PLUMBING SPECIFICATIONS

DOMESTIC WATER PIPING - COPPER TUBE AND FITTINGS

A. HARD COPPER TUBE: ASTM B 88, TYPE L (ASTM B 88M, TYPE B) WATER TUBE, DRAWN TEMPER.
   1. CAST-COPPER SOLDER-JOINT FITTINGS: ASME B16.18, PRESSURE FITTINGS.
   2. WROUGHT-COPPER SOLDER-JOINT FITTINGS: ASME B16.22, WROUGHT-COPPER PRESSURE FITTINGS.
   3. BRONZE FLANGES: ASME B16.24, CLASS 150, WITH SOLDER-JOINT ENDS.
   4. COPPER UNIONS: MSS SP-123, CAST-COPPER-ALLOY, HEXAGONAL-STOCK BODY, WITH BALL-AND-SOCKET, METAL-TO-METAL SEATING SURFACES, AND SOLDER-JOINT OR THREADED ENDS.

B. SOFT COPPER TUBE: ASTM B 88, TYPE K (ASTM B 88M, TYPE A) AND ASTM B 88, TYPE L (ASTM B 88M, TYPE B) WATER TUBE, ANNEALED TEMPER.
   COPPER SOLDER-JOINT FITTINGS: ASME B16.22, WROUGHT-COPPER PRESSURE FITTINGS.
   COPPER PRESSURE-SEAL-JOINT FITTINGS:
   MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
   1. NIBCO INC.
   2. VEGA; PLUMBING AND HEATING SYSTEMS.
   NPS 2 (DN 50) AND SMALLER: WROUGHT-COPPER FITTING WITH EPDM-RUBBER O-RING SEAL IN EACH END.
   NPS 3 AND NPS 4 (DN 80 AND DN 100): CAST-BRONZE OR WROUGHT-COPPER FITTING WITH EPDM-RUBBER O-RING SEAL IN EACH END.

C. DIELECTRIC FITTINGS
   GENERAL REQUIREMENTS: ASSEMBLY OF COPPER ALLOY AND FERROUS MATERIALS WITH SEPARATING NONCONDUCTIVE INSULATING MATERIAL. INCLUDE END CONNECTIONS COMPATIBLE WITH PIPES TO BE JOINED.

D. DRAWING PLANS, SCHEMATICS, AND DIAGRAMS INDICATE GENERAL LOCATION AND ARRANGEMENT OF DOMESTIC WATER PIPING. INDICATED LOCATIONS AND ARRANGEMENTS ARE USED TO SIZE PIPE AND CALCULATE FRICTION LOSS, EXPANSION, AND OTHER DESIGN CONSIDERATIONS. INSTALL PIPING AS INDICATED UNLESS DEVIATIONS TO LAYOUT ARE APPROVED ON COORDINATION DRAWINGS.

E. INSTALL COPPER TUBING UNDER BUILDING SLAB ACCORDING TO CDA'S "COPPER TUBE HANDBOOK."

F. INSTALL SHUTOFF VALVE IMMEDIATELY UPSTREAM OF EACH DIELECTRIC FITTING.

G. INSTALL DOMESTIC WATER PIPING LEVEL WITH 0.125 PERCENT SLOPE DOWNWARD TOWARD DRAIN AND PLUMB.

H. INSTALL PIPING CONCEALED FROM VIEW AND PROTECTED FROM PHYSICAL CONTACT BY BUILDING OCCUPANTS UNLESS OTHERWISE INDICATED AND EXCEPT IN EQUIPMENT ROOMS AND SERVICE AREAS.

I. INSTALL PIPING INDICATED TO BE EXPOSED AND PIPING IN EQUIPMENT ROOMS AND SERVICE AREAS AT RIGHT ANGLES OR PARALLEL TO BUILDING WALLS. DIAGONAL RUNS ARE PROHIBITED UNLESS SPECIFICALLY INDICATED OTHERWISE.

J. INSTALL PIPING ABOVE ACCESSIBLE CEILINGS TO ALLOW SUFFICIENT SPACE FOR CEILING PANEL REMOVAL, AND COORDINATE WITH OTHER SERVICES OCCUPYING THAT SPACE.

K. INSTALL PIPING ADJACENT TO EQUIPMENT AND SPECIALTIES TO ALLOW SERVICE AND MAINTENANCE.

L. INSTALL PIPING TO PERMIT VALVE SERVICING.

M. INSTALL NIPPLES, UNIONS, SPECIAL FITTINGS, AND VALVES WITH PRESSURE RATINGS THE SAME AS OR HIGHER THAN SYSTEM PRESSURE RATING USED IN APPLICATIONS BELOW UNLESS OTHERWISE INDICATED.

