce a sound and serviceable welded joint.

PART 3 - EXECUTION

- 3.01 WELDING METHODS: Unless otherwise approved by the City of Pompano, welding of steel shall be by an electric arc welding process and shall conform to AWS, Structural Welding Code, and the applicable sections of the AISC.
- 3.02 WELDING EQUIPMENT: All items of the welding equipment shall conform to the requirements of AWS.
- 3.03 QUALIFIED WELDS: Only qualified welded joints shall be permitted in accordance with AWS, Structural Welding Code, and applicable sections of AISC.

END OF SECTION

SECTION 05070 BOLTED FASTENERS

PART 1 - GENERAL

- 1.01 SCOPE: The Work of this Section consists of furnishing all labor, materials and equipment necessary for installation of bolted fasteners as shown on the drawings.
- 1.02 STANDARD REFERENCES: The following standard specifications shall apply to the Work of this Section as indicated:
- A. American Society of Testing Materials (ASTM)
 - B. American National Standards Institute (ANSI)
 - C. American Institute of Steel Construction (AISC)
- 1.03 WARRANTY:
- A. The MANUFACTURER shall warrant the EQUIPMENT, MATERIALS and PRODUCTS specified in this section against defective materials and workmanship with the MANUFACTURER'S standard warranty, but for no less than one year from the date of Substantial Completion, and as described in the General Terms and Conditions.
 - B. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in the General Terms and Conditions.

PART 2 - MATERIALS

- 2.01 HIGH STRENGTH BOLTS: High strength bolts shall conform to the requirements of ASTM A325, High Strength Bolts for Structural Steel Joints. The bolt dimension shall conform to the current requirements of ANSI B18.2.1 for heavy hex structural bolts.
- 2.02 ALLOY STEEL BOLTS: Alloy steel bolts shall conform to the requirements of ASTM A490, Quenched and Tempered Alloy Steel Bolts.
- 2.03 STANDARD THREADED FASTENERS: Standard threaded fasteners shall be low carbon steel square bolts conforming to ASTM A307.
- 2.04 NUTS: Nuts shall conform to ASTM A563, Standard Specification for Carbon and Alloy Steel Nuts. The nut dimension shall conform to ANSI B18.2.2 for heavy hex nuts.
- 2.05 WASHERS: Flat, circular and square washers shall conform to ASTM F436, Standard Specification for Hardened Steel Washers.
- 2.06 TAMPER RESISTANT FASTENERS: Fasteners removable only by use of a special tool shall be provided in all high security locations as directed by the City of Pompano

PART 3 - EXECUTION

- 3.01 INSTALLATION: Fasteners shall be tightened in properly aligned holes to provide, when all fasteners in the joint are tight, at least the minimum tension required by AISC Specification for Bolted Connections. The turn-of-the-nut method shall be utilized for all high-strength bolts as defined by AISC Specification for Bolted Fasteners. The A325 fasteners shall be installed without hardened washers. A490 shall have a washer both under the nut and the bolt head.

- 3.02 REUSE: A490 bolts and galvanized A325 bolts shall not be reused. Other A325 bolts may be reused, if approved by the City of Pompano.
- 3.03 BOLTED PARTS: The slope of the bolted parts in contact with the bolt head and nut shall not exceed 1:20 with respect to a plane normal to the bolt axis. Holes shall be punched and reamed, or drilled, and shall have a diameter nominally 1/16-inch in excess of the nominal bolt diameter. Over-size, short slotted and long slotted holes shall conform to the requirements of AISC Specifications for Structural Joints.
- 3.04 GALVANIZING: The galvanizing of the bolts, nuts and washers shall conform to the requirements of ASTM A153.

END OF SECTION

SECTION 05100 STRUCTURAL STEEL

PART 1 - GENERAL

1.01 SCOPE: The Work of this Section shall consist of furnishing all the labor, materials, and equipment necessary for installation of structural steel as shown on the Drawings and as specified herein.

1.02 CONDITIONS OF THE CONTRACT APPLY:

1.03 SHOP DRAWINGS AND ERECTION PROCEDURES:

- A. Prepare and submit shop and erection plans covering all structural steel and related items. All dimensions for checking of structural steel details shall be shown on the drawings.
- B. The CONTRACTOR shall be responsible for the conformation of all steel details to the typical and special details shown on the drawings. All details, notes and schedules appearing on the drawings, and giving information for the fabrication and erection of the structural steel and related items shall be shown also on the erection or shop drawings. Drawing shall include all shop and erection details, including cuts, copes, connections, holes, bolts and welds. For bolted connections, the type, size and length of bolts including washers shall be shown. All welds, both shop and field, shall be indicated by standard welding symbols as noted by AWS A2.0. Drawings shall show the size, length and type of each weld.
- C. Prepare and submit, for information, two copies of a detailed erection procedure with the shop and erection drawings. The procedure shall include the sequence of erection with temporary staying and bracing. No copies of such procedures will be returned.

1.04 APPLICABLE SPECIFICATIONS AND CODES: The following specifications and codes form a part of this section of these specifications:

- A. American Institute of Steel Construction Publications, Eighth Edition, with Commentary
 - 1. Code of Standard Practice for Steel Buildings and Bridges
 - 2. Specification for the Design, Fabrication and Erection of Structural Steel for Buildings, with Commentary
 - 3. Manual of Steel Construction
- B. American Society for Testing and Materials:
 - 1. A36 - Specifications for Structural Steel
 - 2. A307 - Specification for Low-Carbon Steel Externally Threaded Standard Fasteners
 - 3. A501 - Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
 - 4. A325 - Specification for High-Strength Steel Bolts for Structural Steel, Joints, Including Suitable Nuts and Plain Hardened Washers
 - 5. E329 - Recommended Practice for Inspection and Testing Agencies for Concrete, Steel and Bituminous Materials as Used in Construction
- C. American Welding Society:
 - 1. D1.1 - Code for Welding in Building Construction
- D. Specifications for Structural Joints Using ASTM A325 or A490 bolts, approved April 1978, by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation

- E. Unless otherwise indicated on the drawings, the Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings of the American Institute of Steel Construction, hereafter designated AISC, shall govern structural steel work. Welding shall be in accordance with American Welding Society Standard Code D1.1.
- 1.05 SUBSTITUTIONS OF SECTIONS: Substitutions of sections or modifications of details, or both, and the reasons therefore, shall be submitted with the shop drawings for approval. Approved substitutions, modifications, and changes in related portions of the work shall be coordinated by the CONTRACTOR and shall be accomplished at no additional cost to the City of Pompano.
- 1.06 RESPONSIBILITY FOR ERRORS: The CONTRACTOR shall be responsible for all errors of detailing, fabrication, and for correct fitting measurements in the field to verify or supplement dimensions shown on the drawings and shall assume responsibility for fitting new work to existing work.
- 1.07 TEMPLATES: Templates shall be furnished by the Fabricator to the job, together with instructions for the setting of anchors, anchor bolts and bearing plates. The CONTRACTOR shall ascertain that the items are set during the progress of the work.
- 1.08 QUALIFICATION:
- A. Fabrication Shop and Erection personnel shall have fabricated and erected projects of similar size and complexity for at least five years.
- B. Welders and Welding Operators, shop and field, shall be qualified by an independent laboratory using test procedures covered by an independent laboratory using test procedures covered in AWS D1.1, and shall have been employed as a welder using the positions for which he is qualified during the previous 90 days. The CONTRACTOR shall provide the City of Pompano and the laboratory inspector with the names of welders to be employed in the shop and field on the work, certification of the position, date of the last qualification test and the name of the qualifying laboratory.
1. All welders employed in the shop on the fabrication of the steel work shall be qualified for the most difficult welding position during shop fabrication.
 2. All welders employed in the field on the erection of the steel work shall be qualified for the most difficult welding position during field erection.
 3. The CONTRACTOR shall require any welder to retake the test, when, in the opinion of the City of Pompano, the work of the welder creates a reasonable doubt as to the proficiency of the welder. Recertification of the welder shall be made to the City of Pompano only after the welder has taken and passed the specified test. The City of Pompano may require radiographic or ultrasonic testing or may require coupons to be cut from any location in any joint for testing.
 4. Should any two radiographic or ultrasonic tests or coupons cut from the work of any welder show strengths, under tests, less than that of the base metal, it will be considered evidence of negligence or incompetence and such welder shall be removed from the work.
 5. When coupons are removed from any part of a structure, the members cut shall be repaired, at no additional cost to the City of Pompano, in a neat and workmanlike manner with joints of type to develop the full strength of the members and joints cut, with peening to relieve residual stress. All sections of welds found defective shall be chipped or cut out to base metal and rewelded before proceeding with the work.
 6. Costs of all qualifications, tests and retests shall be borne by the CONTRACTOR.
- C. Joint Qualification: All joints shall comply with AWS D1.1.

1.09 INSPECTION AND TESTING:

- A. Inspections and tests shall be performed by an independent laboratory complying with ASTM E329, selected, directed, and paid by the City of Pompano. All material to be furnished shall be subject to inspections and tests in the shop and field.
- B. Shop inspections and tests shall include fit-up, preparation of surfaces and welding.
- C. Field inspections and tests shall include fit-up, preparation of surface, welding and bolting.
- D. Reports of shop and field inspections and testing shall be made by the laboratory on a weekly basis and submitted directly as follows: One copy each to the City of Pompano, Inspector, Contractor, Fabricator and Erector.

1.10 WARRANTY:

- A. The MANUFACTURER shall warrant the EQUIPMENT, MATERIALS and PRODUCTS specified in this section against defective materials and workmanship with the MANUFACTURER'S standard warranty, but for no less than one year from the date of Substantial Completion, and as described in Article 13 of Section 00700 - General Terms and Conditions.
- B. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in the General Terms and Conditions.

PART 2 - PRODUCTS

2.01 GENERAL: Materials shall be of domestic manufacture, within trade tolerances, new, undamaged and without splices. Structural material, plain or fabricated, shall be stored above the ground upon platforms, skids or supports. Material shall be kept free of dirt, grease and foreign matter and shall be protected from corrosion.

2.02 STRUCTURAL STEEL:

- A. Structural steel shall comply with ASTM A36, and ASTM A501. Refer to the drawings for the locations of each type of structural steel.
- B. The CONTRACTOR shall furnish two copies of all mill reports covering the chemical and physical properties of the steel used.

2.03 BOLTS, NUTS AND WASHERS:

- A. All bolts, nuts and washers shall comply with ASTM A307 and A325.
- B. ASTM A307 bolts shall be used for all bolts set in concrete.
- C. ASTM A307 and A325 bolts shall be used for connections as indicated on the drawings.

2.04 WELDING EQUIPMENT: Welding equipment shall be capable of providing the welding required by the drawings or specifications herein in accordance with the requirements of joint qualifications in AWS D1.1.

2.05 WELDING ELECTRODES:

- A. Electrodes and flux used for submerged arc welding shall be of the same manufacture. The flux shall be free of contamination from dirt, mill scale and foreign material. Fused flux used in welding shall not be reused. Bare electrodes and flux used in combination shall conform to the requirements of AWS D1.1.
- B. Electrodes for manual shielded metal-arc welding shall conform to AWS D1.1.

- 2.06 PAINT: Paint for both shop or primer coat and field touch-up shall be Tnemec Company, Incorporated's 99 Green Primer; Sherwin-Williams Company's Ken Kromik Metal Primer; or Pratt & Lambert Incorporated's Noxide #96 Red Primer. Paint shall be compatible with Sprayed Fireproofing Systems.
- 2.07 GROUT: Non-shrink grout beneath base and bearing plates shall be Five Star Grout by U.S. Grout Corp., SonogROUT by L. Sonneborn Inc., Horn Non-Metallic Grout by A.C. Horn Inc., or Non-Ferrous Non-Shrink Grout by the Burke Co.
- 2.08 FABRICATION:
- A. Structural material shall be fabricated and assembled in the shop. Assembled pieces shall be taken apart for the removal of burrs and shavings produced by the reaming operation. Parts not connected in the shop shall be secured by bolts to prevent damage in shipment and handling.
 - B. Connections shall be as shown on the drawings. Connections not indicated shall be made to conform to the AISC Specifications. One-sided or other types of eccentric connections will not be permitted except where shown on the plans. Surfaces of joints for welded and bolted connections shall be clean, bright metal. Fit-up of the parts shall be inspected and approved by the laboratory inspector prior to making final connection.
 - 1. Holes shall be cut, drilled or punched at right angles to the surface of the metal and shall not be made or enlarged by burning. Holes in base or bearing plates shall be drilled. Holes shall be clean-cut without torn or ragged edges. Outside burrs resulting from drilling or reaming operation shall be removed. Holes for bolts shall be 1/16 inch larger than the diameter of the bolt.
 - 2. ASTM A307 bolts transmitting shear shall be threaded to such a length that no more than one thread will be within the grip of the metal. The bolts shall be of the length that will extend through, but no more than 1/4 inch beyond the nut. Nuts shall be tightened while bolt heads are tapped with a hammer. Tightening shall progress outward from the center of the joint. Nuts shall be locked after final tightening.
 - 3. Welded connections will be permitted only where indicated on the drawings. Welded construction shall conform to the AISC and AWS Specifications.
 - 4. Bolted connections using ASTM A325 bolts shall conform to the Specifications for Structural Joints using ASTM A325 or A490 bolts. Bolt threads shall be excluded from the shear planes of the contact surfaces between the connected parts and the bolts shall be tightened by the "Turn-of-Nut" method.
 - C. Milled surfaces shall comply with the AISC Specification and the drawings.
 - D. Allowance shall be made for draw in all tension bracing.

PART 3 - EXECUTION

3.01 STRUCTURAL STEEL:

- A. Splices and field connections shall be made as shown or noted on the drawings. Errors in shop fabrication or deformation resulting from handling and transportation that prevent the assembly and fitting of parts shall be reported immediately to the City of Pompano for directions as to method of correction. Corrections shall be made at no additional cost to the City of Pompano.
- B. Leveling plates shall not be used under base plates.
- C. Anchor bolts and anchors shall be located and built into connecting work. Bolts and anchors shall be preset by the use of templates to locate the anchors and anchor bolts.

- D. Column bases and bearing plates shall be attached as shown on the drawings. Plates shall be supported and aligned on steel wedges or shims. After the supported members have been plumbed and positioned and the anchor nuts tightened, the entire bearing area under the plate shall be dry-packed solidly with non-shrink grout. Wedges and shims shall be cut off flush with edge of column base and bearing plates, and shall be left in place.
- E. After assembly, the various members forming parts of a completed frame or structure shall be aligned and adjusted before being fastened. Tolerance shall conform to AISC. Fastening of splices of compression members shall be done after the abutting surfaces have been brought completely into contact. Bearing surfaces and surfaces that will be in permanent contact shall be cleaned before the members are assembled. As erection progresses, the work shall be fastened to take care of all dead load, wind and erection stresses. Splices will be permitted only where indicated on the drawings. Erection bolts used in welded construction shall be tightened and left in place. Welding for redrilling will not be permitted.
- F. Drift pins may be used only to bring together the several parts, and shall not be used in such manner as to distort or damage the metal.
- G. The use of a gas-cutting torch in the field for correcting fabrication errors is prohibited unless the City of Pompano has specifically approved such procedures for each case individually in writing.

3.02 PAINING:

- A. All steel work shall be cleaned of loose mill scale, loose rust, accessible weld slag or flux deposit, dirt, and foreign matter. Solvent shall remove oil and grease deposits. No paint shall be applied when steel temperature is below the dew point of the atmosphere. Paint shall be mixed and no pigment shall remain on bottom of can.
- B. After cleaning and connections are approved by the laboratory inspector, all steel work except that to be encased in concrete, surfaces to be fireproofed, or surfaces to be welded or bolted shall be given a shop coat of primer. The primer shall be applied at a rate to provide a minimum dry film of two (2.0) mils. The primer shall be applied without holidays or paint runs.
- C. After erection, all field connections shall be cleaned. All connections, including welds and bolts, and all abraded surfaces on the shop primer shall be painted to give one complete coat primer. Paint for field touch-up shall be the same paint used for the shop coat.

END OF SECTION

SECTION 05120 STEEL

PART 1 - GENERAL

1.01 SCOPE: This Section includes fabrication and erection of the structural steel and other steel or metal items as defined in AISC Manual, Code of Standard Practices.

1.02 REFERENCES:

A. Applicable Standards:

1. American Institute of Steel Construction (AISC):
 - a. Manual of Steel Construction
 - b. Quality Criteria and Inspection Standards
2. American Welding Society (AWS):
 - a. D1.1 - Structural Welding Code
 - b. QC1 - Standard Qualification and Certification of Welding Inspectors
3. American Society for Testing and Materials (ASTM):
 - a. A6 - General Requirements for Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use
 - b. A36 - Structural Steel
 - c. A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - d. A153 - Zinc Coating (Hot Dip) on Iron and Steel Hardware
 - e. A307 - Carbon Steel Externally Threaded Standard Fasteners
 - f. A569 - Steel Carbon (0.15 Maximum Percent) Hot- Rolled Sheet and Strip, Commercial Quality
 - g. B695 - Coatings of Zinc Mechanically Deposited on Iron and Steel
 - h. F436 - Hardened Steel Washers
4. Steel Structures Painting Council (SSPC):
 - a. SP1 - Solvent Cleaning
 - b. SP11 - Power Tool Cleaning to Bare Metal

1.03 SUBMITTALS:

- A. Submit as specified in DIVISION 1.
- B. Includes, but not limited to, the following:
 1. Fabrication drawings for all work
 2. All necessary information for the fabrication, including filler metal for welds, of the component part of the structure, presented on drawings to conform to recognized standard practice, AISC Manual Part 5, and AWS Code

1.04 QUALITY ASSURANCE:

- A. Welder Qualifications:

1. Welders shall be previously qualified by passing the tests prescribed in the AWS Standard Qualification Procedure, or by passing such other tests as the City of Pompano may accept.
 2. Welders shall have been tested within the past twelve months and their qualification shall be considered as remaining in effect unless the welder is not engaged in a given process of welding for a period exceeding six months.
 3. Submit two certified copies of the qualification records to City of Pompano as evidence of qualification to the above-mentioned code.
- B. Inspection: Material or workmanship will be subject to inspection in the shop and field.
- 1.05 DELIVERY, STORAGE AND HANDLING: Handle and store all steel and appurtenances as specified in DIVISION 1.
- 1.06 WARRANTY:
- A. The MANUFACTURER shall warrant the EQUIPMENT, MATERIALS and PRODUCTS specified in this section against defective materials and workmanship with the MANUFACTURER'S standard warranty, but for no less than one year from the date of Substantial Completion, and as described in the General Terms and Conditions.
 - B. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in the General Terms and Conditions.

PART 2 - PRODUCTS

2.01 BASIC MATERIALS:

- A. Steel: Conform to ASTM A36, as designated in the AISC Manual, Part 1, unless otherwise indicated or specified.
- B. Anchor Bolts:
 1. Conform to ASTM A307 using A36 steel, unless otherwise indicated to be galvanized steel.
 2. Washers: Conform to F436.
- C. Welding:
 1. For ASTM A36 steel, use E70 electrodes for shielded metal arc welding, F7 series electrodes for submerged arc and E70T series electrodes for flux cored arc welding.
 2. Galvanizing: Galvanize steel after fabrication to conform to ASTM A123 and ASTM A153, where indicated or specified. Nuts, bolts and washers may be hot-dip galvanized to conform to ASTM A153 or mechanically galvanized to conform to ASTM B695.

2.02 STEEL FABRICATION:

- A. Fabricate all steel to conform to AISC specifications, codes and standards.
- B. Permissible variations for sweep, camber, length and cross-section of all steel members shall conform to ASTM A6, AISC "Manual of Steel Construction, Part 1 "and AISC" Quality Criteria and Inspection Standards" unless indicated otherwise.
- C. Welding:
 1. All welding shall be shielded metal arc, submerged arc or flux cored arc. Other welding processes may be used provided they are qualified by applicable tests as prescribed in the AWS D1.1 Code and approved by the City of Pompano prior to use.

For the use of any other welding process, the CONTRACTOR shall prepare and submit to the City of Pompano for approval, a qualified welding procedure specification and the procedure qualification test results. These submittals shall be deemed compliance submittals and these other welding processes shall be approved for use only after receipt of specific written approval from the City of Pompano.

2. Conform to AWS Code, AISC Manual Part 4 and the AISC Quality Criteria and Inspection Standards.
 3. The CONTRACTOR shall perform fabrication-welding inspection in accordance with AWS D1.1. AWS Certified Welding Inspector(s) (CWI) shall perform this welding inspection. All such Certified Welding Inspectors shall be qualified and certified in accordance with the provisions of AWS QC1. Only individuals so qualified shall be authorized to perform fabrication/erection or verification inspection of the welding performed under the provisions of this AWS D1.1 Code and these Contract Documents. Certifications verifying the qualifications of welding inspectors shall be submitted to the City of Pompano as compliance submittals prior to commencement of structural welding operations and/or prior to welding inspection performed by an individual welding inspector. Defective welds shall be corrected.
- D. Shop Connections:
1. Weld, rivet, or bolt as indicated or specified.
 2. Shop portions of connections may be welded equivalent to any bolted connection specified if City of Pompano concurs.
 3. Welded connections shall be as indicated or in accordance with acceptable alternative designs.
 - a. All butt joint groove welds shall be complete penetration welds unless otherwise indicated and shall conform to the applicable standards in AISC Manual Part 4 with special emphasis on maintaining root opening. Accomplish this for single-bevel butt joint welds by using backup plates or by chipping out and welding on the opposite side.
 - b. Prepare weld bevels with a mechanically guided cutting torch or by grinding.
 - c. Remove all run-out tabs.

PART 3 - EXECUTION

3.01 STEEL ERECTION:

- A. Erect all steel to conform to AISC specifications, codes and standards, AISC Quality Criteria and Inspection Standard or any local, State or Federal Codes which may exceed such requirements.

3.02 FIELD PROTECTIVE COATINGS:

- A. Surface Preparation: If grease or oils are present, SP1 - Solvent Cleaning must precede any other method specified. Prepare all surfaces by SSPC-SP11 and 1 mil profile depth.
 1. Clean all shop coated surfaces damaged from rust and mill scale, welding and abrasion.
- B. Field spotting coat:
 1. Apply to cover all unpainted or blemished parts of the steel furnished under this Contract including unpainted portions of field welded and bolted connections.
 2. For galvanized surfaces, apply epoxy organic zinc-rich primer at 3 mils dry. Primer may be any of the following at CONTRACTOR's option.
 - a. Ameron - 68
 - b. Carboline - SP676

- c. Cook - Galva Pac 135
- d. Glidden - 5526/5527/5528
- e. Koppers - Organic Zinc
- f. Porter - Zinc-Lock 308
- g. ZRC Products Co. - Cold Galvanizing Compound

END OF SECTION

SECTION 05550 FABRICATED METALWORK AND CASTINGS

PART 1 - GENERAL

- 1.01 SCOPE: The Work of this Section shall consist of furnishing all labor, materials, and equipment necessary for the installation of fabricated metalwork and castings as shown on the Drawings and specified herein.
- 1.02 GENERAL:
 - A. Like items of material provided hereunder shall be the end products of one manufacturer in order to achieve standardization for appearance, maintenance, and replacement.
 - B. See Conditions of the Contract and DIVISION 1, General Requirements, which contain information and requirements that apply to the work specified herein and are mandatory for this project.
- 1.03 SUBMITTALS: Submittals shall be made in accordance with DIVISION 1, General Terms & Conditions. In addition, the following specific information shall be provided:
 - A. Shop drawings, including calculations where required
 - B. Test pieces and samples
 - C. Certificates, test reports, etc.
- 1.04 WARRANTY:
 - A. The MANUFACTURER shall warrant the EQUIPMENT, MATERIALS and PRODUCTS specified in this section against defective materials and workmanship with the MANUFACTURER'S standard warranty, but for no less than one year from the date of Substantial Completion, and as described in the General Terms and Conditions.
 - B. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in the General Terms and Conditions.

PART 2 - PRODUCTS

- 2.01 GENERAL:
 - A. The use of manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired only. Products of other manufacturers will be considered in accordance with the General Terms & Conditions.
 - B. Unless otherwise indicated, all materials shall conform to the latest issue of the following ASTM Specifications:

<u>Item</u>	<u>ASTM Specification</u>
Steel Shapes & Plates	A36
Steel Pipe Columns	A501 or A53, Type EDRS, Grade B
Stainless Steel:	
Bars & Shapes	A276, Type 316
Steel Plate, Sheet & Strip	A167, Type 316
Bolts	A193, Type 316, B8MN, B8M2, or B8M3
Nuts	A194, Type 316, B8MN, B8M2, or B8M3

Aluminum, Structural Shapes & Plates	Alloy 6061-T6; conform to referenced specifications and ASTM Sections found in the Aluminum Association current Construction Manual Series
Connection Bolts for Steel Members; Use Compressible- Washer Type Direct Tension Indicators at all Connections; Use Hardened Washers also under Head & Nut	A325-F F959-85 F436 (Washers)
Anchor Bolts & Nuts:	
Carbon Steel	A307 or A36
Stainless	A193, Type 316
Galvanized Steel Bolts Head & Nuts	A153, Zinc Coating for A307 or A36
Flat Washers (Unhardened)	F844, Use A153 for Zinc Coating
Threaded Bars	A36
Connection Bolts for Aluminum	Use appropriate Stainless Steel

- C. The miscellaneous metalwork and castings indicated on the Drawings, or required to secure the various parts together and provide a complete installation, shall be included under this section.

