SECTION 15400

PLUMBING

DIVISION I REQUIREMENTS ARE A PART OF THIS SECTION

PART 1 – GENERAL: General Provisions of the Contract Documents to be included but not necessarily limited to General Conditions, Supplementary Conditions and sections of Division One of this project manual.

1.01 WORK INCLUDED

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing and piping all as required and as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the County.

1.02 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to the latest requirements of the following regulations:
   1. National Fire Protection Association.
   2. State Division of Industrial Safety.
   3. 2007 California Code of Regulations (CCR).
   4. 2007 California Plumbing Code (CPC), Part 5, Title 24, 2007 California Code of Regulations (CCR).
   5. 2007 California Fire Code, Part 9, Title 24.
   6. County Health Department.
   7. Any other legally constituted body having jurisdiction thereof.
   8. City of Orange Building Department.
   9. 2007 California Building Code CBC:
      a. Access plumbing fixtures shall comply with all of the requirements of CBC Section 1115B.
      b. Heights and location of all fixtures shall be according to CBC Section 1115B. 4.
      c. Fixture controls shall comply with CBC Section 1115B.4.4.4.
      d. Sinks shall not exceed 6½-inch in depth, CBC Section 1115B.4.7.

B. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted authorities having jurisdiction and from the County's representative.

C. Under Ground Fire Sprinkler Piping Requirements: "See Fire Service" here in after.

1.03 DRAWINGS

A. Because of the small scale drawings, it is not possible to indicate all offsets, fittings and accessories, which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices, which may be required to complete the installation.

B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings prior to

installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his acceptance. Only when Architect's acceptance is given, in writing, shall Contractor proceed with installation of the work.

C. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

D. In case of a difference in the specifications between the specifications and the drawings, or in the drawings, the contractor shall include the cost of the most expensive alternate in the bid proposal. The contractor shall secure direction from the architect before start of any construction.

1.04 PERMITS, INSPECTIONS AND LICENSES

A. All permits; inspections and licenses required by the legally constituted authorities for installation of the work according to the plans and specifications shall be obtained and paid as a part of the work of this section.

1.05 UTILITIES

A. See Drawings for Points of Connection.

B. Gas Service and Meter Assembly: The Contractor shall arrange with the serving utility company for the installation of new gas service with complete meter assembly of the capacity indicated and in the location as shown on the drawings. All items served with gas shall be operated at full fire and adjusted by the Contractor. In cooperation with gas company, make all required adjustments to main gas pressure regulator and individual gas pressure regulators at each building. The Contractor shall pay for all required fees.

1.06 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.07 PROTECTION

A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.08 LOCATIONS

A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid confliction and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

1.09 SUBMITTAL DATA (Also see Division I)

A. Furnish, all at one time, prior to any installation, within the time noted below, six (6) copies of valid submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to put identification numbers on fixtures and equipment schedules.

B. Manufacturers submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.

C. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.

D. A list of names is not a valid submittal. To be valid, all submittals must:
   1. Be submitted per the requirements of Section 01350 – Submittals.
   2. Include all pertinent construction, installation, performance and technical data.
   3. Have all copies marked to indicate clearly the individual items being submitted.
   4. Have each item cross-referenced to the corresponding specified item and be marked to show how differences will be accommodated.
   5. Contain calculations and other detailed data justifying how the item was selected for proposal. Data must be completed enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.

1.10 UNINSPECTED WORK

A. Contractor shall not allow or cause any of his work to be covered up before it has been duly inspected, tested and approved by the County, Architect or any other authorized inspectors having legal jurisdiction over his work. Should he fail to observe the above, he shall uncover the work and, after it has been inspected, tested and approved, recover it at his own expense.

1.11 SUBSTITUTIONS (Also see Division I)

A. The Contractor assumes full responsibility that alternate manufacturers, items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures, which ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates were selected without proper regard to the requirements of the job, will not be approved. No more than one proposed alternate will be considered for each item.

B. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

C. Provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.

D. This Contractor is responsible to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.

E. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials and decisions of the Architect or that of his representative shall be final and conclusive.

1.12 RECORD DRAWINGS (Also see Division I)

A. Contractor shall provide and keep up-to-date a complete "as-built" record set of blueline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc.

1.13 GUARANTEES (Also see Division I)

A. Contractor shall guarantee the entire plumbing and piping systems unconditionally for a period of one (1) year after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the County.

B. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of one (1) year after date of acceptance of his work.

C. All equipment and fixtures shall carry manufacturer's warranty against defective parts or poor workmanship and shall not be less than one (1) year. See specific equipment specifications for extended warranty requirements.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT (See Schedules on Drawings)

A. General: Provide all materials and equipment as specified or required in the work, new and free from defects and imperfections.

B. Pipe and Fittings:

1. Soil and Waste Piping:
   a. Soil and Waste Piping within the building itself and outside within five feet (5') of the foundation, except where indicated otherwise, shall be No-Hub cast iron pipe and fittings, asphaltum coated, free from defects, and shall conform to the requirements of CISPI Standard 301 ASTM A-888 or ASTM A-74 and manufactured by AB & I, Charlotte or Tyler. Fittings shall be up with "HUSKY" SD-4000 or "CLAMP ALL" 125 Stainless Steel, Heavy-Duty No-Hub Couplings and shall be in compliance with ASTM C-1540 and ASTM C-564 Standards, except all above ground vent piping joints may be made up with "ANACO", TYLER", or "MISSION" Standard-Duty No-Hub Coupling in compliance with CISPI –310, and ASTM C-564 Standards. At the contractor's option, Type "DWV" hard drawn copper waste, vents and end fittings with soldered joints may be used for above ground piping, except waterless urinal rough-in.

