SECTION 16060 - GROUNDING AND BONDING

1.0 GENERAL

1.1 DRAWINGS AND GENERAL PROVISIONS OF CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION-1 SPECIFICATION SECTIONS, APPLY TO THE WORK OF THIS SECTION.

1.2 DIVISION-16 BASIC ELECTRICAL MATERIALS AND METHODS SECTIONS APPLY TO WORK OF THIS SECTION.

1.3 SUBMITTALS

1.3.1 SUBMIT PRODUCT DATA FOR EACH TYPE OF PRODUCT BEING PROVIDED. MARK THE DATA SHEET FOR THE PRODUCT BEING PROVIDED WITH AN IDENTIFYING MARK OR ARROW. PROVIDE THE FOLLOWING:

A. GROUND ROD.
B. EXOTHERMIC GROUND ROD CONNECTIONS.

2.0 PRODUCTS

2.1 GROUND RODS SHALL BE SECTIONAL COPPERCLAD 3/4"X10'0". A MINIMUM OF 20' OF GROUND ROD SHALL BE SUPPLIED AT EACH LOCATION.

2.2 GROUNDING CONDUCTORS SHALL BE COPPER WITH GREEN INSULATION.

3.0 EXECUTION

3.1 GROUNDING CONDUCTOR SIZE NO. 6 AWG OR SMALLER SHALL BE IDENTIFIED BY A CONTINUOUS GREEN OUTER FINISH ALONG ITS ENTIRE LENGTH. SIZES LARGER THAN NO. 6 AWG SHALL BE IDENTIFIED BY EITHER A CONTINUOUS GREEN OUTER FINISH ALONG ITS ENTIRE LENGTH OR AT THE TIME OF INSTALLATION BY A DISTINCTIVE GREEN MARKING AT ITS TERMINATION.

3.2 PROVIDE AN EQUIPMENT GROUNDING CONDUCTOR WHICH SHALL BE SEPARATE FROM THE ELECTRICAL SYSTEM NEUTRAL CONDUCTOR. THE EQUIPMENT GROUNDING CONDUCTOR SHALL BE COLORED GREEN. IT SHALL BE CONTINUOUS FROM A CONNECTION AT THE SERVICE ENTRANCE EQUIPMENT GROUND TO ALL SWITCHBOARDS, TRANSFORMERS AND DISTRIBUTION AND BRANCH PANELBOARDS. EQUIPMENT GROUNDING CONDUCTORS SHALL BE PROVIDED IN ALL BRANCH CIRCUITS SERVING CONVENIENCE OUTLETS, RECEPTACLES, PORTABLE AND PERMANENTLY INSTALLED ELECTRIC APPLIANCES, EQUIPMENT APPARATUS AND OTHER MISCELLANEOUS METAL ENCLOSING BODIES INCLUDING LIGHT SWITCH BOXES NORMALLY WITHIN CONTRACT OF PERSONNEL. BRANCH CIRCUIT GROUNDING CONDUCTORS SHALL BE SIZED IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE. IN ADDITION, EQUIPMENT GROUNDING CONDUCTORS SHALL BE PROVIDED WITH ALL CABLE TRAY INSTALLATIONS AS INDICATED IN SECTION 16051. CONNECTIONS AT PANELBOARDS, OUTLETS, EQUIPMENT APPARATUS SHALL BE MADE IN AN APPROVED AND PERMANENT MANNER. RESISTANCE TO GROUND SHALL NOT EXCEED 25 OHMS.

3.3 ALL GROUND CONNECTIONS SHALL BE MADE ON SURFACES WHICH HAVE BEEN CLEANED OF ALL PAINT, DIRT, OIL, ETC., SO THAT CONNECTIONS ARE BARE METAL TO

BARE METAL CONTACT. ALL GROUND CONNECTIONS SHALL BE TIGHT, AND SHALL BE MADE WITH U.L. LISTED GROUNDING DEVICES FITTINGS, BUSHINGS, ETC.

3.4 THE SERVICE ENTRANCE EQUIPMENT GROUND BUS SHALL BE GROUNDED TO A 3/4-INCH COLD WATER PIPE AND TO THE GROUND GRID AS INDICATED ON THE DRAWINGS. THE PROTECTING CONDUITS SHALL BE BONDED TO THE GROUNDING CONDUCTOR AT BOTH ENDS. THE CONTRACTOR SHALL NOT ALLOW THE WATER PIPE CONNECTIONS TO BE PAINTED. IF THE CONNECTIONS ARE PAINTED, THEY SHALL BE DISASSEMBLED AND REMADE WITH NEW FITTINGS.

