

**ANICAL SPECIFICATION**

ANICAL CONTRACTOR SHALL SUBMIT PRICE FOR THE COST OF SUPPLY AND INSTALLATION OF  
 MECHANICAL MATERIAL NECESSARY TO PROVIDE A COMPLETE AND OPERATING MECHANICAL PACKAGE.  
 ANICAL PACKAGE TO CONSIST OF EQUIPMENT AND MATERIALS AS DESCRIBED IN THIS OUTLINE  
 SPECIFICATION. REFER TO MECHANICAL PLANS FOR ACTUAL REQUIREMENTS OF EQUIPMENT.

**ANICAL SCOPE OF WORK**

INCLUDE IN MECHANICAL SECTION, PROVISION OF LABOUR, NEW MATERIALS, TOOLS, TRANSPORTATION,  
 SERVICES AND FACILITIES FOR A COMPLETE MECHANICAL INSTALLATION. THE INSTALLATION SHALL BE  
 LEFT COMPLETE IN ALL RESPECTS AND READY FOR OPERATION. FINAL INSTALLATION SHALL BE  
 INSTALLED TO COMPLETE SATISFACTION OF THE CONTRACT ADMINISTRATOR.

THE MECHANICAL SCOPE OF WORK INCLUDES, BUT IS NOT NECESSARILY LIMITED TO THE FOLLOWING  
 PROVISION:

- GENERAL:
  - 2.1.1. FAMILIARIZE CREW WITH SITE IN ORDER TO DETERMINE APPROPRIATE LOCATIONS, SITE  
 CONDITIONS, ETC. THAT MAY AFFECT WORK.
  - 2.1.2. WORK MAY NEED TO BE PERFORMED AT NON-STANDARD HOURS. DETERMINE SCHEDULE WITH  
 THE CITY.
  - 2.1.3. OBM MANUALS AND THE CITY TRAINING.
  - 2.1.4. RECORD DRAWINGS.
  - 2.1.5. PROVISION OF FIRE STOPPING AT ALL PIPE, DUCT AND CONDUIT WIRING PENETRATIONS  
 INSTALLED BY THIS TRADE (ONLY).
- PLUMBING:
  - 2.2.1. PROVISION OF ALL PIPING, FIXTURES, PLUMBING BRASS, PIPE FITTINGS, LABOR, INSULATION AND  
 MISCELLANEOUS MATERIALS AS REQUIRE TO COMPLETE THE PROJECT.
  - 2.2.2. PROVISION OF ALL DOMESTIC HOT WATER HEATERS, PUMPS, AND ASSOCIATED PIPING.
- HVAC
  - 2.3.1. PROVISION OF ALL AIR HANDLING EQUIPMENT, FANS, DUCTWORK, CONTROL/BALANCE FITTINGS,  
 INSULATION, GRILLES/REGISTERS/DIFFUSERS/LOUVERS, FIRE DAMPERS, LABOR AND  
 MISCELLANEOUS MATERIALS AS REQUIRED TO COMPLETE THE PROJECT.
  - 2.3.2. PROVISION OF TAB REPORTS INCLUDING FIRE DAMPER TESTING, CERTIFICATION AND AIR FLOWS  
 AND PUMP PERFORMANCE.
- CONTROLS
  - 2.4.1. PROVISION OF COMPLETE ELECTRONIC CONTROLS AS DESCRIBED.
  - 2.4.2. COORDINATION OF ALL CONTROL INTERFACE AND POWER REQUIREMENTS WITH ELECTRICAL  
 CONTRACTOR.

**RAL CONDITIONS**

PROVIDE ALL LABOUR, MATERIALS, AND EQUIPMENT NECESSARY TO COMPLETE THE WORK SHOWN ON  
 DRAWINGS AND AS SPECIFIED HEREIN.

ALL NECESSARY PERMITS SHALL BE OBTAINED AND ALL FEES SHALL BE PAID TO CARRY OUT THE  
 SPECIFIED WORK.

ALL WORK SHALL BE GUARANTEED FOR ONE YEAR FROM DATE OF COMPLETED WORK ACCEPTANCE BY  
 THE CITY. SUBMIT DOCUMENTATION IDENTIFYING ADDITIONAL EQUIPMENT WARRANTY COVERAGE AND  
 TIME FRAMES.

ALL WORK SHALL COMPLY IN EVERY RESPECT WITH ALL NATIONAL, PROVINCIAL AND LOCAL CODES AND  
 BY-LAWS, WHICH SHALL BE CONSIDERED PART OF THIS SPECIFICATION. IN THE CASE OF CONFLICTING  
 REQUIREMENTS, BE GOVERNED BY THE MOST STRINGENT REGULATIONS.

ALL CUTTING, PATCHING, FLASHING FOR WORK AS REQUIRED HEREIN SHALL BE BY THE GENERAL  
 CONTRACTOR.

