

# PLUMBING SPECIFICATIONS

## DIVISION 22 PLUMBING

### 22 05 00 BASIC PLUMBING REQUIREMENTS

- A. SEE DIVISION 00 PROCUREMENT AND CONTRACTING AND DIVISION 01 GENERAL REQUIREMENT FOR ADDITIONAL REQUIREMENTS.
- B. PLUMBING CONTRACTOR SHALL VERIFY REQUIREMENTS FOR TEMPORARY WATER WITH GENERAL CONTRACTOR AND INCLUDE IN HIS SCOPE OF WORK WHEN DIRECTED BY G.C.. INSTALL IN ACCORDANCE WITH ALL CODE AND OSHA REQUIREMENTS FOR CONSTRUCTION PROJECTS.
- C. SUBSTITUTIONS
  1. SEE DIVISION 01 23 00 PRODUCT SUBSTITUTION PROCEDURES FOR ADDITIONAL REQUIREMENTS.
  2. CONTRACTOR SHALL PROVIDE ALL SUPPORTING DATA AND ASSUME THE BURDEN OF PROOF THAT ANY SUBSTITUTE IS EQUIVALENT AS TO APPEARANCE, CONSTRUCTION, CAPACITY, AND PERFORMANCE. THE JUDGMENT OF EQUIVALENCE SHALL BE MADE BY THE ENGINEER AT THE TIME OF SHOP DRAWING REVIEW, NOT DURING BIDDING.
  3. WHERE SUBSTITUTE EQUIPMENT REQUIRES REDESIGN OF ANY PART OF THE PROJECT, THE COST OF REDESIGN AND ADDITIONAL COSTS OF THE WORK SHALL BE PAID BY THE CONTRACTOR. REDESIGN SHALL BE SUBJECT TO THE APPROVAL OF ALL AUTHORITIES HAVING JURISDICTION OVER THE WORK INCLUDING THE ARCHITECT/ENGINEER.
  4. CONTRACTOR SHALL ASSUME ALL COORDINATION RESPONSIBILITIES FOR SUBSTITUTE EQUIPMENT INCLUDING COORDINATION ACROSS TRADES AND COORDINATION OF PREVIOUSLY REVIEWED AND APPROVED SHOP DRAWING SUBMITTALS, SHOULD THESE SHOP DRAWINGS BE AFFECTED BY THE SUBSTITUTED EQUIPMENT.
- D. SHOP DRAWINGS, PRODUCT DATA, TEST RESULTS AND SAMPLE SUBMITTALS:
  1. SEE DIVISION 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES FOR ADDITIONAL REQUIREMENTS
  2. PLUMBING CONSTRUCTION ADMINISTRATION SUBMITTAL LIST:
    - a. PIPING
    - b. PIPE IDENTIFICATION
    - c. FIXTURES
    - d. INSULATION
    - e. HANGERS
    - f. DRAINS AND CLEANOUTS
    - g. VALVES
    - h. BACKFLOW PREVENTERS
    - i. WATER HEATERS
    - j. PUMPS
    - k. SEWAGE EJECTORS
  3. PROJECT CLOSOUT
    - a. PROVIDE PLUMBING EQUIPMENT OPERATING AND MAINTENANCE MANUALS TO THE OWNER PER IECC C303.3 AND C408.2.5.1.
    - b. PROVIDE RECORD DRAWINGS TO THE OWNER IN AUTOCAD FORMAT.
  4. FINISHING AND PAINTING
    1. SEE DIVISION 09 91 00 FINISH AND PAINTING FOR ADDITIONAL REQUIREMENTS.
    2. PREPARE EXPOSED PIPE, FITTINGS, SUPPORTS, AND ACCESSORIES FOR FINISH PAINTING IN ROOMS THAT WILL HAVE CEILING AND STRUCTURE PAINTED.
    3. COORDINATE WORK WITH THE PAINTERS SO THAT ALL EQUIPMENT IS INSTALLED PRIOR TO PAINTING. P.C. SHALL PAINT ITEMS IF NOT IN PLACE PRIOR TO NORMAL ROUTINE PAINTING.
    4. IF FINISH BECOMES RUSTED, CORRODED, SCRATCHED, OR FLAKED DURING STORAGE OR INSTALLATION, REFINISH THE EQUIPMENT TO THE SATISFACTION OF THE OWNER.
    5. WHERE THE PLUMBING CONTRACTOR IS REQUIRED TO PAINT, THE PAINTING SHALL BE DONE IN ACCORDANCE WITH THE PAINTING PORTION OF THE ARCHITECTURAL SPECIFICATION.
  - F. DETAILS AND SCHEDULES ARE SHOWN TO AID THE CONTRACTOR AND ARE NOT MEANT TO BE INCLUSIVE OF ALL DEVICES. PROVIDE REQUIRED EQUIPMENT AND ACCESSORIES FOR A COMPLETE INSTALLATION.
  - G. INSTALL ALL EQUIPMENT PER MANUFACTURER'S INSTALLATION INSTRUCTIONS AND REQUIREMENTS. PROVIDE ADDITIONAL WORK AND MATERIALS AS REQUIRED.
  - H. PROVIDE ALL STATE AND LOCAL PERMITS AND ANY OTHER RELATED FEES.
  - I. REGULATORY REQUIREMENTS
    1. PROVIDE CERTIFICATE OF COMPLIANCE FROM AUTHORITY HAVING JURISDICTION INDICATING APPROVAL BACKFLOW PREVENTION DEVICES INSTALLATION.
    2. PERFORM WORK PER ALL LOCAL AND STATE CODES, ORDINANCES AND REGULATIONS HAVING JURISDICTION.
