SECTION 15010

GENERAL PROVISIONS

1. PART 1 - GENERAL

1.1. SUMMARY

1.1.1. Provide items, articles, materials, operations and methods listed, mentioned and scheduled on drawing and specifications, including labor, material, equipment or fixtures, and incidentals necessary or required for the completion, testing, inspection, adjusting, re-testing and readjusting to provide the various systems operable and complete in all respects.

1.2. RELATED SECTIONS

1.2.1. Section 15250 Mechanical Insulation

1.2.2. Section 15300 Fire Sprinkler Systems

1.2.3. Section 15400 Plumbing

1.2.4. Section 15800 Heating, Ventilating and Air Conditioning

1.2.5. Section 15900 Controls

1.3. DRAWINGS AND SPECIFICATIONS

1.3.1. Examine and become familiar with all project drawings and sections of the specifications, and coordinate the work accordingly. Make reasonable modifications in the layout and installation as needed to prevent conflict with work of other trades and for proper execution of the work, without additional cost.

1.3.2. The drawings indicate approximate locations of equipment, fixtures, ductwork, piping, etc., however, prior to ordering any equipment, fixtures or materials, or performing any work, all dimensions, locations, and clearances shall be verified by the Contractor, based on actual field conditions, following the necessary coordination with other trades.

1.3.3. The substitutions of equipment or fixtures may not be the same as that which was used as a basis for design. The term substitutions only refers to items listed in our specification that are not used as the basis of design on our drawings. Provide all necessary revisions to the installation, or work of all other trades to accommodate the substituted equipment or fixtures, maintaining comparable clearances and provisions for maintenance, shall be provided, with all related costs, by the Contractor. Submit substituted working drawings and submittals that have been coordinated with all other associated trades, showing the proposed installation.

1.3.4. It is the intention of the specifications and drawings to call for finished work, tested and ready for operation.

1.3.5. Where any device or part of equipment or fixtures is herein referred to in the singular number, such reference shall be deemed to apply to as many such devices as are required to complete the installation or as shown.

1.4. SUBMITTALS - SHOP DRAWINGS/PRODUCT DATA/MATERIAL CERTIFICATIONS

1.4.1. Submittals shall include six copies of all shop drawings, product data and material certifications for the project. These submittals shall be sent to the Architect.

1.4.2. Mechanical Engineer will review the shop drawings, product data and material certifications for the project. Do not fabricate pipe, duct or order any equipment or fixtures without shop drawings and product data being approved. All pipe systems, duct systems, equipment, fixtures and other accessories require submittal review.

1.4.3. Shop drawings, product data and material certifications shall be complete in every respect so that a thorough review and evaluation can be performed. All required shop drawings, product data and material certifications shall be submitted at one time. Incomplete submittals, those without shop drawings, those that are not prepared properly, or submittals with less than the required number of copies, shall be returned for resubmittal.

1.4.4. It is intended that only a one-time review of all shop drawings and submittals will be performed, and any additional checking, which is required due to improper preparation by the Contractor, will be billed as an extra cost to the Contractor.

1.4.5. All shop drawings, product data and samples submitted by the Contractor shall illustrate details of work, equipment, fixtures, materials, products, systems, designs or workmanship that the Contractor intends to use in order to comply with the design concept established in the contract documents. The review of these submittals is only for the limited purpose of checking the same for conformity with the design concept of the work as established in the contract documents. The review is not intended to be for the purpose of determining the accuracy of other matters that may be contained in such submittals, including but not limited to such matters as dimensions, quantities and performance of equipment. Contractor shall furnished construction means, methods, techniques, sequences, procedures or safety precautions, the correctness of which as set forth in the contract documents or submittal shall be the sole responsibility of the Contractor.

1.4.6. Only equipment, fixtures, material and components of those manufacturers indicated in this specification are acceptable. Products that have not been reviewed and accepted by the Mechanical Engineer before the bidding period will not be accepted.

1.4.7. To be considered as a acceptable confirm that the alternate manufacturers' equipment or fixture is comparable with regard to such features as noise level, power requirements, metal gauges, vibration attenuation, finish, appearance, certification of recognized testing agencies and standard bureaus, allowable working pressures, physical size and arrangement. The Contractor shall also consider the effect of installation in the available space, factory-applied insulation, electrical devices, controls, access to internal parts, operating efficiencies, and all other features and capacities specified herein. The Mechanical Engineer School District's Owner's Representative shall be judge of the ability of any equipment, fixture or material to meet the requirements of this specification and the burden of proof shall be the responsibility of the Contractor.