2. Vent Piping:
   a. Concealed or underground vent piping shall be cast iron pipe and fittings as specified for soil and waste piping.
   b. Exposed vent piping shall be Schedule 40 galvanized steel pipe, ASTM A53, with black cast iron threaded drainage fittings.

3. Water Piping:
   a. Piping within the building and above grade shall be Type "L" ASTM B88, hard drawn copper tubing with wrought copper sweat fittings ANSI B16.22.
   b. Outdoor underground piping in sizes 2-1/2" and 3" shall be Type "L" ASTM B88, hard drawn copper as specified for water piping within the building. Piping 2" and smaller shall be Type "K" ASTM B88, hard drawn copper with wrought copper sweat fittings ANSI B16.22.
   c. Piping below the building floor shall be Type "K" soft annealed copper tubing with no fittings below the slab.

4. Gas Piping:
   a. Gas piping within the building shall be Schedule 40 black steel pipe conforming to ASTM A53 using 150 pound banded malleable iron screwed fittings for piping 2" and smaller and weld type steel fittings for piping 2-1/2" and larger except all medium pressure gas shall be welded.
   b. Exposed gas piping outside the building shall be Schedule 40 galvanized steel pipe conforming to ASTM A53 using galvanized 150 pound banded galvanized malleable iron screwed fittings for piping in sizes 2" and smaller and seamless weld type steel fittings for all medium pressure gas piping and piping 2-1/2" and larger. All outdoor welded black steel pipe and fittings shall be painted with oil base prime coat and oil base enamel finish.
   c. Underground gas piping shall be Schedule 40 SDR-11 Polyethylene PE2406 (Yellow) as manufactured by Plexco. Fittings shall be socket fusion weld Polyethylene as manufactured by Plexco or Central, PE2406 (Yellow) complying with ASTM, D2513. Where required provide "Lyco" or Double "O" seal transition fittings between steel and polyethylene as manufactured

by Central, all identified and approved for gas service. A No. 16 copper tracer wire shall be installed with and attached to PE piping and shall terminate above grade at each end. Gas piping extending to above grade, within valve yard boxes, below structures such as porches, steps, roofed patios, covered walks, uncovered walks adjacent to building or similar structures covered or uncovered shall be Schedule 40 steel pipe with 150 pound buttweld fittings. Piping below concrete slab shall be installed within a schedule 40 PVC pipe sleeve extending between building and vented shut-off valve yard box. Steel pipe and fittings below grade shall be wrapped with 20 MIL identified polyethylene tape, two (2) layers, each half-lapped for a total thickness of 80 MILS. Underground polyethylene piping shall be installed by personnel certified by the pipe manufacturer as having received instructions directly from the pipe manufacturer's field representative. Contractors not having certified personnel will be required to have a factory representative of the pipe manufacturer visit the site at the time of underground pipe installation and provide the required instructions. All required cost for training and certification will be paid for by this Contractor. Upon completion of the gas piping underground installation, this Contractor shall submit a written report directly to the Architect stating that all materials installed are as specified and approved, that installation was done by factory certified personnel, that where required, steel pipe buried had received a minimum of 80 mils thick pipe wrap and finally that the entire system was wire traced, installed to a depth of thirty inches (30") within a sand bed and tested to 60 P.S.I.

5. Fire Main Water Service Below Grade: pipe shall be ductile iron, cement lined with mechanical joint fittings Class 250, flanged or mechanical joint, in accordance with ANSI-AWWA C111/A21.11, Class 52 or AWWA C153 ductile-iron compact fittings of dimensions to match pipe outside diameter, with AWWA C104, cement lining and AWWA C111 neoprene gaskets. Underground Fire Sprinkler supply piping below building shall be AMES service IBR in-buildings raisers, grooved end (AWWA C606) in accordance with NFPA-24 and UL/FM. Provide concrete thrust blocks at all underground fittings per manufacturer's recommendations.

6. Storm Drain Piping:
   a. All concealed storm drain pipe and fittings shall be cast iron as specified for soil and waste piping.
   b. All exposed storm drain pipe and fittings shall be galvanized steel pipe as specified for exposed vent piping.

7. Indirect Waste Piping: Shall be Type "L" copper as specified for water piping.

8. Condensate Drain Piping: (Air Conditioning units) Shall be Type "L" copper as specified for water piping.

9. Compressed Air Piping: Shall be Type "L" copper as specified for water piping.

10. All exposed piping at plumbing fixtures shall be chrome plated yellow brass except exposed pipes in shop or utility areas.

11. Unions or flanges shall be furnished and installed at each threaded connection to all equipment or valves. The unions or flanges shall be located so that the piping can be easily disconnected for removal of the equipment, tank, or valve, and shall be of the type specified in the following schedule.
    a. Unions:

1) Black Steel Pipe: 250 pound screwed black malleable iron, ground joint, brass to iron seat.
2) Galvanized Steel Pipe: 250 pound screwed galvanized malleable iron, ground joint, brass to iron seat.
3) Copper or Brass Tubing: 150 pound cast bronze or copper, ground joint, nonferrous seat with ends, by Walseal, NIBCO or Mueller.

b. Flanges: Raised face 150 pound class forged steel, weld, neck or slip-on type conforming to ASA B16.5 and ASTM A181. For copper piping systems, provide flanges conforming to ANSI B16.24. The faces of the flanges being connected to be alike in all cases. Locate flanges so that the piping can be easily disconnected for removal of the equipment or valve. Gasket material shall be of material suiting the service of the opening system in which installed and which conforms to its respective ANSI Standard (A21.11. B16.21). Provide materials that will not be detrimentally affected by the chemical and thermal conditions of the fluid being carried.