  - J. COORDINATE INSTALLATION OF PLUMBING WORK WITH THE OTHER CONTRACTORS TO AVOID CONFLICTS WITH OTHER WORK.
  - K. VERIFY CONNECTION REQUIREMENTS FOR EQUIPMENT FURNISHED BY OTHERS WITH FINAL SHOP DRAWINGS.
  - L. CUTTING AND PATCHING
    1. PROVIDE ALL CUTTING AND PATCHING NECESSARY FOR PLUMBING WORK INSTALLATION UNLESS THIS WORK IS IDENTIFIED TO BE THE WORK OF OTHER CONTRACTORS. PATCHING SHALL MATCH ADJACENT SURFACES. CORE DRILL OR SAW-CUT OPENINGS THROUGH EXISTING CONCRETE.
    2. P.C. SHALL PROVIDE SAWCUTTING, EXCAVATION, AND BACKFILL OF EXISTING FLOORS AS REQUIRED FOR INSTALLATION OF NEW UNDERGROUND PIPING. P.C. SHALL PROVIDE CONCRETE AND REINFORCING PER FLOOR SLAB SPECIFICATIONS IN REMOVED AREA OF THICKNESS TO MATCH EXISTING (FIELD VERIFY). PROVIDE DOWELS INTO EXISTING FLOOR SLAB. DOWEL DIAMETER SHALL BE MINIMUM ONE EIGHTH OF FLOOR SLAB THICKNESS. DOWEL LENGTH SHALL BE 12" FOR SLABS LESS THAN 6" THICK, 16" FOR SLABS 6-7" THICK, 18" FOR SLABS 8-9" THICK, AND 20" FOR SLABS GREATER THAN 9" THICK. DOWELS SHALL BE SPACED 12" O.C. AND PENETRATION IN EXISTING SLAB SHALL BE HALF THE LENGTH.
  - M. FIRE RATED INTERIOR WALL AND FLOOR PIPE PENETRATIONS
    1. SLEEVE REQUIRED FOR PENETRATION OF CONCRETE AND MASONRY WALLS AND FLOORS.
    2. SEAL OPENING AROUND PIPE WITH A UL APPROVED FIRE-STOP SYSTEM HAVING AN F-RATING NOT LESS THAN THE HOURLY RATING OF THE ASSEMBLY BEING PENETRATED.
    3. WHERE A SLEEVE IS REQUIRED, FURNISH AND INSTALL SLEEVES FOR NEW DRYWALL WALLS AND CONCRETE WALLS AND FLOORS. FURNISH SLEEVES TO THE MASON CONTRACTOR FOR INSTALLATION IN NEW MASONRY WALLS. PROVIDE SLEEVE AND GROUT SLEEVE IN EXISTING MASONRY WALLS.
  - N. SEALANTS
    1. PLUMBING CONTRACTOR SHALL PROVIDE ALL SEALANTS WHERE JOINT IS HIDDEN AND WHERE JOINT IS EXPOSED IN MECHANICAL ROOM.
    2. SEALANT CONTRACTOR SHALL PROVIDE SEALANTS AT ALL EXPOSED LOCATIONS IN FINISHED ROOMS.
  - O. ESCUTCHEONS
    1. INSTALL ONE-PIECE (TWO PIECE FOR EXISTING PIPING) POLISHED CHROME PLATED STEEL ESCUTCHEONS AT PENETRATIONS EXPOSED IN FINISHED ROOMS (ROOMS WHICH DON'T HAVE UNFINISHED CONCRETE FLOORS).
    2. ESCUTCHEONS WITH SPRINGS FOR WALL AND CEILING LOCATIONS.
    3. ID TO CLOSELY FIT AROUND PIPE/INSULATION, SO THAT COMPLETELY COVERS THE OPENING.
    4. ESCUTCHEONS REQUIRED IN CABINETS AND CASEWORK.
  - P. PROJECT COMPLETION
    1. CLEAN FIXTURES AND EQUIPMENT AND LEAVE IN PROPER WORKING CONDITION AT THE TIME OF FINAL CLEAN-UP.
    2. REMOVE, CLEAN AND REPLACE AERATORS AFTER FLUSHING WATER SYSTEM.
    3. PROVIDE OPERATING INSTRUCTIONS FOR A TOTAL OF TWO (2) HOURS, OBTAIN A RECORD OF OPERATING INSTRUCTION PERIODS AND OBTAIN OWNER SIGNOFF THAT INSTRUCTIONS HAVE BEEN COMPLETED.
  - Q. ACCESS
    1. FURNISH ACCESS PANELS OF ADEQUATE SIZE TO PERMIT SERVICE OF EQUIPMENT, VALVES, OR OTHER SPECIALTIES WHICH REQUIRE MAINTENANCE OR ADJUSTMENT WHICH ARE INSTALLED BEHIND WALLS OR ABOVE NON-LAYIN CEILING SURFACES.
    2. PANELS SHALL BE SUITABLE FOR INSTALLATION IN THE MATERIAL FORMING THE FINISHED SURFACE. WITH FLANGED FLUSH METAL FRAME, FLUSH HINGED STEEL DOOR, FLUSH SCREWDRIVER OPERATED LATCH.
    3. PANELS UL LISTED TO CONFORM TO THE FIRE RATING OF THE SURFACE INSTALLED IN.
    4. TURN ACCESS PANEL OVER TO CONTRACTOR SKILLED IN THE CONSTRUCTION OF THE SURFACES INVOLVED FOR INSTALLATION.
    5. ARCHITECT TO APPROVE ACCESS PANEL LOCATION PRIOR TO INSTALLATION OF EQUIPMENT REQUIRING ACCESS.
    6. COORDINATE WITH THE OTHER CONTRACTORS AND WHEREVER PRACTICAL, GROUP DEVICES IN SUCH A MANNER SO AS TO MINIMIZE PANELS.

