INVITATION FOR TENDERS

Nelson and District Community Complex
Pool Boilers Replacement

Regional District of Central Kootenay

Issued: 14/07/2023

Closing Location:
Regional District of Central Kootenay
Box 590, 202 Lakeside Drive
Nelson, BC V1L 5R4

Closing Date and Time:
2:00 pm (PST), **02/08/2023**

Ryan Ricalton
Facility Manager
PH: 250-352-8168
FX: 250-352-9300
Email: rricalton@rdck.bc.ca

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PART 1 – INVITATION & INSTRUCTIONS TO BIDDERS

1 Invitation & Instructions to Bidders

The definitions set out in Article 3.1 apply throughout this document except when expressly stipulated or the context otherwise clearly indicates.

1.1 Executive Summary

To provide all services required to remove two (2) existing boilers and to supply and install two (2) boilers and all associated work after the installation of the two (2) boilers.

This shall generally include work in the following area(s):

I. Regional District of Central Kootenay, Nelson and District Community Complex – two (2) new boilers in Mechanical Room 120A

This includes but is not limited by the generality of the following:

I. Work for Mechanical Trade
II. Testing and Commissioning

The RDCK is seeking Bids for a Contract to supply the Services herein described on or before 02/08/2023

1.2 Bid Documents

It is the responsibility of the Bidder to ascertain that they have received a full set of Bid documents. Upon submission of their Bid, the Bidder shall be deemed conclusively to have been in full possession of a full set of Bid Documents.

1.3 Intent to Submit

Bidders intending to submit a Bid should provide an email notification to the RDCK Representative.

A Bidder who does not submit an Intent to Submit email may not be sent any amendments or addenda.

No Bidder who sends an Intent to Submit email is obligated to submit a Bid.

1.4 Enquiries

All enquiries related to this Bid are to be directed, **in writing**, to the following person who is hereby designated as the RDCK Representative:

Ryan Ricalton
Facility Manager
Fax: 250-352-9300
Email: rricalton@rdck.bc.ca

Information about this Invitation for Tenders or any matter pertaining to the Services that is obtained from any source other than the RDCK Representative is not official and should not be relied upon. Enquiries that are directed to the RDCK Representative and responses will be recorded and **MAY** be distributed to all Bidders at the option of the RDCK.

1.5 Examination of Sites and Local Conditions

The Bidder must satisfy themselves as to the practicability of supplying the Services in accordance with the Contract, and shall be held to have satisfied themselves in every particular before submitting a Bid, by inquiry and by inspection of the Site herein described.

If applicable, the Bidder should examine the Site surroundings and, before submitting a Bid shall satisfy themselves as to the nature of the Site, the quantities and nature of the Services to be supplied and in general, shall obtain all relevant information as to risks, contingencies and other circumstances which may influence their Bid.

Bids will only be accepted from Prime Contractors who register at a **mandatory** site tour and walk-through, scheduled for Wednesday, July 19, 2023 at 10:00 AM.

The site visit is **mandatory** for contractors intending to act as Prime Contractors.

As the project primarily involves mechanical work, Mechanical Contractors are invited to bid as Prime Contractors. In the event Contractors who are not qualified to carry out the mechanical installation work intend to bid as Prime Contractors, they shall be accompanied on the site visit by the Mechanical Contractor they intend to carry as a sub-Contractor.

The person attending the mandatory walkthrough must be a principal of the firm, estimator employed by the firm, or a ticketed gas, pipe or sheet metal tradesmen, with valid TQ number, indicative of competency in mechanical systems installation and an understanding of the project requirements described by the Owner and Consultant.

The site tour is not mandatory for other sub-contractors.

1.6 Bid Closing Time and Location

Bids will be accepted until the Closing Time and the Closing Location indicated on the cover page.

1.7 Bid Submissions

A digital PDF format of the Bid submission may be sent by e-mail to: rricalton@rdck.bc.ca

Bidders wishing to send or deliver a Bid submission in paper format to the RDCK must submit one (1) bound and one (1) unbound copy of the document in a SEALED envelope clearly labeled "**INVITATION FOR TENDERS – Nelson and District Community Complex Pool Boilers Replacement**".