N. INSTALL PIPING FREE OF SAGS AND BENDS.

O. INSTALL FITTINGS FOR CHANGES IN DIRECTION AND BRANCH CONNECTIONS.

P. INSTALL UNIONS IN COPPER TUBING AT FINAL CONNECTION TO EACH PIECE OF EQUIPMENT, MACHINE, AND SPECIALTY.

Q. INSTALL SLEEVES FOR PIPING PENETRATIONS OF WALLS, CEILINGS, AND FLOORS.

R. INSTALL ESCUTCHEONS FOR PIPING PENETRATIONS OF WALLS, CEILINGS, AND FLOORS.

S. INSTALL SHUTOFF VALVE CLOSE TO WATER MAIN ON EACH BRANCH AND RISER SERVING PLUMBING FIXTURES OR EQUIPMENT, ON EACH WATER SUPPLY TO EQUIPMENT, AND ON EACH WATER SUPPLY TO PLUMBING FIXTURES THAT DO NOT HAVE SUPPLY STOPS. USE BALL VALVES FOR PIPING NPS 2 (DN 50) AND SMALLER. USE GATE VALVES FOR PIPING NPS 2-1/2 (DN 65) AND LARGER.

T. HANGER AND SUPPORT INSTALLATION: SUPPORT VERTICAL PIPING AND TUBING AT BASE AND AT EACH FLOOR.

U. ROD DIAMETER MAY BE REDUCED ONE SIZE FOR DOUBLE-ROD HANGERS, TO A MINIMUM OF 3/8 INCH (10 MM).

V. INSTALL HANGERS FOR COPPER TUBING WITH THE FOLLOWING MAXIMUM HORIZONTAL SPACING AND MINIMUM ROD DIAMETERS:
   1. NPS 3/4 (DN 20) AND SMALLER: 60 INCHES (1500 MM) WITH 3/8-INCH (10-MM) ROD.
   2. NPS 1 AND NPS 1-1/4 (DN 25 AND DN 32): 72 INCHES (1800 MM) WITH 3/8-INCH (10-MM) ROD.
   3. NPS 1-1/2 AND NPS 2 (DN 40 AND DN 50): 96 INCHES (2400 MM) WITH 3/8-INCH (10-MM) ROD.
   4. NPS 2-1/2 (DN 65): 108 INCHES (2700 MM) WITH 1/2-INCH (13-MM) ROD.
   5. NPS 3 TO NPS 5 (DN 80 TO DN 125): 10 FEET (3 M) WITH 1/2-INCH (13-MM) ROD.
   6. NPS 6 (DN 150): 10 FEET (3 M) WITH 5/8-INCH (16-MM) ROD.
   7. NPS 8 (DN 200): 10 FEET (3 M) WITH 3/4-INCH (19-MM) ROD.

W. INSTALL SUPPORTS FOR VERTICAL COPPER TUBING EVERY 10 FEET (3 M).

X. FIELD QUALITY CONTROL PERFORM TESTS AND INSPECTIONS.
   PIPING INSPECTIONS:
   1. DO NOT ENCLOSE, COVER, OR PUT PIPING INTO OPERATION UNTIL IT HAS BEEN INSPECTED AND APPROVED BY AUTHORITIES HAVING JURISDICTION.
   2. DURING INSTALLATION, NOTIFY AUTHORITIES HAVING JURISDICTION AT LEAST ONE DAY BEFORE INSPECTION MUST BE MADE. PERFORM TESTS SPECIFIED BELOW IN PRESENCE OF AUTHORITIES HAVING JURISDICTION.
   3. ROUGHING-IN INSPECTION: ARRANGE FOR INSPECTION OF PIPING BEFORE CONCEALING OR CLOSING-IN AFTER ROUGHING-IN AND BEFORE SETTING FIXTURES.
   4. FINAL INSPECTION: ARRANGE FINAL INSPECTION FOR AUTHORITIES HAVING JURISDICTION TO OBSERVE TESTS SPECIFIED BELOW AND TO ENSURE COMPLIANCE WITH REQUIREMENTS.
   5. REINSPECTION: IF AUTHORITIES HAVING JURISDICTION FIND THAT PIPING WILL NOT PASS TESTS OR INSPECTIONS, MAKE REQUIRED CORRECTIONS AND ARRANGE FOR REINSPECTION.
   6. REPORTS: PREPARE INSPECTION REPORTS AND HAVE THEM SIGNED BY AUTHORITIES HAVING JURISDICTION.