THE MECHANICAL CONTRACTOR SHALL INSTALL PLUMBING, HEATING, VENTILATION AND AIR CONDITIONING  
 SYSTEMS IN COMPLETE ACCORDANCE WITH THE RECOMMENDATIONS OF THE NATIONAL/PROVINCIAL  
 BUILDING CODE, ASHRAE, SMACNA LATEST EDITION DUCT STANDARDS, AND LOCAL PLUMBING CODES,  
 V.F.P.A. REQUIREMENTS..

COORDINATE WORK WITH WORK OF OTHER TRADES TO AVOID CONFLICT.

ALTER THE LOCATION OF DUCTS OR PIPES AT THE DIRECTION OF THE CONSULTANT WITHOUT CHARGE  
 TO THE CITY, PROVIDED THE CHANGE IS MADE BEFORE INSTALLATION AND DOES NOT NECESSITATE  
 ADDITIONAL MATERIALS.

QUOTATIONS SHALL BE BASED ON THE USE OF SPECIFIED MANUFACTURERS OR APPROVED EQUAL. THE  
 USE OF AN EQUAL OR ALTERNATE MANUFACTURER SHALL IN NO WAY RELIEVE THE MECHANICAL  
 CONTRACTOR FROM THE RESPONSIBILITY OF PROVIDING ALL WORK THAT MAY BE REQUIRED BY REASON  
 OF DIFFERENT SPACE, WEIGHT, ELECTRICAL, OR OTHER REQUIREMENT FROM THAT OF THE SPECIFIED  
 MANUFACTURER. ALTERNATES SHALL BE APPROVED PRIOR TO THE CLOSE OF TENDERS. NO SUBMITTALS  
 RECEIVED AFTER TENDER CLOSING WILL BE ACCEPTED.

THE MECHANICAL CONTRACTOR SHALL SUBMIT ELECTRONIC COPIES OF SHOP DRAWINGS FOR ALL  
 EQUIPMENT FOR REVIEW AND APPROVAL BY CONSULTANTS. CONTRACTOR SHALL STAMP SHOP  
 DRAWINGS REVIEWED BY CONTRACTOR PRIOR TO SUBMISSION. CONTRACTOR SHALL LABEL SHOP  
 DRAWINGS WITH THE CORRESPONDING EQUIPMENT LABEL LISTED ON MECHANICAL DRAWINGS  
 SPECIFICATION, AND/OR SCHEDULES. FAILURE TO COMPLY WILL RESULT IN SHOP DRAWINGS BEING  
 RETURNED "UNREVIEWED" BY CONSULTANT.

FURNISH TO THE CONSULTANT THREE (3) HARD-COVERED LOOSE-LEAF BINDERS CONTAINING THEREIN  
 ONE (1) COMPLETE SET OF MANUFACTURERS' OPERATING AND MAINTENANCE INSTRUCTIONS SHOWING  
 ALL MAJOR EQUIPMENT AND APPARATUS REQUIRING MAINTENANCE. INSTRUCTIONS SHALL BE COMPLETE  
 FOR INSTALLATION, OPERATION AND MAINTENANCE AND SHALL INCLUDE PERTINENT INFORMATION SUCH  
 AS DETAILED DRAWINGS AND OPERATION CURVES. SPARE PARTS, SUPPLIER LISTS AND ADDRESSES  
 SHALL BE SUPPLIED. INSTRUCTION SHALL BE REQUIRED WITH THE CITY'S REPRESENTATIVE TO ENSURE  
 A THOROUGH UNDERSTANDING OF THE EQUIPMENT AND ITS OPERATION.

ALL WIRING, SUPPLY AND INSTALLATION OF DISCONNECT SWITCHES FOR EQUIPMENT SPECIFIED HEREIN  
 SHALL BE PERFORMED BY THE ELECTRICAL CONTRACTOR, UNLESS OTHERWISE NOTED.

CONTRACTOR SHALL EXAMINE THE SITE AND CONDITIONS AFFECTING WORK, METHODS OF CONNECTION  
 AND LOCATION OF ALL SERVICES INVOLVED UNDER THIS CONTRACT. FAILURE TO MAKE THIS VISIT IN  
 NO WAY ALLEVIATES THE MECHANICAL CONTRACTOR FROM RESPONSIBILITY FOR COMPLETING THE  
 MECHANICAL WORK OF THIS CONTRACT IN A WORKMANLIKE MANNER. NO ALLOWANCE WILL BE MADE  
 AFTER CONTRACT AWARD FOR ANY EXPENSE INCURRED THROUGH A FAILURE TO MAKE THIS  
 EXAMINATION AND INVESTIGATION.

SCHEDULING OF ALL WORK SHALL BE ARRANGED WITH THE CITY, AND THE CITY SHALL BE NOTIFIED  
 AND APPROVAL OBTAINED PRIOR TO SHUTTING OFF EXISTING SERVICES FOR PURPOSES OF CONNECTING  
 NEW WORK. WORK WITHIN THE BUILDING MAY HAVE TO BE PERFORMED DURING NON-REGULAR  
 WORKING HOURS AND MUST CONFORM TO WORK RULES OF THE BUILDING AS DIRECTED BY THE CITY.