The Bidder's name and full mailing address must be clearly marked on the outside of the response envelope.

Submissions should be accompanied by a clear indication of the anticipated schedule for the supply of the Services along with any other supporting pertinent information.

Bids will be received until the Closing Time at the Closing Location indicated on the cover page.

Each Schedule of the Bid Form must be completed and signed by a person authorized to sign on behalf of the Bidder and authorized to bind the Bidder to any statements made in response to this Invitation for Tenders.

1. The Bidder's name and full mailing address must be clearly marked on the outside of the response envelope.
2. The Bid must include the Bid Form.
3. The Bid must include a complete itemized pricing schedule (Schedule 2-Pricing Schedules).
4. The Bid must include a list of the equipment to be used, and in the event of a breakdown, the type of back-up equipment available (Schedule 3-Equipment List).
5. The Bid must include a list of proposed Sub-Contractors, if any (Schedule 4-Proposed Sub-Contractors).
6. The Bid must include a synopsis of all relevant experience. A list of references shall also be included with the Bid (Schedule 5-List of Previous Experience).

~~Emailed and faxed Bids will **NOT** be accepted. Any Bid received after the Closing Time, or other than in the manner specified, will be considered disqualified and will be returned, unopened, to the Bidder.~~

1.8 Ownership of Bid and Freedom of Information

All responses to this Invitation for Tenders become the property of the RDCK. By submitting a Bid the Bidder agrees the RDCK has the right to copy the Bid Documents. Bids will be held in confidence by the RDCK, subject to the provisions of the *Freedom of Information and Protection of Privacy Act* and any requirement for disclosure of all or a part of a Bid under that Act. The requirement for confidentiality shall not apply to any Bid that is incorporated into the Contract for the supply of the Services. Further, the RDCK may disclose all or part of any Bid to the RDCK Board at a public meeting of the RDCK Board of Directors, when making a recommendation for the award of the Contract.

1.9 RDCK's Right to Accept or Reject Bid

The lowest or any Bid will not necessarily be accepted. The RDCK reserves the right in its absolute discretion to: accept the Bids which it deems most advantageous and favourable in the interests of the RDCK; and waive informalities in, or reject any or all Bids, in each case without giving any notice. In no event will the RDCK be responsible for the costs of preparation or submission of a Bid.

If there is only one compliant Bid received by the Closing Time, the RDCK reserves the right to accept the Bid or cancel the Bid process with no further consideration for the sole Bid. This includes the right to cancel this Invitation for Tenders at any time prior to entering into the Contract with the Contractor. The RDCK reserves the right to cancel this Invitation for Tenders at any time before execution of the Contract without being obligated to any Bidder regardless of whether there is one or more compliant Bids.

Bids that contain qualifying conditions or otherwise fail to conform to these Instructions to Bidders may be disqualified or rejected by the RDCK in its absolute discretion. The RDCK may at its sole discretion reject or retain for consideration Bids which are non-conforming including Bids that do not conform because they do not contain the content or form required by these Instructions to Bidders or because they have not complied with the process for submission set out herein.

1.10 No Claim for Compensation

Except as expressly and specifically permitted in these Instructions to Bidders, no Bidder shall have any claim for any compensation of any kind whatsoever, as a result of participating in the Invitation for Tenders, and by submitting a Bid each Bidder shall be deemed to have agreed that it has no claim.

1.11 Conflict of Interest

By submitting a Bid, the Bidder warrants that neither it nor any of its officers or directors, or any employee with authority to bind the Bidder has any financial or personal relationship or affiliation with any elected official or employee of the RDCK or their immediate families which might in any way be seen (in the RDCK's sole and unfettered discretion) to create a conflict.

1.12 Anti-Collusion, Fraud & Corruption

The Bidder shall not communicate to any person prior to the opening of Bids (other than to the RDCK through the delivery of a Bid in the prescribed manner) the amount of any Bid, or at any time adjust the amount of any Bid by arrangement with any other persons, make any arrangement with any other person about whether or not they or that other person should or should not submit a Bid or otherwise collude with any other person in any manner whatsoever in the Bid process.