Y. PIPING TESTS.
   1. FILL DOMESTIC WATER PIPING. CHECK COMPONENTS TO DETERMINE THAT THEY ARE NOT AIR BOUND AND THAT PIPING IS FULL OF WATER.
   2. TEST FOR LEAKS AND DEFECTS IN NEW PIPING AND PARTS OF EXISTING PIPING THAT HAVE BEEN ALTERED, EXTENDED, OR REPAIRED. IF TESTING IS PERFORMED IN SEGMENTS, SUBMIT A SEPARATE REPORT FOR EACH TEST, COMPLETE WITH DIAGRAM OF PORTION OF PIPING TESTED.
   3. LEAVE NEW, ALTERED, EXTENDED, OR REPLACED DOMESTIC WATER PIPING UNCOVERED AND UNCONCEALED UNTIL IT HAS BEEN TESTED AND APPROVED. EXPOSE WORK THAT WAS COVERED OR CONCEALED BEFORE IT WAS TESTED.
   4. CAP AND SUBJECT PIPING TO STATIC WATER PRESSURE OF 50 PSIG (345 KPA) ABOVE OPERATING PRESSURE, WITHOUT EXCEEDING PRESSURE RATING OF PIPING SYSTEM MATERIALS. ISOLATE TEST SOURCE AND ALLOW TO STAND FOR FOUR HOURS. LEAKS AND LOSS IN TEST PRESSURE CONSTITUTE DEFECTS THAT MUST BE REPAIRED.
   5. REPAIR LEAKS AND DEFECTS WITH NEW MATERIALS AND RETEST PIPING OR PORTION THEREOF UNTIL SATISFACTORY RESULTS ARE OBTAINED.
   6. PREPARE REPORTS FOR TESTS AND FOR CORRECTIVE ACTION REQUIRED.

Z. DOMESTIC WATER PIPING WILL BE CONSIDERED DEFECTIVE IF IT DOES NOT PASS TESTS AND INSPECTIONS.

AA. PREPARE TEST AND INSPECTION REPORTS.

AB. CLEAN AND DISINFECT POTABLE AND NON-POTABLE DOMESTIC WATER PIPING AS FOLLOWS:

AC. PURGE NEW PIPING AND PARTS OF EXISTING PIPING THAT HAVE BEEN ALTERED, EXTENDED, OR REPAIRED BEFORE USING.

AD. USE PURGING AND DISINFECTING PROCEDURES PRESCRIBED BY AUTHORITIES HAVING JURISDICTION; IF METHODS ARE NOT PRESCRIBED, USE PROCEDURES DESCRIBED IN EITHER AWWA C651 OR AWWA C652 OR FOLLOW PROCEDURES DESCRIBED BELOW:
   1. FLUSH PIPING SYSTEM WITH CLEAN, POTABLE WATER UNTIL DIRTY WATER DOES NOT APPEAR AT OUTLETS.
   2. FLUSH SYSTEM WITH CLEAN, POTABLE WATER UNTIL NO CHLORINE IS IN WATER COMING FROM SYSTEM AFTER THE STANDING TIME.
   3. SUBMIT WATER SAMPLES IN STERILE BOTTLES TO AUTHORITIES HAVING JURISDICTION. REPEAT PROCEDURES IF BIOLOGICAL EXAMINATION SHOWS CONTAMINATION.

AE. UNDER-BUILDING-SLAB, DOMESTIC WATER PIPING, NPS 2 (DN 50) AND SMALLER, SHALL BE THE FOLLOWING:
   1. SOFT COPPER TUBE, ASTM B 88, TYPE L (ASTM B 88M, TYPE B); WROUGHT-COPPER SOLDER-JOINT FITTINGS; AND BRAZED JOINTS.

AF. ABOVEGROUND DOMESTIC WATER PIPING, NPS 2 (DN 50) AND SMALLER, SHALL BE THE FOLLOWING:
   1. HARD COPPER TUBE, ASTM B 88, TYPE L (ASTM B 88M, TYPE B); WROUGHT-COPPER SOLDER-JOINT FITTINGS; AND SOLDERED JOINTS.
   2. COPPER PRESS FITTINGS: AT THE CONTRACTOR'S OPTION ON THE DOMESTIC HOT AND COLD WATER PIPING, COOLING COIL CONDENSATE DRAINS IN COPPER LINES 1/2" DIAMETER UP THROUGH 2-1/2" DIAMETER MECHANICAL PRESS (PRO-PRESS) JOINTS AND FITTINGS INCLUDING THE SMART CONNECTION FEATURE OPTION TO ENSURE THAT UNPRESSED FITTING WILL EASILY AND RELIABLY DETECTED DURING PRESSURE TESTING AS MANUFACTURER BY VIEGA, NIBCO AND APOLLO PRESS WILL BE ACCEPTABLE PROVIDED THE FITTING MANUFACTURER'S RECOMMENDED CRIMPING TOOL WITH PROPERLY SIZED REPLACEABLE JAWS ARE UTILIZED RIGID TOOL COMPANY. INSTALLATION WILL BE IN ACCORDANCE WITH MANUFACTURER'S APPROVED PUBLISHED GUIDELINES.