12. All underground cast iron, ductile iron, copper, steel or other metallic piping located both inside and outside of building shall be encased within a minimum of 10 mil polyethylene plastic sleeve sealed water tight with polyvinyl chloride tape. Sleeve shall terminate 3" above grade or floor slab.
13. All underground non-metallic piping shall have 16 gauge copper "Tracer Wire" continuous for entire length.

C. Valves:
1. General:
a. Piping systems shall be supplied with valves arranged so as to give complete and regulating control of piping systems throughout the building, and located so all parts are easily accessible and maintained.
b. Valve Design: Rising stem or outside screw and yoke stems. Non-rising stem valves may be used where space conditions prevent full extension of rising stems.
c. Sizes: Same size as upstream pipe, unless otherwise indicated.
d. Operators:
1) Hand wheels fastened to valve stem for all valves other than quarter turn.
2) Lever handles on quarter-turn valves, and provide plug valves with operating wrench.
e. Extended stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation.
f. End Connection: 2 inches and under shall be threaded, 2-1/2 inches and larger shall be flanged or full lug style.

2. Approved Manufacturers:
a. Hammond
b. Watts
c. Nibco
d. Nordstrom
e. Apollo

3. Provide Class 150 valves meeting the valve specifications where Class 125 valves are specified but are not available.

4. Gate Valves:
a. Gate Valves, 2-Inch and Smaller: Hammond UP645, MSS SP-80; Ultra-Pure, 125 lb., bronze body, threaded bonnet, ASTM B62; solid wedge disc,

B-62 stem material, brass packing gland, non-asbestos packing, and malleable iron handwheel.

b. Gate Valves, 2-1/2-Inch & Larger: Hammond IR 1140, MSS SP-70; Class 125, iron body, bolted bonnet, flanged ends, non-rising stem, solid wedge, bronze trim, replaceable seat rings.

5. Ball Valves: (Hammond UP8303A)

a. Ball Valves, 2 Inches and Smaller: Hammond UP8303A, MSS SP-110, Ultra Pure, rated for 150 psi saturated steam pressure, 600 psi WOG pressure; two-piece construction; with bronze body. Full port, stainless steel ball, "Teflon" seats and seals, separate adjustable packing gland and nut, blowout-proof stem and vinyl covered steel handle.

6. Valves: (for gas service)

a. Hammond Ball Valve, 8901 UL, FM, 2-Inch and Smaller: MSS-SP-110, Rated at 150 wsp-600 WOG; UL listed, brass body, stainless steel ball, and threaded ends. Valve shall be C.S.A. certified.

b. Walworth #1797F Plug Valves, 2-1/2 Inch and Larger: MSS SP-67; rated at 200 PSI CWP; lubricated plug type, with cast iron body, single gland, wrench operated, and flanged ends.

7. Check Valves:

a. Swing Check Valves, (Hammond UP904), 2-Inch and Smaller: MSS SP-80; Ultra-pure, 125 lb, threaded ends, cast-bronze body and cap conforming to ASTM B62; with horizontal swing, and brass disc.

8. Hose Bibbs: Shall be Acorn or approved equal.

a. Hose bibbs shall be bronze body with chrome or nickel plated finish, with renewable composition disc, have loose key 3/4" hose end with 3/4" female inlet and vacuum breaker. Vacuum breaker shall conform to ASSE Standard 1011 with finish to match hose bibb.

b. Recessed Hose Bibbs: See schedule on drawings.

9. Combination Temperature and Pressure Relief Valves: Shall be McDonald, Watts, or approved equal, bronze body, test lever, thermostat, complying with ANSI Z21.22 listing requirements for temperature discharge capacity. Relief valves shall be factory set for 210 degree F. and 150 p.s.i. pressure. Relief valves shall be type as recommended by water heater manufacturer.

10. Trap Primers: Provide where indicated on drawings of type as specified in equipment schedule complying with ASSE 1018. Install behind access panel.

11. Gas Pressure Regulators: Shall be of the manufacturer, model and sizes as indicated on the drawings. Regulators installed in vaults shall be entirely corrosion proof and approved by the Gas Company.

D. Traps, Strainers and Tailpieces: Every sanitary fixture, unless otherwise specified, shall be provided with a seventeen (17) gauge tailpiece chromium tailpiece, a Los Angeles pattern chrome plated cast-brass trap, and wall flanges. Provide chromium plated brass casing between the trap and wall flanges with each fixture. All sanitary waste system floor drains and floor sinks shall have cast iron "P" traps.

E. Cleanouts: Shall be J.R. Smith, Zurn or Josam.

1. General: Provide cast-iron ferrule and countersunk brass clean-out plug with round cast iron access frame and heavy duty secured top cover.
2. Wall Cleanouts: Zurn No. Z-1468 for steel pipe and Zurn No. Z-1446-NH for cast iron pipe.
3. Floor Cleanouts: Zurn No. ZN-1400-NH, watertight ABS bronze plug and polished nickel bronze top.
4. Cleanouts to Grade: Zurn Heavy Duty Clean-out Housing ZN-1474-SG-IN with bronze plug set flush with surface for concrete areas. Asphalt or non-surfaced areas shall be installed with ring of concrete poured around the bottom flange six inches (6") below surface. Use cast iron soil pipe on cleanout risers. For cleanouts in non-traffic areas, terminate cleanout plug in concrete yard box.