### 22 05 19 METERS AND GAUGES

- A. PRESSURE GAUGES AND THERMOMETERS

1. MANUFACTURERS: TRERICE, U.S. GAUGE, ASHCROFT, MARSH, WEISS, WEKSLER.
2. PRESSURE GAUGES
  - a. GENERAL PURPOSE: TRERICE 600CB PBF CERTIFIED LEAD FREE CAST ALUMINUM CASE, PHOSPHOR BRONZE BOURDON TUBE; TRERICE 872-1PBF LEAD FREE BRASS PRESSURE SNUBBER.
    - 1). GAUGE COCK: APOLLO 77FLF-100 LEAD FREE FULL PORT THREADED BRASS VALVE, 150 PSI SWP, 400 DEG F MAXIMUM TEMPERATURE.
3. STEM THERMOMETERS
  - a. GENERAL PURPOSE: TRERICE B39, ASTM E1, ORGANIC SPIRIT LIQUID FILL, CAST ALUMINUM CASE WITH EPOXY FINISH, CAST ALUMINUM ADJUSTABLE JOINT WITH POSITIVE LOCKING DEVICE, 9" SCALE, 3/4" NPT BRASS STEM, WITH EXTENSIONS AS REQUIRED FOR INSULATION.
  - b. PROVIDE THERMOWELL FOR ALL THERMOMETERS, BRASS IN COPPER TUBING. SIZE AND INSERTION LENGTH FOR APPLICATION. PROVIDE HEAT TRANSFER MEDIUM.
4. SCALE RANGES AND MINIMUM INCREMENT AS FOLLOWS:
  - a. COLD WATER: 0-100 PSIG/ 1 PSIG; 0-100 DEG F/ 1 DEG F
  - b. HOT WATER: 0-100 PSIG/ 1 PSIG; 0-160 DEG F/ 2 DEG F.
5. EXTEND NIPPLES TO ALLOW INSULATION CLEARANCE.
6. INSTALL WHERE READ FROM NORMAL OPERATING LEVEL.
7. CALIBRATE FOR ACCURACY.