AG. ABOVEGROUND DOMESTIC WATER PIPING, NPS 2-1/2 TO NPS 4 (DN 65 TO DN 100), SHALL BE OF THE FOLLOWING:
   1. HARD COPPER TUBE, ASTM B 88, TYPE L (ASTM B 88M, TYPE B); CAST-COPPER SOLDER-JOINT FITTINGS; AND SOLDERED JOINTS.
   2. GALVANIZED-STEEL PIPE; GROOVED-JOINT, GALVANIZED-STEEL-PIPE APPURTENANCES; AND GROOVED JOINTS.

AH. DRAWINGS INDICATE VALVE TYPES TO BE USED. WHERE SPECIFIC VALVE TYPES ARE NOT INDICATED, THE FOLLOWING REQUIREMENTS APPLY:
   1. SHUTOFF DUTY: USE BALL VALVES FOR PIPING NPS 2 (DN 50) AND SMALLER. USE GATE VALVES WITH FLANGED ENDS FOR PIPING NPS 2-1/2 (DN 65) AND LARGER.
   2. THROTTLING DUTY: USE BALL VALVES FOR PIPING NPS 2 (DN 50) AND SMALLER. USE BALL VALVES WITH FLANGED ENDS FOR PIPING NPS 2-1/2 (DN 65) AND LARGER.
   3. HOT-WATER CIRCULATION PIPING, BALANCING DUTY: CALIBRATED BALANCING VALVES.
   4. DRAIN DUTY: HOSE-END DRAIN VALVES.

AI. USE CHECK VALVES TO MAINTAIN CORRECT DIRECTION OF DOMESTIC WATER FLOW TO AND FROM EQUIPMENT.

AJ. IRON GROOVED-END VALVES MAY BE USED WITH GROOVED-END PIPING.

AK. WATER HAMMER ARRESTERS
   1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLWING:
      A.. AMTROL, INC.
      B.. JOSAM COMPANY.
      C.. MIFAB, INC.
      D.. PPP INC.
      E.. SIOUX CHIEF MANUFACTURING COMPANY, INC.
      F.. SMITH, JAY R. MFG. CO.; DIVISION OF SMITH INDUSTRIES, INC.
      G.. TYLER PIPE; WADE DIV.
      H.. WATTS DRAINAGE PRODUCTS INC.
   2. STANDARD: ASSE 101 OR PDI-WH201.
   3. TYPE: COPPER SUBE WITH PISTON.
   4. SIZE: ASSE 1010, SIZES AA AND A THROUGH F OR PDI-WH 201, SIZES A THROUGH F.

   INSTALL WATER HAMMER ARRESTERS IN WATER PIPING ACCORDING TO PDI-WH 201.

   INSTALL AIR VENTS AT HIGH PINTS OF WATER PIPING. INSTALL DRAIN PIPING AND DISCHARGE ONTO FLOOR DRAIN.

SANITARY WASTE AND STORM PIPING

A. HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS
   PIPE AND FITTINGS: ASTM A 74, SERVICE CLASS(ES).
   GASKETS: ASTM C 564, RUBBER.

B. HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS
   PIPE AND FITTINGS: ASTM A 888 OR CISPI 301.
   SOVENT STACK FITTINGS: ASME B16.45 OR ASSE 1043, HUBLESS, CAST-IRON AERATOR AND DEAERATOR DRAINAGE FITTINGS.
   CISPI, HUBLESS-PIPING COUPLINGS:
   MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
   1. ANACO-HUSKY, SD-4000.
   2. MIFAB, INC.
   3. MISSION RUBBER COMPANY; A DIVISION OF MCP INDUSTRIES, INC.
   4. CLAMP-ALL CORP.
   5. STANDARDS: ASTM C 1277 AND CISPI 310.
   6. DESCRIPTION: STAINLESS-STEEL CORRUGATED SHIELD WITH STAINLESS-STEEL BANDS AND TIGHTENING DEVICES; AND ASTM C 564, RUBBER SLEEVE WITH INTEGRAL, CENTER PIPE STOP.

C. DRAWING PLANS, SCHEMATICS, AND DIAGRAMS INDICATE GENERAL LOCATION AND ARRANGEMENT OF PIPING SYSTEMS. INDICATED LOCATIONS AND ARRANGEMENTS WERE USED TO SIZE PIPE AND CALCULATE FRICTION LOSS, EXPANSION, PUMP SIZING, AND OTHER DESIGN CONSIDERATIONS. INSTALL PIPING AS INDICATED UNLESS DEVIATIONS TO LAYOUT ARE APPROVED ON COORDINATION DRAWINGS.

D. INSTALL PIPING IN CONCEALED LOCATIONS UNLESS OTHERWISE INDICATED AND EXCEPT IN EQUIPMENT ROOMS AND SERVICE AREAS.

E. INSTALL PIPING INDICATED TO BE EXPOSED AND PIPING IN EQUIPMENT ROOMS AND SERVICE AREAS AT RIGHT ANGLES OR PARALLEL TO BUILDING WALLS. DIAGONAL RUNS ARE PROHIBITED UNLESS SPECIFICALLY INDICATED OTHERWISE.

