

ARCHITECTURE
SCOTT MARISOLF - ARCHITECT
815 Daggett Avenue
Fort Worth, Texas 76104
Phone: (817) 820-0005

ST. JUDE CATHOLIC CHURCH PARISH HALL REMODEL & CONNECTOR
500 E DALLAS ST.
MANSFIELD, TX 76063

03/28/2024 REVISION 3 - CITY COMMENTS

PERMIT SET

Drawing Title: HVAC SPECIFICATIONS
Project No. 2307 Date: 1/12/2024
Sheet No. MO.2



MEP Consultant
Rene A. Culross
Rene A. Culross, P.E., PLLC
1820 Hunting Green Drive
Fort Worth, TX 76134
817-798-6642
raculross@gmail.com
F-12230

2347.0328.3804

SECTION 5 -- SYSTEM BALANCING

5.1.1 SCOPE

A. Testing, adjustment and start-up of mechanical systems shall be performed by personnel certified by the American Air Balance Council. Testing, adjusting and balancing shall be performed by an independent 3rd party contractor. All necessary test equipment, instruments, materials and labor required for performing all the tests described shall be provided as part of the work of this division.
B. Upon completion of the installation and start-up of the mechanical equipment, check, adjust and balance systemic components to obtain optimum conditions in each conditioned space in the building.
C. Prior to requesting a final inspection, this sub-contractor shall prepare and submit to the architect/engineer of record complete reports on the balance and operations of the system, bearing the seal of a certified air balance technician. In this report, the original conditions measured at startup and final conditions after balancing of all equipment shall be clearly indicated.
D. Make an inspection in the building during the opposite season from that in which the initial adjustments were made and, at the time, make any necessary modifications to the initial adjustments required to produce optimum operation of the systemic components to produce the property conditions in each conditioned space.

5.1.2 WORK INCLUDED

A. The balancing technician shall be responsible for inspecting, adjusting, balancing and logging the data on the performance of fans, all dampers in the duct systems and all air distribution devices. The mechanical contractor and the suppliers of the equipment installed shall all cooperate with the balancing technician to provide all necessary data on the design and proper application of the systematic components and shall furnish all labor and materials required to eliminate any deficiencies or improper-performance.
B. During the balancing, the temperature regulation shall be adjusted for proper relationship between controlling instruments and calibrated by the temperature controls sub-contractor using data submitted by the balancing technician. The total variations shall not exceed 3 degrees from the present median temperature during the entire temperature survey period.
C. In all fan systems, balance the air quantities to be between plus 10- to minus 5-percent of the values shown on the plans. It shall be the obligation of the mechanical contractor to furnish or revise fan drives and/or motors, if necessary, without cost to the contractor, to attain the specified air volume.

5.1.3 REPORT

A. Before final acceptance is made, the balancing technician shall prepare a detailed, written report.
B. The data shall be neatly entered on appropriate forms together with any typed supplements required to completely document all results.
C. Written explanations of any abnormal conditions shall be included. All this shall be assembled into a suitable brochure, and a total of four copies shall be provided.
D. The typed test data sheets and correlation of the test results shall be certified to be true and correct by a certified air balance technician over the signature of the subcontractor. Such signature shall be executed by an officer if the subcontracting firm is a corporation, a partner if a partnership, or by the owner if a sole ownership. This data shall be delivered to designated members of the building operating personnel not less than three days after the texts are complete settings, reading, etc. shall be prepared and submitted in quadruplicate.

5.1.4 INSTRUCTIONS

A. During the test periods, the balancing technician shall instruct the building maintenance personnel in the construction and operation of all equipment.

4.7.1 PACKAGED ROOF TOP UNITS

4.7.1.1 Casing:

- 1. Galvanized steel painted with baked enamel.
2. Galvanized-steel liner.
3. Insulated with fiberglass.
4. Stainless-steel or corrosion resistant drain pan.
B. Supply-Air Fan: Belt driven, forward curved, centrifugal.
C. Condenser-Coil Fan: Direct-driven propeller.
D. Relief-Air Fan: Forward curved.
E. Supply-Air Refrigerant Coil:
1. Aluminum-plate fins and seamless copper tube.
2. Baked phenolic coating.