### 22 05 29 PIPE AND EQUIPMENT HANGERS AND SUPPORTS

- A. MANUFACTURERS: B-LINE, EMPIRE INDUSTRIES, GLOBAL PIPE HANGER PRODUCTS, GRINNEL, NATIONAL PIPE HANGER, UNI STRUT.
- B. ANGLES, CHANNELS, AND BEAMS: ASTM A36 AND A572 AS REQUIRED.
- C. HANGERS SHALL NOT BE ATTACHED TO JOIST BRIDGING.
- D. ATTACHMENT TO METAL DECK: HANGERS MAY BE ANCHORED TO METAL FLOOR/ROOF DECK IF ALL THE FOLLOWING CONDITIONS ARE MET:
  1. MAXIMUM HANGER LOAD OF 50 LBS.
  2. ANCHORED TO BOTTOM OF DECK FLUTES, NOT UPPER FLUTE.
  3. ANCHOR LENGTH SHALL EXCEED DECK DEPTH.
- E. PIPE HANGERS/SUPPORTS
  1. SEE DETAILS ON PLANS FOR ADDITIONAL PIPE HANGER SPECIFICATIONS.
  2. SEE SCHEDULE ON PLANS FOR HANGER SPACING.
  3. CONFORM TO ASME B31.9 AND MANUFACTURER'S STANDARDIZATION SOCIETY (MSS) SP-58-2009.
  4. MATERIALS
    - a. V BOTTOM CLEVIS HANGER: MSS SP-58 TYPE 1, B-LINE FIGURE B3106 AND FIGURE B3106V PRE-GALVANIZED PLASTIC PIPE SUPPORT CHANNEL FOR PEX PIPING TO INCREASE HANGER SPACING.
  5. INSTALL HANGERS AND SUPPORTS SO PIPING LIVE AND DEAD LOADS AND STRESSES FROM MOVEMENT WILL NOT BE TRANSMITTED TO CONNECTED EQUIPMENT. ADJUST HANGERS TO DISTRIBUTE LOADS EQUALLY ON ATTACHMENTS AND TO PROVIDE INDICATED PIPE SLOPES.
- F. STRUT SYSTEM
  1. COMPLY WITH THE LATEST REVISION OF MFMA STANDARDS PUBLICATION NUMBER MFMA-3, "METAL FRAMING STANDARDS PUBLICATION".
  2. INSTALL STRUT IN ACCORDANCE WITH MFMA-102 "GUIDELINES FOR THE USE OF METAL FRAMING"; IN ACCORDANCE WITH EQUIPMENT MANUFACTURER'S RECOMMENDATIONS, AND WITH RECOGNIZED INDUSTRY PRACTICES.
  3. COLD FORMED LOW CARBON STEEL METAL FRAMING CHANNEL STRUT, B-LINE TYPE B CHANNEL.
  4. 1-5/8 INCHES WIDE IN VARYING HEIGHTS AND WELDED COMBINATIONS AS REQUIRED TO MEET LOAD CAPACITIES.
  5. MANUFACTURER'S STANDARD FINISH OR PLAIN FINISH.
  6. PROVIDE SUPPORT FOR UTILITY METERS IN ACCORDANCE WITH REQUIREMENTS OF UTILITY COMPANIES.

### 22 05 53 MECHANICAL IDENTIFICATION

- A. VALVE TAGS
  1. MANUFACTURERS: MARKING SERVICES, W.H. BRADY, AND SETON NAME PLATE COMPANY.
  2. 1-1/2" DIAMETER 20 GAUGE BRASS TAG WITH STAMPED BLACK LETTERS. ATTACH WITH S765 #6 SOLID BRASS BEAD CHAIN.
  3. PROVIDE TYPEWRITTEN LETTER SIZE CHART.
  4. COORDINATE VALVE TAG NOMENCLATURE/NUMBERING SEQUENCE/STARTING NUMBER WITH OWNER PRIOR TO ORDERING TAGS.
  5. ALL VALVES SHALL BE TAGGED EXCEPT DRAIN VALVES AND FIXTURE STOPS.
- B. SIGNAGE
  1. MANUFACTURERS: W.H. BRADY, MY SAFETY SIGN AND SETON NAME PLATE COMPANY.
  2. PLASTIC SIGN: MIN 4" SIDE x 2" HIGH, 1/16" THICK LAMINATE PLASTIC WITH ENGRAVED LETTERS, TWO HOLES PUNCHED, WITH VALVE CHAIN. WHITE BACKGROUND W/ RED LETTERS.
  3. PROVIDE AT MAIN WATER SHUTOFF VALVE IN ASPEN DENTAL MECHANICAL ROOM.
- C. PIPE IDENTIFICATION
  1. INDOOR SELF-ADHESIVE PIPE MARKERS
    - a. MANUFACTURERS: MARKING SERVICES MS-900, BRADY B-736, SETON OPTI-CODE.
    - b. FLEXIBLE PVC FILM WITH PRESSURE SENSITIVE ACRYLIC ADHESIVE BACKING WITH PRINTED MARKINGS.
    - c. SECURE WITH 2" WIDE TAPE WITH ARROWS INDICATING FLOW.
  2. COLOR, OVERALL SIZE AND LETTER HEIGHT SHALL CONFORM TO ASME A13.1-2007 REQUIRE FOR THE IDENTIFICATION OF PIPING SYSTEMS".
  3. IDENTIFY PIPE SERVICE, FLOW DIRECTION, AND PRESSURE.
  4. IDENTIFICATION SYSTEM SHALL MATCH CURRENT SYSTEM IN THE BUILDING. WHERE NON-EXISTS, PROVIDE PER SPECIFICATIONS.
  5. NOMENCLATURE TO MATCH NAME ON DRAWING LEGEND.
  6. LOCATIONS
    - a. LOCATE TO FACE GREATEST POINT OF VISIBILITY. ALL ADJACENT LABELS TO BE INSTALLED NEATLY IN A ROW.
    - b. LOCATE IDENTIFICATION NEXT TO FIELD SCHEDULE FOR EXPOSED PIPING.
    - c. LOCATE IDENTIFICATION NEXT TO EXPOSED 25 FEET FOR PIPING ABOVE CEILINGS.
    - d. MINIMUM CLEARANCE TO FLOOR.
    - e. IDENTIFICATION WITH TAGS AND INSULATION IS COMPLETE TO ENSURE MAXIMUM VISIBILITY OF THE IDENTIFICATION SYSTEM.
    - f. BEHIND ACCESS PANELS SHALL BE ALL OTHER ACCESSIBLE POINTS OF SERVICE.
    - g. CLEAR LOCATIONS WHERE PIPES PENETRATE WALLS, FLOORS OR CEILINGS.
    - h. TAG EACH VALVE AND CONTROL DEVICE.
    - i. AT EACH MAJOR PIECE OF EQUIPMENT.