F. INSTALL PIPING ABOVE ACCESSIBLE CEILINGS TO ALLOW SUFFICIENT SPACE FOR CEILING PANEL REMOVAL.

G. INSTALL PIPING TO PERMIT VALVE SERVICING.

H. INSTALL PIPING AT INDICATED SLOPES.

I. INSTALL PIPING FREE OF SAGS AND BENDS.

J. INSTALL FITTINGS FOR CHANGES IN DIRECTION AND BRANCH CONNECTIONS.

K. INSTALL PIPING TO ALLOW APPLICATION OF INSULATION.

L. MAKE CHANGES IN DIRECTION FOR SOIL AND WASTE DRAINAGE AND VENT PIPING USING APPROPRIATE BRANCHES, BENDS, AND LONG-SWEEP BENDS. SANITARY TEES AND SHORT-SWEEP 1/4 BENDS MAY BE USED ON VERTICAL STACKS IF CHANGE IN DIRECTION OF FLOW IS FROM HORIZONTAL TO VERTICAL. USE LONG-TURN, DOUBLE Y-BRANCH AND 1/8-BEND FITTINGS IF TWO FIXTURES ARE INSTALLED BACK TO BACK OR SIDE BY SIDE WITH COMMON DRAIN PIPE. STRAIGHT TEES, ELBOWS, AND CROSSES MAY BE USED ON VENT LINES. DO NOT CHANGE DIRECTION OF FLOW MORE THAN 90 DEGREES. USE PROPER SIZE OF STANDARD INCREASERS AND REDUCERS IF PIPES OF DIFFERENT SIZES ARE CONNECTED. REDUCING SIZE OF DRAINAGE PIPING IN DIRECTION OF FLOW IS PROHIBITED.

M. LAY BURIED BUILDING DRAINAGE PIPING BEGINNING AT LOW POINT OF EACH SYSTEM. INSTALL TRUE TO GRADES AND ALIGNMENT INDICATED, WITH UNBROKEN CONTINUITY OF INVERT. PLACE HUB ENDS OF PIPING UPSTREAM. INSTALL REQUIRED GASKETS ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS FOR USE OF LUBRICANTS, CEMENTS, AND OTHER INSTALLATION REQUIREMENTS. MAINTAIN SWAB IN PIPING AND PULL PAST EACH JOINT AS COMPLETED.

N. INSTALL SOIL AND WASTE DRAINAGE AND VENT PIPING AT THE FOLLOWING MINIMUM SLOPES UNLESS OTHERWISE INDICATED:
   1. BUILDING SANITARY DRAIN: 2 PERCENT DOWNWARD IN DIRECTION OF FLOW FOR PIPING NPS 3 (DN 80) AND SMALLER; 1 PERCENT DOWNWARD IN DIRECTION OF FLOW FOR PIPING NPS 4 (DN 100) AND LARGER.
   2. HORIZONTAL SANITARY DRAINAGE PIPING: 1 PERCENT DOWNWARD IN DIRECTION OF FLOW.
   3. VENT PIPING: 1 PERCENT DOWN TOWARD VERTICAL FIXTURE VENT OR TOWARD VENT STACK.

O. INSTALL CAST-IRON SOIL PIPING ACCORDING TO CISPI'S "CAST IRON SOIL PIPE AND FITTINGS HANDBOOK," CHAPTER IV, "INSTALLATION OF CAST IRON SOIL PIPE AND FITTINGS."
   1. INSTALL ENCASEMENT ON UNDERGROUND PIPING ACCORDING TO ASTM A 674 OR AWWA C105/A 21.5.

P. DO NOT ENCLOSE, COVER, OR PUT PIPING INTO OPERATION UNTIL IT IS INSPECTED AND APPROVED BY AUTHORITIES HAVING JURISDICTION.