F. Access Panels: Wall access panels shall be minimum 12" x 12" for concealed valves and other equipment unless otherwise specified or indicated. Ceiling access panels shall be 18" x 18" minimum.
1. Wall Panels: Elmdor, DW 12" X 12"– AKL, 14-gage Stainless Steel, Allen Key Latch, for all tile walls and dry wall walls in toilet rooms. Access panels in dry wall walls in general areas shall be prime coated steel.
2. Ceiling Panels Elmdor, DW 18" X 18" –SS-AKL, prime coated steel, type as required for plaster, or dry wall ceilings. Allen Key Latch.
3. Fire Rated Walls: Elmdor, FR 12" X 12" –SS-CL, for all Fire rated tile walls and dry walls in toilet rooms. Fire rated access panels in dry wall. Walls in general areas shall be prime coated steel. Cylinder Lock.

G. Yard Boxes: For service shut-off valves on gas and domestic water and for cleanouts, shall be Brooks Products or Fraser Cement Products Co., concrete type with cast iron cover and name of service clearly marked on cover. Box shall be of size to permit easy removal of valve assembly.

H. Roof Flashing: Provide for all pipe penetrations through roof a Elmdor / Stoneman No. 1100-4, one (1) piece, six (6) pound, series with cast iron counter flashing. Seal joint between flashing and pipe with waterproofing compound.

I. Escutcheons: Shall be chrome plated cast brass with set screw locking device.

J. Water Hammer Arresters: Shall be provided where indicated on drawings of type indicated on equipment schedule and shall be sized per the manufacturer's recommendations. Install behind access panel.

K. Dielectric Union Isolators: Where incompatible materials come in contact, isolate from each other with material best suited for the characteristics of materials to be isolated. Dielectric union isolator for connection piping or non-compatible materials shall be of standard commercial design with threaded connections.

L. Pipe Supports: Unless otherwise indicated on the drawings, shall be as follows:
1. The Contractor shall furnish and install all miscellaneous iron work including angles, channels, etc., required to appropriately support the various piping systems. Hanger spacing and location shall conform to California Plumbing Code requirements.
2. All horizontal runs of piping within the building, except for copper water supply stub-outs at fixtures and copper supply headers within walls, to be supported from the structural framing with steel rods and split ring hangers: B-Line, Grinnell Company, Tolco, or approved equal. Copper stub-outs and copper headers within walls to be supported from the wall framing with Holdrite pipe hangers and supports as specified at item O.9., below. Steel rods shall be secured to overhead framing with

side beam connectors. Where necessary, install angle iron between framing to accommodate hanger rods. Where several pipes are running together, Unistrut, B-Line, or Powerstrut channels with clamps may be used in lieu of individual pipe hangers, and supported from structure as herein specified. Submit test data for type of hanger supports to be provided. For support conditions other than specified herein, the Contractor shall submit method of support for approval prior to any installation.

3. Makeshift, field devised methods of plumbing pipe support, such as with the use of scrap framing materials, are not allowed. Support and positioning of piping shall be by means of engineered methods that comply with IAPMO PS 42-96. These shall be Hubbard Enterprises/HOLDRITE support systems or County-approved equivalent.

4. Horizontal Piping Hangers and Supports:
   a. General: Provide factory fabricated horizontal hangers and supports complying with one of the following MSS types listed to suit horizontal piping systems, in accordance with MSS SP-69, IAPMO PS 42, and manufacturer's published information. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for copper-piping systems.
      1) Adjustable Steel Clevis Hangers: (MSS Type 1) B-Line B 3100
      2) Adjustable Swivel Pipe Rings: (MSS Type 5) B-Line B 3690
      3) Split Ring: (MSS Type 11)
      4) Pipe Alignment and Support Brackets: (Per IAPMO PS 42) HOLDRITE products (see section O.9.)

5. Vertical-Piping Clamps:
   a. General: Provide factory fabricated vertical-piping clamps complying with the following types listed, to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe. Provide copper-plated clamps for copper-piping systems.
   b. Two-Bolt Riser Clamps: (MSS Type 8) B-Line B3373
   c. For vertical mid-span supports of piping 4" and under, use Hubbard Enterprises/HOLDRITE Stout Brackets™ with Hubbard Enterprises/HOLDRITE Stout Clamps or two-hole pipe clamps (MSS Type 26).

6. Hanger-Rod Attachments:
   a. General: Provide factory fabricated hanger-rod attachments B-Line, Tolco or approved equal, selected by Installer to suit horizontal-piping hangers and building attachments, in accordance with MSS SP-58 and manufacturer's published product information. Select size of hanger-rod attachment to suit hanger rods. Provide copper-plated hanger-rod attachments for copper-piping systems.
   b. Side beam eye socket, Tolco Fig. #57 for rod sizes 3/8" dia. and Tolco Fig. #25-30-251 for rod sizes 1/2" dia.

7. Building Attachments:
   a. General: Provide factory fabricated building attachments, selected by Installer to suit building structural framing conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size

of building attachments to suit hanger rods. Provide copper-plated building attachments for copper-piping systems.

b. For existing concrete construction, provide expansion shields.

8. Hanger Rods and Spacing shall conform to the following table:

Pipe Sizes	Spacing	Rods
2 Inch and Smaller	6 Feet	3/8 Inch
2-1/2 Inch to 3 Inch	8 Feet	1/2 Inch
4 Inch and larger	8 Feet	5/8 Inch

9. Hangers and Supports shall be adequate to maintain alignment and prevent sagging and shall be placed within 18 inches of joint. Support shall be provided at each horizontal branch connection.

10. When securing copper water supply piping directly to the DWV piping or to the wall framing (horizontal water headers and fixture stub-outs), the following copper-plated components of the "HOLDRITE" system are to be used as a support system:
    a. For positioning supply/flush valve for wall-hung water closet, use model 114C (attaches to carrier) and 114C-EXT (extension for above, e.g., for fixtures to be used by handicapped).
    b. For attachment to wall framing, use models 101-26, 102-26.