4.7.1.2 Refrigerant Circuit Components:

- 1. Number of Refrigerant Circuits: One.
2. Compressor: Hermetic scroll.
3. Refrigerant Charge: R-410A.
4. Low-ambient kit.
5. Hot-gas reheat valve.
6. Hot-gas bypass valve.
G. Filters: Disposable, pleated.
H. Gas Furnace:
1. Heat Exchanger and Drain Pan: Stainless steel.
2. Fuel: Natural.
3. Ignition: Electronic.
4. Gravity vent.
5. Modulating gas control valve.
J. Outdoor- and Return-Air Mixing Dampers: 0 to 100 percent economizer with motorized dampers and hood.
K. Electrical Power Connection: Single.
L. Basic Unit Controls: Programmable wall-mounted thermostat.

M. Accessories:

- 1. Gas burner compartment heater.
2. Duplex electrical outlet.
3. Low-ambient kit.
4. Hall guards.
5. Roof Curb:
6. Vibration isolators, where not integral to factory construction.
7. Wind restraints.

4.8.1 EXHAUST FANS

A. In-line Exhaust Fans shall be direct drive, forward curved, centrifugal blower type, fan wheel and scroll shall be constructed of galvanized steel. Fan wheel shall be dynamically balanced. The fan housing shall be constructed of galvanized steel and acoustically lined for quiet operation. Fan housing shall be provided with mounting lugs for suspension above a ceiling. Provide fan with an integral aluminum gravity back-draft damper. The motor shall be permanently lubricated with built-in thermal overload protection. Provide a safety disconnect switch mounted to the exterior of the fan enclosure. Fans shall be AMCA rated.
B. Ceiling Exhaust Fans shall be direct drive, forward curved, centrifugal blower type, fan wheel and scroll shall be constructed of galvanized steel. Fan wheel shall be dynamically balanced. The fan housing shall be constructed of galvanized steel and acoustically lined for quiet operation. Provide fan with an integral aluminum gravity back-draft damper. The ceiling ventilator shall be furnished with a white, metal ceiling exhaust grille. Provide mounting kit for suspension from structure with rubber-in-shear vibration isolators. Provide manufacturer's standard roof jack or wall cap, and transition fittings. The motor shall be permanently lubricated with built-in thermal overload protection. Fans shall be AMCA rated.
C. Roof Mounted Upblast/Downblast Exhaust Fans shall be belt or direct drive, backward inclined, centrifugal blower type. Fan wheel and scroll shall be constructed of aluminum. Fan wheel shall be dynamically balanced. The fan housing shall be constructed of aluminum. Top cap shall be provided with stainless steel quick release hatches for access to the motor and fan wheel. Fan housing shall be provided with lifting lugs. Provide fan with a gravity back-draft damper to be installed in the intake. The motor shall be provided with re-greaseable bearings with a 200,000 hour average life minimum and built-in thermal overload protection. Provide a safety disconnect switch integrally mounted to the fan enclosure. Fans shall be AMCA rated.

4.9.1 ELECTRIC UNIT HEATERS

A. Electric unit heater cabinet shall be constructed of heavy gauge steel casing. Individual adjustable louvers with 30 degrees downward stops shall be furnished to provide desired control of discharge air. All metal surfaces of the enclosure shall be phosphate coated to resist corrosion and finished in decorative baked enamel. Mounting brackets designed for either ceiling or wall swivel mounting shall be factory furnished.
B. Fans shall be aluminum, direct drive and designed specifically for unit heater application. Protect fans by means of a corrosive resistant welded fan guard.
C. All heaters shall be UL listed and meet the requirements of the national electric code.
D. Provide unit heater with a 24v control transformer, thermostat, relays and other control devices as necessary for the control of the unit. Thermostat shall be factory wired internally in the heater or remote mounted on a wall and served by low voltage wiring concealed inside conduit as indicated on the drawings.
E. Motors shall be totally enclosed, designed for continuous operation and equipped with built-in thermal overload protection.
F. Electric unit heaters shall be OMark/Marley, Berko, Markel or approved equal.

