Conform to terms and conditions of the General Contract Document.

- Provide complete, fully tested and operational mechanical systems to meet the requirements described herein and in complete accordance with applicable codes and ordinances. .2 Contract documents of this division and drawings are diagrammatic and approximately to scale unless detailed otherwise. They establish scope,
- naterial and installation quality and are not detailed installation instruction .3 Follow manufacturer's recommended installation details and procedures for equipment, supplemented by requirements of contract documents.
- .4 Install equipment generally in locations and routes shown close to building structure with minimum interference with other services or free space. Remove and replace improperly installed equipment to the satisfaction of the consultant at no extra cost.
- .5 The drawings indicate the general location and route to be followed by the piping and ductwork. Where details are not shown on the drawings or only shown diagrammatically, the pipes and ductwork shall be installed in such a way as to conserve headroom and interfere as little as possible with the free use of space through which they pass. Service lines shall run parallel to building lines. All duct and pipes at ceiling shall be kept as tight as possible to beams or other limiting members at high end. All pipes and ducts shall be coordinated in elevation to ensure that they are procealed in the ceiling space provided unless detailed and dimensioned otherwise on drawings and permitted otherwise by the consultant. .6 Connect to equipment specified in other sections and to equipment supplied and installed by other contractors or by the owner. Uncrate
- equipment, move in place and install complete; start-up and test. .7 Connect into existing systems with minimum disruption to the existing systems.
- .8 Provide seismic restraints for all equipment, piping and ductwork when required by code.
- .9 Field verify all building and site dimensions prior to any fabrication and installation of equipment or materials. No additional charge shall be entertained for failure to verify these dimensions on site.
- .10 Identify all openings and holes required for the passage of mechanical services through structures and dividing walls to the general contractor
- Such identification shall be via marked up drawings showing opening locations, sizes, and levels. If required, the contractor is to clearly mark on site the intended openings for review by the structural engineer.
- .11 The work shall include but not limit to the following: .1 Complete heating / ventilating installation.
- .2 Complete plumbing installation.
- .3 Complete gas piping installation. .4 Complete automatic control and related wiring installation.
- Commissioning and balancing. .12 Project is located in ASHRAE Climate Zone 6 - Quesnel.

.1 Materials and equipment installed shall be new, full weight and of quality specified. Use same brand or manufacturer for each specified

1.4 Cutting and Patching Provide holes and sleeves, cutting and fitting required for mechanical work. Relocate improperly located holes and sleeves.

.2 Each major component of equipment shall bear manufacturer's name, address, catalog and serial number.

- .2 Drill for expansion bolts, hanger rods, brackets, and supports. .3 Obtain written approval from structural consultant before cutting or burning structural members. This work shall be carried out by the specialist
- .4 Provide openings and holes required in precast members for mechanical work. Cast holes larger than 100mm (4") in diameter tight to columns shall not exceed 200mm (8") in diameter. Cast or field cut holes smaller than 100mm (4"). Caulk gaps between wall finishes and pipes where the gap is approximately 13mm (½"). For gaps greater than 13mm (½"), install an escutcheon plate. In fire rated walls, where the total size of a hole
- .5 Repair building where damaged from equipment installation, improperly located holes, etc., by this section of the work. This repair work shall be carried out by the specialist trade at the expense of this section of work. Use matching materials as specified in the respective sections.

exceeds 645 mm2 (20 in2), the condition is unacceptable and must be patched with fire rated drywall or similar to maintain the required fire

1.5 **Shop Drawings**

- Provide pdf shop drawings as indicated in accordance with the MCA-BC standards for shop drawings.
- Identify materials and equipment by manufacturer, trade name and model number. Include copies of applicable brochure or catalog material. .3 Clearly mark submittal material using arrows, underlining or circling to show differences from specified, e.g. Ratings, capabilities and options being proposed. Cross out non-applicable material. Specifically note on the submittal specified features such as special tank linings, pumps,
- seals, material, or painting. .4 Include dimensional and technical data sufficient to check if equipment meets requirements. Include wiring, piping, service connection data and
- .5 Installed materials and equipment shall meet specified requirements regardless of whether or not shop drawings are reviewed by the consultant. .6 Do not order equipment or material until the consultant has reviewed and returned approved shop drawings
- .7 Shop drawings shall be reviewed by the General Contractor and Mechanical Sub-Contractor indicating that the shop drawings have been reviewed, coordinated with the work and that the shop drawings are submitted without qualifications. Shop drawings shall bear the 'reviewed' stamp dated and initialed by the Mechanical Sub-contractor prior to submitting the shop drawings to the consultant. Shop drawings which do not bear the General Contractor's, Mechanical Sub-contractor's and sub-trades 'reviewed' stamp, initials and date will be rejected and sent back as
- .8 Submit a minimum of (4) copies of shop drawings prior to ordering equipment if pdf not available. .9 Submit weights of all major equipment for review such that the loads can be reviewed by the appropriate consultant.
- .10 Submit list of all electrical motors and power requirements to Electrical Consultant and Contractor.

1.6 Standards of Materials, Equipment and Installation

- Requests for changes to the specification in standards, materials, equipment or installation techniques shall be submitted for review seven (7) working days prior to close of tenders, and if applicable will be incorporated in an addendum to the specification
- .2 Equipment used shall not exceed space limitations in any dimension. Replace any equipment or apparatus which does not meet this specification at no cost. Assume full responsibility for the expense of redesign and adjustment to other parts of the building when proposing the use of approved equal or alternate equipmen
- .3 Submit samples, in addition to drawings, of all items which in the consultant's judgment, can be better examined for capacity, quality, finish or detail by sample rather than by drawings. Samples shall be submitted before equipment is ordered.
- .4 Provide equipment from the following manufacturers. Those manufacturers not listed are considered as alternatives. All mechanical equipment shall have the manufacturers name permanently affixed to it. It is the responsibility of both the 'named' product/supplier as well as the following listed "acceptable" products/suppliers to ensure that they meet or exceed the scheduled performance and are suitable for the intended use
- .5 Alternate manufacturers may be shown along with cost savings; however, these alternatives must be shown in addition to a manufacturer from the acceptable list. .6 If shop drawings are rejected technically after 3 submissions, the contractor, at no additional expense to the owner, shall revert to the specified
- product and manufacturer for this project. .7 The equipment manufacturer shall ensure that the strength and anchorage of the internal components of the equipment exceeds the force level
- used to restrain and anchor the equipment unit itself to the supporting structure. .8 Equipment to meet ASHRAE 90.1-2016 minimum efficiency requirements.

<u>ITEM</u> ACCEPTABLE PRODUCTS/ SUPPLIERS/MANUFACTURERS

Access Doors Acudor, E.H. Price, Maxam, Steel Brothers, Milcor, Mifab, Cendrex Inland Technical Services Ltd., Western Mechanical Services Ltd., K.D. Engineering, MDT Systems. **Backflow Protection** Watts, Febco, Clayton, Beeco, Wilkins, Ames, Conbraco Condensing Units Carrier, Trane, Lennox, McQuay, York

Inland Technical Services Ltd., Webir, K.D. Engineering, Airmec, Western Mechanical Federal, Price, Thermolec Coils, Electric

Victaulic, Grinnell Couplings American Warming, Tamco, Ruskin, Pottorff Damper - Low Leakage

Domestic Hot Water Heaters John Wood, State, P.V.I., Rudd, Giant, Bradford White Power Suction Service, Enviro-vac, Ace Mobile Power Service Ltd., Clean Air Services Ltd. Power Vac **Duct Cleaning Company** United Sheet Metal, B.C. Ventilating, Spiro-Lok, Ecco Duct Spiral and Fittings Electric Terminal Heating Units / Chromalox, Q-Mark, Thermolec, Oullette, Caloritech, EH Price

Greenheck, Delhi, Penn, Broan, Cook, Nutone, Panasonic

baseboard / Convector / Wallfin / Unit Heaters / Force Flow Heaters Flexonics, Hyspan, Uniroyal, Keflex, Mason, Goodall Expansion Joints Fans, Cabinet Delhi, Greenheck, Acme, Lau, Penn, Cook, Panasonio

Fans, Ceiling

Insulation - Flexible Piping

Tanks (Expansion)

Nutone, Broan Fan Range Hoods Filter Gauges Dwyer, Cambridge Farr, Continental, Cambridge, AAF Filters – Fibreglass Free Viledon, Tridec

Canadian Advanced Air, Maxam, Ruskin, Controlled Air, Nailor-Hart, Price Fire Dampers Fire Stopping and Smoke Seals 3M. Tremco. Hilti Flow Meters Western Meter, Annubar, PSE, Bell & Gossett, Armstrong

Flexible Air Duct Thermoflex, Wiremold, Flexmaster, Canaflex Furnaces - Gas Fired Lennox, Carrier, Trane E.H. Price, Krueger, Titus, Tuttle & Bailey Grilles, Diffusers and Registers

Enermax, Armstrong, Leitch, Bell & Gossett, B.A.C. Heat Exchangers Broan, BKM, VanEE, Greenheck, Venmar, American Aldes, Tempeff, Nuaire Heat Recovery Units Fiberglas, Knauf, Johns-Manville, Atlas, PPG, Manson, Certainteed Insulation – Duct Insulation - Flexible Duct

Armstrong, PPG, Knauf, Johns-Manville, Manson

Fiberglas, Knauf, Johns-Manville, Manson, Atlas, PPG, Certainteed Insulation - Piping Childers, Fiberglas, Johns-Manville, Flamex FR Canvas Jacketing Material Airolite, Penn, Westvent, Alumavent, Ruskin, Price

Mixing Valves Leonard, Bradley, Powers, Symmons Pipe Fittings and Flanges Crane, Grinnell (groove lock for grooved pipe), Jenkins, Victaulic Crane, Unistrut, Myatt, L.E. Taylor, Grinnell, Sarco Pipe Supports and Hangers Plumbing Drainage Accessories J.R. Smith, Watts, Zurn, Mifab, ACO

Plumbing Trim American Standard, Crane, Cambridge, Kohler, Elier, Alsons, Bradley, Powers, Symmons, Moen, (All to be CSA approved) Delta, Brasscraft, T & S Brass, Emco, Acorn, Leonard, Briggs, Chicago, Toto, Zurn Plumbing Fixtures Crane, K.I.L., Fiat, Kohler, Eljer, American Standard, Williams, Metcraft, Wessan/Elkay, Haws, (All to be CSA approved) Aquarius, Jacuzzi, Sunroc, Western, Swan, Bradley, Speakman, Valley, Hytec, Watrous, Briggs Kindred, Waltec, Venco, Encon, Gerber, Toto, Sloan

Pressure Gauges Weiss, Ametek, Trerice, Winters Grundfos., Taco, Wilo Pumps - In-Line Pumps (Sewage & Storm)

Pumps & Powers, Hydro-Matic, Toran, Flygt, Meyers, Zoeller, Gould, Barnes Relief Valves Crosby, Sarco, Watts Sound Attenuation I.A.C., Vibron, Vibro Acoustics, Wisp Air Red & White, Crane, Sarco, Armstrong, Kitz, Mueller, Plenty, Conbraco Strainers

Trerice, Weiss, Weksler, Winters Toilet Seats Beneke, Bemis, Olsonite, Moldex, Sperzel, Centoco Red & White, Grinnell, Jenkins, Watts, Hills, Crane, McCanna, Kitz, Millwaukee, Nibco, Valpres, Valves - Ball

Anthes, Leitch, Armstrong, Enermax Clemmer, Westeel-Rosco, Conbraco

Red & White, Crane, Jenkins, Kitz Grinnell, Vogt, Millwaukee, Nibco, Fortune Valves - Gate & Globe

Red & White, Centerline, Keystone, Grinnell, Millwaukee, Nibco, Crane, Jenkins, Fortune Valves – Butterfly Valves – Balancing DeZurik, Millcentric, Grinnell

Valves - Balancing/Flow Meter T/A, Bell & Gossett, Armstrong, Grinnell Valves – Check Spring Loaded Mission, Moyes & Groves, Grinnell, Crane Vibration Control Equipment Vibro-Acoustics, Lo-Rez, Vibron, Korfund, Mason Water Pressure Reducing Valves Wilkins, Slinger, Watts, Clayton, Bermad, Conbraco

1.7 Performance Verification of Installed Equipment

- Installed mechanical equipment whose performance is questioned by the consultant, may be subject to performance verification as specified
- .2 When performance verification is requested, equipment shall be tested to determine compliance with specified performance requirements. .3 The consultant will determine by whom testing shall be carried out. When requested, the contractor shall arrange for services of an independent testing agency.

.7 Should test results reveal that originally installed equipment meets specified performance requirements the owner will pay all costs resulting from

- .4 Testing procedures shall be approved by the consultant.
- .5 Maintain building comfort conditions when equipment is removed from service for testing purposes. .6 Promptly provide the consultant with all test reports.