Q. INSTALL SLEEVES FOR PIPING PENETRATIONS OF WALLS, CEILINGS, AND FLOORS.

R. INSTALL ESCUTCHEONS FOR PIPING PENETRATIONS OF WALLS, CEILINGS, AND FLOORS.

S. HANGER AND SUPPORT INSTALLATION
   COMPLY WITH REQUIREMENTS FOR PIPE HANGER AND SUPPORT DEVICES AND INSTALLATION.
   1. INSTALL CARBON-STEEL PIPE HANGERS FOR HORIZONTAL PIPING IN NONCORROSIVE ENVIRONMENTS.
   2. INSTALL STAINLESS-STEEL PIPE HANGERS FOR HORIZONTAL PIPING IN CORROSIVE ENVIRONMENTS.
   3. INSTALL CARBON-STEEL PIPE SUPPORT CLAMPS FOR VERTICAL PIPING IN NONCORROSIVE ENVIRONMENTS.
   4. INSTALL STAINLESS-STEEL PIPE SUPPORT CLAMPS FOR VERTICAL PIPING IN CORROSIVE ENVIRONMENTS.
   5. VERTICAL PIPING: MSS TYPE 8 OR TYPE 42, CLAMPS.
   6. INSTALL INDIVIDUAL, STRAIGHT, HORIZONTAL PIPING RUNS:
   7. 100 FEET (30 M) AND LARGER: MSS TYPE 1, ADJUSTABLE, STEEL CLEVIS HANGERS.
   8. LONGER THAN 100 FEET (30 M): MSS TYPE 43, ADJUSTABLE ROLLER HANGERS.
   9. LONGER THAN 100 FEET (30 M) IF INDICATED: MSS TYPE 49, SPRING CUSHION ROLLS.
   10. MULTIPLE, STRAIGHT, HORIZONTAL PIPING RUNS 100 FEET (30 M) OR LONGER: MSS TYPE 44, PIPE ROLLS. SUPPORT PIPE ROLLS ON TRAPEZE.
   11. BASE OF VERTICAL PIPING: MSS TYPE 52, SPRING HANGERS.

T. SUPPORT HORIZONTAL PIPING AND TUBING WITHIN 12 INCHES (300 MM) OF EACH FITTING, VALVE, AND COUPLING.

U. SUPPORT VERTICAL PIPING AND TUBING AT BASE AND AT EACH FLOOR.

V. ROD DIAMETER MAY BE REDUCED ONE SIZE FOR DOUBLE-ROD HANGERS, WITH 3/8-INCH (10-MM) MINIMUM RODS.

W. INSTALL HANGERS FOR CAST-IRON SOIL PIPING WITH THE FOLLOWING MAXIMUM HORIZONTAL SPACING AND MINIMUM ROD DIAMETERS:
   1. NPS 1-1/2 AND NPS 2 (DN 40 AND DN 50): 60 INCHES (1500 MM) WITH 3/8-INCH (10-MM) ROD.
   2. NPS 3 (DN 80): 60 INCHES (1500 MM) WITH 1/2-INCH (13-MM) ROD.
   3. NPS 4 AND NPS 5 (DN 100 AND DN 125): 60 INCHES (1500 MM) WITH 5/8-INCH (16-MM) ROD.
   4. NPS 6 AND NPS 8 (DN 150 AND DN 200): 60 INCHES (1500 MM) WITH 3/4-INCH (19-MM) ROD.
   5. INSTALL SUPPORTS FOR VERTICAL CAST-IRON SOIL PIPING EVERY 15 FEET (4.5 M).

X. DURING INSTALLATION, NOTIFY AUTHORITIES HAVING JURISDICTION AT LEAST 24 HOURS BEFORE INSPECTION MUST BE MADE. PERFORM TESTS SPECIFIED BELOW IN PRESENCE OF AUTHORITIES HAVING JURISDICTION.
   ROUGHING-IN INSPECTION: ARRANGE FOR INSPECTION OF PIPING BEFORE CONCEALING OR CLOSING-IN AFTER ROUGHING-IN AND BEFORE SETTING FIXTURES.
   FINAL INSPECTION: ARRANGE FINAL INSPECTION FOR AUTHORITIES HAVING JURISDICTION TO OBSERVE TESTS SPECIFIED BELOW AND TO ENSURE COMPLIANCE WITH REQUIREMENTS.

Y. REINSPECTION: IF AUTHORITIES HAVING JURISDICTION FIND THAT PIPING WILL NOT PASS TEST OR INSPECTION, MAKE REQUIRED CORRECTIONS AND ARRANGE FOR REINSPECTION.