4.1.22 GUARANTEE

A. The Contractor shall furnish a written guarantee in triplicate, warranting all materials, equipment and labor furnished by him to be free of all defects for a period of one year from date of final acceptance by the Owner. The Contractor shall further guarantee that all equipment shall meet the characteristics, capacities and workmanship specified and within the warranty period, the defects and/or equipment will be repaired or made good without cost to the Owner. The Contractor further agrees to correct warranty deficiencies within 48 hours of notification by management.

REFERENCE DOCUMENTS: Conditions of the Contract and Division 01 B General Requirements are made a part of this section whether attached hereto or not.

4.1.23 IDENTIFICATION

A. All equipment shall have permanently affixed identification tags. Tags shall be UV resistant plastic laminate, red face with 1/2-inch tall white letters. The tag shall match the unit and panel designations shown on the schedules. The tag shall include the panel and circuit number, and fire alarm address (where applicable).
B. Locate tags to be visible and accessible.

4.1.1 SCOPE

A. Provide complete air supply, return, outside air and exhaust systems including fans, terminal devices and other components specified herein.

4.1.2 SUBMITTALS

A. Shop Drawings: Submit complete shop drawings, in accordance with Section 1, indicating materials, quantities, sizes and installation details.

4.1.3 COORDINATION

A. Install materials and equipment at proper time to keep pace with the general construction and the work of the other trades involved.

4.1.4 WARRANTY

A. The Mechanical Sub-contractor shall warrant all material, workmanship and equipment for a period of one year after final acceptance by the Owner. The warranty specifically implies that any defective portion becoming apparent during this period will be repaired, replaced or otherwise made good at no additional cost to the Owner. It shall further include replacement or refrigerant loss not due to Owner negligence. Compressors shall contain an additional four-year warranty.

4.2.1 DUCTWORK

A. Rigid Ductwork: All air conditioning and exhaust ductwork, plenum, casings and sheet metal, connections shall be fabricated of new joint-forming quality galvanized prime grade sheets.

B. Round Low Pressure Ducts: Constructed of the following minimum gauges:
Largest Dimension of Duct Gauge of Metal
Up to 12" No. 26 U.S. Gauge
13" to 30" No. 24 U.S. Gauge
31" to 54" No. 22 U.S. Gauge
C. Round Low Pressure Ducts: "SNAP-LOK" as manufactured by United Sheet Metal Company.

D. Rectangular Ductwork Fittings: Fabricated per SMACNA Standards for low-pressure ductwork (2-inch pressure class).
E. Round Ductwork Fittings: As manufactured by United Sheet Metal Co., and/or as detailed on the drawings.

F. Flexible Connections: Connections to air conditioning units and fans shall be flexible connections which shall be neoprene coated glass fabric weighing not less than 30 ounces per square yard and at least 1/16" thick.

G. At the Contractor's option, 2" insulated flexible duct may be used for final run out to the devices when installed per manufacturer's installation instructions. Flexible run outs shall not exceed 5-feet extended length.
H. Access doors shall be provided for access to all dampers, fusible links, and where required for maintenance and cleaning operations. Access doors serving insulated ducts shall be double-skin doors with one inch of insulation on the door. Where duct size permits, the access doors shall be 16-inches by 18-inches. Access doors shall be as manufactured by MILCOR.