11. Provide lateral bracing as manufactured by B-Line or approved equal for all piping to prevent swaying or movement in accordance with SMACNA "Guidelines for Seismic Restraints of Piping Systems". Piping smaller than indicated in the guidelines shall be provided with bracing as specified for the smallest size indicated. The entire water distribution system shall be properly braced and will not move due to the action of quick closing of valves.

12. Miscellaneous Supports, Wall Brackets, Etc.: Provide where required in accordance with the best standard practices of the trade. Submit shop drawings for all fabricated supports where engineered supports are not available.

13. Isolators: All water piping shall be installed with a manufactured type isolator. Isolators shall be B-Line vibra clamp and cushion, Super Strut, Stoneman, "Trisolator", or approved equal. Piping shall be installed and supported in a manner to provide for expansion without strains. Guides shall be properly installed to ensure this requirement.

14. Shields:
    a. General: Provide 20 gauge galvanized sheet metal shields at piping hangers for all insulated piping. Size shields for exact fit to mate with pipe insulation.

15. Roof Mounted Piping: Pipe supports installed on roof shall be as manufactured by Mapa Products Model MS-12, Portable Pipe Hangers Inc., Model No. PP10 or approved equal. Support shall include all required clamps and devices for a complete system. Secure base of pipe support in adhesive on square roof pad in accordance with manufacturer's installation instructions. Proposed installation procedure shall have approval of roofing contractor.

M. Insulation:

1. Hot and Tempered Water Pipe Insulation: All hot and tempered water supply and return piping, except exposed connections to plumbing fixtures, flanges and unions shall be insulated with "ASTM C547, Class I, "Johns Manville" "Micro-Lock" 850-APT, Owens-Corning Fiberglass Corp., ASJ/SL-11 or approved equal, 1" thick for sizes up to 2" and 1-1/2" thick for sizes 2" and larger. Insulated piping exposed in occupied areas and equipment rooms shall be covered with "Childers" 0.016 inch thick aluminum jacket installed per manufacturer's recommendations. Insulation shall have a flame spread of not more than 25 and a smoke density not exceeding 50 per 2007 CMC Sec. 1201.2.1.8.
2. Condensate Pipe Insulation: All condensate piping within building shall be insulated with IMCOA "IMCOLOCK" pre-split, pre-glued pipe insulation, 1/2 inch thick. Insulation shall have a flame spread of not more than 25 and a smoke density not exceeding 50 per 2007 CMC Sec. 1201.2.1.8.
3. Indirect Waste Pipe Insulation: All indirect waste drains from refrigerated kitchen equipment shall be insulated with "Armstrong" "Armoflex" insulating tape.
4. All insulation shall be continuous through supports and hangers, except at fixture stub-out support locations.
5. All fixtures that are accessible shall have an off-set grid drain permitting the trap to be installed flush with the wall. In addition provide PROWRAP insulation kit for exposed hot water pipe, tailpiece, and trap as manufactured by MCGUIRE, and secured per manufacturers recommendations.

N. Equipment and Fixtures:
1. See schedule on drawings.
2. Fixtures:
   a. Accessible plumbing fixtures shall comply with all of the requirements of CBC Section 1115B. Heights and location of all fixtures shall be as indicated on construction documents and according to CBC Section 1115B.4 and Table 1115B-1. Fixture controls shall comply with CBC Chapter 15 CBC Section 1115B.4.4.4 for Showers, 1115B4.3.1 for lavatories, 1115B4.1.5 for Toilets and 1115B.4.2.3 for Urinals.
   b. Plumbing fixtures shall be as manufactured by American Standard or Kohler and as noted on the drawings. Drinking fountains shall be as manufactured by Haws. Sink and lavatory faucets shall be Chicago. Push-Type faucets. Lever-Operated and electronically controlled mechanisms are acceptable (controls to be operable with one hand: no tight grasping, pinching or twisting of the wrist). Force to activate controls to be no greater than 5 lbs. CBC 1115B.2.2.1. Self closing valves shall remain open for at least 10 seconds. CBC 115B.2.1.2.1.
   c. Furnish complete with necessary trim, including stops. All trim and fittings shall be chrome plated brass including handles, supply tailpieces, traps and escutcheons.
   d. Connections to fixtures shall be in accordance with code requirements except as exceeded herein or on the drawings and in no case less than the supply stop size.
   e. All plumbing fixture faucets submitted for review shall have identification label or certification showing compliance with California TITLE 24, PART 5, ARTICLE I, "Energy Conservation Standards". ARTICLE I, T20-1406; ARTICLE 2, T20-1525 and ARTICLE 4, 1604 and 1606.
   f. Minimum waste sizes shall be four inch (4") for water closets and two inch (2") for lavatories.
   g. Steel plate supports shall be provided for all wall hung fixtures. Supports shall be 3/8 inch thick x 6 inch wide steel plates recessed and lag screwed to wood studs or welded to steel studs and tapped for fixture bolts. Length

and number of plates as required to satisfactorily support the fixtures installed.

h. Sinks shall not exceed 6-1/2" in depth, CBC Section 1115B.4.7.1.

O. Water Heaters: (See equipment schedule on drawings) (ASHRAE 90.1 Std. Compliance)

P. Air Compressor and Storage Tank:

1. Furnish, install and put into operation the air compressor and storage tank unit as shown on the drawings and as herein specified. The unit shall be of the make and model as indicated on the drawings or approved equal. The complete unit shall be bolted to the floor and provided with seismic braces.

2. The unit shall have centrifugal pressure release for "load free" starting and automatic switch to start and stop at preset minimum and maximum pressure limits.

3. The unit shall be complete with the following accessories mounted on the unit:

a. Completely enclosed, CAL OSHA approved belt guard.
b. Safety valve.
c. Pressure gauge.
d. Drain valve.
e. Pressure switch.