Z. REPORTS: PREPARE INSPECTION REPORTS AND HAVE THEM SIGNED BY AUTHORITIES HAVING JURISDICTION.

AA. TEST SANITARY DRAINAGE AND VENT PIPING ACCORDING TO PROCEDURES OF AUTHORITIES HAVING JURISDICTION OR, IN ABSENCE OF PUBLISHED PROCEDURES, AS FOLLOWS:
   1. TEST FOR LEAKS AND DEFECTS IN NEW PIPING AND PARTS OF EXISTING PIPING THAT HAVE BEEN ALTERED, EXTENDED, OR REPAIRED. IF TESTING IS PERFORMED IN SEGMENTS, SUBMIT SEPARATE REPORT FOR EACH TEST, COMPLETE WITH DIAGRAM OF PORTION OF PIPING TESTED.
   2. LEAVE UNCOVERED AND UNCONCEALED NEW, ALTERED, EXTENDED, OR REPLACED DRAINAGE AND VENT PIPING UNTIL IT HAS BEEN TESTED AND APPROVED. EXPOSE WORK THAT WAS COVERED OR CONCEALED BEFORE IT WAS TESTED.
   3. ROUGHING-IN PLUMBING TEST PROCEDURE: TEST DRAINAGE AND VENT PIPING EXCEPT OUTSIDE LEADERS ON COMPLETION OF ROUGHING-IN. CLOSE OPENINGS IN PIPING SYSTEM AND FILL WITH WATER TO POINT OF OVERFLOW, BUT NOT LESS THAN 10-FOOT HEAD OF WATER (30 KPA). FROM 15 MINUTES BEFORE INSPECTION STARTS TO COMPLETION OF INSPECTION, WATER LEVEL MUST NOT DROP. INSPECT JOINTS FOR LEAKS.
   4. FINISHED PLUMBING TEST PROCEDURE: AFTER PLUMBING FIXTURES HAVE BEEN SET AND TRAPS FILLED WITH WATER, TEST CONNECTIONS AND PROVE THEY ARE GASTIGHT AND WATERTIGHT. PLUG VENT-STACK OPENINGS ON ROOF AND BUILDING DRAINS WHERE THEY LEAVE BUILDING. INTRODUCE AIR INTO PIPING SYSTEM EQUAL TO PRESSURE OF 1-INCH (25-MM) WG (250 PA). USE U-TUBE OR MANOMETER INSERTED IN TRAP OF WATER CLOSET TO MEASURE THIS PRESSURE. AIR PRESSURE MUST REMAIN CONSTANT WITHOUT INTRODUCING ADDITIONAL AIR THROUGHOUT PERIOD OF INSPECTION. INSPECT PLUMBING FIXTURE CONNECTIONS FOR GAS AND WATER LEAKS.
   5. REPAIR LEAKS AND DEFECTS WITH NEW MATERIALS AND RETEST PIPING, OR PORTION THEREOF, UNTIL SATISFACTORY RESULTS ARE OBTAINED.

AB. CAP AND SUBJECT PIPING TO STATIC-WATER PRESSURE OF 50 PSIG (345 KPA) ABOVE OPERATING PRESSURE, WITHOUT EXCEEDING PRESSURE RATING OF PIPING SYSTEM MATERIALS. ISOLATE TEST SOURCE AND ALLOW TO STAND FOR FOUR HOURS. LEAKS AND LOSS IN TEST PRESSURE CONSTITUTE DEFECTS THAT MUST BE REPAIRED.

AC. REPAIR LEAKS AND DEFECTS WITH NEW MATERIALS AND RETEST PIPING, OR PORTION THEREOF, UNTIL SATISFACTORY RESULTS ARE OBTAINED.

AD. PREPARE REPORTS FOR TESTS AND REQUIRED CORRECTIVE ACTION.

AF. ABOVEGROUND, SOIL AND WASTE PIPING 6" AND SMALLER SHALL BE ANY OF THE FOLLOWING:
   1. SERVICE CLASS, CAST-IRON SOIL PIPE AND FITTINGS; GASKETS; AND GASKETED JOINTS.
   2. HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS HEAVY-DUTY HUBLESS-PIPING COUPLINGS; AND COUPLED JOINTS. PVC ALLOWED, BUT NOT IN RETURN AIR PLENUMS.

AG. ABOVEGROUND, SOIL AND WASTE PIPING 8" AND LARGER SHALL BE ANY OF THE FOLLOWING:
   1. SERVICE WEIGHT(SW) HUB AND SPIGOT CAST IRON SOIL PIPE FITTINGS. PVC ALLOWED, BUT NOT IN RETURN AIR PLENUMS.

AH. ABOVEGROUND, VENT PIPING 6" AND SMALLER SHALL BE ANY OF THE FOLLOWING:
   1. HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS; CISPI HUBLESS-PIPING COUPLINGS; AND COUPLED JOINTS.

AI. ABOVEGROUND, VENT PIPING 8" AND LARGER SHALL BE ANY OF THE FOLLOWING:
   1. SERVICE CLASS, CAST-IRON SOIL PIPE AND FITTINGS; GASKETS; AND GASKETED JOINTS.

AJ. UNDERGROUND, SOIL, WASTE, AND VENT PIPING 15" AND SMALLER SHALL BE ANY OF THE FOLLOWING:
   1. SERVICE CLASS, CAST-IRON SOIL PIPE AND FITTINGS; GASKETS; AND GASKETED JOINTS
   2. SOLID WALL PVC PIPE, PVC SOCKET FITTINGS, AND SOLVENT-CEMENTED JOINTS

CLEANOUTS

A. EXPOSED METAL CLEANOUTS:
   MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
   1. JOSAM COMPANY; JOSAM DIV.
   2. MIFAB, INC.
   3. SMITH, JAY R. MFG. CO.; DIVISION OF SMITH INDUSTRIES, INC.
   4. TYLER PIPE; WADE DIV.
   5. ZURN PLUMBING PRODUCTS GROUP; SPECIFICATION DRAINAGE OPERATION.
   STANDARD: ASME A112.36.2M FOR CAST IRON FOR CLEANOUT TEST TEE.
   SIZE: SAME AS CONNECTED DRAINAGE PIPING
   BODY MATERIAL: HUB-AND-SPIGOT, CAST-IRON SOIL PIPE T-BRANCH AS REQUIRED TO MATCH CONNECTED PIPING.
   CLOSURE: COUNTERSUNK PLUG.
   CLOSURE PLUG SIZE: SAME AS OR NOT MORE THAN ONE SIZE SMALLER THAN CLEANOUT SIZE.
   CLOSURE: STAINLESS-STEEL PLUG WITH SEAL.