4.2.2 COMMERCIAL KITCHEN DUCTWORK

A. Ducts Connected to Type I Commercial Kitchen Hoods
1. Comply with NFPA 96.
2. Exposed to View: Type 304, stainless-steel sheet, No. 4 finish.
3. Concealed: Type 304, stainless-steel sheet, No. 2D finish.
4. Welded seams and joints.
5. Pressure Class: Positive or negative 4-inch wg.
6. Minimum SMACNA Seal Class: Welded seams, joints, and penetrations.
7. SMACNA Leakage Class: 3
B. ADDITIONAL INSTALLATION REQUIREMENTS FOR COMMERCIAL KITCHEN HOOD EXHAUST DUCT
a. Install commercial kitchen hood exhaust ducts without dips and traps that may hold grease, and sloped a minimum of 2 percent to drain grease back to the hood.
b. Install fire-rated access panel assemblies at each change in direction and at every floor for vertical ducts, or as indicated on Drawings. Locate access panel on top or sides of duct a minimum of 1-1/2 inches from bottom of duct.
c. Do not penetrate fire-rated assemblies except as allowed by applicable building codes and authorities having jurisdiction.

4.3.1 INSULATION

A. All rectangular sheet metal ducts shall be insulated with 1.5-inch thick 3/4" lb density fiberglass-faced insulation, or as required to meet a minimum installed R-value of 5.0. Install with all joints overlapped and neatly sealed.
B. All round sheet metal ducts shall be insulated with 2" thick, 3/4" lb density fiberglass-faced insulation, or as required to meet a minimum installed R-value of 5.0. Install with all joints overlapped and neatly sealed with UL 181 listed sealant.
C. Where rectangular or round sheet metal duct is exposed to view in public areas, ducts shall be lined with glass-mat or foil faced liner of thickness, as required, to meet a minimum installed R-value of 5.0. Liner shall be treated with anti-microbial coating. Install with all joints overlapped and neatly sealed.
D. Insulate refrigerant piping with 3/8" thick ARMAFLEX. Apply insulation with all joints firmly butted together.

4.4.1 FILTERS

A. Filters shall be 1" throw away type and shall be Farr 30-30 filter or equal types by Cambridge or Microtron. Maximum velocity through filter media shall be 500 fpm.

4.5.1 AIR DISTRIBUTION DEVICES

A. Air distribution devices shall be furnished with frame styles, deflecting device, dampers and other accessories as shown on the schedule, or manufactured by Titus or approved equal by Metal-aire, Price, or Krueger.
B. Wall louvers shall be recessed frame double weather stop with bird screen. Provide Ruskin model series ELF or approved equal by Greenbeck or SEMCO.
C. Furnish and install screens on all duct, fan or other mechanical openings or equipment furnished by this contractor, which lead to or are outdoors. Screens shall be 16 gauge, one-half inch mesh in removable galvanized frames.

1.1.10 SCHEDULE OF MATERIAL AND EQUIPMENT

A. The Contractor shall submit for approval a complete schedule of material and equipment which is to be installed under the contract. The schedule shall be submitted within 30 days after the award of this contract and prior to the installation or fabrication of any of the material involved. The schedule shall include for materials the Manufacturer's name, Catalog Number, Type and Trade Name; in addition, for equipment, attach Manufacturer's Engineering Data and Specification Sheet.

1.1.11 SHOP DRAWINGS AND SUBMITTALS:

- A. Provide Submittals and Shop Drawings (3 copies minimum) for the following equipment and layout:
1. Ductwork fabrication details and layout at 1/4" = 1'-0" scale.
2. Mechanical equipment cut sheets including the performance characteristics, accessories, drawings, wiring diagrams, etc. Accessories shall be clearly labeled to show what is and is not provided.
3. Piping details showing materials used and joining/sealing methods.
4. Piping layout at 1/4" = 1'-0" scale.
B. Equipment shall not be ordered until approved by the Architect and Engineer of Record. The Contractor shall allow two (2) weeks for design team review of submittals.