RECORD DRAWINGS:  
 OBTAIN SETS OF WHITE PRINTS (ONE FOR EACH SYSTEM I.E. PLUMBING, HVAC) AND KEEP AT JOB  
 SITE AT ALL TIMES.

RECORD ALL ADDITIONS OR DEVIATIONS FROM THE CONTRACT DOCUMENTS INCLUDING ALL CHANGES  
 INCURRED BY ADDENDA, CHANGE ORDERS, FIELD CHANGES, JOB CONDITIONS, ETC.

MECHANICAL SUB CONTRACTORS SHALL BE RESPONSIBLE FOR THE PRODUCTION OF RECORD  
 DRAWINGS WHICH SHALL PROVIDE A COMPLETE AND ACCURATE RECORD OF THE ACTUAL  
 MECHANICAL INSTALLATION. ALL PRINCIPLE BELOW GRADE OR INACCESSIBLE PIPING OR DUCT  
 SYSTEMS, ETC. SHALL BE DIMENSIONED AT EACH CHANGE IN DIRECTION. INCLUDE ALL ROUTING OF  
 SERVICES NOT INDICATED ON ORIGINAL DRAWINGS.

PROJECT RECORD DRAWINGS SHALL BE TRANSFERRED BY MECHANICAL CONTRACTOR TO  
 REPRODUCIBLE BOND DRAWINGS AND LABELED RECORD.

15.5. SUBMIT REPRODUCIBLE BOND DRAWINGS TO CONSULTANT FOR REVIEW UPON COMPLETION. IF  
 CORRECTIVE MEASURES ARE REQUIRED AFTER THE SECOND CONSULTANT REVIEW (DUE TO MISSING  
 INFORMATION AND/OR IMPROPER DRAFTING STANDARDS), THE MECHANICAL CONTRACTOR SHALL BE  
 RESPONSIBLE FOR CONSULTANT'S TIME COSTS FOR CORRECTIVE MEASURES, COURIER AND PRINTING  
 COSTS.

15.6. CONTRACTOR SHALL EMPLOY CONSULTANT (OR CAD DRAFTING SERVICE) TO PRODUCE ELECTRONIC  
 COPY RECORD DRAWINGS. MECHANICAL CONTRACTOR SHALL BEAR ALL COSTS OF PRODUCTION.

15.7. COPY OF FINAL RECORD DRAWINGS SHALL BE SUBMITTED TO ARCHITECT.

15.8. ALL COSTS OF RECORD DRAWINGS PRODUCTION SHALL BE BORNE BY MECHANICAL CONTRACTOR.

16. THE CONTRACTOR SHALL, AT THEIR OWN EXPENSE, PROVIDE TEMPORARY HEATING AND HOARDING AS  
 REQUIRED FOR THE PROPER PROGRESS OF THE WORK.

17. VERIFY SIZES, INVERTS AND LOCATIONS OF ALL SERVICES PRIOR TO COMMENCEMENT OF WORK. THIS  
 SHALL INCLUDE, BUT NOT BE LIMITED TO SANITARY SEWER, STORM SEWER, DOMESTIC WATER MAINS,  
 FORCE MAINS, ETC.

18. HOISTING OF ALL MECHANICAL EQUIPMENT SHALL BE BY THE MECHANICAL CONTRACTOR.

19. ASSUME FULL RESPONSIBILITY FOR LAYING OUT ALL WORK AND ENSURING THAT NO DAMAGE IS CAUSED  
 TO THE CITY'S EQUIPMENT AND PREMISES DUE TO IMPROPER LOCATION AND EXECUTION OF WORK IN  
 THIS CONTRACT. PROTECT AND MAINTAIN ALL WORK UNTIL WORK HAS BEEN COMPLETED AND  
 ACCEPTED BY THE CITY. STORE ALL MATERIALS AS REQUIRED, AND CLEAN UP REFUSE CAUSED BY  
 ALL WORK.

20. IDENTIFY ALL NEW PIPING WITHIN BUILDING INSTALLED IN THIS CONTRACT SHOWING SERVICE, PIPE SIZE,  
 AND FLOW DIRECTION. USE CAPITAL LETTERS USING EITHER FIRE RESISTANT HIGH GLOSS INTERIOR  
 ENAMEL PAINT OR WATERPROOF, HEAT RESISTANT PLASTIC MARKER TAGS (SIMILAR TO: W.H. BRADY  
 IDENTIFICATION TAPES, BANDS, MARKERS.) IDENTIFY AT MAXIMUM OF EVERY 50 FT. AND AT LEAST  
 ONCE IN EACH ROOM. LOCATE AND SIZE LETTERING SUCH THAT IT CAN BE SEEN FROM FLOOR.

21. IN THE CASE OF DISCREPANCY BETWEEN ARCHITECTURAL AND MECHANICAL DRAWINGS TO NUMBER,  
 TYPE, OR LOCATION OF HVAC EQUIPMENT AND SYSTEMS COMPONENTS, OBTAIN WRITTEN RULING.