### 22 07 00 INSULATION

- GENERAL
  1. SEE INSULATION SCHEDULES ON PLANS FOR ADDITIONAL INFORMATION.
  2. INSULATION, INSULATION SYSTEMS AND JACKETS SHALL MEET UL-723/ASTM E84 REQUIREMENTS OF MAX. FIRE HAZARD CLASSIFICATION OF 25, AND MAX. FLAME SPREAD, FUEL CONTRIBUTED, AND SMOKE DEVELOPED OF 50 WHEN INSTALLED IN RETURN AIR PLENUMS.
  3. INSTALL MATERIALS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND MICA PUBLICATION "COMMERCIAL AND INDUSTRIAL STANDARDS", 2011 SEVENTH EDITION.
  4. CONTINUE INSULATION WITHOUT INTERRUPTIONS THROUGH WALLS AND FLOOR PENETRATIONS AND HANGERS.
  5. REPAIR INSULATION ON EXISTING PIPING WHICH IS DAMAGED DUE TO CONNECTING OF NEW PIPING. MAINTAIN EXISTING VAPOR BARRIER INTEGRITY.
- B. FIBERGLASS (F.G.) INSULATION
  1. RIGID PIPING:
    - a. O.C. FIBERGLAS PIPE INSULATION, KNAUF EARTHWOOL PIPE INSULATION, JOHNS MANVILLE MICRO-LOK.
    - b. SINGLE OR DOUBLE ADHESIVE SELF-SEALING LAP SYSTEM FOR LONGITUDINAL JOINT, PRESSURE SENSITIVE BUTT STRIP SEALS, ALL SERVICE JACKET VAPOR BARRIER COVERING.
    - c. 3.5-5.5 LB./CU.FT., R=4.3 / NOMINAL INCH AT 75 DEG F.
    - d. MAX 850 DEG F, JACKET MAX 150 DEG F, 0.02 PERM.
    - e. COMPRESSIVE STRENGTH AT 10% DEFORMATION 125 LB./S.F.
    - f. VALVES, FITTINGS, AND FLANGE COVERS:
      - 1). ZESTON 2000/300 SERIES, CEELCO 300 SERIES, PROTO LOSMOKE PVC JACKET
      - 2). HIGH IMPACT 30 MIL WHITE PVC WITH PRECUT FIBERGLASS INSERTS. MAX TEMP 150 DEG
  2. ELASTOMERIC FOAM INSULATION
    1. SEAL BUTT JOINTS WITH ADHESIVE.
    2. PIPE
      - a. MANUFACTURERS: AEROFLEX AEROCCEL SPST, K-FLEX INSUL-LOCK DS, ARMACELL AP/ARMAFLEX BLACK LAPSEAL.
      - b. EPDM/PVC BASE ELASTOMERIC FOAM MATERIAL
      - c. DUAL TAPE CLOSURE

- d. MAX. 'K' VALUE 0.245 AT 75 DEG F
  - e. MAX. CONTINUOUS TEMPERATURE 220 DEG F
  - f. MAX. 0.05 PERM PER ASTM E96
  - g. MAX. FIRE/SMOKE DEVELOPED OF 25/50 PER ASTM E84 FOR UP TO 2" THICK.
  - h. PROVIDE MANUFACTURER PREFORMED INSULATION OVER VALVES AND FITTINGS
  - i. FIELD CUTTING AND GLUING LONGITUDINAL JOINT NOT PERMITTED.
- D. PIPE INSULATION REQUIREMENTS
    1. INSULATE ENTIRE PIPING SYSTEM INCLUDING VALVES AND FITTINGS PER MICA INSULATION STANDARDS PLATES 10 THRU 18.
    2. SEAL ALL INSULATION ENDS.