2.02 ANCHOR BOLTS:

- A. Anchor bolts for equipment and machinery, where permanently anchored into concrete, shall be stainless steel, unless otherwise shown. The diameter, length, and any bend dimensions shall be as required by the equipment or machinery manufacturer. Unless otherwise required, use ¾-inch minimum diameter and other geometry shown on the Drawings. Furnish a minimum of two nuts and a washer of the same material for each bolt. Provide sleeves as required or as shown for location adjustment.
- B. Submerged use is defined as any connection to concrete from a point 1 foot 6 inches above the maximum water surface in a water-holding basin and any connection below that point.
- C. Anchor bolts for other uses to anchor fabricated metalwork or structural building, or structural frame components in areas of wet use or washdown areas shall be stainless steel. Minimum size shall be ¾-inch diameter by 12-inches long, unless otherwise shown. Furnish two nuts and one washer per bolt of the same material as the bolt, unless otherwise shown.

2.03 STAINLESS STEEL FASTENERS LUBRICANT (ANTI-SEIZING): Where stainless steel nuts and machined bolts, anchor bolts, concrete anchors, and all other threaded fasteners are used, CONTRACTOR shall apply an anti-seizing lubricant to the threads prior to making up the connections. The lubricant shall contain substantial amounts of molybdenum disulfide, graphite, mica, talc, or copper.

2.04 STRUCTURAL STEEL SUPPORTS: Provide all structural steel supports of the sizes and weights shown. All connections shall be welded, unless otherwise shown.

2.05 BOLTS AND FASTENERS:

- A. Bolts and fasteners not permanently embedded in concrete, but located outdoors in areas subject to the weather; chemical handling areas; equipment rooms subject to drainage, leakage, and washdown; and in galleries and trenches, shall be Type 316 stainless steel as hereinbefore specified.

- B. Bolts for flanges of piping, valves, and other similar connections shall be as specified in other sections or as shown on the Drawings.

PART 3 - EXECUTION

3.01 GENERAL:

- A. Workmanship and finish of all metalwork specified under this section shall be of the highest grade and equal to the best practice of modern shops for the respective work. Exposed surfaces shall have smooth finish and sharp, well-defined lines. Provide all necessary rabbets, lugs, and brackets so that the work can be assembled in a neat, substantial manner. Conceal fastenings where practical. Drill metalwork and countersink holes as required for attaching hardware or other materials. Fabricate metals as specified. Weld connections, except where bolting is directed. Items requiring special fabrication methods are mentioned herein. Fabrication of all other items shall be of equal quality. Methods of fabrication not otherwise specified or shown shall be adequate for the stresses and as directed by the City of Pompano.
- B. Grind all exposed edges of welds smooth on walkways, guardrails, handrails, stairways, channel door frames, steel column bases, and where indicated on the Drawings. All sharp edges shall be rounded to a 1/8" minimum radius; all burrs, jagged edges, and surface defects shall be ground smooth.
- C. Welds and adjacent areas shall be prepared such that there is (1) no undercutting or reverse ridges on the weld bead, (2) no weld spatter on or adjacent to the weld or any other area to be painted, and (3) no sharp peaks or ridges along the weld bead. All embedded pieces of electrode or wire shall be ground flush with the adjacent surface of the weld bead.
 - 1. Aluminum: Fabricate aluminum as shown, and in accordance with the Aluminum Association Standards and the manufacturer's recommendations as approved. Grind smooth sheared edges exposed in the finished work.

3.02 WELDING:

- A. The technique of welding employed, appearance, quality of welds made, and the methods of correcting defective work shall conform to codes for Arc and Gas Welding in Building Construction of the AWS and AISC. Surfaces to be welded shall be free from loose scale, rust, grease, paint, and other foreign materials, except that mill scale that will withstand vigorous brushing may remain. A light film of linseed oil may likewise be disregarded. No welding shall be done when the temperature of the base metal is lower than 0 degrees Fahrenheit. Finished members shall be true to line and free from twists.
- B. All welding operators shall be qualified in accordance with the requirements of current AWS Standard Qualification Procedure D1.1, Chapter 5, and welders of structural and reinforcing steel shall be certified for all positions of welding in accordance with such procedure. A recognized testing laboratory shall run qualification tests at the CONTRACTOR's expense.
- C. All welding operators shall be subject to examination for requalification using the equipment, materials, and electrodes employed in the execution of the Contract work. Such requalification, if ordered by the City of Pompano, shall be done at the expense of the CONTRACTOR.
 - 1. Aluminum: Aluminum shall be welded with Gas Metal Arc (MIG) or Gas Tungsten Arc (TIG) processes in accordance with the manufacturer's recommendations as approved, and in accordance with the recommendations of the American Welding Society contained in the Welding Handbook, as last revised. Grind smooth all exposed aluminum welds.

- 3.03 **INSTALLATION OF FABRICATED METALWORK:** Install in accordance with the shop drawings, the Drawings, and these specifications. Perform field welding and erection work by skilled mechanics. Install fabricated metalwork plumb or level as applicable. The complete installations shall, in all cases, be rigid, substantial, and neat in appearance. Erect structural steel in accordance with the applicable portions of AISC

Code of Standard Practice, except as modified. Install commercially manufactured products in accordance with manufacturer's recommendations as approved.

- A. Aluminum: Erection of aluminum shall be in accordance with the Aluminum Association. Mill marking shall not be removed from concealed surfaces. Exposed surfaces not otherwise coated shall have the inked or painted identification marks removed after the material has been inspected and approved by the City of Pompano.

3.04 ANCHOR BOLTS: All anchor bolts shall be accurately located and held in place with templates at the time the concrete is poured.

3.05 GALVANIZING AND REPAIR:

- A. Galvanizing of steel plates, shapes, bars (and products fabricated from these items), and strip 1/8-inch thick or thicker, shall conform to ASTM A120. Material thinner than 1/8-inch shall either be galvanized before fabrication in conformance with the requirements of ASTM A525, Coating Designation G210 or after fabrication, in conformance with the requirements of ASTM A123, except that the weight of zinc coating shall average not less than 1.2 ounces per square foot of actual surface area with no individual specimen having a weight of less than 1.0 ounce. Unless otherwise provided, galvanizing shall be done before or after fabrication, for material that is thinner than 1/8-inch, at the option of the CONTRACTOR. Galvanizing will not be required for stainless steel, monel metal, and similar corrosion-resistant parts.
- B. All welded areas shall be thoroughly cleaned prior to galvanizing to remove all slag or other material that would interfere with the adherence of the zinc. When it is necessary to straighten any sections after galvanizing, such work shall be performed without damage to the zinc coating.
- C. In like manner, galvanizing of iron and steel hardware, and nuts and bolts, shall conform to ASTM A153. Galvanizing shall be performed after fabrication. Galvanizing of tapped holes will not be required.
- D. Fabrication shall include all operations such as shearing, cutting, punching, forming, drilling, milling, bending, welding, and riveting.
- E. Components of bolted assemblies shall be galvanized separately before assembly.
- F. The minimum pitch diameter of the threaded portion of all bolts, anchor bars, or studs shall conform to ANSI B1.1, having a Class 2A tolerance before galvanizing. After galvanizing, the pitch diameter of the nuts or other threaded parts may be tapped over ANSI B1.1, Class 2B tolerance, by the following maximum amounts:

3/8-inch through 9/16-inch	0.016-inch oversize
5/8-inch through 1-inch	0.023-inch oversize
1-1/8 inches and larger	0.033-inch oversize
- G. Except for inlet grates not otherwise required to be welded, all edges of tightly contacting surfaces, where galvanizing is required, shall be completely sealed by welding before galvanizing.
- H. Galvanized surfaces that are abraded or damaged at any time after the application of the zinc coating shall be repaired in accordance with SECTION 09900.

3.06 ELECTROLYTIC PROTECTION: Where aluminum is in contact with dissimilar metals, or to be embedded in masonry and concrete, protect surfaces in accordance with SECTION 09900. Allow paint to dry before installation of the materials. Protect painted surfaces during installation; should coating become marred, prepare and touch up surface per paint manufacturer's instructions.

3.07 PAINTING: Thoroughly clean all ferrous metal items not galvanized and give a shop coating of metal primer. Preparation of surfaces and application of primer shall be in accordance with the paint manufacturer's

printed directions and recommendations as approved; and in accordance with SECTION 09900, utilizing the appropriate painting system.

- 3.08 PREPARATION FOR SHIPMENT: Insofar as is practical, the items provided hereunder shall be factory assembled. The parts and assemblies that are of necessity shipped unassembled, shall be packaged and clearly tagged in a manner that will protect the materials from damage, and facilitate the identification and final assembly in the field.

END OF SECTION

PART 1 - GENERAL

1.01 SCOPE:

- A. The Work of this Section shall consist of furnishing all labor, material, and equipment for installation of a standing seam metal roof system, including gutters, downspouts, roof vents, related flashing and accessory components in accordance with the Drawings and applicable codes and as specified herein.

1.02 STANDARD REFERENCES:

- A. Codes and Standards: Comply with provisions of the following codes and standards, except as otherwise indicated or specified:
 - Florida Building Code 2007 (FBC)
 - American Iron and Steel Institute (AISI), "Specification for the Design of Cold-Formed Steel Structural Members"
 - AWS "Structural Welding Code."
 - SDI "Design Manual for Floor Decks and Roof Decks."
- B. Qualification of Field Welding: Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure."
- C. FM Listing: Provide metal roof deck units and roof deck fasteners which have been evaluated by Factory Mutual System and are listed in "Factory Mutual Approval Guide" for "Class I" fire rated construction.

1.03 SUBMITTALS:

- A. Product Data: Submit product data or manufacturer's specifications and installation instructions for all elements of the roof panel system including, roof panels, gutters, downspouts, roof vents, and accessories.
- B. Samples: Submit sample of panel section, at least 6" x 6", showing seam profile and a sample of color selected.
- C. Shop Drawings: Show roof panel system with sub-purlins, flashings and accessories in plan and elevation; sections and details. Include gage, finishes, panel length, joining details, anchorage details, flashings and special fabrication provisions for termination and penetrations. Indicate dimensions, panel layout, construction details, method of anchorage and installation, and relationship with adjacent and interfacing work. Submit shop drawings signed and sealed by a professional engineer licensed in the State of Florida to the Engineer for review.
- D. Product Approval: Submit Florida Product approvals for all elements of the roof panel system including but not limited to deck properties, yield strength, uplift capacities, fastener assembly, pull out values, sub-purlin configuration and spacing. Include laboratory test reports and other data to show compliance with specifications and specified standards.

1.04 DELIVERY, STORAGE AND HANDLING:

- A. Inspect materials upon delivery.

- B. Unload, store and erect metal roof panels in a manner to prevent bending, warping, twisting and surface damage.
- C. Stack metal roof panels off the ground providing for drainage, covered with suitable weathertight and ventilated covering. Do not store metal roof panels in contact with other materials that might cause staining, denting, or other surface damage. Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to the extent necessary to period of metal roof panel installation.

1.05 WARRANTY:

- A. The MANUFACTURER shall warrant the Factory-Finished Metal Coating System against defective materials and workmanship including, but not limited to, chalking, crazing, checking, peeling, adhesion and fading with the MANUFACTURER'S standard warranty, but for no less than twenty years from the date of Substantial Completion.
- B. The MANUFACTURER shall provide a twenty-year watertight warranty, jointly signed by the MANUFACTURER and CONTRACTOR.
- C. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion.
- D. Warranty coverage commences at time of Final Completion / Acceptance by Owner.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

- A. Innovative Metals Company, (IMETCO), or approved equal.
- B. Products referenced in this Section are manufactured by IMETCO, unless specified otherwise.

2.02 STANDING SEAM METAL ROOFING AND FASCIA:

- A. Roof panel: Panels shall be Series 300, 22 Gage structural galvalume steel roof system. This product has been reviewed by the Miami Dade Product Control Division and accepted by the Board of Rules and Appeals to be used in Miami Dade County and other areas according to Notice of Acceptance No. 09-0224.04.
 - 1. Design: 22 Gage. (t = 0.03"), ASTM 792 Grade D steel with a Kynar 500 coating applied.
 - 2. Panel dimensions: 16" wide x 2-3/8" high manufactured in continuous lengths.
 - 3. Fasteners: Manufacturer's standard panel clip system for Series 300, 22 Gage structural galvalume steel roof assemblies. Panels shall be installed along the rib with Manufacture's standard panel clip system for Series 300, 22 Gage structural galvalume steel roof assemblies secured with two ¼ - 14 x 1½" corrosion resistance self drilling screws per clip; the screws shall be of sufficient length to penetrate through the sheathing a minimum of 3/16". Position clips at all intersections of panel seams and support members. Panel clips shall be spaced a maximum of 16" O.C.
 - 4. Finish: Kynar 500 fluorocarbon coating applied over epoxy-type prime coat. Provide 20-year warranty against fading, peeling, and chalking.
 - 5. Color: Selected by City of Pompano from manufacturer's standard colors after award of contract.
- B. Fascia, trim, closure panels, and flashings; inside and outside: Same material and finish as respective inside and outside elements of panels.

- C. Fasteners: Manufacturer's standard for applicable use. Exposed fasteners shall be gasketed-type with finish to match panel.
- D. Vent pipe penetrations shall be detailed with Dektite rubber sleeves; 2" x 2" x 1/8 aluminum plates; #10-24 x 1/2" studs; #10-24 stop nuts; set in sealant acceptable to roof manufacturer, color to match roofing color.
- E. Gutters and downspouts shall match roofing.
- F. Rivets shall be acceptable to roof manufacturer.
- G. Accessories shall match roofing and be as required by roof manufacturer.
- H. Sealants shall be as required by roof manufacturer.

PART 3 - EXECUTION

3.01 INSPECTION:

- A. Examine surfaces to receive metal panels and notify City of Pompano in writing of any defects.
- B. Starting of work by CONTRACTOR shall constitute acceptance of work of others as satisfactory.

3.02 JOB CONDITIONS:

- A. Protection: Installed work shall be carefully protected against disfiguration, contamination, or damage by mechanical abuse or contact with other harmful materials. Wherever exposure to damage is critical, provide protective cover or barriers.

3.03 INSTALLATION:

- A. Installation of metal panel system shall be performed under experienced supervision and in strict accordance with Shop Drawings. Install the Series 300, 22 Gage structural galvalume steel roof panels, or approved equal, including flashing penetrations, valleys, end laps and accessories in compliance with "Innovative Metals Company, (IMETCO)" current, or approved equal, published installation instructions and in compliance with the minimum requirements detailed in Roofing Application Standard RAS 133.
- B. Roof panels shall be set plumb and true to line as indicated on Drawings with work properly centered and well secured to adjoining construction, in such manner as to be rigid and watertight. Attachment to structure shall be by approved fastening method.
 - 1. Erect panels to a tolerance not exceeding 1/4" in runs of 20'.
 - 2. Fittings shall have laps of sufficient width to make work watertight.
 - 3. Limit use of exposed fasteners to extent indicated in manufacturer's data and instructions with fasteners driven and tightened full depth to head.
 - 4. Anchor component parts securely in place, providing for necessary thermal and structural movement without undue distortion or overstressing of any component.
 - 5. Roof panels shall transition into side walls as indicated on Drawings. Transition to form a continuous seam line with concealed flashings.
- C. Install soffit panels in accordance with manufacturer's recommendations.
- D. Install metal trim members, flashings, and similar accessory items straight and plumb, level and true, securely fastened, and sealed in place as recommended by panel manufacturer. Trim member lengths

as long as practical, with joints concealed or located in unobjectionable places. Fittings shall have laps of sufficient width to make work watertight.

- E. Apply 1 coat of bituminous paint, concealed, on 1 or both surfaces wherever dissimilar metals would otherwise be in contact to eliminate possibility of corrosive or electrolytic action between metals.
- F. Install sealants at joints and where sheets adjoin other work, as shown or required to achieve wind and watertight condition with work in accordance with manufacturer's recommendations.
 - 1. Calking shall include head, joint, and sill members where panel meets structure. Perimeter calking shall also include such items as door frames, windows, and other penetrations occurring within system.
 - 2. Make lap joints in flashing watertight with 2 beads of sealant.

3.04 CLEAN UP:

- A. After installation has been completed, CONTRACTOR shall thoroughly clean metal components, interior and exterior, exposed surfaces in a manner acceptable to the City of Pompano. Cleaning procedures shall be in accordance with metal panel manufacturer's recommendations.
- B. Work that is damaged or defective shall be replaced at no additional cost to the City of Pompano.

END OF SECTION

SECTION 05600 MISCELLANEOUS METALS

PART 1 - GENERAL

- 1.01 MATERIALS: Materials shall be new, free from defects impairing strength, durability of appearance, and of best commercial quality for intended purposes.
- 1.02 SUBMITTALS: Submit for acceptance fully detailed shop and erection drawings for all miscellaneous metal work required for this project. Include with submittal color selections as required.
- 1.03 RELATED WORK SPECIFIED ELSEWHERE:
- A. SECTION 05100 Structural Steel
- 1.04 WARRANTY:
- A. The MANUFACTURER shall warrant the EQUIPMENT, MATERIALS and PRODUCTS specified in this section against defective materials and workmanship with the MANUFACTURER'S standard warranty, but for no less than one year from the date of Substantial Completion, and as described in the General Terms and Conditions.
- B. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in the General Terms and Conditions.

PART 2 - PRODUCTS

- 2.01 BASIC MATERIALS:
- A. Miscellaneous Structural Shapes: ASTM A36
- B. Miscellaneous Aluminum Shapes: ASTM B221, alloy 6063 T-5, Sheet: ASTM B 209, alloy 3003, tempered as required
- C. Miscellaneous Iron Castings: ASTM A48, Class 30
- D. Anchors and Fastenings: Compatible with material to be fastened
- E. Shop Primer: No. 5210 Universal Primer by Glidden
- F. Isolator for Aluminum and Specified Galvanized Metals: Aluminum pigmented bituminous paint or epoxy
- 2.02 FINISHES:
- A. Hot-dipped galvanizing ASTM A386, Class C, for angle thresholds and all other shapes cast-in or directly attached to concrete or masonry.
- B. Shop Primer: One coat on all ferrous metals not scheduled or required to be galvanized.
- C. Caustic Etch and Lacquer: Miscellaneous aluminum.
- 2.03 SHOP FABRICATED ITEMS:
- A. Pipe Railings: 1-1/2-inch diameter schedule 40, all welded construction, galvanized after fabrication.

- B. Angle Thresholds, Corner Guards, and Other Shapes Indicated as Cast-In-Construction: Weld round-rod back anchors as detailed or required. At corners, miter, weld and grind smooth. Follow basic material requirements.
- C. Steel Pipe Stanchions: 4" diameter schedule 40 galvanized steel pipe, heights as shown on the Drawings.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Follow accepted shop and erection drawings. Coordinate with work of Section 03100 for items cast into concrete.
- B. Isolate aluminum surfaces in contact with other surfaces with two (2) coats of specified paint.
- C. Isolate galvanized surfaces to be cast into concrete with two (2) coats of specified paint.

3.02 FIELD WELDING: Conform to AWS Code Standards. Use certified welders.

3.03 MISCELLANEOUS:

- A. Furnish all fastenings including lag screws, rods, bolts, washers, nuts, and inserts as required to complete all work.
- B. Embed pipe stanchions minimum 3 inches below grade in minimum 1-foot-4-inches diameter by 3-foot-6-inches deep 3000 psi concrete.

END OF SECTION

SECTION 07200 INSULATION

PART 1 - GENERAL

- 1.01 SCOPE: The extent of thermal insulation work is shown on the Drawings. The applications of thermal insulation specified in this section include the following:
- A. Blanket-type building insulation.
 - B. Board-type building insulation, concealed.
- 1.02 QUALITY ASSURANCE:
- A. Thermal Conductivity: The thicknesses shown are for the thermal conductivity (k-value at 75 degrees F.) specified for each material. Provide adjusted thicknesses as directed for the equivalent use of material having a different thermal conductivity. Comply with the minimum "R" value as indicated on the Drawings.
 - B. Fire and Insurance Ratings: Comply with the fire-resistance, flammability and insurance ratings indicated, and comply with governing regulations as interpreted by authorities. All materials shall meet factory mutual requirements for Class I construction.
- 1.03 SUBMITTALS, MANUFACTURER'S DATA, THERMAL INSULATION: Submit manufacturer's specifications and installation instructions for each type of insulation required. Include data substantiating that materials comply with specified requirements.
- 1.04 PRODUCT HANDLING:
- A. Protection from Deterioration: Do not allow insulation materials to become wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage and protection during installation. Protect plastic insulation from exposure to sunlight.
 - B. Fire Hazard: Do not deliver plastic insulating materials to the project site ahead of installation time. Protect at all times against ignition. Complete installation and concealment of plastic materials as rapidly as possible in each area of work.
- 1.05 JOB CONDITIONS, EXAMINATION OF SUBSTRATE: The CONTRACTOR must examine the substrate and the conditions under which the insulation work is to be performed, and notify the City of Pompano, in writing, of unsatisfactory conditions. Do not proceed with the insulation work until unsatisfactory conditions have been corrected in a manner acceptable to the City of Pompano.
- 1.06 WARRANTY:
- A. The MANUFACTURER shall warrant the EQUIPMENT, MATERIALS and PRODUCTS specified in this section against defective materials and workmanship with the MANUFACTURER'S standard warranty, but for no less than one year from the date of Substantial Completion, and as described in the General Terms and Conditions.
 - B. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in the General Terms and Conditions.

PART 2 - PRODUCTS

- 2.01 MATERIALS:

- A. 6 mil polyethylene vapor barrier standard type, placed directly over compacted ground with a minimum 6-inch wide Z-lock type lapping. Provide "Visqueen", vapor barrier or "Cytoplast" vapor barrier, or approved equal.
- B. Mineral/Glass Fiber Blanket/Batt Insulation: Inorganic fibers formed into flexible resilient blankets or semi-rigid resilient sheets; FS HH-I-521; density as indicated, but 1.0 pound minimum; provide "R" value or thickness indicated; manufacturer's standard lengths and widths as required to coordinate with spaces to be insulated; as shown on the Drawings, and as manufactured by one of the following: Manville, Owens-Corning Fiberglas, Rockwood Industries, U.S. Gypsum.
 - 1. Type: Reflective aluminum foil facing with integral nailing flanges; 1.0 perm rating, other face (if any) permeable.
 - 2. Flame Spread Rating: 25 (ASTM E 84) for foil facing.
- C. Board Type Building Insulation Concealed:
 - 1. Roof System: Polyisocyanurate foam core with fiberglass or foil faced both sides minimum thickness 1-1/2-inches. Adjust thickness as required to provide "R" value indicated.
- D. Miscellaneous Materials:
 - 1. Adhesive for Bonding Insulation: The type recommended by the insulation manufacturer, and complying with fire-resistance requirements.
 - 2. Mechanical Anchors: Type and size shown or, if not shown, as recommended by the insulation manufacturer for the type of application shown and condition of substrate.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. General: Comply with manufacturer's instructions for the particular conditions of installation in each case. If printed instructions are not available or do not apply to the project conditions, consult the City of Pompano before proceeding with the work. Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement. Apply a single layer of insulation of the required thickness, unless otherwise shown or required to make up the total thickness.
- B. General Building Insulation: Apply insulation units to the substrate by the method indicated, complying with the manufacturer's recommendations. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

END OF SECTION

SECTION 07620 SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.01 SUMMARY:

- A. This Section includes sheet metal flashing and trim in the following categories:
 - 1. Scuppers, conductor heads, and downspouts
 - 2. Exposed trim and gravel stops
 - 3. Copings
 - 4. Metal flashing
 - 5. Reglets
- B. Related Work Specified Elsewhere:
 - 1. Set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units: DIVISION 7.
 - 2. Flashing and roofing accessories installed integral with roofing membrane as part of roofing-system work: DIVISION 7.

1.02 REFERENCES:

- A. Aluminum Association (AA)
- B. American Architectural Manufacturers Association (AAMA)
- C. American Society for Testing and Materials (ASTM):
 - 1. A526/A526M - Steel Sheet, Zinc-Coated (Galvanized by the Hot-Dip Process, Commercial Quality)
 - 2. B32 - Solder Metal
 - 3. B209/209M - Aluminum and Aluminum-Alloy Sheet and Plate
- D. Federal Specifications (FS):
 - 1. UU-B-790a - Building Paper, Vegetable Fiber: (Kraft, Waterproofed, Water Repellent, and Fire Resistant)
- E. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
 - 1. Architectural Sheet Metal Manual, 5th ED
- F. National Roofing Contractors Association (NRCA)

1.03 PERFORMANCE REQUIREMENTS:

- A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing.
- B. Fabricate and install flashings at roof edges to comply with recommendations of FM Loss Prevention Data Sheet 1-49 for the wind pressures indicated on the drawings.

1.04 SUBMITTALS:

- A. Submit in accordance with DIVISION 1.

- B. Product Data including manufacturer's material and finish data, installation instructions, and general recommendations for each specified flashing material and fabricated product.
- C. Shop Drawings of each item specified showing dimensions, layout, profiles, methods of joining, and anchorage details.
- D. Samples of sheet metal flashing, trim, and accessory items, in the specified finish.

1.05 QUALITY ASSURANCE:

- A. Applicator: Company specializing in sheet metal flashing work with a minimum of 5 years experience.

1.06 PROJECT CONDITIONS:

- A. Coordinate Work of this Section with interfacing and adjoining Work for proper sequencing of each installation. Ensure best possible weather resistance, durability of Work, and protection of materials and finishes.