B. METAL FLOOR CLEANOUTS:
   MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
   1. JOSAM COMPANY; JOSAM DIV.
   2. SMITH, JAY R. MFG. CO.; DIVISION OF SMITH INDUSTRIES, INC.
   3. TYLER PIPE; WADE DIV.
   4. A. MIFAB, INC.
   STANDARD: ASME A112.36.2M FOR THREADED, ADJUSTABLE HOUSING CLEANOUT.
   SIZE: SAME AS CONNECTED BRANCH.
   TYPE: ADJUSTABLE HOUSING THREADED, ADJUSTABLE HOUSING.
   BODY OR FERRULE: CAST IRON.
   CLAMPING DEVICE: NOT REQUIRED.
   OUTLET CONNECTION: THREADED.
   CLEANOUT PLUG: BRASS PLUG WITH STRAIGHT THREADS AND GASKET.
   ADJUSTABLE HOUSING MATERIAL: CAST IRON WITH SET-SCREWS OR OTHER DEVICE.
   FRAME AND COVER MATERIAL AND FINISH: ROUGH BRONZE.
   FRAME AND COVER SHAPE: ROUND.
   TOP LOADING CLASSIFICATION: LIGHT DUTY.
   RISER: ASTM A 74, SERVICE CLASS, CAST-IRON DRAINAGE PIPE FITTING AND RISER TO CLEANOUT.
   STANDARD: ASME A112.3.1.
   SIZE: SAME AS CONNECTED BRANCH.
   HOUSING: STAINLESS STEEL.
   CLOSURE: STAINLESS STEEL WITH SEAL.
   RISER: STAINLESS-STEEL DRAINAGE PIPE FITTING TO CLEANOUT.

C. CAST-IRON WALL CLEANOUTS:
   MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
   1. JOSAM COMPANY; JOSAM DIV.
   2. MIFAB, INC.
   3. SMITH, JAY R. MFG. CO.; DIVISION OF SMITH INDUSTRIES, INC.
   4. TYLER PIPE; WADE DIV.
   5. ZURN PLUMBING PRODUCTS GROUP; SPECIFICATION DRAINAGE OPERATION.
   STANDARD: ASME A112.36.2M. INCLUDE WALL ACCESS.
   SIZE: SAME AS CONNECTED DRAINAGE PIPING.
   BODY: HUB-AND-SPIGOT, CAST-IRON SOIL PIPE T-BRANCH AS REQUIRED TO MATCH CONNECTED PIPING.
   CLOSURE: COUNTERSUNK OR RAISED-HEAD, BRASS PLUG.
   CLOSURE PLUG SIZE: SAME AS OR NOT MORE THAN ONE SIZE SMALLER THAN CLEANOUT SIZE.
   WALL ACCESS: ROUND, STAINLESS-STEEL WALL-INSTALLATION FRAME AND COVER.
   WALL ACCESS: ROUND, STAINLESS-STEEL WALL-INSTALLATION FRAME AND COVER.

D. INSTALL CLEANOUTS IN ABOVEGROUND PIPING AND BUILDING DRAIN PIPING ACCORDING TO THE FOLLOWING, UNLESS OTHERWISE INDICATED:
   1. SIZE SAME AS DRAINAGE PIPING UP TO NPS 4 (DN 100). USE NPS 4 (DN 100) FOR LARGER DRAINAGE PIPING UNLESS LARGER CLEANOUT IS INDICATED.
   2. LOCATE AT EACH CHANGE IN DIRECTION OF PIPING GREATER THAN 45 DEGREES.
   3. LOCATE AT MAXIMUM INTERVALS OF 50 FEET (15 M) FOR PIPING NPS 4 (DN 100) AND SMALLER AND 100 FEET (30 M) FOR LARGER PIPING.
   4. LOCATE AT BASE OF EACH VERTICAL SOIL AND WASTE STACK.

E. FOR FLOOR CLEANOUTS FOR PIPING BELOW FLOORS, INSTALL CLEANOUT DECK PLATES WITH TOP FLUSH WITH FINISHED FLOOR.

F. FOR CLEANOUTS LOCATED IN CONCEALED PIPING, INSTALL CLEANOUT WALL ACCESS COVERS, OF TYPES INDICATED, WITH FRAME A