### 22 10 00 EXCAVATION AND BACKFILL

- A. P.C. SHALL EXCAVATE AND BACKFILL TRENCHES FOR PLUMBING WORK.
- B. PROTECT TREES, PLANTS, LAWNS, AND OTHER FEATURES REMAINING AS PORTION OF FINAL LANDSCAPING.
- C. PROTECT BENCHMARKS, EXISTING STRUCTURES, FENCES, SIDEWALKS, PAVING, AND CURBS FROM EXCAVATING EQUIPMENT AND VEHICULAR TRAFFIC.
- D. MAINTAIN, PROTECT, AND TEMPORARILY SUPPORT ABOVE AND BELOW GRADE UTILITIES WHICH ARE TO REMAIN.
- E. PROVIDE AND MAINTAIN ALL FENCING, BARRICADES, SIGNS, WARNING LIGHTS, AND/OR OTHER EQUIPMENT NECESSARY TO KEEP ALL EXCAVATION PITS AND TRENCHES AND THE ENTIRE SUBGRADE AREA SAFE UNDER ALL CIRCUMSTANCES AND AT ALL TIMES. NO EXCAVATION SHALL BE LEFT UNATTENDED WITHOUT ADEQUATE PROTECTION.
- F. ELEVATIONS SHOWN ON THE PLANS ARE SUBJECT TO SUCH REVISIONS AS MAY BE NECESSARY TO FIT FIELD CONDITIONS.
- G. EXCAVATING
  1. CUT TRENCHES SUFFICIENTLY WIDE TO ENABLE INSTALLATION AND ALLOW INSPECTION. REMOVE WATER OR MATERIALS THAT INTERFERE WITH WORK.
  2. DO NOT INTERFERE WITHIN 45 DEGREE BEARING SPREAD OF FOUNDATIONS.
  3. EXCAVATE MINIMUM 4" BELOW BOTTOM OF PIPE IF STONE GREATER THAN 1" OR BEDROCK IS ENCOUNTERED.
  4. REMOVE UNSTABLE AREAS OF SUBGRADE BELOW PIPE TO MINIMUM 24" BELOW PIPE OR TO STABLE MATERIAL. BACKFILL WITH PEA GRAVEL, LIMESTONE SCREENINGS, OR EQUIVALENT AND COMPACT TO DENSITY EQUAL TO REQUIREMENTS FOR SUBSEQUENT BACKFILL MATERIAL.
  5. STOCKPILE EXCAVATED MATERIAL IN AREA DESIGNATED ON SITE AND REMOVE EXCESS MATERIAL NOT BEING USED FROM SITE.
- H. BEDDING AND BACKFILL:
  1. LINES PASSING UNDER FOUNDATIONS:
    - a. INSTALL WITH MINIMUM OF 1-1/2 INCH CLEARANCE TO CONCRETE AND ENSURE THERE IS NO DISTURBANCE OF BEARING SOIL.
    - b. BACKFILL WITH COMPACTED ENGINEER FILL PER GEOTECH REPORT.
  2. MECHANICALLY COMPACT BEDDING AND BACKFILL TO PREVENT SETTLEMENT. THE INITIAL COMPACTED LIFT TO NOT EXCEED 24" COMPACTED TO 95% DENSITY PER MODIFIED PROCTOR TEST (ASTM D-1557). SUBSEQUENT LIFTS UNDER PAVEMENTS, CURBS, WALKS AND STRUCTURES ARE NOT TO EXCEED 12" AND BE COMPACTED TO 95% DENSITY PER MODIFIED PROCTOR TEST. IN ALL OTHER AREAS WHERE CONSTRUCTION ABOVE THE EXCAVATION IS NOT ANTICIPATED WITHIN 2 YEARS, MECHANICALLY COMPACT BACKFILL IN LIFTS NOT EXCEEDING 24" TO 90% DENSITY PER MODIFIED PROCTOR TEST.
  3. MAINTAIN OPTIMUM MOISTURE CONTENT OF FILL MATERIAL TO ATTAIN REQUIRED COMPACTION DENSITY.
  4. BEDDING: WHERE OVEREXCAVATED, BRING BACK TO BOTTOM OF PIPE ELEVATION WITH DRY SAND, GRAVEL OR CRUSHED STONE PASSING A 3/4" SIEVE.
  5. BACKFILL TO A DEPTH OF 12" OVER PIPE WITH SAND, CRUSHED STONE THAT PASSES A 1" SIEVE. PLACE IN WELL TAMPED LIFTIMUM 6" THICK FOR LENGTH OF SEWER AND WIDTH OF TRENCH.
  6. BACKFILL ABOVE 12" ABOVE PIPE:
    - a. UNDER EXISTING AND FUTURE UTILITIES: BUILDINGS: GRANULAR MATERIALS, PIT RUN SAND, GRAVEL, OR CRUSHED STONE FREE FROM LARGE STONES, ORGANIC, AND FROZEN MATERIALS.
  7. DIRECTLY EXPOSED WATER AWAY FROM STOCKPILE SITE TO PREVENT EROSION OR DETERIORATION OF MATERIALS. MOVE STOCKPILE, LEAVE AREA IN A CLEAN AND NEAT CONDITION. GRADE SITE SURFACE TO MATCH PREEXISTING SURFACE WATER.