1.07 WARRANTY:

- A. The MANUFACTURER shall warrant the EQUIPMENT, MATERIALS and PRODUCTS specified in this section against defective materials and workmanship with the MANUFACTURER'S standard warranty, but for no less than one year from the date of Substantial Completion, and as described in the General Terms and Conditions.
- B. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in the General Terms and Conditions.

PART 2 - PRODUCTS

2.01 METALS:

- A. Stainless-Steel Sheet: ASTM A 167, Type 304, soft annealed, with No. 2D finish, except where harder temper is required for forming or performance; minimum 0.0187 inch thick, unless otherwise indicated or specified.
- B. Terne-Coated Stainless-Steel Sheet: ASTM A167, Type 304 sheet, both sides coated with a minimum terne alloy (80% lead, 20% tin) total coating weight of 0.092 lb/sq. ft.; minimum 0.0187 inch thick, unless otherwise indicated or specified.
- C. Galvanized Steel Sheet: ASTM A526, G90 (ASTM A526M, Z275), commercial quality, or ASTM A527, G90 (ASTM A527M, Z275), lock-forming quality, hot-dip galvanized steel sheet with 0.20% copper, mill phosphatized where indicated for painting; not less than 0.0396 inch thick, unless otherwise indicated or specified.
- D. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A792, Class AZ-50 coating, Grade 40 (ASTM A792M, Class AZ-150 coating, Grade 275) or to suit project conditions, with 55% aluminum, not less than 0.0396 inch thick, unless otherwise indicated.
- E. Coil-Coated Galvanized Steel Sheet: Zinc-coated, commercial-quality steel sheet conforming to ASTM A755, G90 (ASTM A755M, Z275) coating designation, coil coated with high-performance fluoropolymer coating as specified in "Coil-Coated Galvanized Steel Sheet Finish" Article; not less than 0.0336 inch thick, unless otherwise indicated or specified.
- F. Lead Sheet: ASTM B749, Type L51121, copper-bearing lead sheet, with a minimum thickness of 0.0625 inch except not less than 0.0937 inch thick for applications where burning (welding) is involved.

2.02 SHEET METAL FLASHING AND FABRICATIONS:

A. Reglets:

1. General: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces and compatible with flashing indicated.
 - a. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
 - b. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
 - c. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
 - d. Unit Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
 - e. Flexible Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
 - f. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of the counterflashing lower edge.
 - i. Material: Stainless steel, 0.0187 inch thick
 - ii. Material: Copper, 16 oz/sq ft
 - iii. Material: Aluminum, 0.024 inch thick
 - iv. Material: Galvanized steel, 0.0217 inch thick
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fry Reglet Corporation
 - b. W.P. Hickman Co.
 - c. Keystone Flashing Company

B. Sheet Metal Fabrications:

1. General: Fabricate sheet metal items in thickness or weight needed to comply with performance requirements but not less than that listed below for each application and metal.
2. Gutters with Girth up to 15 Inches: Fabricate from the following material:
 - a. Aluminum: 0.0320 inch thick
 - b. Galvanized Steel: 0.0217 inch thick
3. Downspouts: Fabricate from the following material:
 - a. Aluminum: 0.024 inch thick
 - b. Galvanized Steel: 0.0217 inch thick
4. Conductor Heads: Fabricate from the following material:
 - a. Aluminum: 0.0320 inch thick
 - b. Galvanized Steel: 0.0276 inch thick
5. Roof-Drain Flashing: Fabricate from the following material:

- a. Lead: 4.0 lb/sq ft hard tempered
 - b. Copper: 12 oz/sq ft
6. Scuppers: Fabricate from the following material:
 - a. Aluminum: 0.0320 inch thick
 - b. Galvanized Steel: 0.0276 inch thick
 7. Counterflashing: Fabricate from the following material:
 - a. Aluminum: 0.0320 inch thick
 - b. Galvanized Steel: 0.0217 inch thick
 8. Valley Flashing: Fabricate from the following material:
 - a. Copper: 16 oz/sq ft
 9. Equipment Support Flashing: Fabricate from the following material:
 - a. Copper: 16 oz/sq ft
 - b. Galvanized Steel: 0.0276 inch thick
 - c. Aluminum-Zinc Alloy-Coated Steel: 0.0276 inch thick
 10. Roof-Penetration Flashing: Fabricate from the following material:
 - a. Copper: 16 oz/sq ft
 - b. Galvanized Steel: 0.0276 inch thick
 - c. Aluminum-Zinc Alloy-Coated Steel: 0.0276 inch thick
- C. Miscellaneous Materials and Accessories:
1. Solder: ASTM B32, Grade Sn50, used with rosin flux
 2. Solder for Stainless Steel: ASTM B32, Grade Sn60, used with an acid flux of type recommended by stainless-steel sheet manufacturer; use a noncorrosive rosin flux over tinned surfaces.
 3. Stainless-Steel Welding Rods: Type recommended by stainless-steel sheet manufacturer for type of metal sheets furnished.
 4. Fasteners: Same metal as sheet metal flashing or other noncorrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with material being fastened.
 5. Asphalt Mastic: SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil dry film thickness per coat.
 6. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
 7. Elastomeric Sealant: Generic type recommended by sheet metal manufacturer and fabricator of components being sealed and complying with requirements for joint sealants as specified in SECTION 07920.
 8. Epoxy Seam Sealer: 2-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior and interior nonmoving joints, including riveted joints.
 9. Adhesives: Type recommended by flashing sheet metal manufacturer for waterproof and weather-resistant seaming and adhesive application of flashing sheet metal.
 10. Paper Slip Sheet: 5-lb/square red rosin, sized building paper Conforming to FS UU-B-790, Type I, Style 1b.

11. Polyethylene Underlayment: ASTM D4397, minimum 6-mil- thick black polyethylene film, resistant to decay when tested according to ASTM E154.
12. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of Work, matching or compatible with material being installed; noncorrosive; size and thickness required for performance.
13. Roofing Cement: ASTM D4586, Type I, asbestos free, asphalt based.

D. Fabrication, General:

1. Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.
2. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Form exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.
4. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.
5. Seams: Fabricate nonmoving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
6. Expansion Provisions: Space movement joints at maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).
7. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
8. Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.
9. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.
10. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.
 - a. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

2.03 ALUMINUM EXTRUSION FABRICATIONS:

A. Surface-Mounted Reglet and Counterflashing:

1. Reglet frame and flashing of heavy extruded aluminum Alloy 6063-T5 mill finish. Provide with joint cover plates. Reglet frame shall have integral slot at top for installation of sealant.
2. Provide frame and flashing in maximum 12'0" lengths with mitered and welded corners.
3. Flashing screws shall be stainless steel. Also provide with screws and inserts for anchoring to wall material indicated.
4. Manufacturers:
 - a. MM Systems Corporation

- b. Fry Reglet Corporation
 - c. W. P. Hickman and Company
- B. Fascia System Without Cant For Single-Ply Roof Systems
- 1. Fascia shall be of aluminum of 0.040" thickness, AA-C22A42 bronze anodized finish. Provide with covers at joints and prefabricated corners. Provide with continuous extruded aluminum anchor bars. Provide in nominal 12'-0" lengths as much as possible to keep number of joints to a minimum.
 - 2. Manufacturers:
 - a. Metal-Era - Anchor-Tite Standard Version
 - b. W. P. Hickman and Company
 - c. MM Systems Corporation

2.04 PREFORMED METAL FABRICATIONS:

- A. Recessed Reglet and Counterflashing:
- 1. Reglet shall be 1/4" x 1-1/8" deep with counterflashing minimum of 4 inches high.
 - 2. Material shall be galvanized steel - 26 gauge.
 - 3. Manufacturer:
 - a. Fry Reglet - Type B for masonry, Type A for concrete, Snap Lock.
- B. Aluminum Coping System:
- 1. Cap shall be 0.063-gauge aluminum formed to dimensions indicated, fluoropolymer coating, white color finish. Provide in minimum 10'0" lengths as much as possible to keep joints to a minimum.
 - 2. Provide drainage system at joints with concealed joint covers or splice plates, coping chair, and galvanized steel cleats or anchor plates.
 - 3. Provide with adhesive or anchors for anchoring system to top of wall surface and in accordance with manufacturer's system.
 - 4. Manufacturers:
 - a. W.P. Hickman Company - Permasnap Coping.
 - b. MM Systems Corporation - Snap-Lok Coping I.
 - c. Metal-Era - Perma-Tite.

2.05 ELASTOMERIC FLASHING:

- A. Pipe and Conduit Penetrations Flashings
- 1. Preformed EPDM and neoprene units with effective temperature range of 60°F to +270°F
 - 2. Low profile base
 - 3. Provide with base and cap for proper opening size and number of openings required.
 - 4. Provide with adhesive, adapters, and clamps as required for complete and weathertight installation.
 - 5. Use for penetrations indicated.
 - 6. Manufacturer:

- a. York Manufacturing, Inc. - Superflash Multi-Seal

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that Work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION:

- A. Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Anchor units of Work securely in place providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level. Install Work with laps, joints, and seams that will be permanently watertight and weatherproof.
- B. Install exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- C. Roof-Edge Flashings: Secure metal flashings at roof edges according to FM Loss Prevention Data Sheet 1-90 for specified wind zone.
- D. Expansion Provisions: Provide for thermal expansion of exposed sheet metal Work. Spacemovement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant concealed within joints.
- E. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except where pre-tinned surface would show in finished Work.
 - 1. Do not solder the following metals:
 - a. Aluminum
 - b. Coil-coated galvanized steel sheet
 - 2. Pretinching is not required for the following metals:
 - a. Lead
 - b. Lead-coated copper
 - c. Terne-coated stainless steel
 - 3. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
- F. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards. Fill joint with sealant and form metal to completely conceal sealant. Use joint adhesive for nonmoving joints specified not to be soldered.
- G. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.

- H. Seams: Fabricate nonmoving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
- I. Separations: Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.
 - 1. Underlayment: Where installing stainless steel or aluminum directly on cementitious or wood substrates, install a slip sheet of red-rosin paper and a course of polyethylene underlayment.
 - 2. Bed flanges of Work in a thick coat of roofing cement where required for waterproof performance.
- J. Install reglets to receive counterflashing according to the following requirements:
 - 1. Where reglets are indicated in concrete, furnish reglets for installation under DIVISION 3.
 - 2. Where reglets are indicated in masonry, furnish reglets for installation under DIVISION 4.
- K. Counterflashings: Coordinate installation of counterflashings with installation of assemblies to be protected by counterflashing. Install counterflashings in reglets or receivers. Secure in a waterproof manner by means of snap-in installation and sealant, lead wedges and sealant, interlocking folded seam, or blind rivets and sealant. Lap counterflashing joints a minimum of 2 inches (50 mm) and bed with sealant.
- L. Roof-Drainage System: Install drainage items fabricated from sheet metal, with straps, adhesives, and anchors recommended by SMACNA's Manual or the item manufacturer, to drain roof in the most efficient manner. Coordinate roof-drain flashing installation with roof-drainage system installation. Coordinate flashing and sheet metal items for steep-sloped roofs with roofing installation.
- M. Overhead-Piping Safety Pans: Suspend pans from pipe and install drain line to plumbing waste or drain line.
- N. Equipment Support Flashing: Coordinate equipment support flashing installation with roofing and equipment installation. Weld or seal flashing to equipment support member.
- O. Roof-Penetration Flashing: Coordinate roof-penetration flashing installation with roofing and installation of items penetrating roof. Install flashing as follows:
 - 1. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.
 - 2. Seal and clamp flashing to pipes penetrating roof, other than lead flashing on vent piping.
- P. Splash Pans: Install where downspouts discharge on low-sloped roofs, unless otherwise shown. Set in roof cement or sealant compatible with roofing membrane.

3.03 CLEANING AND PROTECTION:

- A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.
- B. Provide final protection and maintain conditions that ensure sheet metal flashing and trim Work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

END OF SECTION

SECTION 07631 GUTTERS AND DOWNSPOUTS

PART 1 - GENERAL

1.01 SCOPE:

- A. Summary of Work: The CONTRACTOR shall furnish all labor, materials and equipment necessary for the construction and installation of gutters and downspouts as shown on the drawings.
 - 1. SECTION 05560 Standing Seam Metal Roof.
 - 2. SECTION 07620 Sheet Metal Flashing and Trim.

1.02 APPLICABLE PUBLICATION:

- A. Florida Building Code 2007 (FBC).

1.03 WORK INCLUDED: Gutters and downspouts shall include not only gutters and downspouts, but also brackets, fasteners, collection boxes, strainers, precast concrete splash blocks and other items to provide a complete collection system. Comply with the Florida Building Code, 2007 edition.

1.04 COORDINATION: Gutters and downspouts work shall be fabricated and installed in close coordination with the requirements of other trades whose work abuts, joins, or is integrated with it. Cooperation among all trades involved is essential to the attainment of satisfactory and acceptable results.

1.05 SUBMITTALS: Submit to the engineer for approval complete shop drawings of all fabricated items showing details of construction, fabrication, fastening, etc.

1.06 QUALIFICATIONS: (Not Used).

1.07 RESPONSIBILITIES: (Not Used).

1.08 PROTECTION: All gutters and downspouts shall be protected from damage by other trades as may be required.

1.09 INSPECTION COORDINATION: The CONTRACTOR shall provide access to the WORK for the City of Pompano as requested for inspection. The Contractor shall provide 48 hours notice of its intention to begin new WORK activities.

1.10 WARRANTY:

- A. The MANUFACTURER shall warrant the EQUIPMENT, MATERIALS and PRODUCTS specified in this section against defective materials and workmanship with the MANUFACTURER'S standard warranty, but for no less than one year from the date of Substantial Completion, and as described in the General Terms and Conditions.
- B. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in the General Terms and Conditions.

PART 2 - PRODUCTS

2.01 GUTTERS AND DOWNSPOUTS:

- A. Gutters and downspouts indicated on drawings shall be minimum of 0.032" thickness aluminum with baked enamel finish color to match roof. Straps shall be 1/8" x 1", 4' - 0" o.c. to match gutters and downspouts.

- B. Strainers shall be removable type with spherical shape with ½” maximum square openings between wires. Fabricated of heavy gauge aluminum wire.
- C. All fasteners shall be aluminum with white baked enamel finish, field paint to match adjacent surface.

2.02 PRECAST CONCRETE SPLASH BLOCKS:

- A. Size: 12” x 16” x 1”

PART 3 - EXECUTION

3.01 FABRICATION:

- A. All gutters and downspouts shall be fabricated of materials specified in configurations shown.
- B. Use seamless type of use interlocking seams that tightly lock together. Seam as required to make waterproof.
- C. Roll all edges so no raw edges are exposed.
- D. Mechanically fasten straps to gutters.
- E. Fasten strap brackets to downspouts.
- F. Fabricate all items in as long lengths as practical.

3.02 INSTALLATION:

- A. Where seams are required, lap all joints 1” minimum and seam watertight.
- B. Mechanically fasten straps to roof to eliminate any sagging.
- C. Attach downspouts brackets to wall with ¼” bolts in lead shields.
- D. Isolate all dissimilar materials with bituminous paint or other approved method.

3.03 CLEANING:

- A. All sheet metal shall be left clean and in good condition.

END OF SECTION

SECTION 07900 SEALANTS

PART 1 - GENERAL

1.01 SCOPE: The required applications include, but are not necessarily limited to, the following:

- A. Flashing and Joints
- B. Partition and Ceiling Joints
- C. Equipment and Isolation Joints
- D. Gasketing for Assembly of Components

1.02 SUBMITTALS:

- A. Manufacturer's Data, Joint Sealers: Submit manufacturer's specifications, recommendations and installation instructions for each type of material required. Include manufacturer's published data, or letter of certification, or certified test laboratory report indicating that each material complies with the requirements and is intended generally for the applications shown.
- B. Guarantee, Joint Sealers: Submit written guarantee agreeing to repair or replace joint sealers which fail to perform as airtight and watertight joints, or fail in joint adhesion, cohesion, abrasion resistance, stain resistance, or general durability, or appear to deteriorate in any other manner not clearly specified by submitted manufacturer's data as an inherent quality of the material for the exposure indicated. Provide guarantee signed by the CONTRACTOR. Guarantee period shall be two (2) years.

1.03 JOB CONDITIONS:

- A. The CONTRACTOR must examine the joint surfaces and backing, and their anchorage to the structure, and the conditions under which the joint sealer work is to be performed. Do not proceed with the joint sealer work until unsatisfactory conditions have been corrected.
- B. Do not proceed with installation of sealants under adverse weather conditions, or when temperatures are below or above manufacturer's recommended limitations for installation. Proceed with the work only when forecasted weather conditions are favorable for proper cure and development of high early bond strength. Wherever joint width is affected by ambient temperature variations, install elastomeric sealants only when temperatures are in the lower third of manufacturer's recommended installation temperature range.

1.04 WARRANTY:

- A. The MANUFACTURER shall warrant the EQUIPMENT, MATERIALS and PRODUCTS specified in this section against defective materials and workmanship with the MANUFACTURER'S standard warranty, but for no less than one year from the date of Substantial Completion, and as described in the General Terms and Conditions.
- B. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in the General Terms and Conditions.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL:

- A. Colors: For exposed materials provide color as indicated or, if not indicated, as selected by the City of Pompano from manufacturer's standard colors. For concealed materials, provide the natural color that has the best overall performance characteristics.

- B. Hardness: As recommended by manufacturer for application shown, unless otherwise indicated.
- C. Modulus of Elasticity: Provide the lowest available modulus of elasticity which is consistent with exposure to weathering, indentation, vandalism, abrasion, support of loading, and other requirements.
- D. Compatibility: Before purchase of each required material, confirm its compatibility with each other material it will be exposed to in the joint system.
- E. Size and Shape: As shown or, if not shown, as recommended by the manufacturer for the type and condition of joint, and for the indicated joint performance or movement.
- F. Grade of Sealant: For each application, provide the grade of sealant (non-sag, self-leveling, no-track, knife grade, preformed) as recommended by the manufacturer for the particular condition of installation (location, joint shape, ambient temperature, and similar conditions) to achieve the best possible overall performance. Grades specified herein are for normal condition of installation.
- G. One-Component Polysulfide Sealant: Polysulfide based, one-part elastomeric sealant, complying with FS TT-S-00230, Class A, Type II (non-sag), unless Type I recommended by manufacturer for the application shown.
- H. Two-Component Polysulfide Sealant: Polysulfide based, two-part elastomeric sealant.
- I. Exterior Sealant: For joints in vertical surfaces, provide ASTM C920, Type S or M, Grade NS, Class 25, Use NT. For joints in horizontal surfaces, provide ASTM C920, Type S or M, Grade P, Class 25, Use T. Color of sealant shall be gray unless in contact with window frame where it shall be dark brown or bronze.
- J. Exterior sealants used adjacent to or above roof surfaces shall be compatible with asphaltic bituminous roofing products, should contact be made with the roofing system, that would not have adverse affects to either product.

2.02 NON-ELASTOMERIC SEALANTS:

- A. One-Component Acrylic Sealant: Acrylic terpolymer, solvent-based, one-part, thermoplastic sealant compound; solids not less than 95 percent acrylic; complying with FS TT-S-00230, Class B, Type II, recommended by manufacturer for general use as an exposed building construction sealant.
- B. Acrylic-Latex Sealant: Latex-rubber-modified, acrylic-emulsion-polymer sealant compound permanently flexible, non-staining, and non-bleeding, recommended by manufacturer for protected exterior exposure.

2.03 CAULKING COMPOUNDS: Synthetic Resin Caulking Compounds - Oil-based caulking compound complying with FS TT-C-598, except compounded only with special synthetic resins, non-staining, non-bleeding, paintable.

2.04 JOINT FILLERS: Provide type as recommended by manufacturer for use with joint type and sealant, non-staining, resilient.

2.05 MISCELLANEOUS MATERIALS:

- A. Oakum Joint Filler: Provide untreated hemp or jute fiber rope, free of oil, tar, and other compounds which might stain surfaces, contaminate joint walls, or not be compatible with sealants.
- B. Joint Primer/Sealer: Provide the type of joint primer/sealer recommended by the sealant manufacturer for the joint surfaces to be primed or sealed.
- C. Bond Breaker Tape: Polyethylene tape or other plastic tape as recommended by the sealant manufacturer to be applied to sealant-contact surfaces where bond to the substrate or joint filler must be avoided for proper performance of sealant. Provide self-adhesive tape wherever applicable.

- D. Sealant Backer Rod: Compressible rod stock of polyethylene foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam, or other flexible, permanent, durable non-absorptive material as recommended for compatibility with sealant by the sealant manufacturer.

PART 3 - EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS: Comply with manufacturer's printed instructions except where more stringent requirements are shown or specified and except where manufacturer's technical representative directs otherwise.

3.02 JOINT PREPARATION: Clean joint surfaces immediately before installation of sealant or caulking compound. Remove dirt, insecure coatings, moisture and other substances that would interfere with bond of sealant or caulking compound. Etch joint surfaces as recommended by sealant manufacturer. Roughen vitreous or glazed joint surfaces as recommended by sealant manufacturer. Prime or seal the joint surfaces wherever shown or recommended by the sealant manufacturer. Do not allow primer/sealer to spill or migrate onto adjoining surfaces.

3.03 INSTALLATION:

- A. Set joint filler units at proper depth or position in the joint to coordinate with other work, including the installation of bond breakers, backer rods and sealants. Do not leave voids or gaps between the ends of joint filler units.
- B. Install sealant backer rod for liquid elastomeric sealants, except where shown to be omitted or recommended to be omitted by sealant manufacturer for the application shown.
- C. Install bond breaker tape wherever shown and wherever required by manufacturer's recommendations to ensure that elastomeric sealants will perform properly.
- D. Employ only proven installation techniques, which will ensure that sealants will be deposited in uniform, continuous ribbons without gaps or air pockets with complete "wetting" of the joint bond surfaces equally on opposite sides. Except as otherwise indicated, fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces. Where horizontal joints are between a horizontal surface and vertical surface, fill joint to form a slight cove so that joint will not trap moisture and dirt.
- E. Install sealant to depths shown or, if not shown, 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 exposures, fill joints to a depth equal to 75 percent of 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 neither more than 1/2 inch deep nor less than 1/4 inch deep.
 - 3. For joints sealed with non-elastomeric sealants and caulking compounds, fill joints to a depth in the range of 75 percent to 125 percent of joint width.
- F. Do not allow sealants or compounds to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces. Clean the adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage.

3.04 CURE AND PROTECTION:

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

Protect joint sealers during the construction period so that they will be without deterioration or damage at the time of the City of Pompano's acceptance.

- B. Cleaning: Immediately clean off fresh compound that has been smeared on any surface and rub clean with a solvent as recommended by the compound manufacturer. Upon completion of compound application, remove all remaining smears and stains resulting therefrom and leave the work in a clean and neat condition.

END OF SECTION

SECTION 09900 PROTECTIVE COATINGS

PART 1 - GENERAL

1.01 SCOPE:

- A. Summary of Work: The CONTRACTOR shall provide coating on exterior surfaces throughout the Project and which are listed in PART 2.
- B. Regulatory Requirements: In addition to requirements specified elsewhere for environmental protection, provide coating materials that conform to the restrictions of the local and regional jurisdiction. Notify the City of Pompano of any coating specified herein that fails to conform to the requirements for the location of the project or location of application.
 - 1. Lead Content: Use only coatings that are totally lead free.
 - 2. Chromate Content: Do not use coatings containing zinc-chromate or strontium chromate.
 - 3. Asbestos Content: Materials shall not contain asbestos.
 - 4. Mercury Content: Materials shall not contain mercury or mercury compounds.
 - 5. The specified maximum VOC content shall apply to the unthinned product.

1.02 APPLICABLE PUBLICATIONS:

- A. American National Standards Institute (ANSI):
 - 1. A 13.1 - Scheme for the Identification of Piping Systems
 - 2. Z 53.1 - Safety Color Code for Marking Physical Hazards
- B. American Society for Testing and Materials (ASTM):
 - 1. D4258 - Standard Practice for Surface Cleaning Concrete for Coating
 - 2. D4259 - Standard Practice for Abrading Concrete
 - 3. D4260 - Standard Practice for Acid Etching Concrete
 - 4. D4261 - Standard Practice for Surface Cleaning Concrete Unit Masonry for Coating
- C. Society for Protective Coatings (SSPC) Surface Preparation Specifications:
 - 1. SP1 - Solvent Cleaning: Removes oil, grease, soil, drawing and cutting compounds, and other soluble contaminants.
 - 2. SP2 - Hand Tool Cleaning: Removes loose mill scale, loose rust, loose paint and other loose foreign matter.
 - 3. SP3 - Power Tool Cleaning: Removes loose material. Not intended to remove all scale or rust.
 - 4. SP5 - White Metal Blast Cleaning: Removes all scale, rust, foreign matter. Leaves surface gray-white uniform metallic color.
 - 5. SP6 - Commercial Blast Cleaning: Two-thirds of each square inch free of all visible residues; remainder only light discoloration.
 - 6. SP7 - Brush-Off Blast Cleaning: Removes only loose material, remaining surface tight and abraded to give anchor pattern.
 - 7. SP10 - Near-White Blast Cleaning: At least 95% of each square inch shall be free of all visible residues.
 - 8. SP11 - Power Tool Cleaning to Bare Metal

1.03 DEFINITIONS:

- A. Coating systems include surface preparation, prime coat (first coat), finish coats (second and third coats), inspection, cleaning, and touch-up of surfaces and equipment. Shop preparation, prime coat, and finish coats to be shop-applied may be specified elsewhere or referenced to this Section so that a complete system is specified and coordinated.
1. Where surface preparation and first (prime) coat are specified in other Sections to be shop-applied, such as for structural steel, hollow metal doors or equipment, only the touch-up and finish coats are a part of field painting. Surface preparation is the required degree of preparation prior to application of first (prime) coat regardless if done in shop or field.
 2. If materials are provided without shop primer such as miscellaneous steel or sheet metal, then surface preparation, first, second, and third coats are a part of field painting.
 3. Concealed surfaces are generally not required to have finish-coats unless otherwise specified, but prime coat should be applied and touched up prior to concealment.
 4. Where equipment and materials are provided with shop-applied finished coating system, only touch-up is a part of field painting.
 5. Refer to applicable Sections to determine whether surface preparation and first coat, or complete coating system, is to be shop-applied.
 6. The term "DFT" means minimum dry film thickness, with no tolerance for thinner films.