Q. Compressed Air Systems:

1. Materials and Products:

a. General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections. Provide fittings of materials, which match pipe materials used in compressed air systems. Where more than one type of materials or products is indicated, selection is Installer's option.

2. Compressed Air Pipes and Pipe Fittings (as specified hereinbefore):

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

A. Locations and Accessibility: Install equipment for ease of maintenance and repair. If changes in the indicated locations or arrangements are made by the Contractor, they shall be made without additional charges.

B. Openings: Furnish information to the other trades on size and location of openings which are required in walls, slabs, roof, for piping and equipment at the proper times.

C. Closing-In of Uninspected Work: Do not allow or cause any of the work to be covered up or enclosed until it has been inspected, tested, and accepted by the Architect. Any work enclosed or covered prior to such inspection and test shall be uncovered and, after it has been inspected, tested, and approved, make all repairs with such materials as may be necessary to restore all work, including that of other trades, to its original and proper condition.

D. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact locations and depth of existing utility and service lines to which he is going to connect. Should existing conditions prevent for installation of piping as detailed on drawings or to make connection in manner indicated, Contractor shall confer with the Architect, County's representative and Engineer for Direction.

E. Excavation, Trenching and Backfill: Do all necessary trench excavation, shoring, backfilling and compaction required for the proper laying of the pipe lines. Remove all surplus earth materials from site.

1. Backfill shall be clean soil free from rocks and debris. Compact to ninety percent (90%) of surrounding soil. All piping both inside and outside of building shall be installed in a minimum 6" sand bed and covered with 6" of sand prior to backfill. Continue backfill with materials free of rocks and debris, properly moistened and mechanically tapered and compacted to 90% of surrounding soil. Compaction by flooding or jetting is expressly prohibited.
2. Water, soil and waste piping shall have twenty-four (24") of cover minimum, fire main shall have thirty six (36") of cover except all PVC pipe material and all gas piping shall have thirty (30") of cover minimum. All other pipe shall have not less than eighteen inches (18") of cover, unless otherwise noted on the drawings. Offset gas and water piping as required to permit crossover of underground piping systems, and electrical conduit systems.
3. Bottoms of Trenches: Cut to grade and excavate bell holes to ensure the pipes bearing for their entire length upon the outside periphery of the lower third of the pipe.
4. Water piping shall not be run in the same trench with sewer or drainage piping unless separated as required by the UPC as follows. The bottom of the water pipe at all points shall be at least twelve (12) inches above the top of the sewer or drain line. The water pipe shall be placed on a solid shelf excavated at one side of the common trench with a minimum clear horizontal distance of at least twelve (12) inches from the sewer or drain line.
5. No piping shall run in, through or above any electrical equipment rooms or spaces at any time.
6. Horizontal soil and waste piping shall be installed to a uniform grade of not less than one-fourth inch (1/4") per foot, unless otherwise indicated or directed.

F. Piping Installation:

1. All piping shall be concealed in finished portion of the building except where otherwise indicated or directed at the time the work is done. All piping shall be installed to clear all framing members and beams, even if drawings do not indicate same. Contractor shall constantly check the work of other trades so as to prevent any interference with the installation of this work.
2. All piping into stem walls and footings shall be double half lap wrapped with 1/8" thick "Armoflex" insulation. The Contractor shall also provide blocked out areas in stem wall and footing as required for the installation of the piping. All piping shall avoid the lower 8" of the footing and the Contractor shall coordinate and provide dropped footings as required for the installation of the underground piping.
3. Unions shall be installed on one side of all screwed shut-off valves, at both sides of screwed automatic valves and on all by-passes, at all equipment connections and elsewhere as indicated or required for ease of installation and dismantling.
4. Connections between copper tubing and equipment shall be with Mueller Brass Company, or approved equal, brass stream line copper to P.P.S. ground joint unions.
5. Corrosion Protection:
   a. All underground metallic piping such as cast iron (soil & storm drain), ductile iron (fire protection), or copper (Water) located both inside and

outside of the building shall be encased within a minimum of 10 mil polyethylene plastic sleeve.

b. All underground metallic valves, unions, fittings, flanges, bolts & appurtenances that are unable to be encased within sleeve as noted above shall be protected as follows.

1) Provide heavy coating of "Henrys" oil base roof mastic over entire exposed surface.

2) After mastic coating is completed and inspected, wrap entire metallic component with a minimum of 10 mil. polyethylene wrap overlapped 50% of the circumference and extended beyond ends of component as required for polyethylene to be secured to piping. The overlap seam shall be located to avoid backfill material from entering the encapsulated area. The ends and seam of the of the polyethylene material shall be secured to the piping and sealed with 3M Scotch/Wrap N. 50, 10 mil., 2" wide, printed, pipe wrap sealing tape.

3) The mastic coating shall be inspected and approved prior to the finish application of the polyethylene material, which shall also be inspected.

G. Sleeves: Shall be schedule 40 galvanized steel where pipes pass through concrete foundation walls and 22 gauge galvanized sheet metal in all other walls, floors and partitions.

1. Isolate pipes through ground floor slabs with double wrap Kraft paper, unless pipe sleeves as specified above as indicated or required by code..
2. Pack space between pipe and sleeves with ceramic fiber rope so as to be absolutely watertight.
3. All sleeve penetrations in or through fire rated stud walls, ceilings or floors shall be protected & sealed per U.L. Fire Resistance System No. WL1001 for uninsulated pipe and No. WL5039 for insulated pipe. All sleeve penetrations in or through fire rated concrete/masonry walls, ceilings or floors shall be protected and sealed per U.L. Fire Resistance System No. C-AJ-1116 for un-insulation pipe and No. C-AJ-5002 for insulated pipe. See architectural plans for all locations of rated walls and other fire rated assemblies.
4. Hanger rods required to pass through fire rated finished ceilings shall be protected as specified here in above and an escutcheon plate provided at face of penetration.

