SECTION 16670

LIGHTNING PROTECTION SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION

A. General: Provide a complete lightning protection system as indicated on the drawings and as specified herein. The lightning protection system shall be installed by a firm presently engaged in installations of Master Labeled or LPI certified lightning protection systems. The system as completed shall comply with the latest edition of UL96A, Installation Requirements for Lightning Protection Systems, and NFPA-780 "Standard for the Installation of Lightning Protection Systems." The system shall meet all requirements of these standards and the Lightning Protection Institute Standard of Practice LPI-175. All components required for a UL master label and a full LPI certification plate shall be provided whether or not such materials are specifically addressed by the contract drawings or described herein.

B. Qualification: All installers shall be experienced with installing UL master labeled and LPI certified systems or of equivalent qualification, as accepted in writing by the engineer of record. A UL/LPI certified installer shall be on the project site at all times during installation of the systems and shall supervise all of the installation.

1.03 COUNTERPOISE CONDUCTOR

A. General: Where indicated on the drawings or required by NFPA 780, the structure shall be provided with a below-grade continuous counterpoise conductor, equal in size to the largest conductor in the building lightning protection system, or sized as indicated on the drawing. This conductor shall be installed at a minimum depth of two feet below finished grade and a minimum of two feet from the exterior foundation wall of the building. The counterpoise conductor shall be copper and extend continuously around the entire perimeter of the building. All joints and connections shall be exothermically welded.

MACRO: DESIGNER TO DELETE WHERE BUILDING IS LESS THAN 60' HIGH.

B. Counterpoise: As a minimum, the counterpoise conductor shall be connected to each of the following system components utilizing appropriate exothermic welds:

1. Each down conductor or steel column ground.

2. All counterpoise conductors on power and communications ducts which enter the building.

3. The building electrical service ground.

4. All metallic water and gas services entering the building (ahead of meter).

5. Counterpoise conductor on adjacent buildings (within fifty feet).

6. All metallic fence posts, safety railings, etc., or any other metallic item within ten feet of the project building.

1.04 SUBMITTALS

A. General: Shop drawings identifying all system wiring and component placement, including all details, shall be submitted to the Engineer for review. The Contractor shall not perform any portion of the Work until the respective submittal has been accepted. All work shall be in accordance with accepted submittals.

B. Detail Submission: Details shall be submitted to the Engineer for review indicating the method of cabling connections and attachments starting at the top of the project building to the ground rods at the counterpoise. All details shall be appropriate for the project.

C. Identification: All product data sheets submitted, for proposed system components, shall clearly identify the item being submitted and shall indicate the UL label.

D. Suppression Device: All transient voltage surge suppressors for the project shall be submitted at the same time as the lightning protection floor plans, details and product data sheets are submitted. Each suppressor shall clearly indicate the item to be protected and shall comply with Section 16709 of these specifications. Suppressors shall be provided as required in NFPA 780 unless otherwise indicated on the drawings or otherwise specified.

E. Deviations: The Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the acceptance of shop drawings, product data, samples or similar submittals unless the Contractor has specifically informed the Engineer in writing of such deviation at the time of submittal and the Engineer has given written acceptance to the specific deviation.

F. Certification: Provide documentation of UL master label, LPI certification or equivalent qualification of exact installer intended to do this particular job.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Labels: All materials used for the system installation shall comply in size, composition and weight to all requirements of NFPA U.L. and LPI for the class of system in which they are installed. All materials shall be labeled or listed by Underwriters Laboratories, Inc. for use in master labeled or LPI certified lightning protection systems.

B. Material: Generally, the external lightning protection system at the roof level shall be constructed of copper cable and copper compatible components. The internal lightning protection system, starting with the down conductors and concluding at the ground termination system shall be constructed of copper cable and copper compatible components. Likewise, all bonding conductors, equipotential loop conductors, etc, shall also be constructed of compatible cable and components.

C. Compatibility: All portions of the system, whether copper or aluminum, shall be galvanically compatible to the building material to which they are to be attached. Connections between copper and aluminum portions of the system shall be made with appropriate bimetallic coupling devices. In all areas, the conductor shall be supported to maintain clearance from all galvanically incompatible materials or shall be of the same material if permitted within these specifications.

D. Components: All system components (i.e. air terminals, bases, connectors, cable, thru-roof fittings, ground rods, etc.) shall be, to the maximum extent possible, the product of a single manufacturer. All components shall be Class I or II as required by NFPA 780 or as noted. All air terminal bases shall be securely mounted to the building structure by means of mechanical fasteners. Adhesive type air terminal bases are acceptable only where hard setting epoxy adhesive is utilized, where mechanical fastening is prohibited by the roofing manufacturer and where acceptable to the code authority having jurisdiction. Submit shop drawings for all proposed air terminal mounting details.

2.02 AIR TERMINALS

A. General: Air Terminals shall be copper as required to match the building system to which they attach. Air terminals shall protrude a minimum of 10 inches above the object to be protected. Center roof terminals shall be 24" high. Air terminal points shall be blunt with the radius of curvature equal to the rod diameter.

B. Base: Each air terminal shall be equipped with the correct type of base for the location in which it is mounted.

C. Roof Top Equipment: Air terminals and interconnecting cable shall be provided for all roof mounted equipment (fans, A/C equipment, etc.) subject to a direct strike as required by NFPA 780 and as shown.

2.03 CONDUCTORS

A. General: Main roof conductors shall be copper unless otherwise specified or required and shall provide a two-way path from each air terminal horizontally or downward to connections with down conductors. Conductors shall be free of excessive splices and bends. No bend of a conductor shall form an included angle of less than 90 degrees nor have a radius of bend of less than 8 inches. Conductors shall be secured to the structure at intervals not exceeding 3 feet with approved fasteners. Cables connected to "thru-roof" connectors may rise from the roof to the connector at a maximum slope of 3 inches per foot, not exceeding 3 feet horizontally in air.