1.04 SUBMITTALS:

- A. Submit as specified in DIVISION 1.
- B. Submittals include, but are not limited to, the following:
1. Schedule of products and paint systems to be used. Schedule shall include the following information:
 - a. Surfaces for system to be applied
 - b. Surface preparation method and degree of cleanliness
 - c. Product manufacturer, name, and number
 - d. Method of application
 - e. Dry film thickness per coat of coating to be applied
 2. Color charts for selection and acceptance
 3. Product information
 - a. Manufacturer's data sheet for each product proposed
 - b. Technical and performance information that demonstrates compliance with the system performance and material requirements
 - c. Manufacturer's instructions and recommendations on surface preparation and application
 - d. Compatibility of shop and field applied coatings (where applicable)
 - e. Material Safety Data Sheet for each product used
 4. Certification by coating manufacturers that each coating is suitable for service intended as stated on each coating system sheet.

5. CONTRACTOR shall certify in writing to the City of Pompano that applicators have previously applied all the systems in this Specification and have the ability and equipment to prepare the surfaces and apply the coatings correctly.
6. Samples
 - a. Sample of each paint, finish, and other coating material on 8-1/2 inch by 11-inch sheet metal. Each sheet shall be completely coated over its entire surface with one coating material, type, or color.
 - b. Two sets of color samples that match each color selected by the City of Pompano from the manufacturer's color charts. The color designation shall be shown on the back of the color sample.

1.05 QUALIFICATIONS:

- A. Coating work shall be performed by an SSPC certified contractor having a minimum of Category QP 1 certification for work without hazardous paint removal, and Category QP 2 certification for work involving hazardous paint removal.

1.06 RESPONSIBILITIES: (Not Used)

1.07 CERTIFICATES AND TESTING: (Not Used)

1.08 INSPECTION COORDINATION:

- A. Prepainting Conference:
 1. Before field painting starts, representatives for the City of Pompano, CONTRACTOR, coating applicator, and coating manufacturer's technical representative shall meet with the City of Pompano's personnel.
 2. Agenda for the meeting will include details of surface preparations and coating systems to ensure understanding and agreement by all parties for compliance.
- B. A coating report shall be completed daily by CONTRACTOR at each phase of the coating system starting with surface preparation. Reports shall be submitted on the form attached at end of this Section.
- C. In the event a problem occurs with coating system, surface preparation, or application, coating applicator and coating manufacturer's technical representative shall promptly investigate the problem and submit results to the City of Pompano.
- D. Prior to starting work, CONTRACTOR shall meet with installers involved and with manufacturers of all materials involved to review Drawings and Specifications to insure that materials are being used properly and details are correct. A written report of this meeting shall be submitted to the City of Pompano. The report shall contain at least:
 1. Meeting date and names and affiliations of those present and written statements from each installer and manufacturer of their acceptance of Drawings, Specifications and conditions, and of proposed use of their materials as proper for purposes shown.

1.09 WARRANTY:

- A. The MANUFACTURER shall warrant the EQUIPMENT, MATERIALS and PRODUCTS specified in this section against defective materials and workmanship with the MANUFACTURER'S standard warranty, but for no less than five years from the date of Substantial Completion, and as described in the General Terms and Conditions. If the MANUFACTURER'S standard warranty is less than the stipulated period, the MANUFACTURER shall provide a special MANUFACTURER'S extended

warranty for the stipulated period, or a Maintenance Bond in the form attached herein, to extend the MANUFACTURER'S warranty period for the stipulated period.

- B. The CONTRACTOR shall warranty the WORK against defects for one year from the date of Substantial Completion and as described in the General Terms and Conditions.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

- A. Proprietary names and product numbers are specified in most systems for material identification from these manufacturers.
 - 1. Ameron International Performance Protective Coatings and Finishes Group
 - 2. Carboline Company, Inc.
 - 3. Chemrex
 - 4. ICI Devoe Coating Company
 - 5. Themec Company, Inc.
 - 6. Xypex Chemical, Ltd.

2.02 GENERAL:

- A. Materials furnished for each coating system must be compatible with the substrate.
- B. Single Manufacturer: All materials in each coating system shall be by the same coating manufacturer to assure compatibility of coatings.
- C. Compatibility: When shop-painted surfaces are to be field coated, the CONTRACTOR shall ascertain whether finish materials will be compatible with shop coating. Coatings of uncertain composition shall be removed completely before applying new coatings
- D. Colors:
 - 1. Color of finish coatings shall match accepted color samples.
 - 2. When second and finish coats of a system are of same type, CONTRACTOR shall tint or use an alternate color on second coat to enable visual coverage inspection of the third coat. When first and second coats only are specified and are of same or different types, tint or use an alternate color on first coat to enable visual coverage inspection of the second coat.
- E. Include on label of material containers:
 - 1. Manufacturer's name, product name, and number
 - 2. Type of paint and generic name
 - 3. Color name and number
 - 4. Storage and temperature limits
 - 5. Mixing and application instructions, including requirements for precautions which must be taken
 - 6. Drying, recoat, or curing time

2.03 COATING SYSTEMS: Specified on the "Coating System" sheets at the end of this Section.

PART 3 - EXECUTION

3.01 DELIVERY, STORAGE, AND HANDLING:

- A. **Manufacturer Recommendations:** Unless this specification requires otherwise, CONTRACTOR shall strictly follow the manufacturer's printed recommendations and instructions for storing and handling coating system materials.
- B. **Delivery of Materials:**
 - 1. Deliver in sealed containers with labels and information legible and intact. Containers shall also have correct labels with required information.
 - 2. CONTRACTOR shall allow sufficient time for testing if required.
- C. **Storage of Materials:** CONTRACTOR shall store under conditions recommended by the Material Safety Data Sheets
 - 1. All protective coating materials shall be used within the manufacturer's recommended shelf life.
 - 2. Store only acceptable materials on project site.
 - 3. Provide separate area and suitable containers for storage of coatings and related coating equipment.
 - 4. Dispose of used or leftover containers, thinners, rags, brushes, and rollers in accordance with applicable regulations.

3.02 PREPARATION FOR COATING:

- A. **General:** All surfaces to receive protective coatings shall be clean prior to application of coatings. The CONTRACTOR shall examine all surfaces to be coated, and shall correct all surface defects before application of any coating material. All marred or abraded spots on shop-primed and on factory-finished surfaces shall receive touch-up restoration prior to any coating application. Surfaces to be coated shall be dry and free of visible dust.
- B. **Protection of surfaces not to be coated:** Surfaces that are not to receive protective coatings shall be protected during surface preparation, cleaning, and coating operations.
- C. **Hardware, lighting fixtures, switch plates, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not to be painted shall be removed, masked, or otherwise protected.** Drop cloths shall be provided to prevent coating materials from falling on or marring adjacent surfaces. The working parts of mechanical and electrical equipment shall be protected from damage during surface preparation and coating operations. Openings in motors shall be masked to prevent entry of coating or other materials.
- D. **Care shall be exercised not to damage adjacent work during blast cleaning operations.** Spray painting shall be conducted under carefully controlled conditions. The CONTRACTOR shall be fully responsible for and shall promptly repair any and all damage to adjacent work or adjoining property occurring from blast cleaning or coating operations.
- E. **Protection of painted surfaces:** Cleaning and coating shall be coordinated so that dust and other contaminants from the cleaning process will not fall on wet, newly coated surfaces.

3.03 SURFACE PREPARATION:

- A. **General**
 - 1. Prepare surfaces for each coating system conforming to SSPC or ASTM surface preparation specifications listed.
 - a. If grease or oils are present, SSPC-SP1 must precede any other method specified.

- b. Remove surface irregularities such as weld spatter, burrs, or sharp edges, prior to specified surface preparation.
2. Depth of profile shall be as specified for each system, but in no instance shall it exceed one-third of the total dry-film thickness of complete system.
3. Prepare only those areas which will receive the first coat of the system on the same day.

B. Metals

1. The minimum abrasive blasting surface preparation shall be as indicated in the coating system sheets included at the end of this Section. Where there is a conflict between these specifications and the coating manufacturer's printed recommendations for the intended service, the higher degree of cleaning shall apply.
2. All sharp edges shall be rounded or chamfered, and all burrs, surface defects, and weld splatter shall be ground smooth prior to blast cleaning.
3. The type and size of abrasive shall be selected to produce a surface profile that meets the system sheet requirements for the particular coating and service conditions. Abrasives for submerged and severe service coating systems shall be clean, hard, sharp cutting crushed slag. Automated blasting systems shall not be used for surfaces that will be in submerged service. Metal shot or grit shall not be used for surfaces that will be in submerged service, even if subsequent abrasive blasting is planned to be one with hard, sharp cutting crushed slag.
4. Abrasive shall not be reused unless an automated blasting system is used for surfaces that will be in non-submerged service. For automated blasting systems, clean oil-free abrasives shall be maintained. The abrasive mix shall include at least 50 percent grit.
5. The CONTRACTOR shall comply with the applicable federal, state, and local air pollution control regulations for blast cleaning.
6. Compressed air for air blast cleaning shall be supplied at adequate pressure from well maintained compressors equipped with oil and moisture separators that remove at least 95 percent of the contaminants.
7. Surfaces shall be cleaned of all dust and residual particles of the cleaning operation by dry air blast cleaning, vacuuming, or another method prior to painting.
8. Enclosed areas and other areas where dust settling is a problem shall be vacuum cleaned and wiped with a tack cloth.
9. Damaged or defective coating shall be removed by the blast cleaning to meet the clean surface requirements before recoating.
10. If the required abrasive blast cleaning will damage adjacent work, the area to be cleaned is less than 100 square feet, and the coated surface will not be submerged in service, then SSPC SP2 or SSPC SP3 may be used.
11. Shop applied coatings of unknown composition shall be completely removed before the indicated coatings are applied. Valves, castings, ductile iron pipe, and fabricated pipe or equipment shall be examined for the presence of shop-applied temporary coatings. Temporary coatings shall be completely removed by solvent cleaning per SSPC SP1 before the abrasive blast cleaning work is started.
12. Shop primed equipment shall be solvent cleaned in the field before finish coats are applied.

3.04 APPLICATION:

- A. CONTRACTOR shall apply coatings in accordance with coating manufacturer's recommendations. Materials shall be thoroughly stirred, strained, and kept at uniform consistency during application. Coatings from different manufacturers shall not be mixed together.

- B. Use properly designed brushes, rollers, and spray equipment for all applications.
- C. On unprimed surfaces apply first coat of the system the same day as surface preparation.
- D. Cleaned surfaces and all coats shall be inspected prior to each succeeding coat. The CONTRACTOR shall schedule such inspection with the City of Pompano in advance.
- E. Blast cleaned ferrous metal surfaces shall be painted before any rusting or other deterioration of the surface occurs. Blast cleaning shall be limited to only those surfaces that can be coated in the same working day.
- F. Special attention shall be given to edges, angles, weld seams, flanges, nuts and bolts, and other places where insufficient film thicknesses are likely to be present. Use stripe painting for these areas.
- G. Dry-film thickness of each system shall be at least as thick as the minimum specified. Maximum dry-film thickness shall not exceed the minimum more than 20% or coating manufacturer's requirements, whichever is less. Where a dry-film thickness range is specified, the thickness shall not be shall not be outside the range.
- H. Shop and field painting shall not be applied within 3 inches of unprepared surface of any substrate such as areas to be welded or bolted.
- I. Environmental Conditions:
 - 1. Atmospheric temperature must be 50 degrees Fahrenheit or higher during application, unless approved in writing by coating manufacturer. Do not apply coatings when inclement weather or freezing temperature may occur during the curing time interval.
 - 2. Wind velocities for exterior applications shall be at a minimum to prevent overspray or fallout and not greater than coating manufacturer's limits.
 - 3. Relative humidity must be less than 85% and the temperature of the surface to be painted must be at least 5 degrees above the dew point.
 - 4. Provide adequate ventilation in all areas of application to ensure that at no time does the content of air exceed the Threshold Limit Value given on the manufacturer's Material Safety Data Sheets for the specific coatings being applied.
- J. Recoat Time: In the event a coating, such as an epoxy, has exceeded its recoat time limit, prepare the previously applied coating in accordance with manufacturer's recommendations.
- K. Protection:
 - 1. Cover or otherwise protect surfaces not to be painted. Remove protective materials when appropriate.
 - 2. Mask, remove, or otherwise protect finish hardware, machined surfaces, grilles, lighting fixtures, and prefinished units as necessary.
 - 3. Provide cover or shields to prevent surface preparation media and coatings from entering orifices in electrical or mechanical equipment. Where ventilation systems must be kept in operation at time of surface preparation, take precautions to shield intakes and exhausts to prevent the materials from entering system or being dispersed.
 - 4. Provide signs to indicate fresh paint areas.
 - 5. Provide daily cleanup of both storage and working areas and removal of all paint refuse, trash, rags, and thinners. Dispose of leftover containers, thinners, rags, brushes, and rollers that cannot be reused in accordance with applicable regulations.
 - 6. Do not remove or paint over equipment data plates, code stamps on piping, or UL fire-rating labels.

3.05 INSPECTION:

- A. CONTRACTOR shall provide and use a wet-film gauge to check each application approximately every 15 minutes in order to immediately correct film thickness under or over that specified.
- B. On ferrous surfaces, measurements shall be made with one of the thickness gauges listed below. The gauge shall be calibrated on metal practically identical in composition and surface preparation to that being coated and be of substantially the same thickness, except that for measurements on metal thicker than 1/4 inch, the instrument may be calibrated on metal with a minimum thickness of 1/4 inch. When calibrating any of the gauges for making film measurements of over 3 mils, the calibrating thickness standards (shims) shall be of non-metallic composition. Where only one thickness criterion is specified, the calibrating shim thickness shall closely approximate the specified thickness, but where both thicknesses are specified, the shim's thickness shall closely approximate an average of the two. Calibrating instructions, thickness standards and, in the case of the Mikrotest gauge, a calibrating tool, should be obtained from the manufacturer or supplier of the gauge. Authorized thickness gauges are:
 - 1. General Electric, Type B, General Electric Company
 - 2. Mikrotest, Elektrophysik - Koln
 - 3. Elcometer, Elcometer Instruments, Ltd.
 - 4. Inspector Gage, Elcometer Instruments, Ltd.
 - 5. Minitector, Elcometer Instruments, Ltd.
- C. Use holiday or pinhole detector on systems over metal substrates to detect and correct voids when indicated on system sheet.
- D. Furnish a sling psychrometer and perform periodic checks on both relative humidity and temperature limits.
- E. Check temperature of the substrate at regular intervals to be certain surface is 5 degrees Fahrenheit or more above the dew point.

3.06 CLEANING AND REPAIRS:

- A. Remove spilled, dripped, or splattered paint from surfaces.
- B. Touch up and restore damaged finishes to original condition. This includes surface preparation and application of coatings specified.

END OF SECTION

SECTION 10200 LOUVERS

PART 1 - GENERAL

1.01 SCOPE: The CONTRACTOR shall furnish all labor, materials, and equipment necessary for the installation of louvers, as shown on the Drawings and specified herein.

A. Related Work Specified Elsewhere:

1. SECTION 07900 Sealants

1.02 SUBMITTALS:

A. Product Data:

1. Submit properly identified manufacturer's literature on louvers and screening including material specifications, wind load calculations and printed installation directions.
2. Provide data on louvers to include the following information: free area chart/table, static pressure loss, air leakage, and water penetration data.

B. Shop Drawings: Submit shop drawings for review showing louvers and screen locations, dimensions, sections, gauges, thicknesses, stiffener, clips, closures, fastening and anchorage devices and installation procedure.

C. Finish: Submit selected anodized finish for review and acceptance.

D. Certifications: Submit manufacturer's certificate stating that louvers and screening provided have been designed and constructed to meet South Florida Building Code and Miami-Dade County requirements for wind loads and large missile impact.

1.03 QUALITY ASSURANCE: Louvers shall be licensed to bear the AMCA Certified Ratings Seal for air performance and water penetration. These ratings are to be based on tests made in accord with the AMCA Standard 500 and will comply with the requirements of the AMCA Certified Ratings Program.

1.04 REFERENCES:

A. Applicable Standards:

1. Air Movement and Control Association, (AMCA)
2. Aluminum Association (AA)
3. American Society for Testing and Materials, (ASTM):
A 525 - General Requirements for Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process
A 526 - Steel, Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process, Commercial Quality
4. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
5. Florida Building Code 2007 (FBC)

1.05 WARRANTY:

A. The MANUFACTURER shall warrant the EQUIPMENT, MATERIALS and PRODUCTS specified in this section against defective materials and workmanship with the MANUFACTURER'S standard warranty, but for no less than one year from the date of Substantial Completion, and as described in the General Terms and Conditions.

- B. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in the General Terms and Conditions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

- A. Airolite
- B. American Warming & Ventilating
- C. Greenheck Fan Corporation
- D. Ruskin
- E. City of Pompano approved equal

2.02 GENERAL:

- A. Bird Screens: Minimum 14 gage aluminum, 1/2 inch square mesh mounted in aluminum frames.
- B. Insect Screens: 18x16 mesh aluminum wire mounted in aluminum frames, conforming to Fed. Spec. RR-W-365. Louver design shall allow screens to be removable and mounted on the face of louvers without interfering with louver, damper, and drive function.
- C. Construct louvers which exceed manufacturer's instructed width or height in multiple sections, connected by hidden mullions. Fabricate mullions of same material as louver with same finish.
- D. Provide interior and/or exterior flanged frames to overlap masonry opening as indicated on manufacturer installation instructions.
- E. Provide all supports, anchorages, and accessories for complete installation.
- F. Finish: Architectural Class 1 satin anodic coating AA-C22-A41 natural anodized. Provide finish on entire louver and bird screen.

2.03 FIXED WALL LOUVERS:

- A. Description: Louvers shall be stationary type with horizontal rain resistant style blades positioned on approximately 2 in. centers within a 4 in. deep frame. Louver head member shall incorporate a front drain gutter to channel water to the louver side frame or jambs where water is further channeled through vertical downspouts and out at the integral louver sill member.
- B. Sizes: As indicated on the Drawings.
- C. Materials: Blades to be fabricated of .081 inch thick extruded 6063-T5 aluminum alloy in accordance with the recommendations of SMACNA.
- D. Jamb Frames, Mullions and Stiffener: .125 inch thick extruded 6063-T5 aluminum alloy.
- E. Construction: Frame corners and blades to be all welded, assembled or fastened with self-tapping stainless steel screws. Provide mullions with integral internal drains.
- F. Closures and Clips: Provided extruded aluminum alloy closure angles and closure flat bars for louver perimeters as indicated. Provide extruded aluminum alloy clips as required for securing mullion ends. Metal thickness .125 inch minimum unless otherwise indicated.
- G. Fasteners: All fasteners shall be as specified by the manufacturer and those exposed fasteners shall be shop enamel finished to match louvers.

- H. Rating: Louvers shall meet the performance requirements established by the AMCA 500L test procedure and shall be licensed to bear the AMCA Certified Ratings Seal for Water Penetration, Air Performance and Wind Driven Rain. Louvers shall have a minimum free area of 6.72 sq ft based on the standard 48 in. W x 48 in. H test specimen. Louvers shall have a maximum static pressure drop of 0.20 in. water gauge based on 1000 ft per minute free area exhaust velocity. Louvers shall carry Class A Water Penetration Classification based on a ventilation core velocity of 591 ft per minute at a rainfall rate of 3 in. per hour and a 29 mph simulated wind velocity and carry Class A Water Penetration Classification based on a ventilation core velocity of 98 ft. per minute at a rainfall rate of 8 in. per hour and a 50 mph simulated wind velocity.

PART 3 - EXECUTION

- 3.01 INSTALL LOUVERS where indicated on the Drawings in accordance with manufacturer's printed installation directions, shop drawings and the following:
- A. Secure louver frame to jamb, head and sill with continuous aluminum closure angles or closure flat bars. Fasten closure to louver frame metal perimeters and to metal jambs and heads with No. 14 sheet metal screws at not over 24 inches o.c. Use concealed anchorages wherever possible.
 - B. For locations requiring removable louvers, install as shown in detail on drawings.
 - C. Closures shall be sealed to building wall and louver frame sealed to closures with sealant specified under SECTION 07900.
 - D. Provide concealed or exposed mullions as required for a stable, rigid installation per manufacturer's recommendations and code requirements.
 - E. Secure stiffener to louvers per manufacturer's published recommendations.
 - F. Seal all fastenings and joints with sealant specified in SECTION 07900.
- 3.02 INSTALL INSECT SCREEN on exterior side of louvers with manufacturer's standard stainless steel screws; size, spacing and type to be in accord with shop and erection drawings.
- A. Frames shall be sealed to adjacent frames with sealant specified in SECTION 07900.
- 3.03 CLEANING: After installation is complete, clean stains off of aluminum without damage to finish per manufacturer's directions.
- 3.04 PROTECTION AND REPAIR OF EXISTING FINISHES: Repair finishes damaged by cutting, welding, soldering and grinding operations required for fitting and jointing. Restore finishes so that there is no evidence of corrective work. Return items that cannot be refinished in the field to the shop, make the required alterations, and refinish the entire unit or provide new units. Protect galvanized and non-ferrous metal surfaces from corrosion on surfaces that will be in contact with concrete, masonry or dissimilar metals.

END OF SECTION

SECTION 15000 GENERAL PROVISIONS FOR MECHANICAL WORK

PART 1 - GENERAL

- 1.01 SCOPE: The provisions of Part 1, General Documents, and DIVISION 1, General Requirements, apply to this section. These general provisions for mechanical work shall apply to all sections of DIVISION 15.
- 1.02 CODES AND STANDARDS: All work shall comply with the Building Codes and Ordinances of the local governmental jurisdiction. Work shall also comply with the codes and standards of the following agencies and organizations as specifically referenced hereinafter:
- A. The American National Standards Institute (ANSI).
 - B. American Society of Mechanical Engineers (ASME).
 - C. The American Society for Testing and Materials (ASTM).
 - D. National Fire Protection Association (NFPA).
 - E. National Electrical Code (NEC).
 - F. National Electrical Manufacturers Association (NEMA).
 - G. Sheet Metal and Air Conditioning Contractors National Association Inc. (SMACNA).
- 1.03 GUARANTEE: All equipment and systems, unless otherwise specified herein, shall be guaranteed for a period of one (1) year from the date of acceptance thereof, either for beneficial use or final acceptance, whichever is earlier. This guarantee shall be against defective materials, design and workmanship. Upon receipt of notice from the City of Pompano of failure of any part of the guaranteed equipment during the guarantee period, the affected part or parts shall be replaced promptly with new parts by and at the expense of the CONTRACTOR.
- 1.04 WARRANTY:
- A. The MANUFACTURER shall warrant the EQUIPMENT, MATERIALS and PRODUCTS specified in this section against defective materials and workmanship with the MANUFACTURER'S standard warranty, but for no less than one year from the date of Substantial Completion, and as described in the General Terms and Conditions.
 - B. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in the General Terms and Conditions.

PART 2 - PRODUCTS

- 2.01 STANDARD PRODUCTS: The equipment to be furnished under these specifications shall be essentially the standard products of the manufacturer. Where two (2) or more units of the same class of equipment are required under these specifications, these shall be the product of a single manufacturer.
- 2.02 MANUFACTURER'S DESCRIPTIVE LITERATURE: The CONTRACTOR shall, before ordering equipment, submit to the City of Pompano for approval four (4) copies of the manufacturer's descriptive literature for all equipment and materials he proposes to use to show that it meets the requirements set forth in these specifications. He shall also submit a layout plan showing the arrangement of his equipment, piping, ducts, etc. if it varies from the Contract Drawings. The City of Pompano must approve any variations.
- 2.03 SPECIFICATIONS AND DRAWINGS: The Contract Drawings indicate the extent and general arrangement of the mechanical systems. The specifications and Drawings shall be considered as supplementary one to the

other. Materials and labor indicated, called for or implied by one and not the other shall be supplied and installed as though specifically called for in both. Equipment, ductwork and piping arrangement shall fit into space allocated, providing clearances for servicing and maintenance. Capacities of all equipment shall be not less than those indicated on the Drawings.

2.04 ELECTRICAL WORK:

- A. General: The Mechanical Contractor shall, unless otherwise specified herein, furnish all equipment specified herein with motors, motor controllers and controls. The Mechanical Contractor shall set motors in place and shall furnish motor controllers to the Electrical Contractor for installation.
- B. Motors: Motors shall be built in compliance with applicable NEMA Standards and shall be in conformance with DIVISION 16.
- C. Motor Controllers: Each motor shall be provided with NEMA standard motor controller suitable for use intended, and in conformance with DIVISION 16.