- performance verification procedure. .8 Should test results reveal that equipment does not meet specified performance requirements the equipment will be rejected and the following
 - shall apply: .1 Remove rejected equipment. Replace with equipment which meets requirements of contract documents including specified performance
- .2 Replacement equipment will be subject to performance verification using the same testing procedures as on originally installed equipment. .3 Contractor shall pay all costs resulting from the performance verification procedure.
- 1.8 Operating and Maintenance Data Instruct the building operators in the operation and preventative maintenance of each piece of equipment and system supplied and installed.
- Complete and turn over documentation prior to substantial performance. .2 Provide operation and maintenance data as required under Section 01300. .3 The agency shall supply four final and one preliminary copy of the equipment data and maintenance cards. The preliminary copy referred to
- above shall include only the systems descriptions, operating and maintenance instructions and shall be delivered to the Consultant for review and comment no later than one (1) month prior to the date of Substantial Performance. This copy may be in a loose-leaf ring binder. .4 Provide three (3) copies to Owner of hard cover three ring binders labeled on front and spine indicating Mechanical Operating and Maintenance Manuals, Arch., Mech. Engineering Firm, Contractor's and Project Name and one (1) CD/DVD containing a pdf of the manual, inclusive of all
- .5 Index Division 15 of maintenance manuals according to the following index system. 6 Tab 1.0 Mechanical Systems:
- Provide title page with clear plastic cover. .2 The front title page shall include the cover information in addition to:
- The Owner The Architect
- The Engineer The General Contractor
- The Mechanical Contractor The Agency preparing the Manuals
- .3 The addresses, phone and fax numbers for the above will be given adjacent to their name.
- .7 Tab 1.1 List of Mechanical Drawings. .8 Tab 1.2 Description of Systems
- .1 Provide complete description of each system.
- .2 Include detailed system description and components comprising that system, explanation of how each component interfaces with others to complete the system, location of each thermostat, controller, or operating setpoints .3 Provide a complete description of emergency shut-down and start-up procedures for all major equipment, systems and controls, including
- fire alarm functions, power failure mode, back-up equipment/systems operation. .9 Tab 1.3 Operating Division:
- Provide complete and detailed operation of each major component. Include starting procedure, exact switch and control location.
- .3 Describe operation of component controls, changes required for summer or winter operation and method of accomplishment.
- .4 Describe trouble shooting sequence when set points can not be maintained. .5 Describe safe guards to check if equipment goes off line.
- Describe fire protection and smoke control. .10 Tab 1.4 Maintenance and Lubrication Division:
- .1 Provide detailed preventative maintenance and lubrication schedule for each of the major components including daily, weekly, monthly, semi-annual and yearly checks and tasks
- Describe lubrication and maintenance procedure for equipment components such as bearings, drives, motors, and filters. Include .3 Compile this information for each typical piece of equipment.
- .4 Provide a belt schedule. .11 Tab 1.5 List of Equipment Suppliers and Sub-contractors:
- .1 Provide complete list of Equipment Suppliers and Sub-contractors, including address and telephone number. .2 Outline procedures for purchasing parts and equipment.
- .3 Provide a parts list and repair manual for each piece of complete equipment specified. .4 Provide a warranty list for all items that extend beyond the standard one-year contractor's warranty period such as gas fired burners for roof top units, drinking fountain chillers, boiler burners, variable frequency drives, electrical motors, etc. Indicate the start date of the one-year
- .12 Tab Certification (2.0, 2.1, etc.) Include copies of: .1 Pre-operational cleaning reports and chemical treatment as specified.
- .2 Hydrostatic and air tests performed on piping systems. .3 Equipment alignment certificates.
- .4 Balancing reports for air and water systems.
- .5 Valve tag identification. Schedule including location, service and normal position. .6 Pipe colour code.
- Inspection approval certificates for plumbing and gas systems. .8 Inspection approval certificates for all air heating and ventilation systems
- .9 Start-up reports of equipment .10 Guarantee certificate. .13 Tab Shop Drawings (3.0, 3.1, etc.):

contractor's warranty period.

- Include copy of all reviewed only Shop Drawings.
- .2 Include reduced record control drawings (8½ x 11 or 11 x 14 fold out). .14 The divider tabs shall be laminated mylar plastic, and coloured according to Section. The colouring is as follows: Mechanical Systems - 1.0 - 1.5
- Orange, Certification 2.0 2.4 Green, Shop Drawings and Maintenance 3.0 3.17 Yellow. Plastic tabs with typed insertions will not be
- .15 Provide a minimum of three (3) monthly, one day visits to the building to check that building operators are operating and maintaining mechanical systems in proper manner and keeping schedules up to date. Forward complete written report to the Consultant after each visit.

.1 Submit record drawings identifying location of fire dampers, access doors, tagged valves and actual room names.

- .2 The contractor shall be responsible for and keep one set of white prints, including revision drawings in the job site office. Backfilling will not be allowed until underground service dimensions are marked on plans. A set of white prints shall be maintained in constant up-to-date condition by each trade (as-built conditions marked in red pencil). The 1 white set of prints will be provided to the contractor by the consultant at the
- .3 The record drawings shall include, but not be limited to, the following changes and shall be recorded daily: .1 Size, location, arrangement, route and extent of ductwork, piping, conduit, terminal units, equipment, fixtures, cleanouts, valves, rough-in,
- etc.. Above and below grade inside the building, including locations of buried piping. Sanitary sewers: all sanitary sewers. Invert elevations and locations to be given at each clean-out. .3 Storm drains & sewers: all storm drains and sewers. Invert elevations to be given at each manhole, clean out, change of direction, junction,
- .4 Gas lines: all piping of any size. Invert elevations to be given at each junction, at entry to building, at change of direction, at high and low
- .5 Location, tagging and numbering of all valves except individual plumbing fixtures or equipment isolation valves. .4 The as-built daily marked-up prints shall conform to the standards of the contract drawings and shall include all details from revision drawings, supplementary drawings, change orders, addenda and site revisions, etc. .5 At the end of construction, all of the above changes shall be transferred by the consultant, at the contractors cost, to a set of "AutoCad" disks. The

CADD files shall be used to produce 1-set of originals turned over to the owner. The contractor shall allow \$200.00 / revised drawing.

- 1.10 Painting and Identification
- Clean all exposed bare metal surfaces supplied by the mechanical and plumbing trade by removing all dirt, dust, grease and millscale. .2 Repaint all marred factory finished equipment, which is not scheduled to be repainted, to match the original factory finish. .3 Natural gas and sprinkler piping shall be colour banded at 6' intervals over their entire lengths throughout all exposed areas and in the mechanical
- Gas: yellow C.G.S.B. 505101Fire: redC.G.S.B. 509102.4 Pipe markers and direction arrows in all exposed areas and in the mechanical room: .1 Provide commercially available pipe markers having standard sizes of lettering and colours. Standard colours designate classes of materials
- follows and are consistent with those specified by the CSA and the USASI. Provide markers to all pipes provided under this contract. Yellow Dangerous materialsBlueProtective materialsGreenSafe materialsRedFire protection equipment.2 Pipe markers and direction arrows shall be made of a vinyl film material that becomes permanent after curing in place for 24 hours or a spray on stencil is acceptable. .3 Pipe markers and direction arrows shall be suitable for continuous operating temperatures between -40°C and 48.9°C (-40°F and 120°F).
- .4 Pipe marker letters are to be 50mm (2") high for pipes 75mm (3") and larger outside diameter (including insulation) and not less than 18mm (3/4") high for smaller diameters. .5 Pipe marker direction arrows are to be 150mm long by 50mm wide (6" x 2") for pipes 75mm (3") and larger outside diameters (including insulation) and 100mm long by 18mm wide (4" x 3/4") for smaller diameters. Mini-markers are to be used for very small diameter pipes.
- .6 Location of pipe markers and direction arrows Pipe marker and direction arrow shall be placed side by side in the bottom quarter of the pipe to be identified. Adjacent to all major changes in direction and at connections to each piece of equipment
- At least once in each room that the pipe passes through. Where piping passes through walls, partitions, or floors, identify piping on both sides of the section and at entry and exits to shafts. .7 Provide ceiling access panel identification for the location of terminal units, valves, etc. above ceiling panels. Mechanical elements shall
- have their location identified by means of a coloured tack or data dot. .1 Provide a schedule of the representation of each colour with the operation and maintenance manuals. .8 Duct access panel. Identification identify the function of duct access panels by the following schedule:
- Symbol Cleaning & service access C.A. Controls (including sensors) CDampers (backdraft, balance & control) DFire dampers DSmoke dampers D.9 .1 All valves, except convector hand valves and individual plumbing fixture stop valves, shall be provided with 50mm x 30mm (2" x 11/4")
- brass tags with stamped numbers, secured by chains to the valve concerned. Numbers shall be prefixed by the letter "P" or the letter "H" indicating that the valve is on plumbing or heating service. .2 Each trade shall prepare a list detailing the valves location, normal position, and purpose served. The list shall be included in the
- Do not use the permanent system for temporary heating or other purposes without written permission from the owner and/or consultant. .2 All equipment used shall be returned to new condition and warranties extended
- 1.12 **Equipment Protection and Clean-up** Protect equipment and material in storage on site and after installation until final acceptance. Leave factory covers in place. Take special precautions to prevent entry of foreign material into working parts of piping and duct systems
- Thoroughly clean piping, ducts and equipment of dirt, cuttings, and other foreign material. .3 Protect bearings and shafts during installation. Grease shafts and sheaves to prevent corrosion. Supply and install necessary extended nipples for lubrication purposes. .4 Ensure that existing equipment is carefully dismantled and not damaged or lost. Do not reuse existing materials and equipment unless specifically
- 1.13 Connection and Interruption to Existing Systems .1 Coordinate interruption of existing building systems with the owner. .2 Include premium time for connection to existing system so that normal use of the existing system will not be affected.
- Co-ordinate and maintain liaison with the Owner and/or Consultant to interrupt, re-route or connect to water, sewer, storm, heating or gas systems, with minimum interruption of service. Contact respective utility companies prior to starting work.
- and 50°C (122°F) for drip proof housing, and operate 1200 or 1800 R.P.M. unless otherwise specified. Do not use air over ratings. Motors shall have ball or roller type bearings with grease lubrication fittings. .3 All belt-driven devices shall have the motors mounted on adjustable bases with adjusting screws so that proper belt tension can be obtained. .4 Where equipment has been specified in division 15 to be complete with starters, disconnects and/or control panels, this contractor shall provide

Provide motors to CEMA and C.S.A. standards for hard, continuous service, designed to limit temperature rise to 40°C (104°F) for open housing

- 1.16 Access Doors and Panels Contractor to provide access panels required in building construction including in architectural walls and ceilings for access to any concealed mechanical equipment which, in the consultant's opinion, requires maintenance or adjustment. Access panel shall match wall/ ceiling finish. Obtain approval from architect prior to installation. General to install.
- .2 Coordinate location of panel(s) with other trades. .3 Such panels shall be manufactured panels, with fastening devices, appropriate to the construction involved, provide access panel (300mm x 300mm (12"x 12") for hand access, otherwise 460mm x 460mm (18"x 18") min.) In wall / ceiling to all mechanical system (such as valve, damper) requiring access. Provide access panel sized to allow manufacturers required access for any other concealed equipment such as HRVs. Dry wall surface: Milcor style DW flush panel access door; masonry tile surface: Milcor style M; plastered wall: Milcor style K.
- 1.17 Access of Equipment

.4 Provide rated panels where required to maintain fire separation ratings of walls, ceilings and floors.

any required wiring and conduit between the equipment and the above items.

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.1 Make all arrangements to ensure that adequate access is available for all mechanical equipment. Do all hoisting and rigging into place of all
      specified equipment and be responsible for any damages incurred therefrom
.2 Contractor to demonstrate reasonable access to all equipment service locations.
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1.18 Liability .1 Assume full responsibility for laying out the work and for any damage caused to the owner or other trades by improper location or carrying out of

.2 Be responsible for prompt installation of his work in advance of concrete pouring or similar work. Provide and set sleeves where required. Should any cutting or repairing of either unfinished or finished work be required, this contractor shall direct the particular sub-contractor whose work is involved to do such cutting and repairing without expense to the owner. Before being undertaken, such work shall be laid out for the consultant's

- .3 Examine the site and the local conditions affecting work under this contract. Examine carefully the mechanical, electrical, structural and architectural drawings and confirm that the work under this contract can be satisfactorily carried out without changes to the building as shown on these plans. Before commencing the work, examine the work of the other trades and report at once any defect of interference affecting the work of this section, of the quarantee of same. No extras will be subsequently allowed to cover any such error, omission or oversight on the thorough inspection of the grounds, building, conditions, etc.
- .4 Arrange work in co-operation with other trades in the building in such a manner as not to interfere with other work being carried on in the building and places where other pipes and equipment be installed along with the pipes and ducts pertaining to this trade. Co-operate with the other trades to get all the pipes, ducts, conduit, etc., installed to the best advantage. When open web structural joists are used, the contractor must obtain
- structural shop drawings to ensure space available for installation of pipes and ductwork. .5 Where any pipes, ducts and equipment must be built into the work of other trades such as masonry, structural, or plastering, be responsible for supplying the equipment to be built in or measurements to allow the necessary openings to be left. All pipes and ducts which are to be concealed
- shall be installed neatly and closely to the building structure so that the necessary furring can be kept as small as possible. Any pipes, ducts, or other work which are not, in the opinion of the consultant, installed as they should be, shall be taken out and replaced without cost to the owner. .6 Protect finished and unfinished work from damage due to the carrying out of his work, giving special attention to the protection of building vapour barriers, waterproof membranes, etc. Cover floors and other parts of the building with tarpaulins, etc., and repair all damage to the satisfaction of the owner and the consultant. During freezing weather, protect all his materials in such a manner that no harm can be done to the installation
- already made and/or to materials and equipment on the job. .7 Be responsible for the condition of all materials and equipment supplied and shall provide all necessary protection for same. .8 Be responsible for the protection and maintenance of the work of this section until the building has been completed and accepted by the owner
- and be responsible for the sorting of his material inside and out of the way, and to clean up all refuse caused by his work to meet consultant's .9 On completion of the work all tools, surplus and waste materials shall be removed and the work left in a clean and perfect condition.