1.4.8. Format: Each type of equipment, fixture or material shall be submitted in a separate section of the submittal package and each such section shall have:

1.4.9. A cover sheet identifying the equipment or fixture by the numbers or letter identical to those listed on the Drawings and/or Specifications, the manufacturer, the model number and size, and the technical data required for each piece of equipment or fixture. Materials shall be identified by system type.

1.4.10. Dimensional drawings (including optional accessories appropriate to this project).

1.4.11. Electrical data tables showing voltage, phase, horsepower (or kW), full load (or rated load) amperes and maximum fuse protection for each piece of equipment.

1.4.12. Capacity data tables (copies of catalog capacity tables) including pump curves and fan curves for water and air moving devices.

1.4.13. Each submittal shall specifically reply to every item of equipment, fixture or material specified or scheduled. All information shall be listed on the submittal cover sheet and shall be marked in the submitted manufacturer's literature. All exceptions to the individual specifications shall be listed separately on the submittal cover sheet and shall be noted on submittal "cut sheet".

1.4.14. Shop drawings are required for the mechanical, plumbing and fire protection systems. Submit one set of original drawings suitable for reproducing clear copies and provide six copies of drawings. The shop drawings will be reviewed. Contractors shall reproduce copies for their use. Shop drawings, equipment, fixture and material submittals shall be delivered at the same time.

1.5. INVESTIGATION OF CONDITIONS

1.5.1. This project is on an existing site with existing utilities and an examination of the site is mandatory.

1.5.2. Examine the existing conditions bearing on labor, transportation, handling and storage of materials, etc. Visit the site to understand the nature and scope of all work to be performed. The submission of a bid will be taken as evidence that such an examination has been made and all conditions have been considered.

1.6. EXISTING INSTALLATION AND CONFLICTS

1.6.1. Existing active services, water, sewer, electric, other piping systems, when encountered, shall be protected against damage due to construction work. Do not disturb operation of active services that are to remain.

1.6.2. If existing active services are encountered which require relocation, make request to the Architect for determination of procedures. Where existing services are to be abandoned, they shall properly terminate in conformance with requirements of the Mechanical Engineer.

1.7. ORGANIZATIONS

1.7.1. Below is a list of organizations that may be identified throughout the specifications by the letters in parenthesis only.

1.7.1.1. American Society of Heating, Refrigerating, Air Conditioning Engineers (ASHRAE)

1.7.1.2. American Society of Mechanical Engineers (ASME)

1.7.1.3. American Society for Testing and Materials (ASTM)

1.7.1.4. American Water Works Association (AWWA)

1.7.1.5. Factory Mutual Laboratories (FM)

1.7.1.6. National Electrical Manufacturer's Association (NEMA)

1.7.1.7. National Fire Protection Association (NFPA)

1.7.1.8. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)

1.7.1.9. Underwriters' Laboratories, Inc. (UL)

1.7.1.10. American National Standards Institute (ANSI)

1.7.1.11. Air Conditioning and Refrigeration Institute (ARI)

1.8. DEFINITIONS

1.8.1. Furnish: To purchase and supply equipment, fixtures, materials or components and deliver to the jobsite.

1.8.2. Install: To place, fix in position, secure, anchor, etc., including necessary appurtenances and labor so the equipment, fixtures or material of the installation will function as specified and intended.

1.8.3. Provide: To furnish and install.

1.8.4. Piping: Includes, in addition to pipe, all fittings, flanges, valves, hangers, and other accessories related to such piping.

1.8.5. Concealed: Means hidden from sight in chases, furred spaces, shafts, hung ceilings, or embedded in construction.

1.8.6. Exposed: Means not installed underground or "concealed" as defined above. Tunnels, trenches, attic spaces and crawl spaces are considered exposed.

1.8.7. Accepted/Acceptable: Items, that in the opinion of the Mechanical Engineer are acceptable alternates for the item specified.

1.9. CODE, PERMITS AND FEES

1.9.1. The drawings and specifications take precedence when they are more stringent than codes, ordinances, standards and statutes. Codes, ordinances, standards and statutes take precedence where they are more stringent than the drawings and specifications.

1.9.2. Secure and pay for permits, tests, Certifications of Inspection, and all other costs incidental to the work.

1.10. GENERAL COORDINATION OF WORK AND WORKING PROCEDURES

1.10.1. All equipment, fixtures and materials shall be covered or otherwise protected from the weather, theft, etc., both when stored on the site and after installation, until final acceptance by the Owner's Representative. All open ends of installed piping and ductwork for partially completed systems shall temporarily be plugged and capped.