PART 3 - EXECUTION

- 3.01 GENERAL: Work shall be started as soon as possible. Work lines and established grades shall be in strict accordance with the Drawings. The CONTRACTOR shall be responsible for furnishing to all trades, in ample time, any information they may require to construct all bases, trenches, pits, chases and openings in floors, walls, and finishes and to provide clearances to accommodate the work. He shall set all sleeves, anchor bolts or inserts required to fasten equipment before adjacent concrete is poured.

The CONTRACTOR shall be responsible for the actions of his employees and for compliance with all laws and ordinances governing the work. He shall layout his work and establish elevations in strict accordance with the Drawings, be responsible for the accuracy of the laying out, and give his personal superintendence to the work. He shall have at all times a competent representative on the premises who shall be acceptable to the City of Pompano.

A continuous cleanup shall be maintained during the progress of the work and appointed storage areas shall be used for surplus materials and supplies. The premises shall be kept free from accumulations of waste materials and rubbish. At completion, refuse shall be removed from the site.

- 3.02 INTERFERENCES: The plans are generally diagrammatic and the CONTRACTOR shall harmonize the work of the different trades so that interference between piping, equipment and structural work will be avoided. All necessary offsets in piping and all fittings, etc. required to properly install the work shall be furnished complete in place. Piping, ducts, etc. shall be kept as close as possible to ceilings, walls, columns, etc., as indicated on mechanical drawings, so as to take the minimum amount of space. All offsets, fittings, etc. required shall be furnished and installed without additional expense to the City of Pompano. In case interference develops, the City of Pompano will decide which equipment shall be relocated, regardless of which apparatus was first installed.
- 3.03 WORKMANSHIP: All materials and equipment shall be installed in accordance with the approved recommendations of the manufacturer and the referenced standards to conform with the Contract documents and shall be subject to the approval of the City of Pompano. The installation shall be accomplished by workers skilled in the type of work involved. Workers shall have current certifications, when required, for a particular trade.
- 3.04 DRAWINGS: The CONTRACTOR shall prepare accurate sleeve and insert drawings for checking and approval, showing all sleeves, boxes and inserts for installation of the work covered in these specifications. The above drawings shall be prepared well in advance of the construction and be coordinated with the work of all trades.

The CONTRACTOR shall furnish the City of Pompano with "as-built" drawings. He shall keep day-to-day records of changes in locations of piping, fixtures and other items, and upon completion of the work, incorporate these changes on clean copies of the original drawings.

- 3.05 CONTRACTOR'S DIFFERENCES: If the CONTRACTOR proposes to deviate from the specifications or Drawings, he shall call attention to any deviations in his proposal; otherwise, it will be assumed that he accepts and agrees to follow the Contract Drawings and specifications.
- 3.06 VIBRATION AND NOISE CONTROL: Excessive vibration or objectionable noise created in any part of building by operation of any equipment installed under this Contract will not be permitted. CONTRACTOR shall isolate various items of equipment from building structure and take all steps that may be necessary to eliminate excessive vibration and objectionable noise produced by any equipment installed under this Contract.
- 3.07 EXAMINATION OF SITE: The CONTRACTOR shall examine the site and the Drawings before bidding and inform himself fully regarding the limitations of space available for the installation of materials and equipment, as well as all conditions regarding service connections, grades, ground conditions, and all factors involved in his bidding and in the completion of the work.
- 3.08 EXCAVATION AND BACKFILL:
- A. Excavation: Trenches for all underground pipelines shall be excavated to the required depths. The bottom of trenches shall be tamped hard and graded to secure the required fall. Bell holes shall be excavated so that pipe will rest on solid ground for its entire length. Rock, where encountered, shall be excavated to a depth of 6" below the bottom of the pipe and, before pipe is laid, the space between the bottom of the pipe and rock shall be filled with approved backfill material. Wastewater and potable water pipes shall be laid in separate trenches.
 - B. Backfilling: After pipelines have been tested, inspected and approved by the City of Pompano, and prior to backfilling, forms shall be removed and the excavation shall be cleaned of trash and debris. Materials for backfilling shall consist of the excavation or borrow of sand, gravel or other approved material and shall be free of trash, lumber, or other debris. Backfill shall be placed in horizontal layers of 6 inches in thickness, each layer being properly moistened and compacted. Backfill shall be brought to a suitable elevation above grade to provide for settlement and shrinkage.
- 3.09 PIPE SLEEVES: Pipe sleeves shall be provided where pipes and tubing pass through masonry or concrete walls, roofs, and partitions. Sleeves shall be placed during construction of the building. Sleeves in outside walls below and above grade, in floor, or in roof slabs shall be zinc-coated steel pipe. Sleeves in partitions shall be zinc-coated sheet steel having a nominal weight of not less than 0.906 pound per square foot. Plastic sleeves may be used when approved by the City of Pompano. Space between pipe, tubing, or insulation and the sleeve shall not be less than ¼-inch. Sleeves shall be held securely in proper position and location before and during construction. All sleeves shall be of sufficient length to pass through entire thickness of walls, partitions or slabs. Space between the pipe or tubing and the sleeve shall be firmly packed with oakum and caulked on both ends of the sleeve with insulating cement. Sleeves located in waterproofed construction shall be provided with flanges and clamping rings.
- 3.10 INSPECTION: Inspection shall continue during installation and testing. The right is reserved to inspect any equipment at the manufacturer's facility during or after manufacture, and to require reasonable witness tests before shipment. All equipment rejected at the manufacturer's facility shall be corrected or replaced prior to shipment. A final inspection of the equipment shall be performed prior to installation to determine conformity to the type, class, grade, size, capacity, and other characteristics specified herein or indicated. All equipment rejected shall be corrected or replaced prior to installation.
- 3.11 TESTS: All materials, equipment and systems that are required to be tested by these specifications or by any applicable regulation shall be tested in the presence of the City of Pompano or City of Pompano's representative. All items requiring pressure or leakage tests shall be tested before being concealed from view.

All defects disclosed by tests shall be rectified and the tests repeated. The CONTRACTOR shall provide all labor, materials and equipment used for tests.

- 3.12 OPERATING INSTRUCTIONS: The CONTRACTOR shall submit operation instruction manuals for the City of Pompano. Manuals shall include manufacturer's data books, parts lists, wiring diagrams, maintenance procedures and start-up/shut-down instructions. Manuals shall be provided for all equipment. The Mechanical Contractor shall also provide all necessary instruction to the City of Pompano's personnel concerning operation of the mechanical system.

END OF SECTION

SECTION 16023 CODES AND STANDARDS

PART 1 - GENERAL

1.01 REFERENCES

- A. Comply with the following:
 - 1. Florida Building Code 2007 (FBC).
 - 2. Florida Building Code (FBC) - Gas.
 - 3. Florida Building Code (FBC) - Mechanical.
 - 4. Florida Building Code (FBC) - Plumbing.
 - 5. National Electrical Code – 2004 (NEC), (NFPA 70).
 - 6. National Fire Protection Association (NFPA), 1997. NFPA 101 and other NFPA codes as applicable, except NFPA 101 10-2.2.7 and 10.2.2.7 Exit Passageways and where exceeded by SREF.
 - 7. American National Standards Institute (ANSI) A117.1, 2005.
 - 8. American Society of Civil Engineers (ASCE) 7 - 2005.

1.02 QUALITY ASSURANCE

- A. Where materials and equipment are available under the continuing inspection and listing service of Underwriters Laboratories (UL), furnish materials and equipment so listed.
- B. Comply with latest FPL Commercial/Industrial Energy Conservation Program Standards, if FPL is the available utility company.
- C. A maximum of 3 helpers to 1 journeyman are allowed according to Metropolitan Broward County.

PART 2 - NOT USED

PART 3 - NOT USED

END OF SECTION

SECTION 16050 BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SCOPE:

- A. Summary of Work: The CONTRACTOR shall furnish all labor, equipment and material for installation of the electrical hardware as described herein and as shown on the Drawings.
- B. The provisions of this Section apply to all sections in DIVISION 16, except as indicated otherwise.
- C. For work at existing sites the CONTRACTOR shall be responsible for identifying available existing circuit breakers in lighting panels for the intended use as required by the Drawings. Costs for this WORK shall be included in the CONTRACTOR'S original bid amount.

1.02 REFERENCES: The latest edition of the following codes or standards shall apply to the design and fabrication of the products and equipment to be supplied under this contract.

- A. NEC (NFPA 70) National Electrical Code
- B. NETA International Electrical Testing Association - Acceptance Testing Specifications
- C. Local Building Codes and Standards

1.03 DEFINITIONS: N/A

1.04 SUBMITTALS:

- A. The CONTRACTOR shall furnish submittals in accordance with SECTION 01300 - Submittals.
- B. The CONTRACTOR shall provide the following for shop drawing submittals:
 - 1. Complete material lists stating manufacturer and brand name of each item or class of material
 - 2. Front, side, rear elevations, and top views with dimensional data
 - 3. Location of conduit entrances and access plates
 - 4. Component data
 - 5. Connection diagrams, terminal numbers, internal wiring diagrams, conductor size, and cable numbers
 - 6. Method of anchoring, seismic requirements, weight
 - 7. Types of materials and finish
 - 8. Nameplates
 - 9. Temperature limitations, as applicable
 - 10. Voltage requirement, phase, and current, as applicable
 - 11. Front and rear access requirements
 - 12. Test reports
 - 13. Grounding requirements
 - 14. Catalog cuts or photocopies of applicable pages of bulletins or brochures for mass produced, non-custom manufactured material. Mark-out any model or part numbers of material on catalog data sheets that do not specifically apply to the project. Catalog data sheets shall be

stamped to indicate the project name, applicable Section and paragraph, model number, and options.

- C. Shop Drawings shall be custom prepared. Drawings or data indicating "optional" or "as required" equipment are not acceptable. Options not proposed shall be crossed out or deleted from Shop Drawings.
- D. Materials and Equipment Schedules: The CONTRACTOR shall deliver to the City of Pompano within 10 days of the commencement date in the Notice to Proceed, a complete list of all materials, equipment, apparatus, and fixtures proposed for use. The list shall include type, sizes, names of manufacturers, catalog numbers, and such other information required to identify the items.
- E. Owner's Manuals: Complete information in accordance with Section 01300.
- F. Record Drawings: The CONTRACTOR shall show invert and top elevations and routing of all conduits in duct banks and concealed below-grade electrical installations. Buried electrical conduits shall be located by showing the horizontal distance to two fixed structures at the start of the conduit installation, the end of the conduit installation, and for every conduit change of direction. In addition, circuit schematic drawings and wiring drawings shall show all field changes. Layout drawings shall show all equipment location changes. Record drawings shall be prepared, be available to the City of Pompano, and be submitted according to Section 01300.
- G. Where test reports are indicated, proof of design test reports for mass-produced equipment shall be submitted with the Shop Drawings, and factory performance test reports for custom-manufactured equipment shall be submitted and be approved prior to shipment. Field test reports shall be submitted for review prior to Substantial Completion.

1.05 QUALIFICATIONS: All electrical work shall be performed by personnel employed by an Electrical Contractor licensed in the State of Florida. Actual work shall be performed by Master and or Journeyman electricians or personnel under direct on-site supervision of a Master and or a Journeyman electrician. If the work is performed under the direct on-site supervision of a Journeyman electrician, he or she shall be certified in the county in which the work is performed or meet the reciprocity standards of Florida State Statue 489 part II. The credentials of the Electrical Contractor, Master and/or Journeyman electricians shall be supplied to the City of Pompano upon request.

1.06 RESPONSIBILITIES:

- A. The CONTRACTOR shall contact the serving utility and verify compliance with requirements before construction. The CONTRACTOR shall coordinate schedules and make payments for work by all utilities.
- B. Electrical service shall be as indicated and be as required by the serving utility.
- C. The CONTRACTOR shall verify and provide all service conduits, fittings, transformer pad, grounding devices, and all service wires not provided by the serving utility. The CONTRACTOR shall verify with the utility the exact location of each service point and type of service, and shall pay all charges levied by the serving utilities as part of the WORK.
- D. Permits shall be obtained and inspection fees shall be paid according to General Conditions.
- E. The CONTRACTOR shall pay all utility construction/connection charges and turn-on service charges required by the utility company.
- F. The CONTRACTOR shall be responsible for factory and field tests required by specifications in DIVISION 16 and by the City of Pompano and other authorities having jurisdiction. The CONTRACTOR shall furnish necessary testing equipment and pay costs of tests, including all replacement parts and labor, due to damage resulting from damaged equipment or from testing and correction of faulty installation.

1.07 TESTING: N/A

1.08 INSPECTION COORDINATION:

- A. The CONTRACTOR shall provide access to the WORK for the City of Pompano as requested for inspection. The Contractor shall provide 48 hours notice of its intention to begin new WORK activities.

1.09 WARRANTY:

- A. The MANUFACTURER shall warrant the EQUIPMENT, MATERIALS and PRODUCTS specified in this section against defective materials and workmanship with the MANUFACTURER'S standard warranty, but for no less than one year from the date of Substantial Completion, and as described in the General Terms and Conditions.
- B. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in the General Terms and Conditions.

PART 2 - PRODUCTS

2.01 GENERAL:

- A. The CONTRACTOR shall provide equipment and materials that shall be new, shall be listed by UL, or by an independent testing laboratory acceptable to the local code enforcement agency having jurisdiction, and shall bear the UL label or other certification where these requirements apply. Equipment and materials shall be the products of experienced and reputable manufacturers in the industry. Similar items in the WORK shall be products of the same manufacturer. Equipment and materials shall be of heavy duty industrial grade.
- B. Where the requirements of the specifications conflict with UL, NEMA, NFPA, or other applicable standards, the more stringent requirements shall govern.
- C. On devices indicated to display dates, the year shall be displayed as 4 digits.

2.02 SIGNAGE:

- A. Electrical Equipment
 - 1. Each piece of electrical equipment shall be legibly marked to indicate its purpose unless the City of Pompano determines that its purpose is indicated by the location and arrangement.
- B. Warning Signs
 - 1. Over 50 Volts nominal, or more - Entrances to rooms and other guarded locations that contain live parts shall be marked with conspicuous signs prohibiting unqualified persons to enter.
 - 2. All buildings, rooms or enclosures containing exposed live parts or exposed conductors operating at 600 volts nominal, or more, shall be lockable. Permanent and conspicuous warning signs shall be provided reading as follows: DANGER - HIGH VOLTAGE - KEEP OUT.
 - 3. Outside branch circuits and feeders - for 600 volts nominal, or less - Warning signs shall be posted in plain view where unauthorized persons might come in contact with live parts.
- C. Isolating Switches - Isolating switches not interlocked with an approved circuit interrupting device shall be provided with a sign warning against opening them under load.
- D. Back-up Generation - A sign shall be placed at the service entrance equipment indicating the type and location of on-site back-up generation.

2.03 AREA DESIGNATIONS:

A. General:

1. Raceway system enclosures shall comply as mentioned herein and in SECTION 16110.
2. Electric WORK specifically indicated in sections within any of the Specifications shall comply with those requirements.

AREA	NEMA ENCLOSURE CLASSIFICATION						Notes
	1	3R	4X	7	9	12	
Air Condition Space	√						
Non A/C Space Interior						√	Or as directed by project drawings
Outdoor Application			√				Or as directed by project drawings

B. Materials Requirements

1. NEMA 4X enclosures shall be 316 stainless steel.
2. NEMA 7 enclosures shall be cast aluminum where used with aluminum conduit; cast iron when used with galvanized steel conduit.
3. NEMA 1, 3R, and 12 enclosures shall be steel coated with ANSI 61 grey paint. NEMA 4X, 7, and 9 enclosures shall not be painted.

2.04 MOUNTING HARDWARE:

A. Miscellaneous Hardware

1. Threaded rods for trapeze supports shall be continuous threaded, 3/8-inch diameter minimum. Utilize hot dipped galvanized steel for dry indoor non process areas and 316 stainless steel for “wet,” “damp,” or “corrosive” areas.
2. Strut for mounting of conduits and equipment shall be 316 stainless steel or hot dipped galvanized as specified on project drawings. Where contact with concrete or dissimilar metals may cause galvanic corrosion, suitable non-metallic insulators shall be utilized to prevent such corrosion.
3. Wall-mounted panels that weigh more than 500 pounds shall be provided and mounted with steel support pedestals. Transformers hung from 4-inch stud walls and weighing more than 300 pounds shall have auxiliary floor supports.

B. Bolts and Anchors

1. Standard Service (Non-Corrosive Application): Unless otherwise indicated, bolts, anchor bolts, washers, and nuts shall be steel as indicated herein. Threads on galvanized bolts and nuts shall be formed with suitable taps and dies such that they retain their normal clearance after hot-dip galvanizing. Except as otherwise indicated, steel for bolt material, anchor bolts and cap screws shall be in accordance with the following.
 - a. Structural connections: ASTM A307, Grade A or B, hot-dip galvanized
 - b. Anchor Bolts: ASTM A307, Grade A or B, or ASTM A36, hot-dip galvanized
 - c. High strength bolts where indicated: ASTM A325
2. Corrosive Service: All bolts, nuts, and washers in the locations listed below shall be stainless steel as indicated below.
 - a. All buried locations
 - b. All submerged locations

- c. All locations subject to seasonal or occasional flooding
 - d. Inside hydraulic structures below the top of the structure
 - e. Inside buried vaults, manholes, and structures which do not drain through a gravity sewer or to a sump with a pump
 - f. All chemical handling areas
 - g. Inside trenches, containment walls, and curbed areas
 - h. Locations indicated by the Contract Documents or designated by the City of Pompano to be provided with stainless steel bolts.
3. Unless otherwise indicated, stainless steel bolts, anchor bolts, nuts, and washers shall be Type 316 stainless steel, class 2, conforming to ASTM A193 for bolts and to ASTM A194 for nuts. All threads on stainless steel bolts shall be protected with an anti-seize lubricant suitable for submerged stainless steel bolts, to meet government specification MIL-A-907E. Buried bolts in poorly drained soil shall be coated the same as the buried pipe.
- a. Anti-seizure lubricant shall be classified as acceptable for potable water use by the NSF.
 - b. Anti-seizure lubricant shall be odorless, non-toxic, weather-proof, teflon based, with operating temperatures up to 475 deg F.
4. Indoors Finished Areas Service:
- a. Expanding-Type Anchors: Expanding-type anchors if indicated or permitted, shall be 18-8 stainless steel split expansion ring with threaded stud bolt body and integral cone expander, nut and washer. Plated carbon steel, hot-dipped galvanized carbon steel, type 304 stainless steel or type 316 stainless steel anchor bodies, as identified in the drawings or other notations.

2.05 ELECTRICAL IDENTIFICATION:

- A. Nameplates: Nameplates shall be fabricated from white-letter, black-face laminated plastic engraving stock. Each shall be fastened securely, using fasteners of brass, cadmium plated steel, or stainless steel, screwed into inserts or tapped holes, as required. Engraved characters shall be block style with no characters smaller than 1/4-inch high.
- B. Conductor and Equipment Identification: Conductor and equipment identification devices shall be either imprinted plastic-coated cloth marking devices or shall be heat-shrink plastic tubing, imprinted split-sleeve markers cemented in place.

PART 3 - EXECUTION

3.01 GENERAL:

- A. Incidentals: The CONTRACTOR shall provide all materials and incidentals required for a complete and operable system, even if not required explicitly by the Specifications or the Drawings. Typical incidentals are terminal lugs not furnished with vendor supplied equipment, compression connectors for cables, splices, junction and terminal boxes, and control wiring required by vendor furnished equipment to connect with other equipment indicated in the Contract Documents.
- B. Field Control of Location and Arrangement: The CONTRACTOR shall determine the exact locations in the field based on the physical size and arrangement of equipment, finished elevations, and other obstructions. The Drawings diagrammatically indicate the desired location and arrangement of outlets, conduit runs, equipment, and other items. Locations on the Drawings, however, shall be followed as closely as possible.
 - 1. Where conduit development drawings or "home runs" are shown, the CONTRACTOR shall route the conduits in accordance with the indicated installation requirements. Routings shall be

exposed or encased as indicated, except that conduit in finished areas shall be concealed unless specifically indicated otherwise. Conduits encased in a slab shall be sized for conduit OD to not exceed one-third of the slab thickness and be laid out and spaced to not impede concrete flow.

2. Conduit and equipment shall be installed in such a manner as to avoid all obstructions and to preserve head room and keep openings and passageways clear. Lighting fixtures, switches, convenience outlets, and similar items shall be located within finished rooms as indicated. Where the Drawings do not indicate exact locations, such locations shall be determined by the City of Pompano. Lighting fixture locations shall be adjusted slightly as necessary prior to installation to avoid obstructions and to minimize shadows.
 3. Wherever conduits and wiring for lighting and receptacles are not indicated, it shall be the CONTRACTOR'S responsibility to provide all lighting and receptacle-related conduits and wiring as required, based on the actual installed fixture layout and the circuit designations as indicated. Wiring shall be #12 AWG minimum, and conduits shall be 3/4-inch minimum (exposed) and 1-inch minimum (encased). Where circuits are combined in the same raceway, the CONTRACTOR shall derate conductor ampacities in accordance with NEC requirements.
- C. Workmanship: Materials and equipment shall be installed in strict accordance with printed recommendations of the manufacturer. Installation shall be accomplished by workers skilled in the work. Installation shall be coordinated in the field with other trades to avoid interference.
- D. Protection of Equipment and Materials: The CONTRACTOR shall fully protect materials and equipment against damage from any cause. Materials and equipment, both in storage and during construction, shall be covered in such a manner that no finished surfaces will be damaged, marred, or splattered with water, foam, plaster, or paint. Moving parts shall be kept clean and dry. The CONTRACTOR shall replace or refinish damaged materials or equipment, including faceplates of panels and switchboard sections as part of the WORK.
- E. Incoming utility power equipment shall be provided in conformance with the utility's requirements.
- F. Installation of electrical equipment and materials shall comply with OSHA Safety and Health Standards (29 CFR 1910 and 29 FR 1926, as applicable), state building standards, and applicable local codes and regulations.

3.02 EQUIPMENT IDENTIFICATION:

- A. General: Equipment and devices shall be identified as follows:
1. Nameplates shall be provided for all panelboards, control and instrumentation panels, starters, switches, and pushbutton stations. In addition to nameplates, control devices shall be equipped with standard collar-type legend plates.
 2. Control devices within enclosures shall be identified as indicated. Identification shall be similar to the subparagraph above.
 3. Toggle switches which control loads out of sight of switch and all multi-switch locations of more than 2 switches shall have inscribed finish plates clearly indicating the load.
 4. Where shown on the drawings, name tags shall be inscribed with the equipment name and tag number.
 5. The CONTRACTOR shall furnish typewritten circuit directories for panelboards; circuit directory shall accurately reflect the devices/equipment connected to each circuit breaker.

3.03 CLEANING:

- A. The CONTRACTOR shall thoroughly clean the electrical WORK before final acceptance. Exposed parts shall be thoroughly clean of cement, plaster, and other materials. Oil and grease spots shall be

removed with a non-flammable cleaning solvent. Such surfaces shall be carefully wiped and all cracks and corners scraped out. Touch-up paint shall be applied to scratches on panels and cabinets. Electrical cabinets or enclosures shall be vacuum-cleaned.

END OF SECTION

SECTION 16110 RACEWAYS, BOXES, FITTINGS AND SUPPORTS

PART 1 - GENERAL

1.01 SCOPE OF WORK:

A. Furnish and install complete raceway systems as shown on the Drawings and as specified herein.

1.02 REFERENCES: The latest edition of the following codes or standards shall apply to the design and fabrication of the products and equipment to be supplied under this contract.

- A. NEC (NFPA 70) National Electrical Code
- B. NETA International Electrical Testing Association - Acceptance Testing Specifications
- C. NEMA 250 - Enclosure for Electrical Equipment (1,000 Volts Maximum)
- D. Local Building Codes and Standards
- E. ASTM A47 - Standard Specification for Ferric Malleable Iron Castings
- F. ASTM A1011 - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High - Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
- G. ASTM A635 - Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Commercial Steel, Drawing Steel, Structural, High - Strength Low Alloy, High - Strength Low Alloy with Improved Formability, Hot-Rolled, General Requirements for D2000 Standard Classification System for Rubber Products in Automotive Applications
- H. ASTM D2564 - Solvent Cements for Poly Vinyl Chloride Plastic Piping Systems
- I. UL 508 - Industrial Control Equipment
- J. UL 514A – Standard for Safety Metallic Outlet Boxes
- K. UL 514B – Standard for Safety Conduit, Tubing and Cable Fittings
- L. UL 886 - Standard for Safety for Outlet Boxes and Fittings for use in Hazardous (Classified) Locations
- M. UL 1059 – Standard for Safety Terminal Blocks
- N. UL 6 - Standard for Safety Electrical Rigid Metal Conduit - Steel
- O. UL 360 - Standard for Liquid Tight Flexible Steel Conduit
- P. ANSI C80.1 – Standard for Electrical Rigid Steel Conduit - Zinc Coated
- Q. UL 5B - Strut-Type Channel Raceways and Fittings
- R. UL 651 – Standard for Safety Schedule 40 and 80 Rigid PVC Conduit and Fittings.

1.03 DEFINITIONS: N/A

1.04 SUBMITTALS:

Furnish submittals in accordance with SECTION 16050 Basic Materials and Methods.