1.1.12 DRAWINGS AND SPECIFICATIONS

A. The drawings show, diagrammatically, the locations of the various lines, ducts, conduits, fixtures and equipment and the method of connecting and controlling them. It is not intended to show every connection in detail and all fittings required for a complete system. The systems shall be indicated, but are not to be taken from the drawings. Exact locations of these items shall be determined by reference to the general plans and measurements at the building and in cooperation with other sub-contractors and, in all cases, shall be subject to the approval of the Architect. The Contractor reserves the right to make any reasonable change in the location of any part of this work without additional cost to the Owner.
B. Should any changes be deemed necessary by the Contractor in items shown on the contract drawings, shop drawings and descriptions, the reason for the proposed changes shall be submitted to the Architect/Owner for approval.
C. Exceptions and inconsistencies in plans and specifications shall be brought to the Architect's attention before bids are submitted; otherwise, the Contractor shall be responsible for the cost of any and all changes and additions that may be necessary to accommodate his particular apparatus.
D. The Contractor shall lay out his work maintaining all lines, grades and dimensions according to these drawings with due consideration for other trades and verify all dimensions at the site prior to any fabrication or installation. Should the layout be impractical, the Architect shall be notified before any installation or fabrication, and the existing conditions shall be investigated and proper changes effected without any additional cost.
E. Titles of Sections and Paragraphs in these specifications are introduced merely for convenience and are not to be construed as a contract. It is the Contractor's option that any work or materials material and/or work. The Architect does not assume any responsibility, either direct or implied, for omissions or duplications by the Contractor or any sub-contractor due to real or alleged error in the arrangement of matter in the Contract Documents.

1.1.13 ARCHITECT'S APPROVAL

A. In any statement under this contract where "approval" is required or requested, it is understood that such approval must be obtained from the Architect in writing before proceeding with the proposal, and an adequate number of copies of any such proposal shall be submitted to the Architect.
B. The approval by the Architect of any materials, changes, drawings, etc., submitted by the Contractor will be considered as general only and to aid the contractor in expediting his work. Such approval as may be given does not in any way relieve the Contractor from the necessity of furnishing the materials and performing all work as required by the drawings and specifications.

1.1.14 LOCAL RESTRICTIONS

A. The Contractor shall become familiar with all rules and regulations of the City, County and State, or any other authority having jurisdiction over the project, if it is the Contractor's opinion that any work or materials shown on the drawings or specifications do not comply with these rules and regulations as to size, type, capacity and quality, he must make it known prior to the submission of his bid, which shall be deemed evidence of compliance; otherwise, the Contractor shall be responsible for the approval of all work or material and, in the event that such Authority should indicate disapproval, he shall correct same with materials approved by the Architect at no additional cost to the Owner.

1.1.15 ELECTRICAL WIRING

A. Except for such items as are normally wired up at their point of manufacture and so delivered, and unless specifically noted to the contrary herein, the Electrical Subcontractor will do all electric wiring of the project, and shall obtain at his expense all permits and approvals to erect all motors in place ready for connections and shall furnish with each such motor a starter of the type specified and deliver it in good condition to the Electrical Subcontractor at the job. The Electrical Subcontractor will mount all such starters, as directed, furnishing supporting structures where necessary. The Owner and other Subcontractors shall furnish with each item receiving electrical connections, the necessary instructions and wiring diagrams to the Electrical Subcontractor. The Electrical Subcontractor shall refer to the Specifications to determine the Scope of the Work.

1.1.16 LARGE APPARATUS AND EQUIPMENT

A. All large apparatus and equipment which is specified or shown to be furnished or installed under this Contract, and which may be too large to be moved into its final position through the normal building openings planned, shall be placed by this Subcontractor in its approximate final position. This shall be accomplished through cooperation and coordination with other Subcontractors before any obstructing structure is installed. All apparatus shall be cribbed up from the floor by this Subcontractor and cared for as specified under "Storage and Protection" or as directed by the Architect.