1.10.2. All materials of construction shall be new and shall bear the manufacturer's labels and trademarks.

1.10.3. The specifications indicate general requirements for the installation of all equipment, fixtures and materials however, follow the specific instructions and directions furnished by the equipment or fixture manufacturer.

1.10.4. All equipment or fixtures shall be installed with full consideration of future maintenance. Equipment or fixtures that is installed such that it cannot be readily serviced shall be removed and installed correctly as directed to facilitate servicing.

1.10.5. Unions, valves, dampers, and other components that may require lubrication or maintenance shall be located to provide sufficient accessibility. When necessary, provide access doors as hereinafter specified at all locations where these items are concealed within walls, chases, or above ceilings which do not have an inherent accessibility feature.

1.10.6. Prior to testing and balancing of air systems, clean the interior of all duct systems and air handling equipment.

1.10.7. Surfaces to be painted shall be wiped, scraped, or wire-brushed as necessary to a clean, smooth painting surface, free from oil, rust and dirt. All material and equipment that is furnished with a factory prime coat of paint, which is damaged in transit, during storage, or from exposure to weather, shall be prime painted.

1.10.8. Contractor shall be responsible for costs related to damage caused by leaks in piping systems, or any other malfunction of the equipment, fixtures, materials, systems, or work, including repairs, replacements, etc.

1.10.9. Contractor shall provide information to other Contractors relative to all required duct or pipe penetrations in walls, floors, roofs etc. The Contractor shall provide information to other Contractors relative to roof curbs. Structural work shall not be altered in any way.

1.10.10. All necessary cutting and patching of roofs, walls, floors, ceilings, etc., as required for the proper installation of the work under this section, shall be performed, and in a neat and workmanlike manner. No joists, beams, girders, columns, or other structural member shall be cut.

1.10.11. Contractor to provide all scaffolding, rigging, hoisting, and services necessary for erection and delivery into the premises for all equipment, fixtures and materials, and remove same from premises when no longer required.

1.10.12. Carefully lay out work on the premises and make proper provision for the other work. The exact location of each item shall be determined by reference to the drawings, by measurements at the building, and in cooperation with other contractors. Be responsible for accurately locating all openings for ducts, pipes, etc., and all access doors required.

1.10.13. Schedule and coordinate work so as to execute expeditiously the contract and to avoid unnecessary delays.

1.10.14. Examine fully the specifications and drawings for other trades, to become familiar with all conditions affecting work, and consult and cooperate with other trades for determining space requirements and adequate clearances with respect to other equipment in the building. The Architect shall determine space priority of the trades in the event of interference between ductwork, piping, conduit, and equipment of various trades.

1.10.15. If the work is installed without coordinating with other trades, and the installation interferes with their installation, the contractor shall make any changes necessary in this work to correct conditions without extra charge.

1.11. ELECTRIC MOTORS

1.11.1. Motors shall be suitable for non-overloading operations, regardless of operating conditions, and shall be capable of continuous operation at full nameplate rating.

1.11.2. Motor speed shall be a maximum of 1750 RPM, unless otherwise noted.

1.11.3. Motors for belt drive shall have adjustable bases with set screw to maintain belt tension. Motor horsepower indicated on the drawing equipment schedules are the minimum size acceptable.

1.11.4. Coordinate the voltage and phase characteristics of each motor with the electrical shop drawings.

1.11.5. NEMA Standards shall be taken as minimum requirements for motor design and performance. Motors shall be suitable for load, duty, voltage, frequency, hazard and for service and location intended. Motors shall be high efficiency type.

1.11.6. Motors shall have name plate giving manufacturers name, shop number, HP, RPM and current characteristics.

1.11.7. Motors for outdoor service shall be TEFC.

1.12. MOTOR STARTERS

1.12.1. Provide motor starters for all mechanical equipment. Provide correct size and voltage characteristics per electrical requirements. Refer to Division 16 for other requirements of motor starters. Motor starters shall be provided by Division 15 and coordinated with Division 16.

1.13. EQUIPMENT SUPPORTING PROVISIONS

1.13.1. Contractor shall confirm locations with Architect or Structural Engineer before installation of hangers, curbs, platforms, equipment frames, etc. Contractor shall coordinate all related work with other trades.