H. Contraction and Expansion: Install all work in such a manner that its contraction and expansion will not do any damage to the pipes, the connected equipment, or the building. Install offsets, swing joints, expansion joints, seismic joints, anchors, etc., as required to prevent excessive strains in the pipe work. All supports shall be installed to permit the materials to contract and expand freely without putting any strain or stress on any part of the system. Provide anchors as necessary.

I. Pipe Joints and Connections:

1. Copper Tubing and Brass Pipe with Threadless Fittings:

a. Solder joints for copper shall be made with 95/5 lead free solder in accordance with manufacturer's recommendations for the service intended and shall be NSF/61 certified approved.

b. Use threaded adapters on copper tubing where threaded connections are required.

2. Welded Joints: All welding to be performed by welders certified as passing ASME Boiler and Pressure Code (Section IX) and shall comply with ASME Std. B31.1.0 and the American Welding Society, Welding Handbook.

J. All closet bends shall be adequately blocked and secured. Trap arms and similar connections installed below the floor level or under concrete slabs shall be adequately supported and anchored to prevent motion in any direction. All piping installed above grade within buildings shall be secured to structural framing with Unistrut or pipe clamps to provide a rigid installation. Piping utilizing gaskets as a seal shall be given prime consideration to providing adequate stability through proper supports and anchors because of its flexible nature.

K. Flexible piping of any kind will not be permitted except when indicated on drawings provide Dormont Safety System, flexible pipe appliance connector series 40, 50 & 60, female union, male nipple and grey PVC coated, CSA certified gas appliance connections. Kitchen gas appliances shall be connected with Dormont Deluxe gas connector kit with antimicrobial coating.

L. Each pipe penetration of the roof shall be separated from other piping and any roof equipment by a minimum of 18" to insure a proper pipe flashing installation.

M. Floor, Wall and Ceiling Plates: Where pipes pierce finished surfaces, C.P. brass split flanges with set screw lock shall be provided.

N. Roof Flashings: Extend pipe a minimum of seven inches (7") above finished roof line, except where a vandal proof hood is required in which case pipe shall extend to a height required to receive the hood and also where specifically required to exceed this dimension by the local authority due to snow conditions.

O. Installation of Plumbing Fixtures:
   1. Install each fixture at the exact height and location shown on the Architectural Drawings.
   2. Set fixtures, supplies, trap and trap outlet square with the wall, in line with fixture outlets without any offsets, angles, or bends.
   3. Grout joint between the fixtures and the walls or floors with polysulfide or silicone sealant to be smooth, even and watertight.
   4. Watertight joints for drainage connections to all fixtures shall be made in accordance with the California Plumbing Code.

P. Completion of Installation:
   1. Cleaning and Flushing: Clean all equipment and materials thoroughly. Leave surface to be painted smooth and clean, ready for painting.
   2. Flush each unit of water supply and distribution system thoroughly with clean water at the highest velocities attainable.
   3. Clean all piping, valves, traps, water heaters, fixtures and other devices thoroughly and flush or blow out until free of scale, oil silt, sand, sediment, pipe dope and foreign matter of any kind.
   4. Compressed Air: Remove all terminal units and flush all piping with compressed air.

3.02 CUTTING & PATCHING (See Division I)

A. The cutting and patching of existing construction shall be coordinated in advance of the work.

B. Where required to remove, cut or core drill existing building walls, partitions, floors, ceilings and roof and outdoor paved and landscaped areas in order to install the work as indicated, the Contractor shall cut and patch existing construction to match adjacent areas in a manner that will not result in visual evidence of any cutting or patching. The materials, finishes and

methods of installation shall match the existing adjacent surfaces and shall be in accordance with the requirements of other applicable sections of these specifications.

C. Unless specified on structural drawings, any alterations or modifications to a structural element by cutting, drilling, boring, bracing, welding, etc., shall have written approval by Structural Engineer of record prior to start of work.

3.03 STERILIZATION OF DOMESTIC WATER LINES

A. Sterilize water lines by filling with a solution containing fifty (50) parts of chlorine per million parts water and holding the solution therein for at least twenty-four (24) hours with a water head of at least five feet (5') above the highest point in the system. Unless otherwise directed, thoroughly flush each line prior to sterilization. Introduction of sterilizing solution or materials into the lines shall be such as to provide thorough and uniform distribution throughout the system.

B. Operate all valves during the retention period. Following retention period, the heavy chlorinated water shall be flushed from the system with clean water.

C. Continue flushing until the residual chlorine at the end of 24 hours does not exceed the chlorine residual in the flushing water.

D. All work and certification of performance must be done by an approved laboratory utilizing qualified applications and personnel. Submit certification to County after completion.

3.04 TESTING

A. No piping work shall be concealed or covered until piping has been tested, inspected and approved by the Inspector. All piping for plumbing systems shall be completely installed and tested as required by the California Plumbing Code. Test pressures and times indicated are a minimum only. All tests shall be as required by the governing authority as well.