1.19 Asbestos .1 All material/products provided shall be free of asbestos.

1.20 Liability Insurance This contractor shall maintain such insurance as will fully protect both the owner and himself from any and all claims, all as noted within the general conditions and supplementary general conditions. When requested the contractor shall provide and show proof of, at his expense, comprehensive general liability insurance of not less than \$2,000,000.00 Including non-owned car coverage, contractual liability and containing a cross liability clause. Coverage shall include loss or damage the contractor may cause to any work, building, equipment, structural, on the owner's property. The insurance may contain a deductible clause not to exceed \$500.00.

complete winter of uninterrupted operation. Warranty shall include any part of equipment, units or structures furnished hereunder that show

.2 The contractor shall at his own expense promptly investigate any mechanical or control malfunction, and repair or replace all such defective work,

1.21 **Guarantee Warranty** This contractor shall furnish a written warranty stating that all work executed under this division will be free from defects of material and workmanship for a period of one (1) year from the date of substantial performance, which shall include one (1) complete summer and one (1)

defects in the works under normal operating conditions and/or for the purpose of which they were intended

runways, etc., shall be requested by this contractor and arranged with the general contractor

.2 The contractor shall carry full employee's liability insurance for the whole of the work in accordance with the Workers' Compensation Act.

and all other damages thereby which becomes defective during the time of the guarantee-warranty. Provide interior movable or roller scaffolds for the installation of the mechanical work. All other hoists, scaffolds, temporary elevators, ladders,

1.23 Pipe Chases and Duct Shafts 1 Unless otherwise indicated, conceal piping and ductwork in the construction of the walls and ceilings, and in pipe chases, duct shafts and furring. If it is necessary, move the location of pipes and ducts from those indicated and provided. Consult the consultant for review before installation of

1.24 Inspection 1 The consultant or his representative may choose to review all work prior to it being concealed.

- .2 The contractor shall notify the consultant in writing for the following minimum, but not limited to, reviews: (Required to provide a Schedule 'C' for .1 Below grade piping prior to backfill.
- .2 All HVAC and plumbing rough-in prior to wall and ceiling finish installation .3 Fire stopping of all openings. .4 Drop test all fire dampers and demonstrate access.
- .5 Trip test the fire protection system. .6 Pre-occupancy review.

.2 Maintenance and operating manuals to be submitted.

specified format for the approval by the consultan

- .7 Final occupancy review and verification of all equipment being fully operational. .3 All work shall be approved by any other regulatory body having jurisdiction where required.
- .4 The contractor is to provide copies of all permits, inspection reports and certificates for insertion into the maintenance manuals. .5 The contractor is to provide the consultant reasonable notice prior to calling an inspection.
- .6 After the pre-occupancy review for substantial performance all deficiencies shall be completed for the final review. The contractor will be permitted one additional final review to finish all remaining deficiencies. Any additional reviews after final occupancy will be at the contractor's cost and paid to the consultant, in advance, at \$1000.00 per site visit.
- 1.25 Substantial Performance Inspection .1 Prior to the contractor requesting an inspection for substantial performance all the following items must be provided to permit beneficial use by the .1 Comply with requirements in general contract conditions.
 - .3 As-built drawings submitted. .4 Balancing reports (air and water.) to be submitted. .5 All systems shall be certified in writing by the contractor as complete and fully operational.
- Instructions to the owner's operating personnel shall be provided in accordance with the specifications .7 A complete list of items which the contractor has not finished, or are deficient, shall be provided. If in the opinion of the consultant this list indicates the project is excessively incomplete, a substantial completion review will not be performed. .8 The contractor shall be fully responsible to accumulate all necessary data from his sub-trades and suppliers and present same in the
- 9 All life/safety items such as fire stopping, fire dampers, plumbing and ventilation fixtures and ventilation must be operational. 1.26 Laws, Notices, Permits and Fees .1 Give all necessary notices, obtain all necessary permits and pay all fees in order that the work specified may be carried out, and furnish any
- certificates necessary as evidence that the work installed conforms with the law and regulations of all authorities having jurisdictio .2 All work shall be in accordance with the regulations of the following authoritative bodies, the codes in effect at the time of tender, and any others having jurisdiction .1 Fire Marshall
- .2 Canadian Electrical Code .3 B.C. Building code and local building by-laws .4 Worksafe BC
- 5 Canadian Standards Association 6 Pollution Control Board .7 B.C. Refrigeration Code and C.S.A. Codes governing refrigeration plants
- .8 Canadian Gas Code B-149.1 .9 B.C. Plumbing Code .10 National Building Code of Canada .11 B.C. Boiler and Pressure Vessel Act

.1 Air handling systems (supply, return, exhaust)

.12 National Fire Protection Association

- .13 I.A.O. Insurers Assurance Organization .14 Underwriters' Laboratories of Canada
- 1.27 Demonstration and Instruction to Owner Demonstrate to and instruct the representative designated by the owner on the complete mechanical systems operating and maintenance procedures using the assistance of specialist sub-trades and manufacturer's representatives .2 The following systems shall be demonstrated in regards to performance and safety features (to the fullest):
- 2 Heating systems (D.H.W.S.) .3 Controls system .4 Plumbing systems
- .3 Obtain a signed statement from the owner certifying that the demonstration and instructions have been given to his satisfaction. 1.28 **Temporary Facilities** .1 Provide any temporary buildings and workshops that may be required for workmen, on-the-site operations, storage of materials and sewer connected water closets for the use of workmen. Provide, near the site and keep open at all times during construction on the project, an office for
- Accommodations shall conform in appearance to the general contractor's. 1.29 Contract Price Breakdown .1 10 days after the award of contract submit mechanical breakdown in materials and labour for plumbing, ventilation, fire protection, heating, and controls in order to assess progress claims

his own use where all notices and instructions from the consultant will be received and acknowledged by himself or his authorized representative.

- .2 In particular cases more detail may be necessary to properly assess a change order or progress claim. This additional information, which could include all suppliers and all sub-contractors, shall be supplied when requested by the Consultant .3 Mark-up information is required for change orders but is optional on the original tender price.
- .1 Provide mechanical breakdown in materials and labour for plumbing, ventilation, fire protection, heating, and controls in order to assess progress

.2 Submit detailed price breakdowns for each separate mechanical change order item exceeding \$20,000.00. Single line items for change orders

\$20,000,00 or less are acceptable. .1 Perform all testing required by the authority having jurisdiction.

.3 Gas piping leakage test as per Canadian Gas code.

.5 Measure and balance the following (where applicable):

.1 Supply, exhaust and return fan volumes and speeds.

- .2 Obtain test certificates for all tests performed and include in operating manuals. .3 Perform the following tests: .1 Sanitary & storm hydraulic test. .2 Heating, chilled and condenser water to min 1 1/2 times working pressure.
- .4 Domestic water test to 1 1/2 times max water pressure or 1380kPa (200psi). .5 Ductwork - test medium velocity systems to a static pressure of system + 500Pa (+ 2") of W.G. .6 Drop test all fire dampers.
- 4 All tests shall be documented and witnessed by the consultant or general contractor. Balancing .1 Contractor is to provide the services of an approved professional testing & balancing firm.
- .3 Balance all air and water quantities to 5% or + 10% of the design requirement, except in air systems part of life safety where deviation shall be 0 .4 Provide all required sheave, belt and impeller changes to achieve the required fan and pump flow rates.

.2 Provide a balance report of all air & water balance points and performance testing & balancing of all equipment as per the AABC.

.2 Airflow at each air outlet and branch connection .3 Adjust pattern control on supply diffusers. 4 Motor amperage draw on all motors and compare with motor rating. .5 Balance domestic water recirculation.

.6 Additional testing of the system may be requested by the consultant to spot check air and water flow quantities. (10% of the system will be

- re-checked at the discretion of the consultant) at the contractors cost
- 4. Systems Commissioning, Verification and Demonstration .1 Be responsible for the performance and commissioning of all equipment provided under Division 15. Commissioning is the process of advancing
 - the installation from the stage of static completion to full working order to specified requirements. It is the activation of the completed installation .2 In consultation with the General Contractor, ensure that sufficient time is allowed and fully identified on the construction schedule for the proper
 - commissioning of all mechanical systems
 - .3 Commissioning is concluded when mechanical systems have been balanced and the installation is in full working order and acceptable for use. The work will include the following:
 - .1 Balancing of the air systems as specified.
 - .2 Balancing of domestic hot water recirculation systems. .3 Set up air diffusers, registers and grilles for optimum distribution/comfort.
 - .4 Plug all air pressure and flow measuring holes .5 Adjust vibration isolators and seismic restraints for optimum performance. Provide letter of certification.
 - 6 Verification of tight closure of outside air dampers
 - .7 Verification and certification of operation of all fire dampers. .8 Verification and certification of the sealing of all HVAC penetrations through fire separations (rated & non-rated) and sound separations.
 - .9 Verification of water tightness of all roof and exterior wall penetrations. .10 Verification that all coil drain pans operate.
 - .11 Verification that equipment is not short cycling. .12 Verification of fire extinguisher pressures .13 Verification of operation of all mechanical related fire alarm functions.
 - .14 Set up all automatic control valves/dampers and automatic temperature control devices. .15 Set up and test all alarm and protective devices .16 Obtain and review trend logs for all control points. Submit trend logs to Consultant with detailed comments after verification of proper
 - operation of all control sequences .17 Verification and certification of sewage and septic system installations. .4 At the conclusion of commissioning, demonstrate the operation of the systems to the Consultant and then to the Owner's Operating Staff.
 - .5 At the completion of the commissioning, testing, balancing and demonstration submit the following to the Consultant:
 - .1 A letter certifying that all work specified under this contract is complete, clean and operational in accordance with the specification and
 - .2 Completed copies of all commissioning check lists plus copies of start-up reports from specialty contractors and vendors. .3 "AS-BUILT" record drawings, as specified.
 - .4 Gas Inspection Dept. approval of boiler on gas firing. .5 A list of all alarm and protective devices tested, with the final operating settings. .6 The verification process shall include instructional seminars to demonstrate all systems and to explain the operation of each. The instruction shall
 - .1 Ease of access provided throughout for servicing coils, filters, motors, drives, fusible link fire dampers, control dampers and damper
 - .2 Operation of all equipment and systems under each mode of operation and failure, including: .1 Furnaces, air conditioners and refrigeration systems
- .2 Pumps, fans, heaters, unit heaters and coils. .3 Sewage and septic installations .4 Tanks - domestic hot water and expansion.
- .7 After demonstration obtain the Owner's signature certifying that the demonstration has been performed and completed to their satisfaction. Indoor Air Quality
- .1 In the interest of providing an acceptable level of indoor air quality for the occupants, the air systems will be used to flush out fumes that may be present from building products. (Cabinets, carpets, paints, solvents etc.) .2 After all systems are fully operational and the building is clean, run the fan systems at 100% outside air for a period of 10 days prior to occupancy. Maintain the building at 21°C (70°F) for heating and 24°C (75°F) for cooling.
- Pipe & Pipe Fittings .1 Ensure all pipe materials and fittings are acceptable to the authority having jurisdiction. .2 All type 'K' copper must be certified to ASTM B88. Provide written guarantee that lead-free solder was used on all domestic water systems.
- .3 Contractor to provide drains at all low points in the piping system. .4 Plumbing Drainage Piping .1 Inside buildings: .1 Above floor slab
- .1 Cast iron with stainless steel couplings .2 D.W.V. copper pipe and fittings .3 System 15 PVC drain and waste pipe and fittings (System XFR required in any plenum). .2 Under floor slab only
- .2 PVC drain and waste pipe and fittings. .2 Outside buildings: .1 ABS drain and waste pipe and fittings.
- .2 PVC drain and waste pipe and fittings. .3 Footing Drains: .1 PVC perforated building sewer pipe and fittings conforming to CGSB 41-GP-29M and CSDA B182.1.
- .2 Filter cloth 2.2 mm thick polyester filter cloth equal to Mirafi P-40, Permaliner, Staff, Nilex. .3 Provide drain rock cover and bedding for all footing drains. .5 Plumbing Water Piping .1 Type 'K' soft copper pipe underground - 75 mm (3") and smaller - brazed.