1.13.2. Equipment schedules on the drawings indicate a particular manufacturer for all equipment and the architectural and structural drawings indicate supports and other design considerations which were based on the use of this equipment.

1.13.3. Contractor shall confirm all support dimensions and locations based on the actual equipment to be installed and shall coordinate all related work with other Contractors.

1.13.4. Mechanical equipment drawing schedules indicate a particular manufacturer for equipment and the structural drawings indicate supports and other design considerations that were based on the use of this equipment. If the Contractor chooses to furnish items other than those indicated they shall assume all responsibilities and additional costs for the furnishing and installation of the proper steel framing. This shall also include reimbursement to the Architect's office and Structural Engineer's office for verification and any redesign of structural steel framing and/or equipment supporting provisions.

1.13.5. Where supports, foundations, stands, suspended platforms for equipment are indicated on drawings or specified in specifications perform the following:

1.13.6. Design and construct supporting structures of strength to safely withstand stresses to which they may be subject and to distribute properly the load and impact over building areas.

1.13.7. Conform to applicable technical societies' standards, also to codes and regulations of agencies having jurisdiction.

1.13.8. Contractor shall provide sufficient supports as required. These supports are for foundations, supporting stands, platforms and they shall be connected to the building structural members. All equipment shall be bolted to supports, foundations, stands and platforms. Design of the supports, foundations, supporting stands and platforms must be approved by a California State Licensed Structural Engineer.

1.14. MACHINERY DRIVES AND ACCESSORIES

1.14.1. Belt drives: Use approved V-belts of the proper number and size, complete with the necessary grooved sheaves and other requisite accessories. Belts for motors shall be capable of not less than 20% in excess of actual motor size used on the job.

1.14.2. Belt guards: All belt drivers shall be protected with belt guards, enclosing both the driving and the driven pulleys, securely fastened in place and provided with removable covers at each shaft center. Belt guards shall comply with all code requirements.

1.14.3. Sheaves: All motor sheaves shall be of the variable pitch type unless otherwise noted. Pitch of variable pitch sheaves shall be selected at approximately 50% of the variable pitch range.

1.14.4. Provide guards for all exposed couplings on rotating equipment.

1.15. LUBRICATION

1.15.1. Lubricate as required all motors, bearings, fans, etc., before operation of any equipment.

1.15.2. Provide a final lubrication to all equipment requiring it before turning over the system to the Owner.

1.16. PIPE SLEEVES

1.16.1. Sleeves shall be schedule 40 galvanized steel pipe.

1.16.2. Pipe motion due to expansion and contraction will occur, make sleeves of sufficient diameter to permit free movement of pipe. Where pipes are insulated, make sleeves of sufficient diameter to pass pipe insulation. Check floor and wall construction and finishes to determine proper length of sleeves for various locations. Terminate sleeves flush with walls, partitions and ceiling. Extend sleeves 1/4" above finish floor, except in equipment rooms and other areas where water may accumulate on floor, extend to 1-1/2".

1.16.3. Set sleeves in ample time to permit pouring of concrete or to allow progression of other work as scheduled. Fasten sleeves securely so that they will not become displaced when concrete is poured or when other construction around them. For sleeves in fire walls, pack space between sleeve and pipe with approved non-combustible material and as otherwise required by local code; for floors where water is to be kept out, fill with graphite packing and caulking compound.

1.16.4. Sleeves in underground walls shall be 1-1/2" larger than outside diameter of pipe. The space between sleeve and pipe shall be sealed with 1" long wool and 1/2" water tight flex caulking on both sides of the wall. The seal shall be guaranteed watertight.

1.17. ESCUTCHEONS

1.17.1. Provide 20 gauge escutcheons at all pipe penetrations in walls, ceilings and floors. Escutcheons shall be one piece or hinged two piece type with positive latch or setscrew, and shall be polished chrome plated in finished rooms, and polished brass in other areas. Escutcheons shall have tempered springs or other means to insure positive attachment to pipe. The escutcheon opening shall be of sufficient diameter to fit around the insulation of insulated pipes, and the outside diameter of the escutcheon shall be of sufficient size to conceal the pipe sleeves.

1.18. EXPANSION AND FLEXIBILITY

1.18.1. A. Install all work with regard for expansion and contraction to prevent damage to the piping, ductwork, equipment, fixtures and the building and its contents. Provide piping offsets, expansion loops, approved type expansion joints, anchors or other means to control pipe movement and to minimize pipe forces.