A. Shop Drawings

1. Complete catalog cuts of all raceways, fittings, boxes, supports, and mounting hardware, marked to show proposed materials and finishes.
2. Complete catalog cuts of all pullboxes, manholes, and handholes, marked where applicable to show proposed materials and finishes
3. Dimensioned layout drawings of all cable tray routings, including elevations.
4. Dimensioned layout drawings of all conduit racks and trapeze type hangers including elevations.

1.05 QUALIFICATIONS: N/A

1.06 RESPONSIBILITIES:

- A. Unless otherwise hereinafter specified, or shown on the Drawings, all boxes shall be metal.
- B. Combination expansion-deflection fittings shall be used where exposed or embedded conduits cross structure expansion joints.
- C. All conduit, fittings and accessories shall be UL listed and labeled.
- D. Furnish sizes of conduit, fittings and accessories as indicated, specified or as required by Electrical Codes and Standards.

1.07 TESTING: N/A

1.08 INSPECTION COORDINATION:

- A. The CONTRACTOR shall provide access to the WORK for the City of Pompano as requested for inspection. The CONTRACTOR shall provide 48 hours notice of its intention to begin new WORK activities.

1.09 WARRANTY:

- A. The MANUFACTURER shall warrant the EQUIPMENT, MATERIALS and PRODUCTS specified in this section against defective materials and workmanship with the MANUFACTURER'S standard warranty, but for no less than one year from the date of Substantial Completion, and as described in the General Terms and Conditions.
- B. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in the General Terms and Conditions.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Rigid Galvanized Steel (RGS) Conduit:
 1. Rigid steel conduit shall be mild steel, hot-dip galvanized inside and out.
 2. Rigid steel conduit shall be manufactured in accordance with ANSI C80.1 - Rigid Steel Conduit, Zinc Coated, and UL-6.
 3. Each conduit length shall be threaded on both ends with threads protected.
- B. Rigid Non-Metallic Conduit:
 1. Rigid non-metallic conduit shall be Schedule 40 PVC, sunlight resistant.

2. Rigid non-metallic conduit shall be manufactured in accordance with NEMA TC-2 - Electrical Plastic Tubing and Conduit, and UL-651 - Standard for Rigid Non-metallic Conduit.
- C. Electrical Metallic Tubing (EMT):
1. Electrical metallic tubing shall be hot-dipped galvanized steel. EMT conduit shall only be allowed in office or control room areas which are considered air conditioned interior space.
- D. Liquidtight Flexible Conduit:
1. Liquidtight flexible conduit shall be constructed of a flexible galvanized metal core with a sunlight resistant thermoplastic outer jacket. Utilize liquid tight flexible conduit with spiral enclosed copper bonding conductors for conduit sizes 1 1/4 inches and smaller.
 2. Liquidtight flexible conduit shall be manufactured in accordance with UL-360 - Steel Conduits, Liquid-Tight Flexible.
 3. Fittings used with flexible conduit shall be of the screw-in type as manufactured by O-Z/Gedney, Appleton or Crouse-Hinds.
- E. Flexible Couplings:
1. Flexible couplings shall be of heavy-duty construction, water tight, and have electrical conductivity equal to rigid conduit. 3/4" - 2" shall have an inner brass core with insulating liner, outer bronze braid. 2 1/2"-4" shall have inner stainless steel core with insulating liner, outer stainless steel braid. Couplings shall be in compliance with UL Standard 886 and conform to ASTM A47, Grade 32510.
- F. Boxes and Fittings:
1. Terminal boxes, junction boxes, pull boxes, etc. shall be sheet steel unless otherwise shown on the Drawings. Boxes shall be galvanized and have continuously welded seams. Welds shall be ground smooth and galvanized. Box bodies shall be flanged and shall not have holes or knockouts. Box bodies shall not be less than 14-gauge metal and covers shall not be less than 12-gauge metal. Covers shall be gasketed and fastened with stainless steel screws.
 2. Cast iron boxes and fittings shall be galvanized with cast galvanized covers and corrosion proof screws. Cast and malleable iron fittings for use with metallic conduit shall be the threaded type with five full threads.
 3. In outdoor areas, conduit shall be terminated in raintight hubs. In other than outdoor areas, sealed locknuts and bushings shall be used.
 4. Conduit, fittings, and boxes in hazardous locations shall be suitable for the Class and Division indicated.
 5. Floor boxes shall be of the round or rectangular cast metal type. Boxes shall be watertight and cover frames shall be adjustable. Box covers shall finish flush with finished floor surface. Boxes shall be located as directed by the City of Pompano and/or as indicated on the Drawings. Necessary gaskets, sealing compound, plugs, or devices shall be provided for the complete installation.
 6. Steel elbows and couplings shall be hot-dipped galvanized. Joints shall be taped.
 7. Electrical metallic tubing fittings shall be of the rain-tight, concrete-tight, compression type.
- G. Outlet Boxes:
1. Construction: Outlet boxes shall be Zinc-coated or cadmium-plated sheet steel boxes of a class to satisfy the condition at each outlet except where unilet or conduit bodies are required. They shall be knockout type with knockouts removed only where necessary to accommodate the conduit entering. Square cornered, straight-sided gang boxes, 4-inch octagon concrete rings

and 4 inch octagon hung ceiling boxes with bars, may be folded type. All other boxes shall be one-piece, deep-drawn.

2. Size: All boxes shall be of sufficient size to accommodate the required number and sizes of conduits, wires and splices in accordance with NEC requirements, but not smaller than size shown or specified. Special purpose boxes shall be sized for the device or application indicated.
 3. Fixture Studs: 3/8 inch malleable-iron fixture studs shall be used in outlet boxes for ceiling lighting fixtures and interior-bracket lighting fixtures, other than lamp receptacles and drop cords.
 4. Exposed: Screw-joint type boxes, with gasketed weatherproof covers shall be used in locations exposed to the weather.
 5. Tile Boxes: Boxes rectangular in shape with square corners and straight sides shall be used for receptacles and switches mounted in furniture cabinets or in glazed tile, concrete block, marble, brick, stone or wood walls. Install without plaster rings.
 6. Wall-mounted Switch, Receptacle, and Signal Boxes: Shall be, unless otherwise noted or specified, not less than 4 inches square by 2 inches deep for two devices, and multigang boxes for more than two devices. Boxes for switches and receptacles on unfinished walls may be screw-joint type with covers to fit the devices.
 7. Wall-mounted Telephone Outlet Boxes: Shall be 4 inches square by 2 inches deep, unless otherwise noted on the Drawings.
 8. Light Fixture Boxes: Shall be 4 inch diameter by 2 inch deep, minimum, for ceiling and interior bracket fixtures with concealed conduits. Plaster covers for bracket fixtures shall have 3-inch diameter openings. Screw-joint boxes with canopy seat shall be used for ceiling and interior bracket fixtures with exposed conduits.
 9. Grounding Terminal: Provide a grounding terminal in each box containing a green equipment ground conductor, or serving motors, lighting fixtures, or receptacles. Grounding terminal shall be green-colored, washer-in-head, machine screw or grounding bushing.
- H. Pullboxes:
1. Pullboxes shall be minimum NEC size requirements unless larger box is noted, as specified for outlet boxes with blank cover for pullboxes with internal volume not more than 150 cubic inches, and as specified for cabinets for pullboxes with internal volume over 150 cubic inches, except covers to have some thickness as box with corrosion resistant screw or bolt attachment.
- I. PVC Fittings:
1. Fittings for use with rigid non-metallic conduit shall be PVC, solvent welded type.
 2. Provide watertight field-applied coat of all weather PVC solvent cement compound with viscosity and wet film thickness recommended as required for installation of non-metallic conduit and fittings. The cement compound shall be furnished by the conduit manufacturer. PVC solvent cement shall meet the requirements of ASTM D2564, "Solvent Cements for Poly Vinyl Chloride Plastic Piping Systems".
- J. Stainless Steel Boxes:
1. Stainless steel boxes shall be used with RGS conduit and where indicated.
 2. Stainless steel boxes shall be NEMA 4X, Type 316 as indicated in specification SECTION 16050.
 3. Stainless steel shall be minimum 14-gauge thickness, with a brushed finish.
 4. Doors shall have full length stainless steel piano hinges. Non-hinged boxes are not acceptable.

K. Terminal Cabinets:

1. Interiors shall be so designed that control relays and terminal blocks can be replaced or added without disturbing adjacent units. Each cabinet shall be furnished with a minimum of 30% spare terminals.
2. All interiors shall be completely factory assembled with control relays, terminal blocks, insulating barriers, etc. All 120 volt AC and DC terminal blocks shall be isolated from each other by insulating barriers or separate enclosures.
3. All wiring within the cabinets shall be grouped together in harnesses and secured to the structure.
4. For terminal block specification refer to SECTION 16120.
5. Boxes shall be made from 14 gauge galvanized steel and shall be of sufficient size to provide a minimum of 4 inches of wiring space on all sides and between adjacent terminal blocks. A minimum two-inch spare shall be provided between control relays. A minimum of four mounting studs shall be provided on each cabinet. Cabinets shall be furnished without knockouts. Holes for raceways shall be drilled on the job.
6. A single hinged door shall cover the front of each terminal cabinet. Doors shall have a neoprene gasket, vault type handle, three-point catch and lock. Two keys will be supplied for each lock. All locks shall be keyed alike.
7. All exterior and interior steel surfaces of the cabinets shall be properly cleaned and finished with gray over a rust-inhibiting phosphatized coating conforming to ANSI A55.1. The finish paint shall be of a type to which field applied paint will adhere.
8. Cabinets shall be painted 14 gauge or 16 gauge steel with 14 gauge steel doors, seams continuously welded and ground smooth, no holes or knockouts, with latch kit hardware. Cabinets shall conform to UL 508, File No. E61997, Type 12 and Type 13, NEMA/EEMAC Type 12 and Type 13.

L. Conduit Mounting Hardware:

1. Conduit supports shall be one hole galvanized malleable iron pipe straps with galvanized clamp backs and nesting backs where required.
2. Ceiling hangers shall be adjustable galvanized carbon steel pipe hangers. Straps or hangers of plumbers perforated tape shall not be acceptable. Hanger rods shall be 3/8 inch minimum galvanized all-thread rod and shall meet or exceed ASTM A193B7. Trapeze, rod type hangers shall not be loaded in excess of 500 pounds per rod. Where loading exceeds this value, rigid frames shall be provided.
3. Racks shall be constructed from framing channel. Channels and all associated hardware shall be steel, hot dipped galvanized after fabrication of the channel. Field cuts shall be painted with zinc rich paint. Channels attached directly to building surfaces shall be 14-gauge minimum material 1 5/8 inch wide by 13/16 inch depth. All other channels shall be 12-gauge minimum 1 5/8 inch wide by 1 5/8 inch minimum depth. Racks shall be designed to limit deflection to 1/200 of span length. All exposed ends of framing channel shall be covered with manufacturer's standard plastic inserts.

2.02 CABLE TRAYS:

- A. Cable tray systems shall be composed of straight sections, curved sections, fittings, and accessories as defined in the latest NEMA Standards publication VE-1 - Ventilated Cable Tray.
1. The cable tray and fittings shall be hot-dip galvanized after fabrication, aluminum or stainless steel.

2. Cable tray shall be ladder type with 6, 9, 12, or 24-inch spacing with ventilated trough or solid trough. Tray sizes shall have 3, 4, 5 or 6-inch minimum usable load depth as indicated on project drawings.
3. Loading capacities shall meet NEMA weight classification with a safety factor of 1.5.

PART 3 - EXECUTION

3.01 PREPARATION:

- A. The CONTRACTOR shall provide suitable protection for conduit risers against damage during construction.
- B. The CONTRACTOR shall cap ends of all conduits before concrete is poured.
- C. The CONTRACTOR shall install pull cord and cap all conduits after cleaning where conduits are to be left empty by this Contract.
- D. The CONTRACTOR shall carefully ream ends of all conduit lengths after cutting to eliminate sharp burrs.
- E. The CONTRACTOR shall clean out all conduits before pulling wire.

3.02 INSTALLATION:

- A. No conduit smaller than 3/4-inch electrical trade size shall be used, nor shall any have more than three 90° bends in any one run. Pull boxes shall be provided as required per references listed in section 1.02.
- B. No wire shall be pulled until the conduit system is complete in all details; in the case of concealed work, until all rough plastering or masonry has been completed; in the case of exposed work, until the conduit system has been completed in every detail.
- C. The ends of all conduits shall be tightly plugged to exclude dust and moisture while under construction.
- D. Conduit supports shall be spaced at intervals of 8 feet or less, as required to obtain rigid construction.
- E. Single conduits shall be supported by means of one-hole pipe clamps in combination with one-screw back plates, to raise conduits from the surface. Multiple runs of conduits shall be supported on trapeze type hangers with steel horizontal members and threaded hanger rods. The rods shall be not less than 3/8-inch diameter.
- F. Conduit hangers shall be attached to structural steel by means of beam or channel clamps. Where attached to concrete surfaces, concrete inserts of the spot type shall be provided.
- G. All conduits on exposed work shall be run at right angles to and parallel with the surrounding wall and shall conform to the form of the ceiling. No diagonal runs will be allowed. Bends in parallel conduit runs shall be concentric. All conduits shall be run perfectly straight and true.
- H. No unbroken run shall exceed 300 feet in length. This length shall be reduced by 75-feet for each 90° elbow.
- I. Conduits terminating in pressed steel boxes shall have double lock nuts and insulated bushings.
- J. Conduits terminating in gasketed enclosures shall be terminated with conduit hubs.
- K. Liquid-tight, flexible metal conduit shall be used for all motor terminations and other equipment where vibration is present.

- L. Conduit stubouts for future construction shall be provided with threaded PVC end caps at each end.
- M. All wiring shall be run in raceway unless indicated otherwise.
- N. Raceways shall be installed between equipment as indicated. Raceway systems shall be electrically and mechanically complete before conductors are installed. Bends and offsets shall be smooth and symmetrical, and shall be accomplished with tools designed for this purpose. Factory elbows shall be utilized wherever possible.
- O. Where raceway routings are indicated on plan views, follow those routings to the extent possible.
- P. Where raceways are indicated but routing is not shown, such as home runs or on conduit developments and schedules, raceway routings shall be the CONTRACTOR'S choice and in strict accordance with the NEC and customary installation practice. Raceway shall be encased, exposed, concealed, or under floor as indicated, except that conduit in finished areas shall be concealed unless specifically indicated otherwise.
- Q. Routing shall be adjusted to avoid obstruction. Coordinate between trades prior to installation of raceways. Lack of such coordination shall not be justification for extra compensation, and removal and re-installation to resolve conflicts shall be by the CONTRACTOR as part of the WORK.
- R. Exposed raceways shall be installed parallel or perpendicular to structural beams.
- S. Install expansion fittings with bonding jumpers wherever raceways cross building expansion joints.
- T. Wherever contact with concrete or dissimilar metals can produce galvanic corrosion of equipment, suitable insulating means shall be provided to prevent such corrosion.
- U. Holes:
 - 1. The CONTRACTOR shall provide the required insert materials and holes for all openings in new work completely bonded, curbed, flashed and finished off in an approved manner, whether in concrete, steel grating, metal panels or roofs. Resulting seal shall prevent smoke and gas penetration and adhere to Lloyds Register Standards Certificate Numbers SVG/F93/468, SVG/F93/469 and SVG/F93/470 and applicable UL Standards. Insert materials shall be of one of the following type:
 - a. Non-shrinking grout applied to continuously fill annular space between pipe and wall opening. The resulting seal shall serve as an isolator of fire, weather and gaseous conditions.
 - b. Fire rated, Ozone and Ultra-Violet radiation resistant, two-part silicone room temperature vulcanizing (RTV) foam.
 - 2. The CONTRACTOR shall place grout or foam as specified, in the following locations:
 - a. All holes in concrete wall, floor and roof slabs after installation of conduit.
 - b. Wall entrances where conduit enters the building or vaults from exterior underground.
 - 3. The CONTRACTOR shall install fire and smoke stop fittings at all conduit penetration of fire rated walls, ceilings and floors.

3.03 CONDUIT:

- A. Exposed conduit shall be Rigid Galvanized Steel , unless indicated otherwise:
 - 1. In areas with chlorine or hydrofluosilicic acid, schedule 40 PVC shall be utilized.
 - 2. In lime or ferric chloride areas, rigid aluminum conduit shall be utilized
 - 3. In Class I, Div. I or Div. II hazardous locations, rigid aluminum conduit shall be utilized.

- B. Where conduit emerges from concrete encasement, a PVC Schedule 40 elbow shall be utilized for transition from the concrete (utilize PVC Coated, RGS elbow for analog control conduits). Conduit shall emerge from the concrete perpendicular to the surface whenever possible.
- C. Concrete cover for conduit and fittings shall not be less than 1-1/2 inches for concrete exposed to earth or weather, or less than 3/4-inch for concrete not exposed to weather or in contact with the ground.
- D. Conduits passing through a slab, wall, or beam shall not impair significantly the strength of the construction.
- E. Conduits embedded within a slab, wall, or beam (other than those merely passing through) shall satisfy the following:
 - 1. Conduits with their fittings embedded within a column shall not displace more than 4 percent of the gross area of cross section.
 - 2. Conduits shall not be larger in outside dimension than one third the overall thickness of slab, wall, or beam in which embedded.
 - 3. Conduits shall not be spaced closer than 3 outside diameters on centers
- F. Conduit shall be placed so that cutting, bending, or displacing reinforcement from its proper location will not be required.
- G. Threads shall be coated with a conductive lubricant before assembly.
- H. Joints shall be tight, thoroughly grounded, secure, and free of obstructions in the pipe. Conduit shall be adequately reamed to prevent damage to wires and cables during installation. Strap wrenches and vises shall be used to install conduit to prevent wrench marks on conduit. Conduit with wrench marks shall be replaced.
- I. Wherever possible, conduit runs shall slope to drain at one or both ends of run. Wherever conduit enters substructures below grade, the conduit shall be sloped to drain water away from the structure.
- J. Installation of rigid steel conduit through a core-drilled hole in an exterior wall below grade shall utilize a modular sealing device.
- K. Each conduit shall be identified at each end with a permanent non-corrosive metal marker. Designation shall be pressure stamped into the tag. The conduit identification shall be designated circuit number as shown.

3.04 SUPPORTS:

- A. The CONTRACTOR shall construct metal framing strut systems with sufficient rigidity to hold all mounted equipment and material in permanent and neat alignment. All channels, fittings and hardware of the strut assemblies shall be as per contract drawings and specifications and shall not exceed load requirements in UL classification 5B and applicable NEC, NEMA and ASTM standards. Utilize galvanized material for interior non-corrosive and air conditioned spaces and stainless steel, for outdoor or corrosive environments.
- B. Design supports to provide 1/4-inch space between equipment housings and walls or columns upon which they are mounted.
- C. After Power Tool Cleaning, paint all welds, field cuts and damaged areas with one manufacturer type of primer and paint. Utilize organic zinc-rich primer at 3 mils dry film thickness.
- D. All screws, nuts, bolts, pipe clamps and other anchoring materials for struts and framing shall be stainless steel.

- E. All outdoor supports shall be constructed to meet wind load requirements of the site as set forth in structural specifications or/and contract drawings.

3.05 OUTLET BOXES:

- A. Installation: Unless otherwise specified or shown on the drawings, outlet boxes shall be flush mounted, and the front edges of the boxes or plaster covers shall be flush with the finished wall or ceiling line; or, if installed in walls and ceilings of incombustible construction, not more than 1/4 inch back of same. Mount boxes with the long axes of devices vertical, unless otherwise specified. A multiple of box extensions and/or covers will not be permitted. Install in a rigid and satisfactory manner with suitable metal bar hangers, box cleats, adjustable box hangers, etc. Use wood screws on wood, expansion shields on masonry and machine screws on steelwork.
- B. Mounting Heights: The mounting height of a wall-mounted outlet box shall be construed to mean the height from the finished floor to the horizontal center line of the cover plate. On exposed tile, block, or brick constructions, mount outlet boxes at the nearest bed joint to the mounting height indicated. Verify heights with the City of Pompano.
- C. Wall-mounted Switch, Receptacle and Signal Outlets: On columns, pilasters, etc., mount so the centers of the columns are clear for future installation of partitions. Install outlet boxes near doors or windows close to the trim. Install according to architectural drawings, unless other locations are approved by the City of Pompano.
- D. Back-to-back: Outlets shown on the drawings "back-to-back" are to be installed with a minimum of 6 inches lateral separation between outlets. "Through-the-wall" type boxes are not permitted.

3.06 FIXTURE CONNECTIONS:

- A. Recessed or surface light fixtures in lay-in or accessible ceilings shall be connected with minimum 1/2 inch flexible metallic conduit, 4 to 6 feet long, with grounding provisions.

3.07 DUCTBANKS:

- A. Ductbanks shall be installed in accordance with the criteria below:
 - 1. Duct shall be assembled using high impact non-metallic spacers and saddles to provide conduits with vertical and horizontal separation. Plastic spacers shall be set every 5-feet.
 - 2. The duct shall be laid on a grade line of at least 3-inches per 100-feet, sloping towards pullboxes or manholes.
 - 3. Changes in direction of the duct envelope by more than 10° horizontally or vertically shall be accomplished using bends with a minimum radius 24 times the duct diameter.
 - 4. Duct couplings shall be staggered a minimum of 6-inches.
 - 5. The bottom of trench shall be of select backfill or sand.
- B. Each bore of the completed ductbank shall be cleaned by drawing through it a standard flexible mandrel one foot long and 1/4-inch smaller than the nominal size of the duct. After passing of the mandrel, a wire brush and swab shall be drawn through. Spare raceways that are not indicated to contain conductors shall have a 1/8-inch polypropylene pull cord installed throughout the entire length of the raceway.
- C. Duct entrances shall be grouted smooth; ducts shall be terminated with flush end bells. Sections of pre-fabricated manholes and pullboxes shall be assembled with waterproof mastic and shall be set on a 12-inch bed of gravel as recommended by the manufacturer or as required by field conditions.

END OF SECTION

SECTION 16112 RACEWAYS AND CONDUIT

PART 1 - GENERAL

1.01 SUMMARY:

- A. Related Sections:
 - 1. 16120 - Wire and Cable.
 - 2. 16450 - Grounding.

1.02 DEFINITIONS:

- A. Refer to NEMA Standard VE 1 for definitions of cable tray terminology used in this section.

1.03 SYSTEM DESCRIPTION:

- A. Performance Requirements: Materials shall bear Underwriters Laboratories (UL) labels.

1.04 SUBMITTALS:

- A. Product Data: Manufacturer's literature including printed installation instructions and recommendations before starting work. Submit samples if requested.
- B. Shop Drawings:
 - 1. Layout floor plans and elevations showing cable tray system.
 - 2. Designate components and accessories for cable trays including clamps, brackets, hanger rods, splice plates connectors, expansion joint assemblies, straight lengths, and fittings.
 - 3. Show accurately scaled components and spatial relationships to adjacent equipment. Show cable tray types, dimensions, and finishes.
- C. Quality Control Submittal: Certified copies of factory test reports performed according to NEMA Standard VE 1 on cable trays of types and size specified for this project.

1.05 QUALITY ASSURANCE:

- A. UL and NEMA Compliance: Cable trays and components shall be listed and labeled by UL. Comply with NEMA Standard VE 1, "Cable Tray Systems".
- B. Electrical Component Standard: Components and installation shall comply with NFPA 70 - National Electrical Code - 2004 (NEC).
- C. Single-Source Responsibility: Cable tray components shall be the products of a single manufacturer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

- A. Cable Tray Manufacturers:
 - 1. B-Line Systems, Inc.
 - 2. The George-Ingraham Corp.
 - 3. GS Metals Corp.
 - 4. Square D Co.
- B. Fibrated Emulsion Conduit Coatings:
 - 1. Karnak Chemical Corp., 220 Fibrated Emulsion.
 - 2. Monsey Products Co., Monsey Asphalt Emulsion Roof Coating Fiber.

3. Sonneborn Building Products, Hydrocide 700B.

2.02 EQUIPMENT:

- A. Conduit shall be sized according to NEC, unless otherwise noted. Feeders and home runs shall not be less than 3/4" diameter.
- B. Rigid Conduit:
 1. Galvanized Rigid Steel Conduit (GRS): Hot dip galvanized or electro-galvanized, with corrosion resistant coating on the inside, threaded, standard weight steel conduit complying with ANSI C80.1-2005, and Article 346 of the NEC.
 2. Intermediate Metal Conduit (IMC): Hot dip galvanized or electro-galvanized, threaded, steel conduit complying with ANSI C80.6-2005 and Article 345 of the NEC.
 3. Rigid Non-Metallic: Schedule 40, PVC plastic 90 degrees C. complying with ANSI/UL 651-2006, and Article 347 of the NEC.
- C. Electrical Metallic Tubing (EMT):
 1. Galvanized steel tubing with smooth interior coat of lacquer enamel or zinc coat.
 2. Comply with ANSI C80.3-2005, and UL 797, and Article 348 of the NEC.
- D. Flexible Metal Conduit:
 1. Steel: Flexible galvanized steel conduit (Greenfield) complying with UL 1 and Article 350 of the NEC.
 2. Liquid Tight: Flexible galvanized steel conduit with oil and water-resistant overall plastic sheath, complying with UL 1, and Article 351 of the NEC.
 3. Minimum size for flexible metal conduit 1/2" except 3/8" where allowed by Section 349 of the NEC for connections to lighting fixtures.
- E. Conduit Fittings:
 1. Rigid Steel Conduit and Intermediate Metal Conduit: Zinc or cadmium plated steel or galvanized malleable iron complying with ANSI C80.1 and C80.3. Fittings shall be threaded type. Die cast zinc alloy fittings are not allowed.
 2. Rigid PVC conduit: 90 degrees C., PVC fittings UL listed. Fittings shall match conduit and complying with ANSI/UL 651-2006.
 3. EMT fittings: Zinc or cadmium plated steel or malleable iron of the compression type or stainless steel multiple point locking (set screw) type. Connectors shall have insulated throats. Fittings shall comply with ANSI C80.3-2005. Die cast zinc alloy fittings are not allowed.
 4. Flexible metal conduit fittings: Steel or malleable iron only with insulated throat, complying with Fed. Spec.W-F-406B. Die cast zinc alloy fittings are not allowed.
 5. Bushings and connectors shall incorporate an insulating insert of at least 150 degrees C. rated plastic or 105 degrees C. rated nylon. Conduit bushings made entirely of nonmetallic material are not allowed. Grounding and bonding bushings shall have clamp type terminal for copper conductor.
 6. Expansion Fittings and Sealing Fittings: UL listed with ground continuity means.
- F. Conduit Supports:
 1. Straps: Formed zinc coated steel or malleable iron one-hole pipe straps or conduit clamps sized for conduits or tubing.
 2. Fastenings: Zinc coated or cadmium plated steel screws, bolts, toggles, and expansion anchors as required.
 3. Electrical steel channels shall be equivalent to Unistrut P-3000 Series. Provide trapeze, clamps, supports, concrete inserts, galvanized steel or plated steel with galvanized conduit clamps, and threaded 1/4" diameter minimum suspension rods.