Schedule of Test Pressures:

System Tested	Gauge	Test	Duration
Water	100 Pounds or 1½ times working pressure whichever is greater.	Water	4 Hours
Gas	60 Pounds	Air	4 Hours
Air	150 Pounds	Air	4 Hours
Waste, Vent & Storm Drain	Per California Plumbing Code (Minimum 10 Feet of Head)		

3.05 OPERATION INSTRUCTION

A. Prior to occupancy or prior to the date of final inspection, whichever may occur first, the Contractor shall prepare two (2) sets of typewritten instructions for the operation of all equipment, valves, etc., specified and furnished as a part of the work under this section, and shall assign a competent person, thoroughly familiar with the job, to demonstrate and instruct a representative of the County in the operation of the equipment. The time of said demonstration and instructions shall be arranged with the County's representative approximately one (1) week in advance. Verbal instructions shall include shut-off location of

gas and water. The Contractor shall assemble all operation and maintenance data supplied by the manufacturers of the various pieces of equipment, all keys and special wrenches required to operate and service the equipment (including keys for yard boxes, gas stops and fixture stops), and all equipment warranties and deliver same to the representative of the County on date of said instructions.

3.06 PIPE AND EQUIPMENT IDENTIFICATION

A. Each operating and service line shut-off valve shall be identified by a 19 ga. brass tag with stamped, engraved type of service identified, complete with hole and brass chain mounted on valve stem or handle. Tag shall be a minimum of one and one-half inch (1½ ") in diameter. The contractor shall provide valve chart (framed and mounted in Janitor Room) with size, type and location of all shutoff valves. Valves shall be numbered to match corresponding valve tag.

B. Access Panel Markers: Provide manufacturers standard 1/16 inch thick engraved plastic laminate marker, with abbreviations and numbers corresponding to concealed valve.

C. Provide on exterior wall of each building opposite the building's main gas service a sign reading "Gas Shut Off". Sign shall be metal with minimum 1½ " high embossed letters.

D. All equipment shall be provided with name plate indicating all pertinent information on it.

E. Manufacturer's (Seton or Bradt) standard permanent, bright colored, continuous printed plastic tape, intended for direct-burial piping. Tape shall be not less than 6 inches wide x 4 mils thick. Provide multi-ply tape consisting of solid aluminum foil core indicating type of service of buried pipe between two layers of plastic tape. The warning plastic (service identified) tape shall be placed one (1) foot above all buried pipe.

END OF SECTION

SECTION 15600

AUTOMATIC FIRE SPRINKLERS

DIVISION I REQUIREMENTS ARE A PART OF THIS SECTION.

PART 1 GENERAL

General Provisions of the Contract Documents to be included but not necessarily limited to General Conditions, Supplementary Conditions and sections of Division One of this project manual.

1.01 SCOPE

A. Furnish all labor, materials, services, testing, transportation and equipment necessary for the proper and satisfactory installation of the automatic fire protection systems as specified herein.

B. This specification is intended to establish the required performance and quality of the work necessary to provide for a complete automatic sprinkler systems to serve all of the buildings on the site. The point of connection for sprinkler system shall be at the riser flange approximately 6 inches above finish floor within the building.

C. Work or equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided by this contractor and incorporated under this Section of the work at no additional cost to the County.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Plumbing

B. Electrical Work

C. Painting

1.03 QUALITY ASSURANCE

A. Code Requirements: All work covered by this Section shall conform to applicable ordinances of the City of Orange including the City of Orange Fire Department, the latest requirements of the National Fire Protection Association 2002 Edition, NFPA 13. The design shall conform to Uniform Fire Code with California Amendments and CBC Chapter 9 Fire Protection Systems. 2007 California Fire Code, Part 9, Five Protection Systems, Title 24, 2007 California Code of Regulations (CCR).

B. UL and FM Compliance: Fire protection system materials and components shall be Underwriter's Laboratories listed and labeled, and Factory Mutual approved for the application anticipated.

C. Permits and Inspections: The Contractor must obtain and pay all fees for permits, licenses, inspections, etc., which are required by all legally constituted authorities and shall deliver all certificates to the County.

1.04 GENERAL REQUIREMENTS

A. It shall be the Contractor's responsibility to provide a complete automatic fire sprinkler system in complete conformance with the governing agencies mentioned herein. The contract drawings indicate only the main fire line riser location and suggested routing for mains and branches. It shall be this Contractor's complete responsibility to prepare drawings indicating the entire automatic fire sprinkler system.

B. Arrangement, size, location and quantity of service, riser and appurtenances indicated on the drawings is suggested as a minimum requirement only. It shall be this Contractor's responsibility to verify the exact requirements of the governing agencies and include these items in the bid. Piping sizes indicated are to be considered as a minimum and where sizes are not indicated the Contractor shall provide the sizes as necessary to meet the code requirements. Any variation from the drawings and specifications and/or piping or equipment relocation shall be approved by the Architect prior to bid.

C. Prior to installation of any work, the Contractor shall carefully prepare complete working drawings of the automatic fire sprinkler system. The Contractor shall examine the Structural, Architectural, Mechanical, Plumbing and Electrical Drawings for the construction of the building in order to fully inform himself as to the scope and detail for the work which will be required of him before proceeding with the design and preparation of the final working drawings. Submit for approval to the City of Orange Fire Department completed working drawings. All sprinkler head locations shall be carefully coordinated with the lighting and diffuser systems to provide a symmetrical appearance.

1.05 PERMITS, LICENSES AND INSPECTIONS

A. Permits and Inspections: This Contractor must obtain and pay all fees for permits, licenses, inspections, etc., which are required by all legally constituted authorities and shall deliver all certificates to the County.

B. Installing Contractor shall have a California C-16 license.

1.06 EXAMINATION OF PREMISES

A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work under this section of the specifications, the Contractor shall be deemed to have made such study and examination and that he is familiar with and accepts all conditions of the site.

1.07 COORDINATION

A. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid confliction and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

B. Piping runs found to be in conflict with work of other trades, as a result of neglected coordination, shall be removed and reinstalled in new locations designated by the Architect at no additional expense to the County.