1.19. ACCESS PANELS/DOORS

1.19.1. Provide access panels/doors. Refer to other Division 15 Sections for further reference. Provide access panels/doors with have same fire rating as ceiling, wall or duct in which they are installed, and shall be of sufficient size to provide the required accessibility.

1.19.2. Provide access panels/doors where necessary to provide access to concealed volume dampers, fire dampers, water hammer arrestors, trap primers, cleanouts, shut off valves, control valves etc.

1.19.3. Access doors:

1.19.3.1. Material and Manufacturer: Stainless Steel Series is 16 gage #304 stainless steel door and frame. Provide cylinder key lock. Equal to MIFAB UA-SS. All MIFAB cylinder locks are keyed alike.

1.19.3.2. Sizes shall be 14" X 14" at easily accessible valves, water hammer arrestors, trap primers, cleanouts etc; 18" X 18" where partial body access is required; 24" X 24" where entire body access is necessary.

1.19.3.3. Confer with other contractors with respect to access panel locations and shall wherever practicable group mechanical and electrical equipment in such a way as to be accessible from a single panel and reduce number of doors required.

1.20. TRENCHING, EXCAVATING AND BACKFILLING

1.20.1. Perform all trenching, excavation and backfilling necessary for the installation of underground piping.

1.20.2. Dig trenches to required grade and depth with only sufficient earth material removed to provide working space. Trenches dug below the required depth shall be refilled to proper depth with sand.

1.20.3. Restore to original condition all paved surfaces, including concrete, asphalt, landscaping and any other work which was cut or disturbed through the performance of work under this contract. New concrete and asphalt shall match the existing thickness, density, quality, material characteristics and surface appearance.

1.20.4. All testing and inspections shall be complete, and approvals obtained, before backfilling is performed.

1.20.5. Backfill material around pipe shall consist of sand. Provide a minimum of 4 inches of sand all round piping systems. The remainder of the backfill materials shall be free of rocks, debris, and other foreign materials and shall consist of earthy sand.

1.20.6. Provide tracer wire around site non metallic water piping systems. Provide tracer wire around site non metallic natural gas piping systems. Tracer wire shall be 14 gauge copper wire with plastic covering. Tracer wire shall extend 6 inches above grade at the ends of the piping systems. Provide warning tape a minimum of 18" above pipe.

1.20.7. Water puddle and tamp backfill material in layers of approximately 6" up to finish grade, and as otherwise required so that no settling will occur.

1.20.8. All excess excavated materials shall be disposed of.

1.21. CORROSION PROTECTION

1.21.1. All metallic piping underground shall wrap with 2 layers of 10-mil plastic tape.

1.21.2. No pressurized water lines or natural gas lines will be permitted under building the concrete slab.

1.21.3. All natural gas and water valves, water pressure regulators and other devices shall installed in pre-cast concrete yard boxes with galvanized steel lids. All natural gas and water valves, water pressure regulators and other devices will not be installed in any soil.

1.21.4. Any piping passing through concrete floors, walls or roofs shall be sleeved and wrapped 3 times with plastic foam wrap. Provide epoxy joint sealer, non-shrink, waterproof caulking around all piping risers coming up through concrete floors & sidewalks. If the floors, walls or roofs are existing then core these areas. Provide foam sealant and epoxy joint sealer (non-shrink) waterproof caulking around the space between the pipe and the floors, walls or roofs.

1.21.5. Provide one piece natural gas transition riser from PE pipe to steel pipe. The schedule 80 steel section of the riser shall be epoxy coated. The transition riser shall meet NFPA-58-1992 and ASTM-D2513.

1.22. FIRE STOPPING

1.22.1. Provide fire stopping at all rated floors, walls or roofs. Use UL listed materials and methods for sealing these areas.

1.23. IDENTIFICATION OF EQUIPMENT

1.23.1. Each item of equipment shall be permanently labeled with a plastic nameplate of sufficient size to clearly indicate the identification designation appearing on the construction drawings. Letters shall be a minimum of 2 inches high.

1.24. GENERAL TESTING REQUIREMENTS FOR EQUIPMENT AND FIXTURES

1.24.1. The following requirements are supplementary to tests specified for individual equipment, fixtures or systems in other Division 15 sections:

1.24.1.1. Furnish labor, materials, instruments, electric power, etc., and bear all costs in connection with these tests.

1.24.1.2. Give a minimum of 72 working hour notification to the Owner's Representative when tests will be conducted. Coordinate test with other trades.