3.5 GROUNDING ELECTRODES SHALL BE DRIVEN AS REQUIRED. WHERE ROCK IS ENCOUNTERED, GROUNDING PLATES MAY BE USED IN LIEU OF GROUNDING RODS.

3.6 ALL EQUIPMENT ENCLOSURES, MOTOR AND TRANSFORMER FRAMES, CONDUITS SYSTEMS, CABLE ARMOR, AND SIMILAR ITEMS SHALL BE GROUNDED.

3.7 EXPOSED CONNECTIONS SHALL BE MADE BY MEANS OF APPROVED GROUNDING CLAMPS. EXPOSED CONNECTIONS BETWEEN DIFFERENT METALS SHALL BE SEALED WITH NO-OXIDE PAINT GRADE A OR APPROVED EQUAL. ALL BURIED CONNECTIONS SHALL BE MADE BY WELDING PROCESS EQUAL TO CADWELD.

3.8 ALL UNDERGROUND CONDUCTORS SHALL BE LAID SLACK AND WHERE EXPOSED TO MECHANICAL INJURY, SHALL BE PROTECTED BY RIGID CONDUIT. CONDUCTORS IN RIGID CONDUIT SHALL BE ELECTRICALLY CONNECTED TO BOTH ENDS OF THE GUARD.

3.9 THE CONTRACTOR SHALL EXERCISE CARE TO INSURE GOOD CONTINUOUS GROUND, IN PARTICULAR BETWEEN THE CONDUIT SYSTEM AND EQUIPMENT FRAMES AND ENCLOSURES. WHERE NECESSARY, JUMPER WIRES SHALL BE INSTALLED.

3.10 PROVIDE A #6 GROUND CONDUCTOR FROM EACH TELEPHONE TERMINAL CABINET TO THE MAIN TELEPHONE TERMINAL BOARD. PROVIDE A #6 GROUND CONDUCTOR FROM THE MAIN TELEPHONE TERMINAL BOARD TO THE BUILDING GROUND BAR. PROVIDE #6 GROUND CONDUCTOR TO EACH CATV SPLITTER AND BOND TO THE BUILDING GROUNDING SYSTEM. PROVIDE #6 GROUND CONDUCTOR TO EACH TERMINAL CABINET THAT CONTAINS SURGE SUPPRESSORS FOR THE FIRE ALARM AND INTERCOM SYSTEM.

3.11 MULTIPLE CONDUCTORS IN A SINGLE LUG ARE NOT PERMITTED. EACH GROUNDING CONDUCTOR SHALL TERMINATE IN ITS OWN TERMINAL LUG.

3.12 PROVIDE A GROUND CONDUCTOR FROM EACH TRANSFORMER LOCATION TO THE BUILDING GROUND SYSTEM. THIS CONDUCTOR SHALL BE USED TO GROUND THE SECONDARY SIDE NEUTRAL, CASE AND CORE IN ACCORD WITH GROUNDING REQUIREMENTS FOR A SEPARATELY DERIVED SYSTEM. IN ADDITION, GROUND TRANSFORMER TO THE NEAREST BUILDING STEEL.

3.13 FLEXIBLE METAL CONDUIT, LIQUID TIGHT FLEXIBLE CONDUIT OR NONMETALLIC RIGID CONDUIT IS NOT PERMITTED TO BE USED AS A GROUNDING CONDUCTOR. IN ALL CASES WHERE FLEXIBLE METALLIC CONDUIT, LIQUID TIGHT FLEXIBLE CONDUIT OR NONMETALLIC RIGID PROVIDED WITH THE PHASE CONDUCTORS IN THE CONDUIT. THIS GREEN WIRE GROUND CONDUCTOR SHALL BE USED TO PROVIDE GROUND CONTINUITY BETWEEN THE EQUIPMENT OR DEVICE AND THE METALLIC CONDUIT-RACEWAY SYSTEM.

3.14 THE METALLIC ELECTRICAL RACEWAY MAY NOT BE USED AS THE GROUNDING CONDUCTOR.

3.15 TESTING: THE CONTRACTOR SHALL TEST THE GROUND RESISTANCE OF THE SYSTEM. ALL TEST EQUIPMENT SHALL BE PROVIDED BY THE CONTACTOR AND APPROVED BY THE ENGINEER. DRY SEASON RESISTANCE OF THE SYSTEM SHALL NOT EXCEED 25 OHMS. IF SUCH RESISTANCE CANNOT BE OBTAINED WITH THE SYSTEM AS SHOWN, THE CONTRACTOR SHALL PROVIDE ADDITIONAL GROUNDING AS DIRECTED BY THE ENGINEER WITHOUT ADDITIONAL PAYMENT.

END OF SECTION