### 22 11 00 WATER PIPING AND VALVES

- A. PIPING
  1. SEE PIPE SCHEDULE ON PLANS FOR ADDITIONAL INFORMATION.
  2. PIPING INSTALLATION
    1. FIELD VERIFY EXISTING SEWER ELEVATIONS AND SIZES BEFORE BEGINNING BUILDING ROUGH-IN AND NOTIFY THE OWNER'S REPRESENTATIVE IN WRITING OF ANY VARIATION OF THE ELEVATIONS BEFORE BEGINNING ANY SEWER AND BUILDING DRAIN WORK.
    2. DRAWINGS AND DIAGRAMS SHOW SIZE AND APPROXIMATE LOCATION OF PIPING. THE DRAWINGS SHALL NOT BE SCALED TO DETERMINE EXACT LOCATION. PROVIDE ADDITIONAL OFFSETS TO COORDINATE WITH INSTALLATION REQUIREMENTS OF OTHER SYSTEMS.
    3. ROUTE ABOVE GROUND PIPING IN ORDERLY MANNER, PARALLEL TO BUILDING STRUCTURE. OFFSET PIPE CONNECTIONS AT EQUIPMENT TO ALLOW FOR SERVICE, SUCH AS REMOVAL OF THE EQUIPMENT.
  3. INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
  4. INSTALL PIPING TO CONSERVE BUILDING SPACE AND NOT INTERFERE WITH USE OF SPACE AND OTHER WORK. GROUP PIPING WHENEVER PRACTICAL AT COMMON ELEVATIONS.
  5. INSTALL PIPING TO ALLOW FOR EXPANSION AND CONTRACTION WITHOUT STRESSING PIPE, JOINTS, OR CONNECTED EQUIPMENT WITH RESPECT TO THE BUILDING AND PLUMBING SYSTEM.
  6. PROVIDE CLEARANCE FOR INSTALLATION OF INSULATION AND ACCESS TO VALVES.
  7. PIPING INSTALLED IN EXTERIOR WALLS SHALL BE INSTALLED ON THE ROOM SIDE OF EXTERIOR WALL INSULATION AND ONLY WHEN APPROVED BY THE ENGINEER. WHEREVER POSSIBLE, AVOID ROUTING DOMESTIC WATER SUPPLY PIPING IN EXTERIOR WALLS.
  8. DO NOT ROUTE PIPING ABOVE TRANSFORMERS, PANELBOARDS, SWITCHBOARDS OR OTHER ELECTRICAL DISTRIBUTION EQUIPMENT.
  9. PROVIDE NON-CONDUCTING DIELECTRIC CONNECTIONS WHEREVER JOINTING DISSIMILAR METALS.
  10. USE ONLY NEW MATERIAL, FREE OF DEFECTS, RUST AND SCALE, AND MEETING THE LATEST REVISION OF THE ASTM SPECIFICATIONS.
  11. PREPARE EXPOSED UNFINISHED PIPE, FITTINGS, SUPPORTS, AND ACCESSORIES, READY FOR FINISH PAINTING.
  12. SLOPE PIPING AND ARRANGE SYSTEMS TO DRAIN AT LOW POINTS. USE TOP CONNECTIONS FOR TAKEOFFS TO EQUIPMENT ABOVE THE MAINS AND BOTTOM CONNECTIONS FOR TAKEOFFS TO EQUIPMENT BELOW THE MAINS.
  13. INSTALL VALVE STEM BETWEEN THE VERTICAL (UPRIGHT) OR HORIZONTAL POSITION.
  14. DO NOT SUPPORT WEIGHT OF PIPING ON VALVE.
- B. PIPING TESTING
  1. EACH TEST MUST BE WITNESSED BY THE OWNER'S REPRESENTATIVE. IF LEAKS ARE FOUND, REPAIR THE AREA WITH NEW MATERIALS AND REPEAT THE TEST. DO NOT INSULATE PIPE UNTIL IT HAS BEEN SUCCESSFULLY TESTED.
  2. MEASURE AND RECORD TEST PRESSURE AT THE HIGH POINT IN THE SYSTEM.
  3. TEST WATER DISTRIBUTION SYSTEM WITH POTABLE WATER UNDER A WATER PRESSURE OF 100 PSIG OR THE WORKING PRESSURE OF THE SYSTEM (WHICHEVER IS GREATER) FOR A PERIOD OF (4) HOURS. IF LOCAL AUTHORITIES REQUIRE MORE STRINGENT TESTING, CONTRACTOR SHALL COMPLY WITH THOSE REQUIREMENTS.
  4. WHERE NEW PIPING IS AN EXTENSION OF THE EXISTING SYSTEM, TEST THE NEW PIPING PRIOR TO CONNECTION TO THE EXISTING SYSTEM.
- C. WATER PIPING BALANCING
  1. VERIFY THAT SUFFICIENT WATER FLOW, PRESSURE AND TEMPERATURE ARE AVAILABLE AT EACH OUTLET AND EQUIPMENT CONNECTION.
  2. BALANCE CIRCULATING HOT WATER SYSTEM TO ENSURE PROPER CIRCULATION OF HOT WATER IN THE SYSTEM WITH HOT WATER AVAILABLE TO ALL FIXTURES AND CONNECTIONS.
  3. FLUSH AND DISINFECT DOMESTIC WATER SUPPLY SYSTEM AS FOLLOWS:
    1. FILL PIPING WITH POTABLE WATER AND ALLOW TO STAND FOR 24 HOURS.
    2. FLUSH EACH OUTLET BEGINNING WITH OUTLET CLOSEST TO BUILDING CONTROL VALVE AND THEN EACH SUCCESSIVE OUTLET IN THE SYSTEM.
    3. FLUSH EACH OUTLET MINIMUM 1 MINUTE AND UNTIL WATER APPEARS CLEAR AT THE OUTLET.
    4. FILL SYSTEM WITH WATER/CHLORINE SOLUTION OF 50 PPM OF CHLORINE AND LET STAND FOR 24 HOURS, OR 200 PPM FOR 3 HOURS.
  4. FLUSH WITH POTABLE WATER.
  5. REPEAT DISINFECTION IF BACTERIOLOGICAL CONTAMINATION EXISTS.
  6. PERFORM WATER QUALITY TEST IF REQUIRED BY LOCAL AUTHORITIES.
  7. IF LOCAL AUTHORITIES REQUIRE MORE STRINGENT FLUSHING AND DISINFECTION, CONTRACTOR SHALL COMPLY WITH THOSE REQUIREMENTS.