1.24.1.3. After the work has been completed, subject all systems to acceptance tests under normal operating conditions for periods of 5 working days to show compliance with Contract requirements. Submit to the Owner's Representative a written certificate that all tests have been performed in accordance with the specification requirements.

1.24.1.4. All equipment, fans, and motors shall run at their required speed without showing undue vibration, objectionable noise, or sparking for a period of 5 working days.

1.24.1.5. Balance individual units and adjust dampers, registers, diffusers, etc., so that they deliver air quantities indicated for each outlet, and inlet, or as required.

1.24.1.6. The drainage system shall be tested in accordance with the rules and regulations of the authoritative agencies.

1.24.1.7. Submit to the Owner's Representative a written certificate that all tests have been performed in accordance with the specification requirements.

1.24.2. Adjustments, repairs, and re-tests:

1.24.2.1. Make adjustments, repairs and alterations, as required to meet specified test results.

1.24.2.2. Correct defects disclosed by tests or inspections, and replace defective parts when directed.

1.24.2.3. In replacing defective parts, use only new materials, and in the case of pipe, replace with same length as defective piece.

1.24.2.4. Repeat tests after defects have been corrected and parts replaced, as directed and until pronounced satisfactory.

1.24.2.5. Bear the cost of repairs, and restoration of the work by other Contractors that have been damaged by the tests.

1.25. RECORD DRAWINGS

1.25.1. Maintain at the site, a set of record drawings, upon which shall be clearly indicated (by shading, coloring, or some other acceptable method) the day by day extent of the work installed. Indicate all changes to the original design at the end of each day.

1.25.2. At the completion of the construction phase, furnish to the Architect all necessary drawings showing work which was not installed as shown in the contract drawings. A minimum of one set of originals and three copied sets shall be furnished. Indicate all pertinent information, i.e., valve locations, pipe and duct routing (dimensionally located), etc. All underground piping shall be located on the record drawings by two or more dimensions. All elevations (inverts) shall be shown with the point of elevation change clearly located. All valves shall be numbered and lettered to correspond with the numbers and letters on the site.

1.26. EMERGENCY REPAIRS

1.26.1. The Owner reserves the right to make emergency repairs as required to keep systems in operation without relieving the Contractor of his responsibilities during the post/partial beneficial occupancy.

1.27. OPERATION BY OWNER

1.27.1. The Owner may require operation of parts or all of the respective installations prior to final acceptance. The Owner shall pay for cost of utilities for such operation. Operation of the installation shall not be construed as acceptance of the work.

1.28. INSTRUCTION MANUAL

1.28.1. Prior to completion of installation and final inspection of work, furnish to the Architect a minimum of three copies of complete instruction manual, bound in booklet form and indexed for each respective trade.

1.28.2. Manual shall contain the following items:

1.28.2.1. List of all equipment with manufacturer's name, model number and local representative, service facilities, and normal channel of supply for each item.

1.28.2.2. Manufacturer's literature describing each item of equipment or fixtures with detailed parts list.

1.28.2.3. Detailed step-by-step instructions for starting, summer operation, winter operation, and shutdown of each system.

1.28.2.4. Detailed maintenance instructions for each system and piece of equipment or fixtures.

1.28.2.5. Copy of each automatic control diagram with respective sequence of operations.

1.28.2.6. Individual equipment or fixtures guarantees.

1.28.2.7. Certificates of inspections.

1.28.2.8. Blueprints of as-built construction and related shop-drawings.

1.28.2.9. All written material contained in manual shall be typewritten.

1.29. INSTRUCTION OF OWNER'S PERSONNEL

1.29.1. Prior to acceptance of work and during time designated by the Owner's Representative provide necessary qualified personnel to operate each system for a minimum period of two consecutive, full working days. During the two working days provide training for each system.

1.29.2. During operating period, fully instruct Owner's Facility Representatives in complete operations, adjustment, and maintenance of each respective installation.

1.30. GUARANTEES AND WARRANTIES

1.30.1. All work shall be guaranteed to be free from defects in material and workmanship for a period of one year from the date of final acceptance of the work, or a longer period if stipulated under specific headings. Replace at no additional cost any material, fixtures or equipment developing defects and also pay for any damage caused by such defects, or the correction of defects.

1.30.2. Use warrantee terms for specific items of equipment, relative to the work guarantee requirements of this specification.

2. PART 2 PRODUCTS (NOT APPLICABLE)

3. PART 3 EXECUTION (NOT APPLICABLE)

END OF SECTION