22. ALL TIME/DATE SENSITIVE ELECTRONIC EQUIPMENT AND SOFTWARE PROVIDED ON THIS PROJECT SHALL  
 BE 4 DIGIT YEAR INPUT COMPATIBLE AND SHALL BE BASED ON THE USE OF FULL, UNABBREVIATED,  
 UNAMBIGUOUS DISCRETE TIME AND DATE CODES.

23. MECHANICAL CONTRACTOR SHALL COORDINATE PROVISION OF POWER TO BUILDING CONTROL  
 TRANSFORMERS WITH ELECTRICAL CONTRACTOR AND CARRY ALL INCREMENTAL COSTS.

24. ALL CONTROL WIRING TO COMPLY IN EVERY RESPECT WITH THE LATEST EDITION OF THE CANADIAN  
 ELECTRICAL CODE. REFER TO ELECTRICAL DRAWINGS AND SPECIFICATIONS FOR ROOM HAZARD  
 CLASSIFICATIONS. ALL ELECTRICAL/MECHANICAL EQUIPMENT, CONTROL WIRING, ACTUATORS, CONTROL  
 DEVICES ETC. SHALL BE INSTALLED IN STRICT CONFORMANCE WITH SECTION 18 OF THE CANADIAN  
 ELECTRICAL CODE FOR EACH ZONE THEREIN. IN CASE OF ANY DISCREPANCIES OBTAIN A WRITTEN  
 RULING FROM THE CONSULTANTS.

25. COORDINATE THE ELECTRICAL REQUIREMENTS OF ALL MECHANICAL EQUIPMENT WITH ELECTRICAL  
 CONTRACTOR. ELECTRICAL CONTRACTOR SHALL PROVIDE THE FOLLOWING:  
 25.1. ALL POWER WIRING TO EQUIPMENT.

25.2. ONE 15 AMP 120V/1PH/60HZ FUSED POWER SUPPLY TO EACH MECHANICAL EQUIPMENT AND/OR  
 JANITOR ROOM.

26. PROVIDE FIRE STOPPING AT ALL PIPING, CONDUIT (CONTROLS) AND DUCTWORK PENETRATIONS OF ALL  
 REQUIRED FIRE SEPARATIONS WITH APPROVED MATERIAL SYSTEMS. ACCEPTABLE MATERIALS: 3M, DOW,  
 CORNING, AFS.

27. MECHANICAL CONTRACT DOCUMENTS ARE DIAGRAMMATIC AND APPROXIMATE TO SCALE; REFER TO  
 ARCHITECTURAL AND/OR STRUCTURAL DRAWINGS, AND SITE VERIFY ALL CRITICAL DIMENSIONS. THE  
 DRAWINGS AND SPECIFICATIONS ESTABLISH SCOPE FOR MATERIAL AND INSTALLATION QUALITY AND ARE  
 NOT DETAILED INSTALLATION INSTRUCTIONS. ANY DISCREPANCIES MUST BE BROUGHT TO THE  
 CONSULTANT'S ATTENTION IN WRITING PRIOR TO THE CLOSE OF TENDERS.

28. SHOULD ANY DISCREPANCY APPEAR BETWEEN THE DRAWINGS AND SPECIFICATIONS, WHICH LEAVE THE  
 CONTRACTOR IN DOUBT AS TO THE TRUE INTENT AND MEANING OF THE PLANS AND SPECIFICATIONS,  
 THE CONTRACTOR SHALL OBTAIN A WRITTEN RULING FROM THE CONSULTANT PRIOR TO TENDER  
 SUBMISSION. IF WRITTEN APPROVAL IS NOT PROVIDED, THE MOST EXPENSIVE ALTERNATIVE SHALL BE  
 INCLUDED IN THE TENDER PRICE.

29. FIELD VERIFY ALL BUILDING AND SITE DIMENSIONS AND REVIEW MECHANICAL DRAWINGS AND  
 SPECIFICATIONS PRIOR TO ANY FABRICATION OR INSTALLATION OF EQUIPMENT OR MATERIALS. DO NOT  
 ATTEMPT ANY FABRICATION OR INSTALLATION UNTIL SUCH CLARIFICATION IS PROVIDED. NO CONTRACT  
 REVISIONS WILL BE CONSIDERED FOR FAILURE TO VERIFY THESE DIMENSIONS ON SITE.

30. DRAWINGS AND SPECIFICATIONS ARE COMPLEMENTARY EACH TO THE OTHER, WHAT IS CALLED FOR BY  
 ONE SHALL BE BINDING AS IF CALLED FOR BY BOTH.

31. MECHANICAL WORK SHALL BE COMPLETED IN CONFORMANCE WITH, AND SUBJECT TO, ALL CAUTIONARY  
 NOTES AVAILABLE TO THE READER INCLUDING THOSE AVAILABLE ON THE WEBSITES OF THE  
 MANUFACTURERS AND CONSULTANTS.