1.1.17 RESPONSIBILITY

A. The Contractor will be held responsible for the satisfactory and complete execution of all work included. He shall produce complete finished operating systems and provide all incidental items required as part of his work, regardless of whether such item is particularly specified or indicated.

1.1.18 CLEAN UP

A. Clean up trash and debris caused by the work of this Section, keeping premises, streets, sidewalks and adjacent areas clean and neat at all times. B. Dispose of such materials outside the limits of the project site to approved locations.

1.1.19 PAINTING

A. Upon completion, clean all pipes and equipment before painting. Painting of mechanical equipment and piping is specified in architectural Painting Section.

1.1.20 ACCESS DOORS

A. Access doors are to be provided by the Contractor. Contractor will closely coordinate locations of valves, etc. in order to have access to all concealed portions of the system requiring periodic service. Prepare shop drawings for coordination of all access doors, locating same for installation by General Contractor. Access door locations shall be approved by Architect or Owner before installation.

1.1.21 FLAME SPREAD PROPERTIES OF MATERIALS

A. All materials and adhesives used for occupational linings and insulation, jackets, tapes, etc. shall conform to Interim Federal Standard Flame-spread Properties of Materials, Inc. Fed. Std. No. 00336A (comm. NBS). The classification shall not exceed No. 2, with the range of indices between 0 and 25 for these classifications as listed in the Federal Specifications for the basic materials, the finishes, adhesives, etc. specified for each system, and shall be such that when completely assembled the total will not exceed an index of 50. Classifications 111 as listed in the Federal Specifications. Modifications shall be made to insulating materials, etc. as required to comply with the Federal Specifications.

SECTION 1 -- SUPPLEMENTARY CONDITIONS FOR MECHANICAL WORK

1.1.1 GENERAL CONDITIONS

A. All work covered by this section of these specifications shall be accomplished in accordance with the respective drawings, information of contractors to the architect and the supplementary general conditions of these specifications.
B. Bidders shall determine the contents of a complete set of drawings and specifications and be aware that they may be bidding from a partial set of drawings, applicable only to the various separate contract, subcontracts or trades as may be issued for bidding purposes only. The contract documents are the combined Architectural, Structural, Plumbing, Heating, Ventilating and Air Conditioning and Electrical drawings and specifications. All drawings and specifications are on file in the Architect's office, and each Bidder shall thoroughly acquaint himself with all of the details of the complete set of drawings and specifications before submitting his bid. All drawings and specifications form a part of the contract documents for each separate contract. They shall be considered as bound therewith in the event partial sets of plans and specifications shall be deemed evidence of the review and examination of all drawings, specifications and addenda issued for this project. No allowances will be made because of the Contractor's unfamiliarity with any portion of the complete set of documents.
C. All equipment and materials shall be manufactured in the United States of America.

1.1.2 SCOPE

A. The work included under this specification consists of the furnishing of all labor, materials, tools, transportation, services, etc. which are applicable and necessary to complete the installation of the systems specified herein; all as described in these specifications, as illustrated on the accompanying drawings, or as directed by the architect.
B. In general, the various lines and ducts to be installed by the various trades under this specification shall be run as indicated, as specified herein, as required by particular conditions at the site and as required to conform to the generally accepted standards so as to complete the work in a neat and satisfactory workable manner. Run work parallel or perpendicular to the lines of the building unless otherwise noted.
C. The construction details for the building are illustrated on the Architectural and Structural Drawings. Each Contractor shall thoroughly acquaint himself with the details before submitting his bid, as no allowance will be made because of the Contractor's unfamiliarity with these details. Place all inserts to accommodate the ultimate installation of pipe hangers in the forms before concrete is poured. Set sleeves in place in forms before concrete is poured, and in place while they are under construction. All concealed lines shall be installed as required by the pace of the general construction to precede that general construction.