.1 ABS drain and waste pipe and fittings.

.5 HRV's and duct heater

- .2 Type 'L' copper pipe above ground with -ittings: Cast brass or wrought copper fittings 95/5 Sn/Sb sold .3 PVC Blue Brute 1034 kPa [150 psi] water piping for underground outside the building.
- .1 Fittings: Grooved mechanical joints. .4 Material: Crosslinked polyethylene PEX A (branch runs to fixtures only) Fittings: Brass compression, PEX press, expansion connection, heat fusion.
- .6 Hangers and Supports: Cadmium plated hanger rods. For steel or cast iron pipe, Grinnell Fig. 260. For copper pipe, Grinnell Fig. CT-65 (copper ated) or Grinnell Fig. 260 epoxy coated .7 Install dielectric couplings at copper piping connections to plumbing equipment of dissimilar material.
- .8 Valves: .1 Sweat ends - Acceptable Products: Toyo 5049A, Apollo, Crane, Kitz, Neuman-Hattersley, Nibco, Watts, Worcester,

.9 Strainers: Bronze equal to Crane 9881-1/2. Acceptable Manufacturers: Toyo, Jenkins.

- .2 Threaded ends Acceptable Products: Toyo 5044A, Apollo-70 Series, Crane 93 TF, Grinnell 3700 full port, Kitz 58, Neuman-Hattersley 1969AT, Nibco T-580-BR, Watts B-6000, Worcester 4211-RT. .3 Provide valve box and cover for all outside valves. Valve box Terminal City.
- .10 Pressure Reducing Valve: Singer PR. .11 Vacuum Breakers: Watts No. 900. .12 Backflow preventers:
 - .1 Vacuum breakers: .1 Pressure applications .1 12 mm [1/2"] unit on pipe sizes up to 25 mm [1"]

.13 HVAC Piping:

.1 Piping:

- .2 20 mm [3/4"] unit on pipe sizes up to 40 mm $[1\frac{1}{2}"]$.3 25 mm [1"] unit on pipe sizes up to 75 mm [3"] .4 Continuous pressure, high hazard, anti-siphon, anti-spill vacuum breaker .5 Standard of Acceptance: Watts series 008PCQT
- .6 Acceptable Manufacturers: Cla-Val, Febco, Wilkins, SMR .2 Atmospheric applications: Standard of Acceptance: Watts 288A, Hose End Series 8
- .2 Acceptable Manufacturers: Febco, Rainbird, SMR .2 Reduced pressure principle device (RPPD) .1 Factory assembled station complete with inlet and outlet isolation valves .2 Provide a repair/maintenance kit for each size of RPPD installed.
- .3 Standard of Acceptance: Watts series 909 .4 Acceptable Manufacturers: Ames, Beeco, Braukman, Cla-Val, Craneline, Febco, Grinnell, Lawler, Neptune, Rockwell, Wilkins, Viking .3 Double check valve (DCV):
- .1 Factory assembled station complete with inlet and outlet isolation valves .2 Standard of Acceptance: Watts series 709 .3 Acceptable Manufacturers: Ames, Beeco, Braukman, Cla-Val, DHC, Febco, Grinnell, Neptune, Rockwell, Wilkins, Viking
- .1 Service: Natural Gas. Material: Steel Schedule 40, A53 Grade B .2 Service: Refrigerant Material: ACR Copper 3 Service: Condensate: Pumped Condensate.
- Material: Galvanized steel pipe to ASTM A120, Schedule 40, D.W.V. copper. .2 Pipe Fittings - Steel Pipe .1 Cast iron pipe flanges: Class 125 to ANSI B16.1. .2 Cast iron screwed fittings: Class 125 to ANSI B16.4.
- .4 Steel butt-welding fittings: to ANSI B16.9a. .5 Malleable iron unions, ground joint type: ANSI B16.3; Class 150 for 30 mm [1-1/4"] and smaller; Class 250 for 40 mm and 50 mm [1-1/2", 2"].
- .1 Cast bronze: to ANSI B16.18 or wrought copper and bronze: to ANSI B16.22. .4 Flanges - Copper Pipe .1 Brass or bronze: to ANSI B16.15 or cast iron: to ANSI B16.4. .5 Pipe Joints
- .2 65 mm [2-1/2"] and larger: welding fittings and flanges to CSA W47.1. .3 Provide dielectric couplings on all systems except closed loop systems wherever pipes of dissimilar metals are joined. .14 Install piping with all necessary changes of direction, expansion loops, anchors and guides to prevent overstressing the piping and equipment

.1 50 mm [2"] and smaller: screwed fittings, except where otherwise noted, with teflon tape or pulverized lead paste.

.15 Hangers and Supports: .1 Cadmium plated hanger rods.

.2 For steel or cast iron pipe, Grinnell Fig. 260.

piping connections from thermal expansion and contraction.

.3 Pipe Fittings - Copper Pipe

Material: CPVC Schedule 40.

.4 Service: Equipment drains and overflows.

.3 Steel pipe flanges and flanged fittings: to ANSI B16.5.

.6 Malleable iron screwed fittings: to ASME B16.3, Class 150.

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KEYPLAN:

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3 2022-06-17 ISSUED FOR BP / TENDER ISSUED FOR ELEC COORDINATION MW 2 2021-07-19 1 2021-07-16 ISSUED FOR REVIEW No. DATE DESCRIPTION **REVISIONS:**

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QUESNEL & DISTRICT

420 WEBSTER AVENUE

QUESNEL, BC

DAYCARE SOCIET

DRAWING NAME: MECHANICAL SPECIFICATIONS

PROJECT NUMBER:

DESIGNED BY: MW APPROVED BY: MW AS NOTED SCALE:

DRAWN BY:

DRAWING:

21424-T

.1 Mineral Fibre - Low and Medium Temperature, vapour barrier jacket. Maximum thermo conductivity: as per Tables 6.8.3A and 6.8.3B

.1 Acceptable Products: Johns Manville Micro Lok Ap-T Plus, Manson Alley K, Owens Corning SSL-II, Partek Paroc 1200 ASJ/SSL.

in ASHRAE 90.1-2016:

.3 Flexible Closed Cell Insulation

.2 Flexible Foamed Elastomeric Insulation.

Acceptable Products: AP Armaflex, Rubatex R-180-FS.

Acceptable Products: Bondtex Polyethylene, Therma-Cel.

.1 Acceptable Products: Armstrong 520, Therma-Cel 1590, Rubatex R-373, Zipcoat 8A.

.4 Flexible elastomeric and flexible closed cell insulation adhesive:

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6	Zipodat, Hobbotho Habbot O	ible closed cell ins oat.							
. /	Zipcoat, Robson's Rubber Coat. Tape - self-adhesive, aluminum, reinforced, 50 mm [2"] wide Vapour barrier jacket adhesive:								
.8	Vapour barrier jacket adhesive: .1 Acceptable Products: Childers CP-82, Foster 85-20. Vapour barrier coating on reinforcing membrane or on insulating cement: .1 Acceptable Products: Bakelite 120-09, Childers CP-50, Epolux Cadalag 336, Robson White Lag.								
.9	Insulating Cement: 1. Acceptable Products: Bakelite 120-09, Childers CP-50, Epolux Cadalag 336, Robson White Lag. Insulating Cement: 1. Acceptable Products: Fibrex Superkote, Partek No. 1, Ryder Thermokote MW high temperature.								
.10	PVC Jacket and Fitting Cove	•			_	-			
	 22 ga. corrugated or smooth aluminum jacketing. Longitudinal slip joints and 50 mm [2"] end laps. Factory applied protective liner on interior surface. 								
	oe: Warm/Hot Piping								
.1 .2	Insulation as required in Table 6.8.3A in ASHRAE 90.1-2016. Piping insulation thickness shall be selected as per Table 1:								
	TABLE 1 Pipe Insulation Thickness - Hot Piping								
		Max. Operating Temp °F (°C)	< 1" (25 mm)	1-1/2" to <1-1/2" (25 mm to 38 mm)	1-½² to <4" (38 mm to 100 mm)	6" (150 mm)	≥ 8" (200mm)		
	Dom. Hot Water Including re-circ & tempered.	-	1" (25)	1" (25)	1-½" (38)	1-½" (38)	1-½" (38)		
	Waste Arm & P-trap on H/C Sink	-	-	½" (13)	-	-	-		
	.3 Tape over all joints a.4 Fittings - tightly wrapped f.5 Valves, Strainers - fitted p.6 Flanges, mechanical joint	flexible insulation of the first insulation with the first insulation with	to full thicknes	off plugs and c	aps uninsulate		ım [3"]		
	.7 Where exposed piping sh protect insulation from dar		h either a cor	tinuous white F	PVC jacket or a	a canvas cove	ering with white P\		
	.1 Exposed pipe is defin	ned as the followir	ng:						
		tructure or unders		_					
	 Installed below st Installed in crawl In boiler and med 	tructure or unders spaces within 2 m chanical service ro	netres (6-feet)	_		es			
	 Installed below st Installed in crawl 	tructure or unders spaces within 2 m chanical service ro efined as:	netres (6-feet)	_		es			
	 Installed below st Installed in crawl In boiler and med Concealed pipe is de Installed above d Installed inside w Installed inside fu 	tructure or unders spaces within 2 m chanical service reafined as: ropped ceilings ralls	netres (6-feet) ooms orizontal pipe	of crawl space	e access hatch				
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3. Installed inside furred vertical or horizontal pipe chases 4. Installed in crawl spaces and located more than 2 metres (6-feet) away from crawl space access hatches

.5 Scope: Refrigerant Piping

.1 Insulation as required in Table 6.8.3B in ASHRAE 90.1-2016. .2 Piping insulation thickness shall be selected as per Table 2, above

.3 Flexible foamed elastomeric or flexible closed cell preformed piping insulation. Secure longitudinal and butt joints with adhesive. Insulate all fittings and components. Finish with flexible elastomeric or flexible closed cell insulation coating. Maintain continuous

.4 Aluminum Jacket: 22 ga. smooth aluminum jacketing with longitudinal slip joints on all pipe insulation outdoors Acceptable Products: Childers, Alco Thermoclad 1

vapour-barrier for suction and mixed phase piping

.6 Insulate all exposed traps under accessible sinks with factory installation kit. 7 Insulate heat pump and air conditioning unit condensate drain for the first 1.5m (5'-0").

.3 Ductwork Insulation

.1 Products

.1 External Insulation - Flexible

.1 Acceptable Manufacturers: Certainteed STP Ductwrap #75, Johns Manville Microlite FSK, Manson Alley-Wrap FSK, Owens Corning all service faced duct wrap, Knauf FSK Ductwrap. .2 Duct Liner - Flexible. Minimum noise reduction criteria (NRC): 0.70 as per ASTM C423 'Type A mounting'.

.1 Acceptable Manufacturers: Certainteed Ultralite #150. Johns Manville Linacoustic. Johns Manville Permacote. Knauf Duct Liner EM. Manson Akousti-Liner, Owens Corning Areomat Duct Liner

.3 Duct Liner- Rigid. Minimum noise reduction criteria (NRC): 0.70 as per ASTM C423 'Type A mounting'. .1 Acceptable Manufacturers: Johns Manville Linacoustic R, Knauf Rigid Coated Duct, Manson Akousti-Liner R. .4 Insulation Adhesive:

.1 Acceptable Products: Foster 85-20, Robson Ticki-Tuff, 3M 4230, United UNI-GRAB. .5 Vapour Barrier Tape:

.1 Acceptable Products: Scrim foil self-adhesive tape. .6 Insulation Coating:

1 Acceptable Products: Childers CP-50, Foster 30-36, Robson's Mastic R.I-10

.7 Weather Coating - vapour barrier: .1 Acceptable Products: Childers CHIL-PRUF CP 22/23/24, Foster 60-25, Insul-Mastic 15187. .2 Scope: Ductwork exterior thermal insulation

.1 Insulation as required in Table 6.8.2A and Table 6.8.2B in ASHRAE 90.1-2016. .2 Insulation shall be provided as follows:

Mechanical System Application	BCICA Insulation Type	Application Type	
Outdoor Air Ductwork and plenums (intake to mixing plenum)	2" (50 mm) thick, A.2 - rigid or flexible insulation (with vapour barrier).	Externally Applied	
Sheet Metal Supply Air Ductwork (Concealed)	1-½" (38 mm) thick, B.2 - flexible insulation (with vapour barrier)	Externally Applied	
Ductwork Where Exposed to Outdoors	2" (50 mm) thick, C.2 flexible duct liner with vapour barrier	Internally Applied	
Ductwork exposed (air-conditioned)	1" (25 mm) thick, C.1 flexible duct liner	Internally Applied	
Exhaust ducts within 10' of exterior walls	1" (25 mm) thick C.2 flexible duct wrap	Externally Applied	
Exhaust ducts within 10' of roof openings	1" (25 mm) thick C.2 flexible duct wrap	Externally Applied	
10' from fan discharge and suction	1" (25 mm) thick C.2 flexible duct liner	Internally Applied	
Acoustic Lining	2" (50 mm) thick, A.2 - rigid insulation	Internally Applied	
Where indicated or denoted on drawings	1" (25 mm) thick C.2 flexible duct liner	Internally Applied	

.3 Insulate outdoor air ductwork from intake to mixing plenum.