**INSULATION**

ALL INSULATING MATERIALS, METHODS, SIZES AND TYPES OF INSULATION FOR ALL PIPING AND DUCT WORK  
 SHALL BE INSTALLED TO THE REQUIREMENTS OF THE ASHRAE STANDARDS 90.1-2010 ENERGY STANDARD  
 FOR BUILDING EXCEPT LOW-RISE RESIDENTIAL BUILDING, AND THERMAL INSULATION ASSOCIATION OF  
 CANADA (TIAC) STANDARDS. THIS SHALL INCLUDE ALL TAPES, SEALANTS, AND MISCELLANEOUS PRODUCTS  
 ASSOCIATED WITH THE INSTALLATION. ALL INSULATING MATERIALS SHALL BE ACCORDANCE WITH  
 CAN/ULC-S102 OR S102.2, WITH A MAXIMUM FLAME SPREAD RATING OF 25 AND A MAXIMUM SMOKE  
 DEVELOPED RATING OF 50.

1. PROVIDE THICK RIGID PIPE INSULATION ON ALL DOMESTIC WATER PIPES C/W VAPOUR BARRIER.  
 INSULATION ON PIPING MINIMUMS:

PIPE SIZE	INSULATION THICKNESS
UP TO 2" (50MM)	1" (25 MM)
2" (50MM) AND GREATER	1½" (38 MM)

2. PROVIDE 1½" (25 MM) THICK PIPE INSULATION ON ALL PLUMBING VENTS PASSING THROUGH ROOF FOR A  
 DISTANCE OF 10'-0" (3 M) INSIDE FROM POINT OF COLD TO WARM SURFACE PENETRATION. INSULATION  
 C/W VAPOUR BARRIER.

3. PROVIDE 1½" (38 MM) THICK KNAUF ATMOSPHERE DUCTWRAP, 1.0 PCF DENSITY, R4.5 (RSI 0.80), 25%  
 COMPRESSED, FLEXIBLE DUCT INSULATION C/W RFRK FACING ON:  
 3.1. ALL RETURN AIR DUCTWORK LOCATED IN A CEILING SPACE NOT USED AS A RETURN AIR PLENUM,  
 3.2. EXHAUST AIR DUCTWORK FOR A MINIMUM DISTANCE OF 10'-0" (3 M) FROM PENETRATION OF  
 BUILDING THERMAL ENVELOPE, AND  
 3.3. ANY ADDITIONAL DUCTWORK INSULATION NOTED ON DRAWINGS.

4. PROVIDE 2" (50 MM) THICK KNAUF ATMOSPHERE DUCTWRAP, 1.5 PCF DENSITY, R6.4 (RSI 1.13), 25%  
 COMPRESSED, THERMAL FACED INSULATION C/W RFRK FACING ON ALL DUCTWORK CONVEYING OUTSIDE  
 AIR. DUCTWORK SHALL BE INSULATED OVER ENTIRE RUN FROM PENETRATION OF BUILDING THERMAL  
 ENVELOPE TO UNIT CONNECTION.

5. PROVIDE 1½" (25 MM) ACOUSTIC, FLEXIBLE DUCT INSULATION WITH FLAME-ATTENUATED FIBRES BONDED  
 WITH THERMOSETTING RESIN; BLACK PLASTIC-COATED MAT FINISH ON:  
 5.1. SUPPLY AND RETURN AIR DUCTWORK OF AIR HANDLING EQUIPMENT, 10'-0" (3 M) FROM OPENINGS,  
 AND

5.2. ANY ADDITIONAL ACOUSTIC DUCTWORK INSULATION NOTED ON DRAWINGS.  
 5.3. ACCEPTABLE PRODUCT: KNAUF AIR DUCT BOARD.

6. DO NOT EXTERNALLY INSULATE ANY DUCTWORK WHICH IS SPECIFIED OR SHOWN TO BE INTERNALLY  
 INSULATED UNLESS NOTED OTHERWISE.

7. EXTERIOR DUCTWORK & INSULATION COVERINGS:  
 DUCTWORK RUNNING OUTSIDE THE BUILDING THERMAL ENVELOPE AND EXPOSED TO THE WEATHER -  
 AS DESCRIBED BELOW OR TO TIAC BEST PRACTICES GUIDE.

7.1. COVER EXPOSED INSULATION WITH APPROVED INSULATION DUCT JACKETING TAPE WITH ZERO  
 PERMEABILITY, PUNCTURE AND TEAR RESISTANCE. STANDARD OF ACCEPTANCE - 3M VENTURECLAD  
 INSULATION JACKETING TAPE.

7.2. ALL ADJOINING UNINSULATED SURFACES MUST BE COMPLETELY WATER-PROOFED AND FLASHED  
 EITHER BY EXTENDING THE VI-CRYL CP-10/11 WEATHER BARRIER COATING AND FABRIC MEMBRANE  
 A MINIMUM OF 4" (102 MM) ONTO THE ADJOINING SURFACE, OR, IF THAT SURFACE WILL ATTAIN  
 TEMPERATURES IN EXCESS OF 180 DEGREES F (82 DEGREES C), USE CHIL-JOINT CP-70 SEALANT  
 AS THE FLASHING COMPOUND.