1.1.3 INSPECTION OF SITE

A. The Contractors shall visit the site, verify all existing items shown on plans or specified herein, and familiarize themselves with the working conditions, existing conditions, actual formations, soil conditions, and local requirements involved, and submission of bids shall be deemed evidence of such visit. All proposals shall take the existing conditions into consideration, and the lack of specific information on the drawings shall not relieve the Contractor of any responsibility.

1.1.4 UTILITIES, LOCATIONS AND ELEVATIONS

A. Locations and elevations of the various utilities included within the scope of this work have been obtained from City and/or other substantially reliable sources and are offered separately from the Contract Documents, as a general guide only, without guarantee as to accuracy. The Contractor shall examine the site, shall verify to their own satisfaction the locations, elevations and availability of all utilities and services required for the work, and they shall be responsible for their relation to the work; the submission of bids shall be deemed evidence thereof.
1.1.5 CODE REQUIREMENTS
A. All work shall comply with the provisions of these specifications, as illustrated on the accompanying drawings, or as directed by the Architect, and shall satisfy all applicable local codes, ordinances, or regulations of the governing bodies, and all applicable codes, rules, regulations, orders, permits and inspections necessary in connection with his work and pay all legal fees on account thereof. In the absence of other applicable local codes acceptable to the Architect, the National Electrical Code and International Plumbing Code shall apply to this work.

1.1.6 RECORDS FOR THE OWNER

A. The Contractor shall obtain at his own expense a complete, full-size set of prints on which he shall keep an accurate record of the installation of all materials and systems covered by his contractual agreement. The record shall indicate the location of all equipment and the routing of all systems. All conduit buried in concrete slabs, walls, and below grade shall be located by dimension unless a surface mounted device in each space indicates the exact location. He shall then obtain at his expense one complete reproducible set of the original drawings on which he shall neatly transfer his notations and deliver these drawings to the Engineer at job completion before the final payment for delivery to the Owner.
B. In addition to the above, the Contractor shall accumulate during the job progress the following data in duplicate prepared in a neat brochure or packet for binding for subsequent delivery to the Owner. The Contractor shall include in his bid the cost of binding into a book:
1. All warranties, guarantee, and manufacturer's directions on equipment and material covered by the Contract.
2. Copies of approved shop drawings and submittals.
3. Copies of sequence of operations for all equipment covered by Contract.

1.1.7 MATERIALS AND WORKMANSHIP

A. All materials, unless otherwise specified, shall be new, free from any defects and of the best quality of their respective kinds. All like materials used shall be of the same manufacturer, model and quality, unless otherwise specified.
B. All manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned, adjusted and conditioned as recommended by the Manufacturers, or all indicated in their published literature, unless specifically herein specified to the contrary. All work under this contract shall be performed by competent workmen and executed in a neat and workmanlike manner providing a thorough and complete installation. Work shall be properly protected during construction, including the shielding of soft or fragile materials and the temporary plugging of open lines during construction. At completion, the installation shall be thoroughly cleaned, and all tools, equipment, obstruction or debris present as a result of this Contract shall be removed from the premises.

1.1.8 STORAGE AND PROTECTION

A. Provide adequate facilities for items furnished under these specifications which are subject to damage if exposed to elements. Take such precautions as necessary to properly protect apparatus from damage. Failure to comply with this provision will be sufficient cause for rejection of the particular apparatus involved.

1.1.9 COOPERATION

A. All work under these specifications shall be accomplished in conjunction with other trades on this project in a manner which will allow each trade adequate time at the proper stage of construction to fulfill his work.
B. Maintaining contact and being familiar with the progress of the general construction and the timely installation of sleeves and inserts, etc., before concrete is placed shall be the responsibility of this trade, as will the installation of the required systems in their several stages, at the proper time to expedite this contract and avoid unnecessary delays in the progress of other contracts, and meet all requirements of progress schedules set up by the Architect.
C. Should any question arise between trades as to the placing of lines, ducts, conduits, fixtures or equipment, or should it appear desirable to remove any general construction which would affect the appearance or strength of the structure, reference shall be made to the Architect for instruction.