.3 Installation: .1 Adhere insulation with insulation adhesive applied in 150 mm [6"] wide strips on 300 mm [12"] centres.

.2 On rectangular ductwork and plenums, over 610 mm [24"] in width secure insulation with pins at one per 0.1 sq. m [1.0 sq ft] minimum.

.3 Adhere vapour barrier tape over all butt joints, raw edges, holding washers and other points of penetration of the vapour barrier jacket. .4 "Exposed" insulation inside the building:

Apply two coats of white insulation coating. .5 "Exposed" outdoor insulation

.1 Apply one coat weather coating at 1 litre per square metre and immediately embed #10 glass fabric into the wet coating. .2 Smooth all wrinkles, lap joints at least 50 mm [2"].

.3 After the initial set, but while still damp, apply weather coating at 2 litres per square metre completely coating the reinforcing glass fabric and providing a smooth finish.

.4 Scope: Ductwork, interior flexible or rigid acoustic insulation .1 Installation:

.1 Provide internal acoustic insulation upstream and downstream a minimum of 3.05m (10'-0") from all supply, return and exhaust fans .37kW (1/2 hp) and larger

.2 Provide internal acoustic insulation where shown hatched on drawings.

.3 All insulation edges must be sealed. Provide fasteners at 300mm (12") O.C. with pins cut and capped.

.4 Adhere insulation with insulation adhesive applied to the entire metal surface.

.5 On rectangular ductwork and plenums, over 610 mm [24"] in width secure insulation with pins at one per 0.1 sq. m [1.0 sq ft] minimum to supplement the adhesive. Cover holding washers with reinforcing membrane and insulation coating/sealer. .6 Seal all transverse joints, raw edges, and other points of penetration of the coating with reinforcing membrane and insulation

.7 Seal all longitudinal joints with insulation coating sealer.

.8 Protect leading and trailing edges of duct sections with sheet metal nosing having 15 mm overlap and fastened to duct.

.2 All exposed ductwork in mechanical rooms to be rigid insulation with RF3 premium finish. .3 Exposed heating and air conditioned ductwork installed in an exposed area in which it is serving, need not be insulated unless there is

.4 External insulation is not required where ductwork is internally lined, indoors only.

.5 Ductwork exposed to the weather shall be provided with weather proof jacketing (P.V.C. or Aluminum).

.1 To comply with BC Plumbing Code 2018 and local municipality requirements. .2 Fire stop all penetrations through rated separations. Provide necessary thermal insulation and vapour barrier at penetrations. Contractor t

provide professional certification from specialist fire-stopping trade prior to report for completion or occupancy review, whichever is the earlier. .3 Supply and install cleanouts on all drains, changes in direction, at base of riser and on main sanitary and storm leaving building in addition to the B.C. Plumbing Code.

.4 Provide water meter c/w remote read-out as per the local authority having jurisdiction. Each water station shall be complete with 2 P.R.V.'s bypass and pressure gauges and strainer. .5 Where drains are located over an occupied area, membrane clamp is to be provided with drain for a waterproof installation.

.6 Prior to commencing the underground plumbing installation excavate and verify:

.1 The location, elevation and size of storm and sanitary service connections .2 The sanitary and storm lines can be routed and sufficiently sloped with adequate cover for freezing protection to meet the service

.3 Inform the engineer immediately if any changes are required.

.4 All floor drains shall have trap primer connection

.5 Water distribution pipe to be 19mm (3/4") minimum.

6 Provide installation of plumbing fixtures when supplied by others

.7 Maintain a minimum headroom clearance of 2.14m (7') in parkade. Keep higher if possible.

.8 Lead free solder to be used for all potable water systems. Contractor to issue guarantee in maintenance manual.

.7 Provide unions to all equipment and valve connections for 65mm (2-1/2") and below. Flanged connections for 75mm (3") and over.

.8 Provide stainless steel bellows type water hammer arrestors on water lines connected to clothes washer, dish washer, washrooms with quick valve fixtures and at top of risers. Provide accessible isolation valve and access to arrestors for servicing.

.9 Provide any excavations necessary for the installation of the mechanical work. No cutting, boring or excavating necessary for this work in or about the building which may cause interference with the progress of the work or weaken the structure in any way, shall be undertaken without the approval of the consultant before commencing work. Trenches for all underground piping shall be excavated to a depth slightly more than required and graded so as to secure all available fall. Support each length of pipe and backfill the trench with gravel to the required depth and

grade. Sanitary and storm lines outside of the building shall be kept as deep as practical.

.10 Backfilling in all trenches shall be with sand or pea gravel where approved, 150mm (6") below pipe and up to 150mm (6") over top of piping. Remainder of all trenches shall be filled by the General Contractor .11 Where sewer, water or storm pipes pass under a grade beam or footing the trench around the piping up to and in contact with the footing, provide

a 450 kg (1000lbs) concrete grouting so as to seal the outside trenching from normal storm run off and backflow of rain water through the trenching and into the crawl space and/or under the basement floor .12 Where sewer, water or storm pipes pass through exterior walls below grade, the General Contractor shall install corbels on the exterior walls and

run bridging from corbel to undisturbed soil for the support of the pipes. One inch thick waterproof mastic shall be applied around the pipes, which

.13 Provide chrome escutcheon plates for all plumbing rough-in. .14 Gas piping shall comply with National Standard of Canada CAN1_B149.1-15 and the BC Gas Safety Branch Bulletins. Installation code of natural

gas burning appliances and equipment. Provide necessary pressure regulator to suit. Yellow jacket buried gas line, prime coat and paint lines

.15 Provide lead sheet flashing and sheet metal counter flashing for pipe passing through roof deck structure .16 Provide non-conducting type connection for joining or supporting. Provide separation between dissimilar metals.

.17 Provide stop valve to all equipment and plumbing fixture connection. Provide stop valve to base of water risers. Provide isolation valves for all fixture trim unless complete with integral stops.

.18 Support plumbing risers at floor level only. To avoid contact with studs and drywall, orient all clamps supporting piping parallel to walls. Use plastic pipe clamps on 13mm Ø (½" Ø) supply piping within suites. Attach wing back elbows, shut off valves, faucets, etc. to separate wood plates

in separate rows of studs in party walls. Provide clearance and use resilient (fire) caulking where piping passes through party walls and floors. The intent of these requirements is to minimize bridging of the wall by the plumbing system. .19 Supply and install all hangers, supports, brackets, reinforcement, 14 gauge steel back_up plates, floor flanges and all accessory piping and fittings, for the proper installation and support of all fixtures and their respective supply fittings

.20 Where piping is suspended from hangers from the floor above, use oversized hangers/straps and include a layer of resilient pipe insulation between the hanger and the pipe (e.g. Armaflex neoprene, 13mm (½ ") thick), with a metal shim to distribute the load (20% maximum compression). Fibreglass pipe insulation is also acceptable provided manufacturer's loading criteria are met

.21 Terminate all vertical waste stacks and rain water leaders in two 45° bends at the bottom of vertical runs, or a large radius 90° bend. .22 Maintain a minimum 13mm (½") clearance between pipes and studs, electrical conduit, or other pipes. If the clearance is minimal, use resilient insulation (Armaflex) to avoid contact. (This requirement is to avoid rattling between pipes.)

.23 Do not use foam spray-on products for insulation 24 Where plumbing fixtures come in contact with wall and/or floor, joints shall be sealed with building sealant, made watertight and beaded smooth

.25 Approval of the plumbing system is required before insulation and drywall work is started. Do not commence final boarding until plumbing has been reviewed for clearance.

13. Plumbing Fixtures & Trim .1 Floor drains and roof drains to be manufactured by approved manufacturer.

.2 Coordinate all floor drains with general contractor to suit final floor finishes.

.3 Coordinate all roof drains with general contractor to maintain water proofing membrane.

RD-1 Conventional Roof: Provide Menzies Metal Products commercial spun copper drain 445mm Ø (17.5" Ø) body with aluminum strainer grid. FD-1 Watts #FD-100-C-7-A5-1 Floor Drain - epoxy coated, cast iron body, reversible flashing clamp with primary and secondary weepholes, trap primer connection with plug, no hub outlet. Watts -A5-1 5" (127 mm) diameter, nickel bronze, adjustable round strainer. FD-2 Watts #FD-100-C-DD Floor Drain with Hub Funnel - epoxy coated, cast iron body, reversible flashing clamp with primary and secondary

weepholes, trap primer connection with plug, cast iron hub outlet. .4 Cleanouts in finished areas to be Smith 4020S cast iron cleanout with adjustable scoriated nickel bronze top. In lino tile area use Smith 4140S HB-1 Watts Drainage HY-725 concealed non-freeze key operated wall hydrant with nickel bronze box and door, chrome plated hydrant face,

integral vacuum breaker, 3/4"(19) hose connection, 3/4"(19) female x 1"(25) male pipe connection, all bronze head, seat casting and internal working parts, bronze wall casing, and loose key. Thickness to suit wall location. Complies with ASSE 1019-2004, UPC/IAMPO Listed. Max operating pressure 125 psi.

5 Clothes washer outlet box

OB-1 Clothes washer supply and drain fixture for 13mm (1/2") hot & cold water supplies, 38mm (1-1/2") drain, complete with service stops. Plastic

box to be 190mm x 200mm x 90mm (7½" x 8" x 3½") c/w faceplate. .6 All plumbing fixtures shall be white in colour. WC-1Toto Eco Drake Close Coupled Toilet CST744E, 402 mm high, vitreous china, Floor Mounted, 4.8 L (1.28 US Gal) per flush, siphon jet

flushing action, 264 mm x 210 mm (10-3/8" x 8-1/4") water surface area, two piece, 305 mm (12") rough-in, elongated bowl, 54 mm (2-1/8") fully glazed internal trapway, bolt down lid, insulated tank, floor outlet, bolt caps, trip leader on approach side of toilet. Centoco #820STS.001 toilet seat, heavy duty, for elongated bowl, open front, white solid plastic, with cover, reinforced stainless steel check hinges, metal flat washers stainless steel posts and nuts. McGuire #LFH166N3RB, Toilet Supply, chrome plated polished brass, heavy duty angle stops, 13 mm (1/2") I.P.S. Inlet x 76 mm (3") long rigid horizontal nipples, wheel handles, escutcheon and stainless steel braided flexible riser. Provide Floor Flange, (same material as the connecting pipe drain), with all brass bolts and with rubber gasket.

WC-2Toto Eco Drake Close Coupled Toilet CST744EL, ADA compliant, 402 mm high, vitreous china, Floor Mounted, 4.8 L (1.28 US Gal) per flush, siphon jet flushing action, 264 mm x 210 mm (10-3/8" x 8-1/4") water surface area, two piece, 305 mm (12") rough-in, elongated bowl, 54 mm (2-1/8") fully glazed internal trapway, bolt down lid, insulated tank, floor outlet, bolt caps, trip leader on approach side of toilet. Centoco #820STS.001 toilet seat, heavy duty, for elongated bowl, open front, white solid plastic, with cover, reinforced stainless steel check hinges, metal flat washers stainless steel posts and nuts. McGuire #LFH166N3RB, Toilet Supply, chrome plated polished brass, heavy duty angle stops, 13 mm (1/2") I.P.S. Inlet x 76 mm (3") long rigid horizontal nipples, wheel handles, escutcheon and stainless steel braided flexible riser. Provide Floor Flange, (same material as the connecting pipe drain), with all brass bolts and with rubber gasket.

WC-3American Standard Baby Devoro #2315.228.020 HET Toilet. 3128.001, 4019.228, 260 mm high, vitreous china, white finish, Floor Mounted, siphon iet flush action, 4.8 L (1.28 US Gal) per flush, raised sanitary bar, 254 mm x 229 mm (10" x 9") water surface, two (2) piece, 'Speed Connect' tank assembly, siphon jet flush action, raised sanitary bar, unlined tank, unbolted tank cover, 51 mm (2") flush valve with flapper, 'Pilot Valve' water control (without float) for quiet refill, 254 mm (10") rough-in, Round Front Bowl, 51 mm (2") fully glazed internal trapway, floor outlet, bolt caps, designed for children. Bemis Toilet Seat #BB540 Baby Toilet Seat, closed front with cover, for round bowl, coordinate colours with owner, solid polypropylene plastic, top mount hinges, post nuts and washers. McGuire #LFH166N3RB Toilet Supply, chrome plated finish polished brass, heavy duty angle stops, 13 mm (1/2") I.P.S. Inlet x 76 mm (3") long rigid horizontal nipples, wheel handles, escutcheon and stainless steel braided flexible risers. Provide Floor Flange, (same material as the connecting pipe drain), with all brass bolts and with rubber gasket.