7.3. ALL INSULATION IN EXPOSED LOCATIONS, AND ALL DUCTWORK IN FAN ROOMS, SERVICE ROOMS,  
 GARAGES, ETC., SHALL BE COVERED WITH CANVAS WRAP. INSULATION EXPOSED TO THE MOISTURE  
 SHALL BE COMPLETE WITH COVER AS ABOVE.

**PLUMBING**

1. PROVIDE COMPLETE FUNCTIONAL PLUMBING SYSTEM COMPRISED OF DOMESTIC WATER PIPING, VENTS,  
 SANITARY AND DRAINAGE PIPING, ETC.

2. PLUMBING SIZING SHOWN IS BASED ON COPPER PIPING FOR DOMESTIC WATER, AND CAST IRON PIPING  
 FOR SANITARY AND STORM. MECHANICAL CONTRACTOR IS RESPONSIBLE FOR COORDINATING REVISED  
 PLUMBING SIZING WITH MANUFACTURER'S RECOMMENDATIONS AS REQUIRED WHEN USING ALTERNATE  
 MATERIALS. SUBMIT TO CONSULTANT FOR REVIEW PRIOR TO ORDERING MATERIALS.

3. ACCEPTABLE MATERIALS SHALL BE USED AS DESCRIBED BELOW.

3.1. DRAINAGE WASTE AND VENT (DWV) MATERIALS  
 3.1.1. UNDERGROUND PIPING  
 3.1.1.1. PVC MEETING CSA B181.2  
 3.1.1.2. ALL PIPING SHALL BE DOMESTIC/NORTH AMERICAN MADE, NO OFFSHORE PIPING SHALL BE  
 USED.

3.1.1.3. CAST IRON MEETING CSA B70  
 3.1.1.3.1. HUB AND SPIGOT CONNECTIONS, THRUST BLOCKS AT CHANGES IN DIRECTION.  
 3.1.2. FOR ABOVEGROUND DWV APPLICATIONS (COMBUSTIBLE CONSTRUCTION)

3.1.2.1. ABS MEETING CSA B181.1  
 3.1.2.2. PVC MEETING CSA B181.2  
 3.1.3. FOR ABOVEGROUND DWV APPLICATIONS (NON-COMBUSTIBLE CONSTRUCTION)

3.1.4. ALL PIPING TO HAVE A FLAME SPREAD RATING OF LESS THAN 25.  
 3.1.4.1. PVC MEETING CSA B151.2, CAN/ULC S102.2  
 3.1.5. FOR DWV APPLICATIONS IN AIR PLENUMS

3.1.5.1. ALL PIPING TO HAVE A FLAME SPREAD RATING OF LESS THAN 25 AND A SMOKE  
 DEVELOPED CLASSIFICATION OF LESS THAN 50.  
 3.1.5.2. PVC MEETING CSA B151.2, CAN/ULC S102.2

3.2. DOMESTIC WATER PIPING MATERIALS  
 3.2.1. ALL PRODUCTS SHALL BE UL CLASSIFIED IN ACCORDANCE WITH ANSI/NSF-61 FOR POTABLE  
 WATER SERVICE, AND SHALL BE CERTIFIED TO THE LOW LEAD REQUIREMENTS OF NSF-372.

3.2.2. COPPER  
 3.2.2.1. ABOVE GROUND: COPPER TUBE, HARD DRAWN, TYPE L; TO ASTM B88M.  
 3.2.2.2. BURED OR EMBEDDED: COPPER TUBE, SOFT ANNEALED, TYPE K; TO ASTM B88M, IN  
 LONG LENGTHS AND WITH NO BURIED JOINTS. TO MEET CSA B181.2.

3.2.3. PEX  
 3.2.3.1. ALL PIPE SHALL BE HIGH-DENSITY CROSS-LINKED POLYETHYLENE MANUFACTURED USING  
 THE HIGH-PRESSURE PEROXIDE METHOD OF CROSS-LINKING (PEX A). PIPE SHALL  
 CONFORM TO ASTM F877, CSA B137.5 AND NSF/ANSI 61.  
 3.2.3.2. PIPE SHALL BE RATED FOR CONTINUOUS OPERATION OF 100 PSI GAUGE PRESSURE AT 180°F  
 TEMPERATURE (630 KPA @ 82°C) AND 80 PSI GAUGE PRESSURE AT 200°F TEMPERATURE  
 (550 KPA 93°C)

3.2.3.3. PEX PIPE IN EXPOSED LOCATIONS SHALL BE RIGID (NOT COIL).  
 3.2.3.4. PIPE SHALL BE RESISTANT TO HOT CHLORINATED WATER. PIPE TO HAVE A MINIMUM  
 EXTRAPOLATED TIME-TO-FAILURE OF 50 YEARS.