4. For individual branch circuit EMT or flexible metal conduit concealed above accessible hung ceilings only, "caddy clips" spring steel conduit clamps.
- G. Conduit Coatings: Steel conduit buried directly in the earth shall receive a factory applied PVC coating or 2 coats of fibrated emulsion conduit coating. Comply with manufacturer's application recommendations.
- H. Surface Raceways: Only where specifically indicated. UL listed and comply with Fed.Spec.W-C-582, and Articles 352 and 353 of the NEC.
1. Manufacturers:
 - a. Walker, Division of Butler Manufacturing Co.
 - b. Wiremold.
 2. Pull Wires: Galvanized steel or nylon rope of sufficient strength to pull in the maximum size conductors through trade size conduit. Minimum strength shall be 200 lbs.
- I. Cable Trays:
1. Wiring from cable trays to equipment, devices, or outlets shall be in metallic conduit.
 2. Conceal cable trays above fully-accessible ceilings. Cable trays in exposed locations or above inaccessible ceilings such as plaster, metal, or concealed-spline are not allowed.
 3. Cable trays shall not obstruct access to light fixtures, access panels, damper controls, piping valves, etc.
 4. Provide fire rated, insulated cable in cable trays located in supply or return air plenums.
 5. Fire-rating shall be maintained when cable tray penetrates fire-rated assemblies.
 6. Cable trays shall not be located over exterior covered walkways.
 7. Cable tray systems shall be of indicated types, sizes, and NEMA classes and shall be complete with manufacturer's recommended covers, barrier strips, dropouts, fittings, conduit adaptors, hold-down devices, grommets, and blind ends as required and indicated.
 8. Cable tray products shall have rounded edges and smooth surfaces.
 9. Cable Trays, Fittings, and Accessories: Aluminum alloy 6063-T6 for rails, rungs, and trays, 505Z for fabricated parts.
 10. Minimum Fitting Radius: 12 inches.
 11. Sizes and Configurations:
 - a. Use "ladder type" at trunks, sized as indicated on plans.
 - b. Use channel type tray at branches, minimum 6 inches wide and with bottom ventilated.
 12. Supports and Connectors: Cable tray supports and connectors, including bonding jumpers shall be as recommended by cable tray manufacturer.
 13. Fasteners for Supports: Fasteners to connect cable tray supports to the building structure shall be all steel springhead type toggle bolts.
 14. Fire Stopping:
 - a. Materials shall be UL labeled and FM approved for fire ratings consistent with penetrated barriers.
 - b. Sleeves: Schedule 40, welded, black steel pipe sleeves. Sizes as indicated.
 15. Warning Signs:
 - a. Lettering: 1-1/2" high, black on yellow background with legend "WARNING! NOT TO BE USED AS WALKWAY, LADDER, OR SUPPORT FOR LADDERS OR PERSONNEL."
 - b. Materials and Fastening: As recommended by manufacturer

- J. Wireways and Auxiliary Gutters:
1. Hot dip galvanized code gage sheet steel, complete with knockouts, enclosures, and removable covers unless indicated as hinged.
 - a. Manufacturers:
 - 1) Hoffman.
 - 2) Lee Products.
 - 3) Keystone.
 - 4) Square D.
 2. Exterior locations shall have weathertight gasketed covers, joints, and drip-proof rain shields. Paint after installation with exterior enamel paint.
 3. Wireways and gutters shall comply with Articles 362 and 374 of the NEC.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Do not proceed with the work of this Section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION:

- A. Provide where indicated and where required, ducts, conduits, tubing, wireways, and gutters to form a complete and integrally grounded raceway system. The system shall be installed according to NEC and local code requirements. Components of the system shall be of sufficient size, strength, and capacity to allow for placements, pulling-in, or other installation of conductors, wires, cables, splices, taps, and terminations whether included in this Contract or for future use without strain or injury to those items being installed.
- B. Provide pull wires in empty raceways where no conductors are installed in this Contract. Allow 10 inches minimum slack at each end of pull wire and securely caulk in place. Provide marking tags showing opposite destination noting building and closet number at each end.
- C. The minimum size of rigid conduit, EMT, and flexible metallic conduit shall be according to NEC except as follows:
1. Unless otherwise specified under "Products" or shown on the Drawings.
 2. Unless otherwise shown on the Drawings, telephone conduits shall be not less than 1 inch trade size.
 3. Feeders and homeruns shall not be less than 3/4" diameter.
- D. Check sizes of raceways to determine the green equipment ground conductor specified, shown, or required can be installed in the same raceway with phase and neutral conductors according to the percentage of fill requirements of NEC. If necessary, increase the duct, conduit, tubing, or raceway sizes shown or specified to accommodate conductors without additional cost to the City of Pompano.
- E. Raceway and Conduit Locations: Unless indicated otherwise, conduit types specified shall be used in the following locations. Any deviation from this schedule shall be submitted for approval with corresponding price adjustments before installation. Any conduit installed and not of the specified type shall be removed and replaced with the specified type at no additional cost to the City of Pompano.
1. Exterior Raceways:
 - a. Below Grade:
 - 1) Below Grade Direct Buried:
Galvanizedrigidsteel(GRS), painted or PVC jacketed.
PVC Schedule 40, as noted on plans.

- 2) Below Grade Concrete Encased:
 - a) GRS.
 - b) PVC Schedule 40.
 - b. Exterior Exposed:
 - 1) GRS conduit.
 - 2) IMC conduit.
 - 3) PVC flexible conduit, PVC jacketed with liquid tight fittings.
 - 4) Gutters, wireways, and troughs of the gasketed, raintight type.
 - 2. Interior Raceways:
 - a. Under Slabs on Grade:
 - 1) GRS (painted or PVC coated).
 - 2) PVC Schedule 40, with 12 inches clear to bottom of slab.
 - b. Embedded in Concrete Walls or Floor On or Below Grade: PVC or GRS with threaded or concrete tight steel fittings.
 - c. Embedded in Concrete Walls or Floors Above Grade:
 - 1) PVC Schedule 40.
 - 2) GRS or IMC with threaded or concrete tight steel fittings.
 - 3) EMT with concrete tight steel fittings.
 - d. Concealed in Masonry Walls:
 - 1) GRS or IMC with steel fittings.
 - 2) EMT with concrete tight fittings.
 - e. Concealed in dry wall construction, or in suspended ceilings: EMT or flexible metal conduit with steel fittings.
 - f. Interior Exposed:
 - 1) GRS or IMC at 8 feet or less above finish floor.
 - 2) EMT with steel fittings more than 8 feet above finish floor.
 - 3) Option: EMT installed below 8 feet from floor in electrical, mechanical, and telephone rooms.
 - 3. Sealing fittings shall be installed at the following points and as otherwise indicated:
 - a. Where conduits enter or leave hazardous areas and enclosures for explosion-proof lighting fixtures, switches, receptacles, etc., use sealing compounds according to NEC to be of a type approved for the conduits.
 - b. Where conduits pass from warm locations to cold locations, such as refrigerated spaces and air conditioned spaces, use to prevent passage of water vapor.
 - c. Where required by the NEC.
 - 4. PVC conduit shall not be used indoors either exposed or concealed, except embedded in concrete or under slabs on grade.
 - a. The depth of conduits under interior slabs shall be based on the minimum allowable bending radii of stub-ups.
 - b. Stub-ups on exterior and exterior walls shall be GRS, with transitions from PVC to GRS occurring below grade. Curves to stub-ups shall be GRS.
- F. Raceway and Conduit Installation:
 - 1. Conduit Routing:
 - a. Route feeders, homeruns, and conduits as indicated, except for minor deviations as accepted.
 - b. Maintain a minimum separation of 12 inches between conduits containing emergency feeders and conduits containing normal feeders.

- c. The routing of conduit, as shown on the plans, is general.
 - d. Before installing any work, examine the working layouts of all other trades to determine exact locations and clearances.
 - e. Where equipment is installed by other trades requiring connection as specified in this section, determine exact conduit entry locations from the approved shop drawings.
 - f. Modifications to conduit runs shown on the electrical drawings, based on this section, shall be made without additional cost to the Pompano, and shall be subject to Engineer approval.
 - g. In determining clearances, conduit shall not be run within 6 inches of any heated pipe or duct, or if unavoidable, the conduit must be kept at least 1 inch from the outer covering.
2. Conduits In Finished Spaces:
- a. Conduits, fittings, outlet boxes, and pull boxes shall be concealed in ceilings, floor slabs, walls, or partitions of the buildings.
 - b. Provide sufficient space at concealed conduits over conduit and coupling for the applications of finished floor, walls, and ceilings.
 - c. Examine the Drawings, and if necessary, confer with the Engineer to determine the type of construction containing the concealed conduits and the space available for such conduits.
 - d. Unless otherwise shown on the Drawings, conduit may be run exposed on unfinished walls, on unfurred basement ceilings, in mechanical rooms and in penthouses, attics, and roof spaces.
3. Roof Conduit:
- a. Avoid running conduit on the roof wherever possible.
 - b. If absolutely necessary, roof mounted conduit shall be GRS or IMC, a minimum of 16 inches above roof on galvanized steel struts, securely supported, horizontally and vertically with pitch pans as required, on supports and conduit penetrations.
4. Conduits Penetrating Waterproof Membranes Under Floor Slabs on Grade:
- a. Coordinate installation of conduits before installation of waterproof membrane.
 - b. Membrane to be sealed waterproof to conduits before pouring of slab over membrane.
 - c. Provide Schedule 40 galvanized steel pipe sleeves for conduits penetrating floor slabs.
5. Conduits Penetrating Waterproof Membranes on Walls: Provide properly coordinated Schedule 40 galvanized steel pipe sleeves for conduits in concrete forms. Membrane to be sealed waterproof to conduits.
6. Conduit Embedded in Concrete:
- a. Conduit embedded in poured concrete shall be of the specified type, unless otherwise indicated.
 - b. EMT shall not be installed underground, in slabs on grade, in wet locations, in hazardous areas, or for circuits operating at more than 600 volts.
 - c. Metallic conduit buried in the ground shall be of the specified type.
 - d. The outside diameter of any conduit buried in concrete shall not exceed one-third of the thickness of the structural slab, wall or beam in which it is placed. The conduit shall be located entirely within the middle third of the member whenever possible.
 - e. In general, conduits shall not be run through beams, except where clearly indicated on Drawings, specified, or where allowed by the Engineer.

- f. Factory applied plastic resin or epoxy coated metal conduit and fittings may be used, provided that coating holidays and abrasions to coating are repaired with compatible mastic.
7. Conduit Bending, Cutting, and Placement:
- a. Conduit bends and offsets shall be avoided where possible.
 - b. Required bends shall be made with standard benders designed for the purpose and with a minimum radius of 6 times the internal conduit diameter.
 - c. Make conduit bends according to the NEC unless otherwise shown on the contract Drawings. Use of a pipe tee or vise for bending conduit is not allowed.
 - d. Conduit crushed or deformed shall not be installed.
 - e. Bends shall be free from dents or flattening. Bends more than 360 degrees are not allowed in conduit between any 2 terminations of pull boxes.
 - f. Make no bend in surface raceways. Use factory formed fittings for surface raceways.
 - g. Raceways shall not contain more than two 90 degree bends or equivalent. Provide additional junction or pull boxes to meet this requirement.
 - h. The ends of conduit shall be carefully reamed out free from burrs before installation and after threading.
 - 1) Cuts shall be made square.
 - 2) Coupling of conduit by means of running threads is not allowed.
 - 3) Where it is impossible to run the conduit and coupling sections together, an Erickson coupling or other accepted combination coupling shall be used.
 - 4) Joints shall be made up tight.
 - 5) Joints in conduits concealed in slab, floor fill, earth, etc., shall be made using approved silicone paint on threads.
 - a. Prevent lodgement of plaster, dirt, or trash in raceways, boxes, fittings, and equipment during course of construction. Clogged raceways shall be entirely freed of obstructions or replaced.
 - b. During installation of conduit, unfinished runs and terminations in pull boxes, cabinets, etc., shall be capped until conductors are installed.
 - c. Plastic caps designed for this specific purpose shall be used to cover and align conduits before concrete pours and shall remain on conduit stub-ups until conduit is extended. Caps shall have self-aligning, interlocking male or female wings molded on each side. Duct or electrical tape and wire are unacceptable.
8. Conduit Connections:
- a. Conduit and EMT runs shall be mechanically and electrically continuous from service entrance to outlets. Unless otherwise specified, each conduit shall enter and be securely connected to a cabinet, junction box, pull box or outlet box by means of a locknut on the outside and a bushing on the inside or by means of a liquid-tight, threaded, self-locking, cold-weld type wedge adapter. Where nominal circuit voltage exceeds 250 volts:
 - 1) In rigid conduit, an additional locknut shall be provided, 1 inside locknut and 1 outside locknut.
 - 2) In EMT or flexible metal conduit, the 1 locknut shall be made wrench-tight.
 - 3) Locknuts shall be the bonding type with sharp edges for digging into the metal wall of an enclosure and shall be installed to provide a locking installation.

- 4) Locknuts and bushings or self-locking adapters will not be required where conduits are screwed into tapped connections.
 - 5) Protect vertical runs of conduit or EMT terminating in the bottoms of wall boxes or cabinets, etc., from the entrance of foreign material before the installation of conductors.
- b. Plastic conduit joints shall be made by brushing a plastic solvent cement on the inside of the plastic coupling fitting and on the outside of the conduit ends. Slip together the conduit and fitting, until seated, with a slight twist to set the joint tightly, and the conduit then rotated one-half turn to distribute the cement evenly. Remove excess cement built-up on the surface of the conduit.
 - c. The end of each conduit one inch and smaller shall be provided where it enters a junction box, outlet box, cabinet, etc., with the locknut and bushing. For conduits 1-1/4" and larger, use insulated bushings with ground stud. If insulated bushings are of the fully insulated type, use additional locknuts inside the junction box or cabinet before installing the bushing. Provide conduit entering main distribution switchboard feeder pull boxes with insulated bushing with ground stud regardless of size.
 - d. Install the conduit system complete before any conductors are drawn in. Each run of conduit shall be blown through and swabbed after plaster is finished and dry, and before conductors are installed.
 - e. Install conduit to drain any moisture, collecting in the conduit, to the nearest outlet or pull box, where possible.
 - f. Where metallic conduit is exposed to different temperatures, seal the conduit to prevent condensation and passage of air from one area to the other.
 - g. Light and power conduit shall run from a permanent and continuous ground return back to the service ground connection point. Conduits used on systems entirely isolated from the light and power distribution system shall be electrically continuous and grounded in an approved manner. Ground cable trays to the conduit system.
9. Conduit Penetrations and Supports:
- a. Sleeves, conduits, or other pipes passing through floor slabs, beams, or walls shall be located to not impair the strength of the structure.
 - b. Conduits penetrating the walls or smoke partitions shall be fire stopped (sealed). Filling materials for openings in floors shall be fire-resistive, and finished to prevent passage of water, smoke and fumes. Filling material for openings in walls shall be fire-resistive where it occurs in fire walls, and shall be installed to prevent the passage of air, smoke or fumes. Where conduit and wiring pass through fire walls or floor slabs, the Contractor shall fill the opening with fireproof sealant, as specified in Section 07270.
 - c. Roof penetrations shall be made using approved flashings and counterflashings. Do not penetrate cant strips or expansion joint covers with conduits. Do not run conduits up through roof nearer than 12 inches from toe of cant strip. Where conduits penetrate exterior walls near flashings, penetration shall be at least 3 inches above the flashing reglet.
 - d. Where conduits passing through the openings are exposed in finished rooms, the finishes of the filling materials shall match and be flush with the adjoining floor, ceiling, or wall finishes.
 - e. Where unused sleeves or slots are provided for future installation of conduit, etc., they shall be suitably identified if not readily recognizable.
 - f. EMT and conduits not embedded in concrete or masonry shall be securely and independently supported so that no strain will be transmitted to outlet box and

- pull box supports, etc. Supports shall be rigid enough to prevent distortion of conduits during wire pulling.
- g. Run conduits exposed in unfinished spaces, mechanical equipment spaces, where specifically indicated on the Drawings, or with the expressed permission of the Engineer.
 - 1) Feeder conduits shall be run exposed or in hung ceilings, except as noted.
 - 2) Where exposed conduits are installed, they shall be run parallel to the building walls or partitions, using approved conduit fittings.
 - 3) Exposed conduits shall be securely supported with malleable iron pipe straps, angle iron pipe straps, angle iron or steel channel racks or other approved means as required for clearance of other piping or ductwork.
 - 4) Wood hangers and perforated sheet metal hanger straps are not allowed.
 - 5) Spacing of conduit supports shall not exceed 7 feet.
 - 6) Horizontal feeder conduit banks shall have their hangers fastened to the building structure by approved means.
 - 7) Hangers for banks consisting of 1 or 2 conduits may be fastened from inserts in the slab.
 - 8) Auxiliary steel for fastening shall be furnished and installed under this section.
 - h. Support individual conduits not larger than 1-1/2" diameter by means of one-hole pipe straps or individual pipe hangers. Support individual horizontal conduits larger than 1-1/2" diameter by individual pipe hangers.
 - i. Conduit located in hung ceilings shall be supported in approved manner similar to exposed conduits.
 - j. Branch circuit conduits above suspended ceilings may be supported from the floor construction above or from the main ceiling support members, however, the finished installation shall not interfere with the removability of ceiling panels. Individual branch conduits above suspended ceilings with removable panels may be supported from the ceiling suspension wires provided the load imposed on any individual wire is not greater than 64 pounds, including the ceiling weight.
 - k. Unsupported vertical drops over 10 feet from bus ducts or at motors shall be in rigid steel conduit. For vertical drops of less than 10 feet EMT may be used. Brace conduit to prevent swaying.
 - l. Space conduits installed against concrete or masonry surfaces away from the surface by clamp backs or other approved means.
 - m. In dry locations, spring steel fasteners, clips, or clamps specifically designed for supporting exposed single conduits may be used instead of pipe straps or pipe hangers.
 - 1) Hanger rods used with spring steel fasteners shall be not less than 1/4" diameter steel with corrosion resistant finish.
 - 2) Spring steel fasteners shall be specifically designed for supporting single conduits or EMT
 - 3) Type, size and spacing of spring steel fasteners with accessories shall be approved by the Engineer and the Contractor.
 - 4) Submit applicable load and rating data for approval.
 - 5) Wire shall not be used for support.
 - 6) Nails are not allowed for the support of conduit.
 - n. Where 2 or more horizontal conduits or EMT run parallel and at the same elevation, they shall be supported on multiple trapeze pipe hangers. Each

- conduit or EMT shall be secured to the horizontal hanger member by a U-bolt, one-hole strap, or other suitably designed and approved fastener.
- o. U-bolts, clamps, attachments, and other hardware necessary for hanger assembly, and for securing hanger rods and conduits shall be provided. Each multiple hanger shall be designed to support a load equal to or greater than the sum of the weights of the conduits, wires, hanger, plus 200 pounds. Hardware shall be hot-dip galvanized after fabrication.
10. Fittings:
- a. Expansion Fittings: Each buried conduit in or rigidly secured to the building construction on opposite sides of a building expansion joint and each long run of exposed conduit that may be subject to excessive stresses shall be provided with an expansion fitting. Expansion fittings shall be made of hot dip galvanized malleable iron and shall have a factory installed packing that will prevent the entrance of water, a pressure ring and a grounding ring.
 - b. In addition to the grounding ring, a separate external copper bonding jumper secured by grounding straps on each end of the fitting shall be provided.
 - c. Sealing Fittings: Sealing fittings for use with rigid steel conduits shall be of the threaded, zinc or cadmium coated, cast or malleable iron type. Fittings used to prevent passage of water vapor shall be of the continuous drain type.
 - d. Sealing fittings shall be installed and sealed according to the manufacturer's recommendations at suitable, approved, accessible locations. In concealed work, each fitting shall have an access door or panel to allow access to the fitting.
 - e. Compression fittings shall be made up tight according to manufacturer's recommendations. No screw type fittings are allowed.
11. Conduit Fastening: Fasten raceways as follows:
- a. To Wood: Wood screws, sheet metal screws, or screw type nails.
 - b. To Hollow Masonry: Toggle bolts or expansion bolts as required. Holes not used to be filled.
 - c. To Concrete or Solid Brick Masonry: By expansion bolts. Holes drilled to a depth of more than 1-1/2".
 - d. To Steel Work: Machine screws, welded threaded studs, or spring-tension clamps. Raceways or pipe straps shall not be welded to steel structures.
 - e. To Light Steel Construction Partitions: Sheet metal screws. Bar hangers may be attached with saddle ties of 16 gage double strand zinc-coated steel wire.
 - f. Nail-type nylon anchors with lock washers and nuts may be used instead of expansion bolts or machine screws.
 - g. Explosive charge setting devices are not allowed for any type of fastening on the project.
 - h. Conduits, tubing, or raceways shall be continuous from outlet to outlet, cabinet, junction box, or pull box.
 - i. Surface Wireways and Auxiliary Gutters: Fasten according to manufacturer's directions with fastenings appropriate for surface as specified.
 - j. Cable Supports in Vertical Raceways: According to NEC Article 300-19.
12. Flexible Conduit:
- a. Flexible conduits shall be used for connections to motors and other electrical equipment when it is subject to movement, vibration, misalignment, cramped quarters, or where noise transmission is to be eliminated or reduced. Flexible conduit used to meet the above requirements shall be of the liquid-tight type when installed under any of the following conditions:
 - 1) Exterior locations.

- 2) Moisture or humidity laden atmosphere where it is possible for condensation to accumulate.
 - 3) Corrosive atmospheres.
 - 4) Where water or spray due to wash-down operations is frequent or possible.
 - 5) Wherever there is a possibility of seepage, dripping, etc., of oil, grease, or water.
- b. Flexible conduit shall be used for short connections to control devices, recessed fixtures, and similar items with enough slack to avoid tension. Connection between structure and first point of attachment to vibrating equipment shall be flexible.
13. Surface Raceways:
- a. Surface metal raceways shall be used where noted on Drawings. Surface metal raceways shall be securely grounded to outlet boxes or to back-plates and fixtures by means of bolts, screws, or other approved means. Ends of raceways shall be provided with bushings at entrances to boxes or canopies. A separate green ground conductor shall be installed in the raceway from the junction box supplying the raceway to receptacle or fixture ground terminals.
 - b. Fasten surface raceways to surface in manner similar to methods specified.
 - c. Each surface metal raceway outlet box with an attached lighting fixture shall be of sufficient diameter to provide a seat for the fixture canopy.
 - d. Where a surface metal raceway is used to supply a fluorescent lighting fixture having central stem suspension with a backplate and a canopy, with or without extension ring, the backplate and canopy will serve as the outlet box and no separate outlet box need be provided.
 - e. A surface metal raceway outlet box shall be provided, in addition to the backplate and canopy, at the feed-in location of each fluorescent lighting fixture having end stem suspension.
 - f. Where a surface metal raceway extension is made from an existing outlet box on which a lighting fixture is installed, a backplate slightly smaller than the fixture canopy shall be provided and no additional surface mounted outlet box need be installed.
14. Cable Trays:
- a. Install cable trays according to equipment manufacturer's written instructions.
 - b. Remove burrs and sharp edges of cable trays.
 - c. Support cable tray independently from the building structural components.
 - d. Comply with manufacturer's recommendations for selection and installation of supports.
 - e. Strength of each support including fastenings to the structure shall be adequate to carry present and future load multiplied by a safety factor of at least four or 200 lbs., whichever is greater.
 - f. Support Locations: Locate supports according to the recommendations of Article 6.6 of NEMA Standard VE 1.
 - g. Installation of supports shall be according to cable tray manufacturer's written instructions and the recommendations of Paragraph 6.5 of NEMA Standard VE-1.
 - h. Fastening Supports: Unless otherwise indicated, fasten cable tray supports securely to the building structure as specified in Division 16 Section "Supporting Devices".