LAV-1 American Standard Colony #0346.001 Basin, 521 mm x 448 mm x 191 mm (20-1/2" x 17-5/8" x 7-1/2") deep, oval, vitreous china, self-rimming - drop-in, front overflow, faucet ledge. Provide basin rim sealant. Chicago faucets no. E80-A11A-67ABCP, E-tronic 80 faucet with dual-beam infrared sensor. Integral spout, chrome plated. Single-hole deck mount, 0.5gpm (1.9 l/min) vandal-proof, pressure compensating, laminar flow outlet. Dual supply for hot and cold water. Long term power supply unit providing up to 30 year battery life. Preassembled with conceal internal thermostatic control mixer. Stainless steel hose included. Multiple field-adjustable modes and ranges McGuire #155AC Open Grid Drain, chrome plated cast brass one piece top, 17 GA. (1.5mm) tubular 32 mm (1-1/4") tailpiece. McGuire #LFH, Faucet Supplies, chrome plated polished brass, commercial duty 1/4 turn ball valve angle stops, 13 mm (1/2") I.D. Inlet x 127 mm (5") horizontal extension tubes, wheel handle, escutcheon and stainless steel braided flexible riser. McGuire #8872C P-Trap, heavy cast brass adjustable body, with slip nut, 32 mm (1-1/4") size, shallow wall flange and seamless tubular wall bend

LAV-2 American Standard Decorum Wall-Hung Lavatory with Everclean #9024.001EC, 533 mm x 514 mm x 127 mm (21" x 20-1/4" x 5") deep, vitreous china, self-rimming - drop-in, rear overflow, faucet ledge. Provide basin rim sealant. Chicago faucets no E80-A11A-67ABCP, E-tronic 80 faucet with dual-beam infrared sensor, Integral spout, chrome plated, Single-hole deck mount, 0.5gpm (1.9 l/min) vandal-proof, pressure compensating, laminar flow outlet. Dual supply for hot and cold water. Long term power supply unit providing up to 30 year battery life. Preassembled with conceal internal thermostatic control mixer. Stainless steel hose included, Multiple field-adjustable modes and ranges. McGuire #155WCC Offset Open Grid Drain, chrome plated cast brass one piece top, 17 GA, (1.5mm) mm tubular 32 mm (1-1/4") tailpiece. McGuire #LFH, Faucet Supplies, chrome plated polished brass, commercial duty 1/4 turn ball valve angle stops, 13 mm (1/2") I.D. Inlet x 127 mm (5") horizontal extension tubes, wheel handle, escutcheon and stainless steel braided flexible riser. McGuire #8872C P-Trap, heavy cast brass adjustable body, with slip nut, 32 mm (1-1/4") size, shallow wall flange and seamless tubular wall bend. McGuire PROWRAP #PW2000WC Sanitary Covering vandal-resistant, flexible seamless moulded closed-cell PVC resin, formulated with anti-microbial additive to limit the growth of fungus and bacteria, to exposed piping (to protect against heat/contusions) as per local codes.

LAV-3 American Standard Colony #0346.001 Basin, 521 mm x 448 mm x 191 mm (20-1/2" x 17-5/8" x 7-1/2") deep, oval, vitreous china, self-rimming - drop-in, front overflow, faucet ledge. Provide basin rim sealant. Chicago faucets no. E80-A11A-67ABCP, E-tronic 80 faucet with dual-beam infrared sensor. Integral spout, chrome plated. Single-hole deck mount. 0.5qpm (1.9 l/min) vandal-proof, pressure compensating, laminar flow outlet. Dual supply for hot and cold water. Long term power supply unit providing up to 30 year battery life. Preassembled with conceal internal thermostatic control mixer. Stainless steel hose included. Multiple field-adjustable modes and ranges. McGuire #155AC Open Grid Drain, chrome plated cast brass one piece top, 17 GA. (1.5mm) tubular 32 mm (1-1/4") tailpiece. McGuire #LFH, Faucet Supplies, chrome plated polished brass, commercial duty 1/4 turn ball valve angle stops, 13 mm (1/2") I.D. Inlet x 127 mm (5") horizontal extension tubes, wheel handle, escutcheon and stainless steel braided flexible riser. McGuire #8872C P-Trap, heavy cast brass adjustable body, with slip nut, 32 mm (1-1/4") size, shallow wall flange and seamless tubular wall bend.

LAV-4 American Standard Colony #0346.403 Basin, 521 mm x 448 mm x 191 mm (20-1/2" x 17-5/8" x 7-1/2") deep, oval, vitreous china, self-rimming - drop-in, front overflow, faucet ledge. Provide basin rim sealant. Chicago faucets no. E80-A11A-67ABCP, E-tronic 80 faucet with dual-beam infrared sensor. Integral spout, chrome plated. Single-hole deck mount. 0.5gpm (1.9 l/min) vandal-proof, pressure compensating, laminar flow outlet. Dual supply for hot and cold water. Long term power supply unit providing up to 30 year battery life. Preassembled with conceal internal thermostatic control mixer. Stainless steel hose included. Multiple field-adjustable modes and ranges. McGuire #155WCC Offset Open Grid Drain, chrome plated cast brass one piece top, 17 GA. (1.5mm) mm tubular 32 mm (1-1/4") tailpiece. McGuire #LFH, Faucet Supplies, chrome plated polished brass, commercial duty 1/4 turn ball valve angle stops, 13 mm (1/2") I.D. Inlet x 127 mm (5") horizontal extension tubes, wheel handle, escutcheon and stainless steel braided flexible riser. McGuire #8872C P-Trap, heavy cast brass adjustable body, with slip nut, 32 mm (1-1/4") size, shallow wall flange and seamless tubular wall bend. McGuire PROWRAP #PW2000WC Sanitary Covering vandal-resistant, flexible seamless moulded closed-cell PVC resin, formulated with anti-microbial additive to limit the growth of fungus and bacteria, to exposed piping (to protect against heat/contusions) as per local codes.

SK-1 BLANCO Horizon 2.0 401250 Double Bowl Countertop Mount Sink, 800 mm (31-1/2") x 521 mm (20-1/2") x 203 mm (8") deep, Counter mounted, grade 18-10 18 GA. (1.2 mm) type 304 stainless steel, self-rimming, Pre-installed foam gaskets, 3 1/2" (90 mm) stainless steel strainer, MOEN #87090MSRS Single Handle Faucet. Stainless finish, Center hole only, washerless ceramic disc valve, agrator outlet. swing spout, braided hose, 219 mm (8-5/8") projection reach. Lever handle, Pull-down spray with adjustable spray pattern, less soap dispenser, Lawler #TMM-1070, Below Deck Mechanical Water Mixing Valve, Bronze body, temperature adjusting dial, 10 mm (3/8") inlets and outlet compression fittings, high temperature thermostatic limit stop, shut-off with automatic reset when temperature exceeds 120 °F (48.8 °C), Integral checks, offer temperature range from full cold through 46 °C (114.8 °F). Note: Provide tee, adaptors and flex. copper tubing to suit installation. Provide tempered water to hot side of faucet. McGuire #LFH170BVRB Faucet Supplies, Chrome plated finish polished brass, commercial duty 1/4 turn ball valve angle stops, 13 mm (1/2") I.D. Inlet x 127 mm (5") horizontal extension tubes, convertible 1/4 turn/loose key handles, Escutcheon and stainless steel braided flexible risers. Provide P-Trap, adjustable all metal construction, 38 mm

SK-2 Franke LBS1308P-1 Single, with ledge, 18 guage, Single compartment self rimming topmount sink with faucet ledge. 18 gauge (1.2 mm), type 304 (CNS 18/10) stainless steel. Exposed surfaces are #4 satin finished. Undercoated to reduce condensation and resonance Includes waste fitting, factory applied rim seal, cutout template, and factory installed EZ TORQUE™ fasteners. Certified to ASME A112.19.3-2008 / CSA B45.4-08. Centre waste location, Includes 3 1/2" (89 mm) crumb cup strainer with 1 1/2" (DN38) brass tailpiece. Chicago Faucets #430-ABCP Single handle Faucet. Chrome plated finish. Center hole only. ECAST construction lead free (equal or less than 0.25%) ECAST brass construction, volume control and Hot Water Limit Stop cartridge, 5.7 LPM (1.5 GPM) pressure compensating Laminar Flow (non-aerating) outlet, 241 mm (9-1/2") projection rigid cast brass spout, Single metal lever handle. Provide tee, adaptors and flex. copper tubing to suit installation. Provide tempered water to hot side of faucet. McGuire #LFBV170 Faucet Supplies, Chrome plated finish polished brass, commercial duty 1/4 turn ball valve angle stops, 13 mm (1/2") I.D. Inlet x 127 mm (5") horizontal extension tubes, convertible 1/4 turn/loose key handles, Escutcheon and flexible copper risers. Lawler #TMM-1070, Below Deck Mechanical Water Mixing Valve, Bronze body, temperature adjusting dial, 10 mm (3/8") inlets and outlet compression fittings, high temperature thermostatic limit stop shut-off with automatic reset when temperature exceeds 120 °F (48.8 °C), Integral checks, offer temperature range from full cold through 46 °C (114.8 °F). Note: Provide tee, adaptors and flex. copper tubing to suit installation. Provide tempered water to hot side of faucet. **Provide** P-Trap, adjustable all metal construction, 38 mm (1-1/2") size, and escutcheon.

JS-1 FIAT #TSBC6010 corner Service / Mop sink, 610 mm (24") x 610 mm (24") x 254 mm (10") deep, chamfered corner, floor mounted, molded stone, plain curbs, stainless steel drain with strainer, 3" (76mm) outlet, American Standard #8344.012 wall mounted Two Handle Faucet, chrome plated, flexible installation within the range of 7 3/4" (197mm) to 8 1/4" (210mm), cast brass body, 1/4 turn ceramic disc valve cartridges, unrestricted hose end outlet, spout with atmospheric vacuum breaker and bucket hook 248 mm (9-3/4") from wall to outlet reach, lever handles, top brace. FIAT E77AA24000 Bumper Guard 610 mm (24") extruded vinyl two FIAT 889CC000 Mop Hanger constructed of 22 gauge type 304 stainless steel. FIAT MSG2424000 Back Splash Panel stainless steel panels plus corner bracket. Provide P-Trap, same material as the connecting pipe drain.

14. Mechanical Heat Tracing

.1 Contractor to supply and install a complete ULc Listed and CSA Certified system consisting of heating cables, components and accessories to provide freeze protection of the sanitary traps, domestic water and fire protection piping in unheated area

.2 Cable is to be self-regulating and consist of (2) 16 AWG nickel-copper bus wires embedded in parallel in a polymer core that modulates output as temperature varies. The cable can be cut to length in the field and is covered by a polyolefin dielectric jacket. Cable has braided tinned-copper layer for grounding and durability and an outer layer cover of modified polyolefin.

.3 Cable to be provided with 208V (120V) power. No transformers are required. Maximum 450 lineal feet of cable is permitted for each 30 amp .4 Crimped and/or silicone sealed connections are not permitted.

.5 Install as recommended by heat trace cable Manufacturer. Apply linearly on the pipe after the piping has been pressure tested. Secure heating cable to the piping with cable ties or fiberglass tape. Cables shall not be permitted to cross or come in contact with sections of cabling. .6 Prior to the installation of thermal insulation, test heat cable to insulation resistance using a 2500Vdc Megger. Insulation resistance shall meet a minimum of 20 megaohm rating.

15. Cleaning & Chemical Treatment .1 Provide for degreasing and cleaning of all heating water, chilled water and hydraulic heat pump systems.

.2 Provide for cleaning and disinfection of all domestic hot & cold water systems

.3 For hot water heating systems perform a bail out and provide Dearborn - 545 or equivalent chemical treatment. .4 During system flushing ensure that all control valves and other system valves are in the full open position. .5 All domestic water piping shall be thoroughly flushed so that it is free from all scale, sediment, etc.

16.1 High Efficiency Gas Fired Furnace / Heat Pump/Condensing Unit

.1 Scope: .1 Gas Fired Furnace. .2 Operating controls.

.4 Seismic restraint. .2 Provide 10 year unconditional parts warranty on heat exchangers and compressor unit

.3 Gas Furnace .1 Product: Upflow Gas Furnace

.3 Heat Pump/Condensing Unit.