3.2.3.5. PEX PIPE TO HAVE A CO-EXTRUDED COLORED UV SHIELD MADE FROM UV-RESISTANT  
 POLYETHYLENE PROVIDING UV RESISTANCE.

3.2.3.6. PIPE TO HAVE A FLAME SPREAD INDEX OF LESS THEN 25 AND A SMOKE DEVELOPED INDEX  
 OF LESS THAN 50 WHEN TESTED IN ACCORDANCE WITH CAN/ULC S102.2. IN ANY CASE  
 WHERE THE PIPE DOES NOT CONFORM WITH THESE STANDARDS, APPROPRIATE PIPING  
 INSULATION SHALL BE INSTALLED IN ORDER TO MEET THE STANDARD.

3.2.4. PVC  
 3.2.4.1. ABOVE GROUND USE ONLY TO CSA 137.6  
 3.2.4.2. PIPE SHALL BE RATED FOR CONTINUOUS OPERATION OF 100 PSI GAUGE PRESSURE AT  
 180°F TEMPERATURE (690 KPA @ 82°C)

3.2.4.3. PIPE TO HAVE FLAME SPREAD INDEX OF LESS THAN 25, AND A SMOKE DEVELOPED INDEX  
 OF LESS THAN 50 WHEN TESTED IN ACCORDANCE WITH CAN/ULC S102.2.  
 3.2.4.4. ALL PIPING SHALL BE DOMESTIC/NORTH AMERICAN MADE, NO OFFSHORE PIPING SHALL BE  
 USED.

4. DRAINS AND VENT PIPING UNDERGROUND INSIDE BUILDING SHALL BE CAST IRON CLASS 4000, OR PVC  
 PLASTIC. FITTINGS SHALL BE MECHANICAL JOINT FOR CAST IRON OR SOLVENT CEMENT FOR PVC.

5. ALL PVC PLASTIC PIPING USED SHALL HAVE A FLAME SPREAD RATING OF 25, AND A SMOKE  
 DEVELOPED RATING OF 50. PIPING AND FITTINGS SHALL BE OF ONE MANUFACTURE; STANDARD OF  
 ACCEPTANCE: IPEX XFR.

6. MECHANICAL CONTRACTOR SHALL VERIFY ON SITE ALL CONNECTION POINTS TO EXISTING BUILDING  
 SERVICES. COORDINATE ALL NEW PIPING RUNS WITH CONSULTANT OR CITY'S REPRESENTATIVE.

7. SOLDERED FITTINGS IN POTABLE WATER SYSTEMS  
 7.1. PROVIDE LEAD, ANTIMONY, CADMIUM AND ZINC FREE SOLLERS COMPOSED OF TIN, COPPER, SILVER  
 OR NICKEL COMPONENTS THAT ARE ACCEPTABLE TO THE AUTHORITY HAVING JURISDICTION.

8. VALVES  
 8.1. SHALL BE BY ONE MANUFACTURER. STANDARD OF ACCEPTANCE: APOLLO VALVES.  
 8.2. SHALL BE UL CLASSIFIED IN ACCORDANCE WITH ANSI/NSF-61 FOR POTABLE WATER SERVICE, AND  
 SHALL BE CERTIFIED TO THE LOW LEAD REQUIREMENTS OF NSF-372.

9. MANUFACTURED SHOCK ABSORBERS, AUTOMATIC AIR VENTS, AND PARTITION STOPS SHALL BE  
 INSTALLED AT THE TOP OF ALL RISERS, AND ON ALL FIXTURES OR BATTERY OF FIXTURES.

10. MECHANICAL CONTRACTOR SHALL ALLOW FOR IN TENDER QUOTATION ANY ADDITIONAL LABOUR,  
 MATERIALS, ETC. DEMAED NECESSARY DUE TO EXACT SITE CONDITIONS WHICH HAVE NOT BEEN  
 REFLECTED IN MECHANICAL DRAWING OR IN MECHANICAL SPECIFICATION. NOTIFY CONSULTANT OF ALL  
 DISCREPANCIES PRIOR TO TENDER CLOSE.

11. ON COMPLETION, ALL PIPING SYSTEMS SHALL BE CLEANED & FLUSHED OUT TO REMOVE ANY FOREIGN  
 MATERIAL IN THE PIPING.

12. CONTRACTOR SHALL COORDINATE SERVICE INSTALLATIONS AND/OR MODIFICATIONS WITH LOCAL UTILITY  
 PRIOR TO COMMENCEMENT OF WORK. PAY ALL COSTS AND/OR FEES.