- i. Direction Changes: Make changes in direction of cable tray with standard cable tray fittings.
 - j. Locate cable tray above piping except as required for tray accessibility and as otherwise indicated.
 - k. Firestopping: Where cable trays penetrate fire and smoke barriers including walls, partitions, floors, and ceilings, install fire-stopping at penetrations after cables are installed.
 - l. Sleeves For Future Cables: Install capped sleeves for future cables through firestopped cable tray penetrations of fire/smoke barriers.
 - m. Working Space: Install cable trays with sufficient space to allow access for installing cables.
 - n. Grounding: Electrically ground cable trays and ensure continuous electrical conductivity of cable tray system. Use tray as an equipment ground conductor for itself only, not for connected equipment.
 - o. Warning Signs: After installation of cable trays is completed, install warning signs on or in proximity to cable trays where easily seen by occupants of space.
15. Empty Conduits: Where empty conduit or tubing is indicated for wiring to be installed in future by utility company or by separate contract, install conduit or tubing according to previous requirements for conduit and tubing with following additional requirements:
- a. No length of run shall exceed 75 feet for 3/4" size and 150 feet for 1 inch or larger sizes.
 - b. Raceways shall not contain more than two 90 degree bends or equivalent.
 - c. Install additional pull or junction boxes to comply with above limitations, whether or not indicated.
 - d. Inside radii of bends in conduits of 1 inch or larger shall be not less than 10 times nominal diameter.
 - e. Provide pull wire in empty raceways.
16. Painting: Paint exposed conduit to match the surrounding wall or ceiling it is mounted against.

3.03 FIELD QUALITY CONTROL:

- A. Grounding: Test cable trays to ensure electrical continuity of bonding and grounding connections.

3.04 ADJUSTING AND CLEANING:

- A. Upon completion of installation of cable trays, inspect trays, fittings, and accessories, remove burrs, dirt, and construction debris and repair damaged finish including chips, scratches, and abrasions.

END OF SECTION

SECTION 16120 WIRES AND CABLE

PART 1 - GENERAL

1.01 SCOPE:

- A. This Section includes furnishing and installing (including terminations) of all electrical wire, cable, and accessories.

1.02 REFERENCES: The latest edition of the following codes or standards shall apply to the design and fabrication of the products and equipment to be supplied by this section.

- A. NEC (NFPA 70) National Electrical Code
- B. UL 83 - Thermoplastic Insulated Wires and Cables
- C. NETA International Electrical Testing Association - Acceptance Testing Specifications

1.03 DEFINITIONS: N/A

1.04 SUBMITTALS:

- A. The CONTRACTOR shall submit Shop Drawings in accordance with CONTRACTOR Submittals and 16050 – Basic Materials and Methods.

1.05 QUALIFICATIONS: N/A

1.06 RESPONSIBILITIES: N/A

1.07 TESTING:

- A. Cable Assembly and Testing: Cable assembly and testing shall comply with applicable requirements of NETA ATS Section 7.3.2. Factory test results shall be submitted in accordance with SECTION 01300 prior to shipment of cable. The following field tests shall be the minimum requirements:
 - 1. Power cable rated at 600 VAC shall be tested for insulation resistance between phases and from each phase to a ground using a megohmmeter.
 - 2. Field testing shall be done after cables are installed in the raceways.
 - 3. Field tests shall be performed by a certified test organization acceptable to the cable manufacturer. Test results shall be submitted to the City of Pompano for review and acceptance.
 - 4. Cables failing the tests shall be replaced with a new cable.
- B. Continuity Test: Control and instrumentation cables shall be tested for continuity, polarity, undesirable ground, and origination. Such tests shall be performed after installation and prior to placing cables in service.

1.08 INSPECTION COORDINATION:

- A. The CONTRACTOR shall provide access to the WORK for the City of Pompano as requested for inspection. The CONTRACTOR shall provide 48 hours notice of its intention to begin new WORK activities.

1.09 WARRANTY:

- A. The MANUFACTURER shall warrant the EQUIPMENT, MATERIALS and PRODUCTS specified in this section against defective materials and workmanship with the MANUFACTURER'S standard warranty, but for no less than one year from the date of Substantial Completion, and as described in the General Terms and Conditions.
- B. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in the General Terms and Conditions.

PART 2 - MATERIALS

2.01 GENERAL:

- A. Conductors, include grounding conductors, shall be stranded copper. Aluminum conductor wire and cable will not be permitted. Insulation shall bear UL label, the manufacturer's trademark, and identify the type, voltage, and conductor size. All conductors except flexible cords and cables, fixture wires, and conductors that form an integral part of equipment such as motors and controllers shall conform to the requirements of Article 310 of the National Electric Code, latest edition, for current carrying capacity. Flexible cords and cables shall conform to Article 400, and fixture wires shall conform to Article 402. Wiring shall have wire markers at each end.

2.02 LOW VOLTAGE WIRE AND CABLE:

- A. Power and Lighting Wire
 - 1. Wire rated for 600 volts in duct or conduit for all power and lighting circuits shall be Class B Type THHN or THWN, polyvinyl chloride rated at 90°C in dry locations, 75°C in wet locations, meeting the requirements of UL 83.
 - 2. Conductors for feeders as defined in Article 100 of the NEC shall be sized to prevent a voltage drop exceeding 3 percent at the farthest outlet of power, heating, and lighting loads, or combinations of such loads, and where the maximum total voltage drop on both feeders and branch circuits to the farthest connected load does not exceed 5 percent.
 - 3. Conductors for branch circuits as defined in Article 100 of the NEC shall be sized to prevent voltage drop exceeding 3 percent at the farthest connected load or combinations of such loads and where the maximum total voltage drop on both feeders and branch circuits to the farthest connected load does not exceed 5 percent.
- B. Control Wire
 - 1. Control wire in duct or conduit shall be the same type as power and lighting wire indicated above.
 - 2. Control wiring shall be No.14 AWG (minimum).
 - 3. Control wires at panels and cabinets shall be machine tool grade type MTW, UL approved, rated for 90 degrees C at dry locations.
- C. Instrumentation Cable
 - 1. Instrumentation cable shall be rated at 600 volts.
 - 2. Individual conductors shall be No. 16 AWG stranded, tinned copper. Insulation shall be color coded polyethylene: black-red for two-conductor cable and black-red-white for three-conductor cable.
 - 3. Instrumentation cables shall be composed of the individual conductors, an aluminum polyester foil shield, a No. 16 AWG stranded tinned copper drain wire, and a PVC outer jacket with a nominal thickness of 0.048-inches.

2.03 CONNECTORS:

- A. General Requirements:
 - 1. Cable connectors shall be designed and sized for specific cable being connected.
 - 2. Solderless, pressure-type connectors shall be constructed of non-corrodible tin-plated copper.
 - 3. All connectors shall have a current-carrying capacity equal to or greater than the cable being connected.
 - 4. Application tooling for compression type connectors shall contain die or piston stops to prevent over-crimping and cycling or pressure relief to prevent under-crimping. Dies of all application tooling shall provide wire size coding for quality control verification. All tooling shall be manufactured by the connector manufacturer.
 - 5. General purpose insulating tape shall be high temperature (105°C) tape, with a dielectric strength of 1,150 V/mil of polyvinyl material.
- B. Mechanical Pressure Connectors:
 - 1. Connectors shall be threaded split bolt type of high strength copper alloy.
 - 2. Pressure type, twist-on connectors will not be acceptable.
 - 3. Barrel shall have funnel entry, and vinyl insulation.
- C. Power Lugs (10 AWG and Smaller) 600V and Below:
 - 1. Pre-insulated ring tongue type
 - 2. Manufactured from high-strength copper alloy
- D. Power Lugs (Sizes 8-4 AWG) 600V and Below:
 - 1. Non-insulated ring-tongue type
 - 2. Ring tongue sized to match terminal stud size
 - 3. Brazed barrel seam
 - 4. Sight hole to verify proper cable insertion
 - 5. Application tooling designed to crimp the wire barrel (conductor grip) with a one-step crimp
- E. Control, Instrument and Specialty Cable Connectors:
 - 1. Tin-plated copper
 - 2. Vinyl or nylon pre-insulated ring-tongue type (Spade lugs will not be permitted.)
 - 3. Sized to match terminal stud size
 - 4. Have insulation grip sleeve to firmly hold to cable insulation
 - 5. Insulation grip sleeve shall be funneled to facilitate wire insertion and prevent turned-back strands.
 - 6. Application tooling designed to crimp the wire barrel (conductor grip) and the insulation grip sleeve with a one-step crimp.

2.04 TERMINAL BLOCKS:

- A. For Mounting in Terminal Boxes:
 - 1. Designed and sized for the cables being terminated
 - 2. Phenolic block rated 600 volts

3. Binding screw-type terminals for power cables and straight-strap stud terminals for control and instrument cables
 4. Rated current carrying capacity equal to or greater than the cable being terminated
 5. Marking strip
- B. For Mounting in Cabinets, Panels, Control Boards, etc.:
1. Designed and sized for the cables being terminated
 2. Terminal blocks shall be tubular screw type with pressure plates and shall be rated 600 V AC/DC, 10 A rated minimum.

2.05 CABLE IDENTIFICATION SLEEVES:

- A. Refer to SECTION 16050 for appropriate conductor identification material.

PART 3 - EXECUTION

3.01 GENERAL:

- A. The CONTRACTOR shall provide and terminate all power, control, and instrumentation conductors except where indicated.

3.02 INSTALLATION:

- A. Conductors shall not be pulled into raceway until raceway has been cleared of moisture and debris.
- B. Pulling tensions on raceway cables shall be within the limits recommended by the cable manufacturer. Wire pulling lubricant, where needed, shall be UL approved.
- C. Instrumentation wire shall not be run in the same raceway with power and control wiring except where specifically indicated.
- D. Wire in panels, cabinets, and wireways shall be neatly grouped using nylon tie straps, and shall be fanned out to terminals.
- E. Single conductor cable in cable trays shall be No. 1/0 or larger and shall be of a type listed and marked for use in cable trays. Tray cable smaller than 1/0 shall be multi-conductor, with outer jacket.

3.03 SPLICES AND TERMINATIONS:

- A. General
1. Wire taps and splices shall be properly taped and insulated according to their respective classes.
 2. In general, there shall be no cable splices in underground manholes or pullboxes. If splices are necessary, the cables shall be brought aboveground and terminated in a NEMA 4X, stainless steel terminal or splice cabinet that is stand mounted on a concrete pad. Splices in underground manholes and pullboxes may be made only with the approval of the City of Pompano.
 3. Stranded conductors shall be terminated directly on equipment box lugs making sure that all conductor strands are confined within lug. Use compression lugs where equipment box lugs have not been provided.
 4. Surplus control and instrumentation wire shall be properly taped and terminated as spares.
- B. Control Wire and Cable
1. Control conductors shall be spliced or terminated only at the locations indicated and only on terminal strips or terminal lugs of vendor furnished equipment.

2. In junction boxes, motor control centers, and control panels, control wire and spare wire shall be terminated to terminal strips.
- C. Instrumentation Wire and Cable
1. Shielded instrumentation cables shall be grounded at one end only, preferably the receiving end on a 4-20 mA system.
 2. Two and three conductor shielded cables installed in conduit runs which exceed available standard cable lengths may be spliced in pullboxes. Such cable runs shall have only one splice per conductor. Splices, where approved by the City of Pompano, shall be made on terminal blocks.
- D. Power Wire and Cable
1. All 120/208-volt, 120/240-volt, and 480/277-volt branch circuit conductors may be spliced in suitable boxes or conduit bodies at locations determined by the CONTRACTOR.
 2. Splices to motor leads in motor terminal boxes shall be wrapped with mastic material to form a mold and then shall be taped with a minimum of two layers of varnished cambric tape overtaped with a minimum of two layers of high temperature tape.

3.04 CABLE IDENTIFICATION:

- A. General: Wires and cables shall be identified for proper control of circuits and equipment and to reduce maintenance effort.
- B. Identification Numbers: The CONTRACTOR shall assign to each control and instrumentation wire and cable a unique identification number. Numbers shall be assigned to all conductors having common terminals and shall be shown on "as built" drawings. Identification numbers shall appear within 3-inches of conductor terminals. "Control Conductor" shall be defined as any conductor used for alarm, control, annunciation, or signal purposes.
1. Multiconductor cable shall be assigned a number which shall be attached to the cable at intermediate pull boxes and at stub-up locations beneath free-standing equipment. It is expected that the cable number shall form a part of the individual wire number. Individual control conductors and instrumentation cable shall be identified at pull points as described above. The instrumentation cable numbers shall incorporate the loop numbers assigned in the Contract Documents.
 2. All 120/208-volt system feeder cables and branch circuit conductors shall be color coded as follows: Phase A - black, Phase B - red, Phase C - blue, and Neutral - white. The 120/240-volt system conductors shall be color coded as follows: Line 1 - Black, Line 2 - Red, and Neutral - White. The 480/277-volt system conductors shall be color coded as follows: Phase A - Brown, Phase B - Orange, Phase C - Yellow, and Neutral - Gray. Color coding tape shall be used where colored insulation is not available. Branch circuit switched conductors shall be yellow. Insulated ground wire shall be green. Color coding and phasing shall be consistent throughout the Site, but bus bars at panelboards, switchboards, and motor control centers shall be connected Phase A-B-C, top to bottom, or left to right, facing connecting lugs.
 3. All 4-wire, delta-connected secondary where the midpoint of one phase winding is grounded, the phase conductor having the higher voltage to ground shall be identified by an outer finish that is orange in color. Color coding tape shall be used where colored insulation is not available. Such identification shall be placed at each point where a connection is made if the ground conductor is also present. The B phase shall be that phase having the higher voltage to ground on 3-phase, 4 wire delta-connected system.
 4. Fire alarm cable jackets shall be red. General purpose DC control cable jackets shall be blue.
 5. Spare conductors shall be terminated on terminal screws and shall be identified with a unique number as well as with destination.

6. Terminal strips shall be identified by computer printable, cloth, self-sticking marker strips attached under the terminal strip.

END OF SECTION

SECTION 16450 GROUNDING

PART 1 - GENERAL

1.01 SCOPE:

- A. The CONTRACTOR shall provide the electrical grounding system, complete and operable, in accordance with the Contract Documents. Including but not limited to the building grounding grid, the grounding rod system and ground riser extension to electrical equipment.
- B. The requirements of SECTION 16050 - Basic Materials and Methods, General apply to this Section.

1.02 REFERENCES: The latest edition of the following codes or standards shall apply to the design and fabrication of the products and equipment to be supplied under this contract.

- A. NEC Article 250 - Grounding
- B. UL 467 - Standard for Safety Grounding and Bonding Equipment
- C. IEEE 837 - Standard for Qualifying Permanent Connections Used in Substation Grounding
- D. IEEE 81 - Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
- E. AWWA C210 - Standard for Liquid-Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines
- F. NETA (International Acceptance Testing Specifications)

1.03 DEFINITIONS:

- A. Low Voltage Grounded System (600V or less): A low voltage grounded system is a system where the local power supply is a transformer with the transformer secondary grounded.
 - 1. The first disconnecting means on the load side of this transformer shall provide the point where the neutral conductor is grounded.
 - 2. The neutral shall be connected to the Equipment Grounding Circuit Conductor only at one point which is within the enclosure of the disconnecting means.
 - 3. The Grounding Electrode Conductor or the Equipment Grounding Circuit Conductor shall not be used as the neutral.

1.04 SUBMITTALS:

- A. Furnish submittals in accordance with CONTRACTOR Submittals and SECTION 16050.
- B. Product Data: Manufacturer's product information for connections, clamps, grounding rods and grounding system components, showing compliance with the requirements of this Section.
- C. "As-built" Drawings: Provide District with "as-built" drawings of actual grounding system installation.

1.05 QUALIFICATIONS: N/A

1.06 RESPONSIBILTIES:

- A. The CONTRACTOR shall not conceal or cover any ground connections until the City of Pompano has established that every grounding connection conforms to the Contract Documents and has given the CONTRACTOR written confirmation.

1.07 TESTING:

- A. Measure and test the ground impedance in accordance with IEEE Standard 81 after installation but before connecting the electrode to the remaining grounding system. Verify all ground potentials on plan drawings and submit to the City of Pompano for final approval.
- B. Test the grounding system per NETA ATS section 7.13.
- C. INSPECTIONS COORDINATION: The CONTRACTOR shall provide access to the WORK for the City of Pompano as requested for inspection. The Contractor shall provide 48 hours notice of its intention to begin new WORK activities.

1.08 WARRANTY:

- A. The MANUFACTURER shall warrant the EQUIPMENT, MATERIALS and PRODUCTS specified in this section against defective materials and workmanship with the MANUFACTURER'S standard warranty, but for no less than one year from the date of Substantial Completion, and as described in the General Terms and Conditions.
- B. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in the General Terms and Conditions.

PART 2 - PRODUCTS

2.01 GENERAL:

- A. Components of the grounding electrode system shall be manufactured in accordance with ANSI/UL 467 - Standard for Safety Grounding and Bonding Equipment, and shall conform to the applicable requirements of National Electrical Code Article 250 and local codes.

2.02 GROUNDING ELECTRODE SYSTEM:

- A. Grounding loop conductors shall be bare annealed copper conductors suitable for direct burial. Conductors shall be #4/0 unless indicated otherwise.
- B. Ground Rods
 - 1. Unless indicated otherwise, the ground rod shall be a minimum of 3/4-inch in diameter, 20-feet long with pointed end to facilitate driving, and have a uniform covering of electrolytic copper metallurgically bonded to a rigid steel core. The copper to steel bond shall be corrosion resistant. The rod length shall be clearly stamped near the top of the rod.
 - 2. Conform to ANSI/UL 467.
 - 3. Sectional type joined by threaded copper alloy couplings.
- C. Buried cable-to-cable and cable-to-ground rod connections shall be made using exothermic welds or compression connectors suitable for direct burial.
- D. Exposed grounding connectors shall be of the compression type (connector to cable), made of high copper alloy, and be manufactured specifically for the particular grounding application.
- E. Grounding clamps shall be used to bond each separately derived system to the grounding electrode conductors.

F. Equipment Grounding Circuit Conductors

1. These conductors shall be the same type and insulation as the load circuit conductors. The minimum size shall be in accordance with the NEC-Article 250, unless indicated otherwise.
2. Present in all raceways. The conduit system is not an allowable equipment ground.
3. Cable to equipment ground lugs shall be compression type, bolted to the equipment with silicon bronze bolts and lock washers.

2.03 COATINGS:

A. Coal Tar:

1. All underground grounding connections shall be coated with coal tar as specified herein.
2. Coating shall be of Polyamide Epoxy-Coal Tar with high build corrosion resistance. Resulting coat shall conform to the performance requirements of AWWA C 210.

PART 3 - EXECUTION:

3.01 WIRE, CABLE AND RACEWAY GROUNDING:

- A. Provide a separate grounding conductor, securely grounded in each raceway independent of raceway material as well as in each raceway with parallel feeder run.
- B. Size shall be as given on the conduit schedule and in accordance with the NEC-Article 250.
- C. Provide the duct bank ground system indicated, including, trenching, splices, ground rods, and connections to equipment and structures.
- D. Grounding Wires and Cables:
 1. Install using as few joints as possible.
 2. Protect against abrasion by several wrappings of rubber tape at all points where cable leaves concrete in exposed areas.
 3. Suitably protect cable against damage during construction.
 4. Replace or suitably repair cable if damaged by anyone before final acceptance.

3.02 GROUNDING BOXES, MOTORS AND ELECTRICAL EQUIPMENT:

- A. Provide a separate grounding conductor for each motor and connect at motor box. Do not use bolts securing motor box to frame or cover for grounding connectors.
- B. Provide a grounding type bushing for secondary feeder and branch circuit conduits which originate from the secondary section of each MCC section, switchboard, or panelboard.
- C. Individually bond these raceways to the ground bus in the secondary section.
- D. Provide solid copper green insulated wire as grounding jumper from the ground screw to a box grounding screw and, for grounding type devices, to equipment grounding conductor.
- E. Interconnect the secondary switchgear neutral bus to the ground bus in the secondary switchgear compartment only at service entrance point or after a transformer.

3.03 GROUNDING SYSTEMS:

A. Embedded Ground Connectors

1. The connection shall be made in accordance with the manufacturer's instructions.

2. Lay in bottom of trench or in other excavations at least 18 inches below finished grade.
 3. Maintain clearance of at least 12 inches from all underground metal piping or structures, except where connections thereto are specifically indicated.
 4. Duct Bank Ground: A grounding conductor shall be embedded in every duct bank as indicated.
- B. Ground Ring
1. Furnish trenching and materials necessary to install the ground ring as indicated.
 2. Bonding conductor shall be in direct contact with the earth and be of the size indicated.
 3. Minimum burial depth 36-inches or as indicated on the Drawings, whichever is greater.
 4. Re-compact disturbed soils to original density in 6-inch layers.
- C. Ground Rods
1. Ground rods forming an individual ground array shall be equal in length.
 2. The CONTRACTOR shall install rods as indicated by driving and not by drilling or jetting.
 3. The CONTRACTOR shall drive rods into unexcavated portion of the earth where possible.
 4. In excavated areas, the CONTRACTOR shall drive grounding rods after compaction and backfill is completed.
 5. The CONTRACTOR shall drive to a depth such that top of rods will be approximately 18 inches below final grade, or subgrade, and connect main grid ground cable thereto.

3.04 SHIELD GROUNDING:

- A. Shielded instrumentation cable shall have its shield grounded at one end only unless Shop Drawings indicate the shield will be grounded at both ends.
- B. The grounding point shall be at the control panel or otherwise at the receiving end of the signal carried by the cable.
- C. Termination of shield drain wire shall be on its own terminal screw.
- D. All terminal screws shall be jumpered together using manufactured terminal block jumpers.
- E. Connection to the ground bus shall be via a green No. 12 conductor to the main ground bus for the panel.

END OF SECTION

SECTION 16500 LIGHTING DEVICES

PART 1 - GENERAL

1.01 SCOPE: This Section includes the following:

- A. Interior and outdoor Lighting
- B. Luminaires
- C. All necessary mounting, wiring and accessories required

1.02 REFERENCES: The latest edition of the following codes or standards shall apply to the design and fabrication of the products and equipment to be supplied under this contract.

- A. American National Standards Institute (ANSI)
- B. Certified Ballast Manufacturers (CBM) - Ballasts
- C. Illuminating Engineering Society (IES)
- D. National Electrical Code (NEC)
- E. National Electrical Manufacturers Association (NEMA)
- F. Reflector and Lamp Manufacturers (RLM) Standards Institute - Industrial Lighting Units
- G. Underwriters' Laboratories, Inc. (UL)

1.03 SUBMITTALS: Includes, but not limited to, the following information for each luminaire for the lamp specified:

- A. Detailed Luminaire Construction Drawings
- B. Ballast Information
- C. Photometric Data, including IES computer files
- D. Catalog Data
- E. Lamp Type and Color

1.04 WARRANTY:

- A. The MANUFACTURER shall warrant the EQUIPMENT, MATERIALS and PRODUCTS specified in this section against defective materials and workmanship with the MANUFACTURER'S standard warranty, but for no less than one year from the date of Substantial Completion, and as described in the General Terms and Conditions.
- B. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in the General Terms and Conditions.

PART 2 - MATERIALS

2.01 ACCEPTABLE MANUFACTURERS:

- A. Fluorescent Lamp Ballasts:
 - 1. Advance Transformer Company

2. General Electric Company
 3. Jefferson Electric Company
 4. Universal Manufacturing Company
- B. Lamps:
1. General Electric Company
 2. Sylvania Electric Products, Inc.
 3. Westinghouse Electric Corporation
- C. Luminaires: Acceptable manufacturer for each luminaire is specified on the Drawings.

2.02 GENERAL REQUIREMENTS:

- A. All equipment and materials shall bear UL label.
- B. Equipment and materials shall be designed to meet the quality and level of illumination established by specified luminaires. Provide substantiation that alternative proposed luminaires perform equivalently to specified units by providing computer calculations for design areas where luminaires are to be installed.
- C. Provide all necessary wiring and accessories as required for complete installation.
- D. Provide Bullet Resistant luminaires where called for on plans. Resistance can be by housing or add on shield.
- E. Motion Sensors shall be passive infrared technology with adjustable sensitivity and direction.

2.03 SYSTEMS: 120/240V single-phase, 3-wire system or 120/208V three-phase, 4-wire system with identified grounded neutral and separate ground wire for lighting, receptacle, and small power.

2.04 BALLASTS:

- A. General: Conform to ANSI and UL Standards regarding light output, reliable starting, radio interference and dielectric rating. Carry CBM and UL labels.
- B. Fluorescent Lamp Ballasts: UL Listed Class "P". Power factor correction capacitor to provide not less than 0.9 pf.

2.05 LAMPS: Type, rating, color and quantity as indicated or specified for each luminaire.

2.06 LUMINAIRES:

- A. Interior luminaires to operate in the following maximum ambient temperatures: (1) 48 degrees C, 117 degrees Fahrenheit, for interior of building.
- B. Furnish luminaires as indicated on the Drawings

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Luminaires:
 1. Install after pipe, conduit, and other equipment above luminaires are installed, unless otherwise acceptable to the City of Pompano.

2. Place accurately as to line and level, and at elevations indicated.
3. Shift location if required to avoid interference with plant piping or other apparatus or material.
4. Clean and fully lamp with new acceptable lamps immediately prior to final testing and City of Pompano acceptance of lighting installation. Complete with all required accessories just prior to final acceptance. Install as indicated.

END OF SECTION