.2 Cabinet:

.1 Low-profile, narrow width cabinet .2 Heavy gauge cold rolled steel construction

.4 Flanges provided on supply air opening for ease of plenum connection or alignment with indoor coil .5 Foil faced insulation on sides and back of heating compartment

.6 Gas piping inlets and electrical inlets in both sides .7 Safety interlock switch to automatically shut off power to unit when blower compartment access panel is removed

.8 Coil match-up .9 Return Air Entry (Upflow/Horizontal only)

.3 Heat Exchanger Assembly .1 Heavy gauge aluminized steel

.2 Multi-pass crimped seam design clamshell .3 Secondary heat exchanger condenser coil constructed of aluminum fins fitted to stainless steel tubes

.4 Coil is factory tested for leaks .5 Laboratory life-cycle tested

.6 Condensate drain header box assembly located in front of coil .4 Header box

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DESCRIPTION

SEAL:

CLIENT:

PROJECT: QUESNEL & DISTRIC

> 420 WEBSTER AVENUE QUESNEL, BC

DRAWING NAME:

MECHANICAL SPECIFICATIONS

PROJECT NUMBER:

21424-T DRAWN BY: GP/JS DESIGNED BY: MW APPROVED BY: MW

AS NOTED

SCALE:

DRAWING:

```
.1 Collects flue condensate for disposal through drains
                                                                                                                                                                                     .4 ERV unit stop command (or de-energized)
               .2 Drains are located on each side of cabinet
                                                                                                                                                                                           .1 The unit can then be commanded off by:
                                                                                                                                                                                         .2 Internal time clock
               .3 Condensate drain trap is included for field installation.
          .5 Flue condensate trap assembly
                                                                                                                                                                                         .3 Supply fan and exhaust fan are de-energized.
               .1 Mounted outside the conditioned air stream on either side of cabinet in upflow and downflow applications
                                                                                                                                                                                         .4 All dampers are unpowered and spring return to their default position after a 10 second delay (adjustable).
               .2 Mounted below the cabinet in horizontal applications (or remotely up to 5ft away from unit)
                                                                                                                                                                                    .5 Supply fan operation:
               .3 Drain cap on trap for easy cleaning and winterizing
                                                                                                                                                                                          .1 The supply fan will operate at a constant speed.
                                                                                                                                                                                         .2 The unit will attempt to start the supply fan when the supply fan delay timer expires. When the supply fan starts the supply fan
               .4 90 degree street elbow furnished for ease of drain trap installation
                                                                                                                                                                                                adjustable current switch should close and remain closed until the fan is turned off.
               .5 Connections can be made with fields provided PVC pipe, PVC coupling, or vinyl tubing with hose clamp. Provide acid neutralization as
          .6 Inshot Burners
                                                                                                                                                                                           .1 Once the supply fan current switch closes heating operation is allowed. After a delay of 90 seconds (adjustable) from supply fan start
                                                                                                                                                                                                signal, if the supply fan current switch is still open the supply fan alarm should be set to true and [heating] operation shall be
               .1 Aluminized steel, trouble free operation
                                                                                                                                                                                                prohibited. The supply fan status shall be set to true only when the supply fan output is on and supply fan current switch is closed.
               .2 Burner assembly to be removable from unit as single component
                                                                                                                                                                                                The supply fan status shall be false in all other circumstances.
         .7 Surface Ignitor
                                                                                                                                                                                     .7 Fixed fan speed option:
               .1 Tough, reliable, long life, trouble-free performance
                                                                                                                                                                                           The analog voltage command to the supply fan FCM can be set from the unit controller display. The adjustable range of 0% to 100%
               .2 Silicon nitride ignitor
                                                                                                                                                                                                correspond to the minimum and maximum fan operating speed. This supply fan operation mode can be used to field balance the
                                                                                                                                                                                                supply air flow rate.
               .3 Ignition leads are constructed of nickel plated copper, enclosed in high temperature Teflon® insulation
                                                                                                                                                                               .8 Defrost
               .4 Cemented to steatite block for leakage protection
                                                                                                                                                                                     .1 A temperature activated and timed defrost system shall be factory installed, wired, and tested.
          .8 Two-Stage Gas Control Valve
                                                                                                                                                                                     .2 Unit shall be equipped with damper defrost/fan shut-down defrost system
               .1 24 V
                                                                                                                                                                                     .3 Unit shall have a field selectable Arctic mode for extreme climates.
               .2 Redundant combination
                                                                                                                                                                               .9 Service Access
               .3 Compact Control to contain Manual shutoff, automatic electric valve (dual) and gas pressure regulation
                                                                                                                                                                                      .1 Provide service access to unit and associated duct heater.
          .9 Combustion Air Inducer
                                                                                                                                                                                    .2 Provide removable doors to allow service access through module drop ceiling.
               .1 Shaded pole heavy duty blower prepurges heat exchanger and safety vents flue products
          .10 Flame Rollout Switches (2)
               .1 Factory installed on burner box with manual reset for protection from abnormal operating conditions
                                                                                                                                                                          16.3 Diffusers, Grilles and Registers.
          .11 Limit control
                                                                                                                                                                                        Provide steel or aluminum ceiling grilles scheduled as shown on drawings.
          .12 Pressure switch
                                                                                                                                                                              .2 Balancing Dampers
          .13 Venting
                                                                                                                                                                                    .1 Install where indicated.
               .1 Direct Vent or Non-Direct Vent
                                                                                                                                                                                    .2 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.
          .14 Blower
                                                                                                                                                                         16.4 Pumps
               .1 Multi Speed Direct drive blower
                                                                                                                                                                               .1 Scope
               .2 Statically and dynamically balanced
                                                                                                                                                                                    .1 All pumps except where integral with a manufactured piece of equipment.
               .3 Resiliently mounted
                                                                                                                                                                                    .2 Pumps controls where self contained.
               .4 Easily removed for servicing
                                                                                                                                                                                   .3 Seismic restraints.
               .5 Blower speeds are easily changed on the Integrated Furnace Control
                                                                                                                                                                              .2 Submittals
     .4 Controls
                                                                                                                                                                                     .1 Submit with shop drawings certified curves showing pump performance characteristics with pump and system operating point plotted.
         .1 24 Volt Transformer
                                                                                                                                                                                           Include NPSH curve when applicable.
               .1 Furnished and factory installed in control box
                                                                                                                                                                               .3 Quality Assurance
               .2 40VA transformer has circuit breaker wired in series
                                                                                                                                                                                     .1 Pumps shall be aligned by qualified millwright and alignment certified.
         .2 Field Wiring Make-up Box
                                                                                                                                                                                    .2 Ensure pumps operate at specified system fluid temperatures without binding and cavitation, are non overloading in parallel or individual
                                                                                                                                                                                           operation, operate within 25% of midpoint of published maximum efficiency curve.
               .1 For line voltage wiring
               .2 Factory installed internally on left side of furnace
                                                                                                                                                                                    .3 Where pumps are operated in conjunction with others such as parallel pumps, show all operating points on the pump curve.
               .3 Box may be installed internally or externally on either
                                                                                                                                                                                    .4 Ensure installation complies with Workers' Compensation Board requirements.
          .3 Integrated Furnace Control
                                                                                                                                                                               .4 General
               .1 Controls combustion air inducer
                                                                                                                                                                                    .1 Statically and dynamically balance rotating parts.
               .2 Contains all necessary controls and relays to operate furnace
                                                                                                                                                                                     .2 Construction shall permit complete servicing without breaking piping or motor connections.
               .3 Flame sensor assures safe and reliable operation
                                                                                                                                                                                    .3 Pumps shall operate at 1750 r/min. unless specified otherwise.
               .4 Ignition control has a red LED to indicate status for troubleshooting
                                                                                                                                                                                    .4 Pump connections shall be flanged.
     .5 Optional Accessories:
                                                                                                                                                                                    .5 Heating pumps shall be suitable for handling water at 110°C.
                                                                                                                                                                                     .6 Domestic water pumps shall be all bronze construction.
         .1 Venting:
               .1 Concentric termination kit
                                                                                                                                                                               .5 In-Line Circulators
               .2 Flush Mount termination kit
                                                                                                                                                                                     .1 In-line circulator pumps shall be of type, size and capacity as specified on the drawings.
               .3 Wall assembly termination kit (Direct vent)
                                                                                                                                                                                    .2 Pump shall be standard iron body for all applications except domestic water and indirect hot water heating where all bronze construction is
               .4 Wall ring
                                                                                                                                                                                    .3 Pump shall be equipped with a 1750 r/min. drip proof, resilient mount, sleeve bearing motor.
               .5 Roof Termination Flashing Kit
                                                                                                                                                                                    .4 The pump shaft shall have an integral thrust collar and shall be supported by two oil lubricated bronze sleeve bearings. Pump to be
               .6 Vent Adaptor
                                                                                                                                                                                           equipped with a water-tight long-life mechanical seal.
               .7 Safety Night Service Kit
                                                                                                                                                                               .6 Submersible Storm Water and Sanitary Pumps
         .2 Filters:
                                                                                                                                                                                      .1 Type: Completely submersible vertical centrifugal.
               .1 Air Filter and Rack Kit for Upflow Side Return Air Applications
                                                                                                                                                                                    .2 Casing: Cast iron volute and oil filled motor chamber.
               .2 Provide MERV 13 filters.
                                                                                                                                                                                    .3 Impeller: Bronze or cast iron, non-clog, on corrosion resistant alloy steel shaft.
     .6 Furnace Schedule.
                                                                                                                                                                                    .4 Bearing: Ball bearings.
         .1 See drawings.
                                                                                                                                                                                   .5 Accessories:
                                                                                                                                                                                         .1 Oil resistant power cord with 3 prong connection.
         .1 Factory assembled packaged condensing units, pre-wired and pre-piped, consisting of cabinet, compressor, outdoor refrigerant coil and fan,
                                                                                                                                                                                         .2 Cema 1 Duplex lockable control panel wall mounted with pump circuit breakers, magnetic contactors, H.O.A. switches, run lights,
                service valves, check valves, fitter strainer, gauge ports, relays, contactors, circuit breakers, and starters.
                                                                                                                                                                                                manual overload reset high level alarm wired to contacts, light, terminal strip and wiring diagram. Vandal proof lockable cover where
          .2 Casing: Weatherproof outdoor unit constructed of 16-gauge steel with baked enamel finish.
                                                                                                                                                                                                accessible to public.
          .3 Condenser Coil: Single circuited R-410A coils with mechanical expanded copper tubing into lanced, ripple-edged aluminum fin. Clean,
                                                                                                                                                                                           .3 Remote high water and overload alarm
                dehydrate and test coils. Seal and ship with holding charge of refrigerant. Supply and install factory coil protection package. Four (4) - way
                                                                                                                                                                                           .4 20' long level controls cord.
               reversing valve (Heat pump only)
                                                                                                                                                                                           .5 Level control bracket.
                                                                                                                                                                                          .6 Junction box.
          .5 Condenser Fans: Direct drive propeller type fans with drip-proof, resiliently mounted motors, pre-lubricated with built-in overload protection.
                                                                                                                                                                                           .7 Check valves.
               Provide fan and coil guards.
              Compressors: Two stage scroll type, crankcase heater, internal current and temperature protection
          .7 Controls. Provide with the following pre-wired operating and safety controls:
                                                                                                                                                                                     .6 Cover for each sump and access covers in cover shall be provided by the pump manufacturer c/w curb ring, seals, lifting chains etc. Covers
                                                                                                                                                                                           shall be suitable for heavy loading and shall be sized to suit sump size and frame requirements. Sanitary covers shall have a gas tight seal
                .1 Defrost control.
               .2 High and low pressure cut-outs with manual reset.
                                                                                                                                                                                     .7 All connections such as elect. and piping to, from sumps shall run under the floor slab to walls and run up or down tight to walls.
               .3 Suction and discharge refrigerant pressure gauge tappings.
                                                                                                                                                                                    .8 Controls (Simplex): Manual overload reset, float switch, separate float switch high level alarm, and overload alarm.