13. PROVIDE DIELECTRIC COUPLINGS WHEREVER PIPES OF DISSIMILAR METALS ARE JOINED.

14. USE THE FOLLOWING ROD DIAMETER AND SPACING SCHEDULE TO ESTABLISH MINIMUM HANGING  
 STANDARDS FOR HORIZONTAL PIPING:

PIPE SIZE	ROD DIA	STEEL	COPPER
THRU 12" (THRU 355MM)	25 (0.7MM)	96" (2438MM)	AS SPECIFIED
13" - 30" (330-762MM)	24 (0.7MM)	60" (1524MM)	AS SPECIFIED

UP TO 3/4"	3/8"	6	6'
1" TO 1 1/4"	3/8"	8	8'
1 1/2" & 2"	3/8"	10'	8'
2 1/2" & 3"	1/2"	12'	8'
4" & 5"	5/8"	12'	8'
6"	3/4"	12'	

15. PIPE HANGERS WHERE REQUIRED SHALL BE GRINNEL FIG.65 FOR STEEL PIPE AND FIG.117 EXPANSION  
 CASE SET IN HOLES DRILLED IN CONCRETE OR ATTACHED TO FIG.225 OR 227 CLAMP ATTACHED TO  
 FLOOR JOIST AND ROOF JOIST. FOR INSULATED PIPING, PROVIDE PROTECTION FIG.167 SADDLES SIZE  
 HANGER TO ACCOMMODATE INSULATION WHERE APPLIED.

16. ALL REFRIGERANT PIPING TO BE SUPPORTED VIA INSTRUT CHANNELS WITH THREADED SUPPORT RODS  
 AT 6' INTERVALS. THREADED RODS SHALL BE ANCHORED TO STRUCTURE, PIPING CLAMPED TO  
 CHANNELS; PROVIDE DIELECTRIC CONNECTIONS AS REQUIRED. INSULATE PIPING AS SPECIFIED HEREIN.

17. THE NEW BUILDING DOMESTIC WATER SERVICES ARE TO BE PROTECTED BY A BACKFLOW PREVENTION  
 SYSTEM AS PER THE LATEST EDITION OF CSA B64 "SELECTION AND INSTALLATION OF BACKFLOW  
 PREVENTERS/MAINTENANCE AND FIELD TESTING OF BACKFLOW PREVENTERS", BASED ON THE BUILDING  
 OCCUPANCY, THE BUILDING SHALL BE PROVIDED WITH A DOUBLE CHECK VALVE BACKFLOW PREVENTER.  
 CONFIRM EXACT REQUIREMENTS WITH LOCAL AUTHORITY.

17.1. PLUMBING FIXTURES ARE TO BE PROVIDED WITH BACKFLOW PREVENTION BASED ON THE FIXTURE  
 HAZARD TYPE DEFINED IN CSA B64. BACKFLOW PREVENTION SHALL BE A VACUUM BREAKER  
 (HOB) FOR MINOR HAZARD, DOUBLE CHECK VALVE BACKFLOW PREVENTER (DCV) FOR MODERATE  
 HAZARD OR REDUCED PRESSURE BACKFLOW PREVENTER (RP) FOR SEVERE HAZARD FIXTURES.

17.2. PROVIDE BACKFLOW PREVENTION FOR THE FLOWING FIXTURES (OR GROUP OF FIXTURES) AS  
 DEFINED ABOVE.

17.2.1. BASIN	DCVA
17.2.2. BATH/TUB (ALL)	DCVA
17.2.3. CLOTHES WASHER (RESIDENTIAL)	DCVA
17.2.4. DISHWASHER (RESIDENTIAL)	DCVA
17.2.5. FLEXIBLE SHOWER HEAD WITH HOSE	HCVV/DCVA/RP
17.2.6. FLUSH TANK	DCVA
17.2.7. FLUSHING EQUIPMENT DEVICE	RP
17.2.8. HOSE CONNECTION (NON-RESIDENTIAL)	DCVA/RP
17.2.9. HOSE CONNECTION (RESIDENTIAL)	HCVV/DCVA
17.2.10. HOT WATER SYSTEMS CONNECTION	HCVB
17.2.11. LAVATORY	DCVA
17.2.12. TRAP PRIMER	RP

**HEATING, VENTILATION & AIR CONDITIONING**

1. PROVIDE SUPPLY, RETURN, RELIEF, AND/OR EXHAUST AIR DUCT SYSTEMS FROM AIR HANDLING  
 EQUIPMENT AND FANS AS SHOWN.

2. ALL DUCTWORK INSTALLATION SHALL BE PERFORMED IN ACCORDANCE WITH THE FOLLOWING STANDARDS:

2.1. AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGH):  
 2.1.1. ACGH INDUSTRIAL VENTILATION  
 2.2. AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS (ASHRAE):  
 2.2.1. ASHRAE HANDBOOK SERIES FUNDAMENTALS: CH. 2. DUCT DESIGN  
 2.2.2. ASHRAE HANDBOOK SERIES EQUIPMENT: CH. 6. DUCT CONSTRUCTION

2.3. ASTM INTERNATIONAL:  
 2.3.1. ASTM A90 / A90M STANDARD TEST METHOD FOR WEIGHT [MASS] OF COATING ON IRON AND  
 STEEL ARTICLES WITH ZINC OR ZINC-ALLOY COATINGS  
 2.3.2. ASTM A 167 STANDARD SPECIFICATION FOR STAINLESS AND HEAT-RESISTING CHROMIUM-NICKEL  
 STEEL PLATE, SHEET, AND STRIP