B. Down Conductors: Down conductors shall be copper and shall be concealed in the exterior wall construction or structural columns. Where run in or on reinforced concrete columns, bond down conductor to the re-bar at top and bottom of column. Down conductors shall be spaced at intervals averaging not more than 100 feet around the perimeter of the structure. If project structure is of structural steel frame construction, down conductors may be omitted and roof conductors shall be connected to the structural steel frame at intervals averaging not more than 100 feet around the perimeter of the structure. Connections to the steel frame shall be made with heavy duty bonding plates having 8 square inches of contact surface or with exothermic welds.

C. Shop Drawing: Submit all conductor types in shop drawings. Each conductor shall be identified as to location in the lightning protection system.

2.04 ROOF PENETRATIONS

A. General: Roof penetrations required for down conductors or for connections to structural steel framework shall be made using pre-manufactured U.L. approved thru-roof type assemblies with solid rods, PVC sleeves and appropriate roof flashing. Roof flashing shall be compatible with the roofing system and shall be provided under this contract and

installed by the roofing contractor. Submit roof flashing data sheets and letter of acceptance from roofing contractor in shop drawing package.

2.05 COMMON GROUNDING

A. General: Common grounding of all ground mediums within the project building shall be made by interconnecting with main size conductors, fittings as required or exothermic welds.

B. Bonding: Grounded metal bodies located within the required bonding distance (as determined by the bonding distance formulas in NFPA 780) shall be bonded to the system using bonding conductors and fittings. Bond to rebar utilizing exothermic weld connections.

2.06 GROUND TERMINATIONS

A. General: One ground termination shall be provided for each down conductor and shall consist of one ¾" inch x 10 foot copper-clad ground rod.. Each down conductor shall be connected to the ground rod by an exothermic weld connection. Tops of ground rods shall be located 2 feet below finished grade and 2 feet from the foundation wall and shall extend a minimum of 10 feet vertically into the earth. Where a counterpoise is provided, rods shall be interconnected with the counterpoise.

B. General: Where the structural steel framework is utilized as the down conductor for the system, every other perimeter steel column shall be grounded but no more than 60 feet apart. Steel columns shall be grounded using bonding plates having 8 square inches of surface contact area or with exothermic welds. Conductors from the steel column connections to the ground terminations shall be full size copper lightning conductors.

2.07 FASTENERS

A. General: Conductor fasteners shall be manufactured of a material which is compatible with the type of conductor being supported. Fasteners shall be of sufficient strength to properly support each conductor or terminal base, etc.

2.08 ACCEPTABLE MANUFACTURERS

A. Manufacturers: Equipment manufactured by ERICO, INC.

B. Certified Installer: BONDED LIGHTNING PROTECTION SYSTEMS, INC.
2080 W. INDIANTOWN ROAD, SUITE 100
JUPITER, FL 33458 561/746-4336

PART 3 - EXECUTION

3.01 INSTALLATION OF CONDUCTORS

A. General: Conductors shall be installed to interconnect all air terminals to the system of grounding electrodes, and in general provide a minimum of at least 2 paths to ground from any air terminal on the system. Conductors shall provide a horizontal or downward path between the system air terminals and grounding electrode system.

B. Routing: Conductors shall be routed in such a manner that maximum concealment from public view is achieved. Down conductors may be installed in one-inch PVC conduit from roof to grade.

C. Counterpoise Conductors: Counterpoise conductors shall be installed after finished grades are established to insure specified depth and to minimize the possibility of damage. Any counterpoise conductor which is cut or damaged shall be repaired or replaced with no additional cost to the contract.

D. Connections: All connections between conductors below grade shall be exothermically welded. Improper application of weld shall be replaced at no additional cost to the contract.

3.02 INSTALLATION OF GROUND RODS

A. General: Ground rods shall be installed vertically at each down conductor position at a minimum of 2 feet from the building foundation wall. Inspection and documentation at each grounded location, weld, depth of counterpoise, etc., shall be made prior to backfill. Contractor shall notify engineer in writing to request inspection of underground work and for L.P.I. inspection before backfill. Allow a minimum of one week for engineer to make the inspection after notification from contractor.

B. Test/Inspection Wells: Provide prefabricated test and inspection wells for all ground rods installed in paved or concrete areas.

3.03 BONDING OF SECONDARY METALLIC BODIES

A. Structure Grounding: Provision shall be made at the roof level on reinforced concrete structures for bonding between the roof or down conductors, metallic elements of the roof system and metallic exterior wall systems.

B. Bonding: All down conductors run in concrete columns shall be bonded to the reinforcing steel at the top and the bottom of the column.

3.04 GENERAL WORKMANSHIP

A. General: All elements of the Lightning Protection System shall be installed in a professional and workmanlike manner consistent with the best industry practices.

B. Concealed Installation: All system components shall be concealed to the maximum extent possible to preserve the aesthetic appearance of the project building on which the system is installed.

3.05 COORDINATION WITH OTHER TRADES

A. Coordination: The Contractor shall coordinate his work with all trades, to insure the use of proper materials and procedures in and around the roof in order not to jeopardize the roofing warranty.

B. Fasteners: Where fasteners are to be embedded in masonry or the structural system, they shall be coordinated to insure installation at the proper time of construction.

C. Certification: Upon completion of the installation the Contractor shall provide to the owner the Master Label issued by Underwriters Laboratories, Inc. for the installation, and the LPI certification issued by LPI.

END OF SECTION