## LEGEND

NOTE: ALL SYMBOLS SHOWN MAY NOT APPEAR ON DRAWINGS.

SYM.	ABBR.	IDENTIFICATION	SYM.	ABBR.	IDENTIFICATION
<b>PIPING ACCESSORIES</b>					
—	CO	CLEAN OUT	— +	UNION	
—	WCO	WALL CLEAN OUT	—	THERMOMETER	
—	FCO	FLOOR CLEAN OUT (FLUSH)	—	PRESSURE GAUGE	
—	BFP	BACKFLOW PREVENTER	—	HB	HOSE BIBB
—	PRV	PRESSURE REDUCING VALVE	—	OD	ROOF DRAIN
—	SHUTOFF VALVE		—	OF	OVERFLOW DRAIN
—	BALANCE VALVE		—	FD	FLOOR DRAIN
—	CHECK VALVE		—	OD-R	ROOF DRAIN WITH REDUCER
—	WHA	WATER HAMMER ARRESTOR	—	HL	HEAD LAMP
—	TEST CONNECTION		—	X	FIXTURE UNIT (WATER SUPPLY OR WASTE)
—	PIPPING CAP				
<b>PIPING</b>					
—	CW	COLD WATER PIPING	—	ST	STORM PIPING
—	HW	HOT WATER PIPING	—	OF	OVERFLOW CONDUCTOR PIPING
—	HR	HEATING RETURN PIPING	—	V	VENT PIPING
—	NP	NON-POTABLE WATER PIPING	—	G	GAS PIPING
—	SOFT	SOFT WATER PIPING	—	A	AIR PIPING
—	SA	SANITARY SEWER PIPING	—	V	VACUUM PIPING
<b>MISCELLANEOUS</b>					
—	EL	ELEVATION	—	---	REMOVE EXISTING
<b>ABBREVIATIONS</b>					
VTR	VENT THRU ROOF	GC	GENERAL CONTRACTOR		
IE	INVERT ELEVATION	PC	PLUMBING CONTRACTOR		
RI	ROUGH IN	NIC	NOT IN CONTRACT		
AFF	ABOVE FINISHED FLOOR	BJ	BETWEEN JOISTS		
HC	HEATING CONTRACTOR	TJ	THRU JOISTS		
EC	ELECTRICAL CONTRACTOR	TTT	TIGHT TO STRUCTURE		
FPC	FIRE PROTECTION CONTRACTOR	TYP	TYPICAL		
ADMI	ASPEN DENTAL MANAGEMENT, INC				

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COLLABORATION

### PROJECT INFORMATION

TENANT BUILD-OUT FOR:

**ASPEN DENTAL**

660 W. LINTON BLVD., STE. 380 • DELRAY BEACH, FL 33444

PROFESSIONAL SEAL

PROFESSIONAL SEAL

### SHEET DATES

ISSUE DATE: MAY 29, 2019

### REVISIONS

NO.	DESCRIPTION

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