               .4 Time delays to prevent repeated cycling of compressor on low loads.
                                                                                                                                                                               .7 Installation
     .8 Heat Pump Unit Schedule.
                                                                                                                                                                                    .1 Provide drains for bases and stuffing boxes piped to and discharging into floor drains.
        .1 See drawings.
                                                                                                                                                                                    .2 Provide air cock and drain connection on horizontal pump casings.
     .9 Execution
                                                                                                                                                                                    .3 Provide line sized gate valve and strainer on suction and line sized soft seated check valve and memory stop balancing valve on discharge.
         .1 Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions, product
                                                                                                                                                                                     .4 Decrease from line size, with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on
               carton installation instructions and manufacturer specification sheets
                                                                                                                                                                                           pump casings. Provide support under elbows on pump suction and discharge line sizes 100 mm and over.
          .2 Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for
                                                                                                                                                                                     .5 Check and align base mounted pumps prior to start-up.
               product installation in accordance with manufacturer's instructions.
                                                                                                                                                                                     .6 Shave or replace pump impellers to meet actual operating conditions.
     .10 Installation
                                                                                                                                                                                      .7 Where remote control panels are used, this contractor shall allow for wiring from panel to pumps.
          .1 Install Gas Furnace and Heat Pump/Condensing Unit in accordance with manufacturer's instructions and regulations of authorities having
                                                                                                                                                                                     .8 Install a coated 10 GA steel drain pan under oil pumps. Drain pan shall be 100 mm deep extending 150 mm around pump. Provide support
16.2 Energy Recovery Unit
                                                                                                                                                                                     .9 Provide spacer at inlet and outlet on vertical in-line pumps complete with screen diffuser.
    .1 Scope:
                                                                                                                                                                                     .10 Provide seismic restraints for pumps.
         .1 Packaged heat recovery unit.
                                                                                                                                                                                     .11 Secure control panels for seismic loads
         .2 Operating controls.
                                                                                                                                                                               .8 Performance
          .3 Heat Recovery Core
                                                                                                                                                                                      .1 Refer to the pump schedule.
         .4 Seismic restraint.
                                                                                                                                                                          16.5 <u>Duct Mounted Electric Reheat Coils</u>
     .2 Provide (2) two year non-prorated warranty on parts, and a (15) fifteen year polypropylene core warranty or a (2) two year enthalpy core warranty.
     .3 Unit Construction
                                                                                                                                                                                     .1 Open coil resistance heaters mounted in a galvanized or aluminized, flanged steel frame of gauge required by CSA. Configure to fit into a
         .1 Materials: Formed double wall insulated metal cabinet, fabricated to permit access to internal components for maintenance.
                                                                                                                                                                                            horizontal duct with side mounted terminal housing. The entire heating coil assembly shall bear the CSA label and each unit certified as
         .2 Outside casing: 20 gauge, galvanized (G90) steel meeting ASTM A653 for components that do not receive a painted finish. Painted
                                                                                                                                                                                           factory run and tested. The following factory installed and pre-wired items shall be included:
                     ponents as supplied by the factory shall have polyester urethane paint on 20 gauge G90 galvanized steel.
          .3 Access doors shall be hinged with airtight closed cell foam gaskets. Door pressure taps, with captive plugs, shall be provided for cross-core
                                                                                                                                                                                          .1 SCR controller with solid state relays
               pressure measurement allowing for accurate airflow measurement
                                                                                                                                                                                        .2 Disconnect
          .4 Unit shall have factory-installed duct flanges on all duct openings.
                                                                                                                                                                                         .3 Sail switch
          .5 Cabinet Insulation: Unit walls and doors shall be insulated with 1 inch, 4 pound density, foil faced, high density fiberglass board insulation,
               providing a cleanable surface and eliminating the possibility of exposing the fresh air to glass fibers, and with a minimum R-value of 4.3
                                                                                                                                                                                         .4 Automatic reset high limit switch mounted in the coil frame.
                                                                                                                                                                                         .5 Terminal block
          .6 Control center / connections: Energy Recovery Ventilator shall have an electrical control center where all high and low voltage connections
                                                                                                                                                                                          .6 Control transformer
                are made. Control center shall be constructed to permit single-point high voltage power supply connections to the disconnect
          .7 Passive Frost Control: The ERV core shall perform without condensing or frosting under normal operating conditions (defined as outside
                                                                                                                                                                          16.6 Bathroom Exhaust Fans
               temperatures above -10°F and inside relative humidity below 40%). Occasional more extreme conditions shall not affect the usual function,
                                                                                                                                                                              .1 Provide multi-blade, forward curved wheel in steel housing for between stud mounting.
                performance or durability of the core. No condensate drains will be allowed.
                                                                                                                                                                               .2 Resiliently mount direct driven fan and motor. Motor shall be plug in type with permanently lubricated bearings.
          .8 Unit shall be 54-1/2x16-3/8x36-3/4 (LxHxD) inches and weigh not more than 200 lbs.
                                                                                                                                                                               .3 Provide wall timer switch and backdraft damper.
     .4 Heat Recovery Core and Filters
                                                                                                                                                                         17. Sheet Metal Ductwork
         .1 Energy recovery core shall be of the total enthalpy type, capable of transferring both sensible and latent energy between airstreams. Latent
               energy transfer shall be accomplished by direct water vapor transfer from one airstream to the other, without exposing transfer media in
                                                                                                                                                                               .1 Ductwork shall be galvanized steel, lock formed 500 Pa (2") W.G. SMACNA standard for low velocity and medium velocity ductwork quality.
               succeeding cycles directly to the exhaust air and then to the fresh air. No condensate drains shall be allowed. The energy recovery core
                                                                                                                                                                                     Fabricated in accordance with SMACNA duct manuals and ASHRAE handbooks. Ductwork shall meet the requirements of NFPA 90A and 91 and
               shall be designed and constructed to permit cleaning and removal for servicing. The energy recovery core shall have a ten year warranty.
                                                                                                                                                                                      conform to applicable codes.
                 Performance criteria are to be as specified in AHRI Standard 1060.
                                                                                                                                                                              .2 Prior to fabrication of ductwork, check all ceiling spaces and heights and conflict with other trades. Include and provide necessary offset to
          .2 The core shall have cross leakage of less than 2%.
                                                                                                                                                                                      maintain ceiling height, headroom etc
          .3 ERV shall have 2" thick MERV 13 disposable pleated filters located in the outdoor air and exhaust airstreams. All filters shall be accessible
                                                                                                                                                                               .3 Provide minimum 300mm x 300mm (12"x 12") access panels to manual dampers, equipment, fire dampers.
               from the exterior of the unit.
                                                                                                                                                                               .4 All ductwork shall be delivered to site in a clean condition and remain clean. During installation all open ends of ductwork shall be capped and
          .1 Unit shall be equipped with 2 (two) forward curve direct drive ECM blowers using permanently sealed bearings.
                                                                                                                                                                               .5 Provide flexible duct connections from duct branches to supply air diffusers, 1500mm (5'-0") maximum. Flex shall be thermally insulated if supply
          .2 The analog voltage command to the supply fan ECM can be set from the unit controller display. The adjustable range of 0% to 100%
                correspond to the minimum and maximum fan operating speed. This supply fan operation mode can be used to field balance the supply air
                                                                                                                                                                               .6 All ducts associated with fans, and other vibration isolated equipment shall be installed with flexible connections on the inlet and outlet openings.
                                                                                                                                                                              .7 All ductwork penetrating floor slabs above and below or fire separations shall be complete with fire dampers.
          .3 Blower motors shall be Premium Efficiency, EISA compliant for energy efficiency. The blower motors shall be totally enclosed (TEFC) and
                                                                                                                                                                              .8 All ductwork penetrating a fire separation to a public corridor shall be complete with fire/smoke dampers.
               be shall be supplied with factory installed motor starters. Direct drive models shall be EISA-compliant for energy efficiency with open drip
                                                                                                                                                                               .9 Provide return air openings and/or sound traps where indicated complete with 1" acoustic lining.
               proof design and integral thermal protection.
                                                                                                                                                                                .10 Provide balancing dampers where indicated on drawings and at all duct branches. Provide additional balance dampers at the request of the
                                                                                                                                                                                     balancing agent to facilitate balancing.
           .1 Unit shall have a wired power connection complete with disconnect, operating on 120 volt/1 phase/60 Hz.
                                                                                                                                                                                .11 Paint all visible ductwork through supply, return or exhaust grilles matte black. Coordinate on site with General Contractor.
          .2 Unit shall operate in high speed on 600 Watts.
                                                                                                                                                                                .12 Size round ducts, installed in place of rectangular ducts, from ASHRAE table of equivalent rectangular and round ducts. No variation of duct
     .7 Controls
                                                                                                                                                                                      configuration or sizes permitted except by permission from consultant.
          .1 Timeclock: Digital Time Clock wall, with up to 8 on/off cycles per day or 50 per week, 24VAC power, with battery backup protection of
                                                                                                                                                                                .13 All exposed air conditioned supply ductwork installed in an exposed area in which it is serving will not require external insulation
               program settings against power failure to energize unit.
                                                                                                                                                                                .14 Provide seismic supports for grilles and diffusers.
         .2 Power up:
                                                                                                                                                                                .15 Provide turning vanes for all rectangular elbows installed as per SMACNA.
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.16 Roof mounted ducts shall have standing seams and sealed water-tight.

.1 Ducts with pressure over 500 Pa (2") use Class A sealing.

.20 Gas vents for atmospheric gas fired equipment shall be double wall type "B" ULC labeled.

.18 Provide galvanized steel screen, 13mm x 13mm (1/2" x 1/2") square mesh for exterior intake & exhaust outlets.

.19 Provide flashing, curb and counter flashing for all ducting passing through roof and external envelope of the building.

.17 Provide back draft damper to all exhaust outlets at exterior.

.21 Duct sealing requirements:

.23 Provide sheet metal tray on top of electrical equipment to prevent sprinkler spray .24 Provide access doors upstream and downstream of all coils and square elbows with turning vanes. .1 Provide U.L.C. Approved fire dampers made of galvanized steel or prime coated black steel weighted to close and lock in closed position when released by fusible link. .2 Fire dampers in low pressure ductwork may be multi blade or curtain type. .3 Fabricate combination fire and balancing dampers with linkage readily adjustable in open position .4 Curtain fire dampers shall have blades retained in a recess so free area of connecting ductwork is not reduced. .5 Fusible links shall be set for 72°C (162°F). .6 The contractor shall drop test all fire dampers in the presence of the consultant. .7 Fire dampers to be dynamic type. 19. Control System Electric .1 Provide complete control system to form fully operable, safe installation. Provide shop drawings of equipment and control sequences prior to .2 The motor list and work stated therein forms part of the contract document. .3 Division 16 to provide wiring to 120V/1 phase motor and also the wiring between such motor and its control device such as thermostat and time clock. All other wiring are generally by Division 15. The motor list scope of work shall be follows. .4 All Division 15 wiring and conduit requirements to follow Division 16 specifications for this project. This shall include low-voltage wiring. Mount of .1 By electrical contractor - mounting and wiring thermostats controlling single phase motor. Wiring of aquastats and timers controlling single .2 By mechanical contractor - mounting of all in-line piping devices (well, valves, pressure switches, orifices, etc.). Mounting of aquastats and all control devices. .3 By sheet metal contractor - mounting of dampers, baffling in mixed air plenum to control contractor requirements, access door for duct or unit mounted controls. .5 Install vandal resistant thermostats in all public areas. .6 Single Zone Furnace Unit, FUR-1, FUR-2 .1 A programmable thermostat controls the operation of the furnace unit. Desired occupied and unoccupied heating and cooling setpoints are programmed via the thermostat. Fan operation is determined by the position of the fan "ON-AUTO" switch, as well as by the mode of occupancy. Heating and cooling operation as described herein assumes that the system "HEAT-AUTO-COOL-OFF" switch is in the "AUTO" .2 Occupied Mode Programmable thermostat signifies occupied mode. Supply fan runs continuously during occupied hours as determined by the position of the fan switch. .2 Upon a drop in space temperature below the occupied heating setpoint, heating is inititated as follows: .1 Balance point is set to .2 Temperature is below the balance point, gas heating is initiated. .3 Temperature is above or equal to the balance point, heat pump heating is initiated. .3 Upon a rise in space temperature above the occupied cooling setpoint, heat pump cooling mode is initiated. .3 Unoccupied Mode Programmable thermostat signifies unoccupied mode. Supply fan cycles upon a call for heating. Unoccupied heating setpoint is lower than occupied heating setpoint (60 degrees adj.). Furnace heating operates as described above in Occupied Mode, except as to maintain unoccupied heating setpoints. .7 Heat Recovery Unit, ERV-1, ERV-2 .1 ERV unit shall operate continuously during occupied hours as determined by time clock controller. .2 Upon defrost cycle initiation, ERV to operate in recirculation mode based on factory controls. .1 SCR controller to modulate to maintain temperature setpoint of duct thermostat to avoid defrost cycle of the HRV. .2 Set setpoints of Duct heaters to the following: .1 ERV-1: -5°F .2 ERV-2: -5°F .3 Provide remote duct sensors capable of sensing low temperatures. .4 Wire remote sensor control to mechanical and furnace rooms. .9 Infant Washroom (103) Exhaust Fan, EF-1 .1 Wire to 20/40/60 minute wall timer. .10 Staff Washroom (114) Exhaust Fan, EF-2 .1 Wire to 20/40/60 minute wall timer. .11 Accessible Washroom (105) Exhaust Fan, EF-3 Wire to 20/40/60 minute wall timer. .12 Electrical Room (111) Exhaust Fan, EF-4 .1 Wire to reverse acting thermostat. .2 Setpoint set to 80°F (adjustable). .13 Janitor Room (106) Exhaust Fan, EF-5 .1 Wire to wall switch. .2 Run continuously.

.2 Ducts up to 500 Pa (2") use Class B sealing.

.22 Provide sheet metal tray underneath domestic hot water heaters.

Branch duct to diffuser other than take-off, use Class C sealing

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4 2022-06-24 ISSUED FOR TENDER 3 2022-06-17 ISSUED FOR BP / TENDER ISSUED FOR ELEC COORDINATION MW 2 2021-07-19 1 2021-07-16 ISSUED FOR REVIEW No. DATE DESCRIPTION **REVISIONS:**

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SEAL:

CLIENT:

PROJECT:

QUESNEL & DISTRIC

420 WEBSTER AVENUE QUESNEL, BC

DRAWING NAME:

MECHANICAL SPECIFICATIONS

21424-1

PROJECT NUMBER:

DRAWN BY: DESIGNED BY: MW APPROVED BY: MW

AS NOTED

DRAWING:

SCALE:

.3 ERV unit start command:

.2 Internal time clock

.3 Enable via controller display

.1 When the unit main disconnect is closed a delay of 10 seconds (adjustable) occurs for the controller to come online.

.6 The supply fan, exhaust fan, [heating] are controlled based on the chosen unit operating modes and air conditions.

.5 The supply fan starts after a 6 second delay (adjustable). The supply fan will not start until the damper actuator end switch closes.

.1 An input signal is required to enable the unit operation. The unit will be commanded on by:

.4 All types of input that are enabled must be true before the unit will start.