Any breach of this provision or non-compliance on the part of a Bidder shall, without affecting the Bidder's liability for such breach or non-compliance, result in the Bid's disqualification.

1.13 Confidentiality

Confidential information about the RDCK obtained by Bidders must not be disclosed unless authorized to do so, in writing, by the RDCK. The Bidder agrees that their obligation of confidentiality will survive the termination of any Contract awarded under this Bid process.

1.14 Irrevocability and Acceptance of Bid

After the Closing Time, all Bids are irrevocable. By submission of a Bid, the Bidder agrees that should its Bid be successful the Bidder will enter into the Contract with the RDCK for the supply of the Services. The Contract shall be on the terms and conditions set out in this Invitation for Tenders and as set out in Appendix B. Each Bid will be irrevocable and open for acceptance by the RDCK for a period of ninety (90) calendar days from the day following the Bid Closing Time, even if the Bid of another Bidder is accepted by the RDCK.

By submission of a clear and detailed written notice the Bidder may amend or withdraw its Bid PRIOR to the Closing Time. Notice in writing must be submitted to the RDCK Representative.

1.15 Irregularities and Informalities

The RDCK reserves the right, at its sole discretion to waive irregularities and informalities in any Bid and to seek clarification or additional information on any area of any Bid when it is in the best interest of the RDCK to do so.

1.16 Discrepancies or Omissions

Bidders finding discrepancies or omissions in the Specifications or other documents or having any doubts on the meaning or intent of any part thereof should immediately request, in writing, clarification from the RDCK Representative who will send written instructions or explanations to all parties having a set of the Bid Documents in accordance with section 1.4. Any work on a Bid done by the Bidder after the discovery of discrepancies, errors or omissions, which the Bidder fails to seek clarification about, shall be done at the Bidder's risk.

1.17 Modification of Terms/Addenda

The RDCK reserves the right to modify the terms of this Invitation for Tenders at any time before the Closing Time in its sole discretion. Written Addenda are the only means of amending or clarifying any of the information contained in the information package. The RDCK may amend or clarify the information package by issuing an Addendum. No employee or agent of the RDCK is authorized to amend or clarify the content of the information package or any Addenda except by issuing an Addendum. The RDCK makes no guarantee as to the timely delivery of any Addendum. Addenda issued prior to closing of this Invitation to Bid shall become a part of the Bid Documents.

1.18 Liability for Errors

While the RDCK has used considerable efforts to ensure an accurate representation of information in this Invitation for Tenders, the information contained in this Invitation for Tenders is supplied solely as a guideline for Bidders. The information is not guaranteed or warranted to be accurate by the RDCK, nor is it necessarily comprehensive or exhaustive. Nothing in this Invitation for Tenders is intended to relieve the Bidders from forming their own opinions and conclusions with respect to the matters addressed in this Invitation for Tenders.

1.19 Basis of Contract Award

Bidders are hereby notified that the RDCK intends to review and enter into the Contract for the supply of the Services based not only on the Bid price, but the Bidder's experience and qualifications considered essential by the RDCK to provide the Services requested and any other criteria the RDCK considers relevant in its absolute discretion, including the following:

a) the qualifications and experience necessary for the satisfactory performance of the assignment;
b) the capacity of the Bidder to supply the Services promptly;
c) the performance of the Bidder on similar projects, record of compliance with all statutes, regulations, and bylaws affecting the Bidder's previous supply of Services;
d) a positive reference referral from previous experience;
e) lowest price to the RDCK of having the Services supplied in accordance with the Invitation for Tenders documents;
f) proposed rebate for commodity value to the RDCK, including comprehensiveness, transparency, ease of tracking price fluctuations, and ease of verifying Contractor's invoice information;
g) environmental attributes of a Bidder's Bid;
h) conformity of the Bid to the requirements set forth in the description of Services; and
i) conformance with the timing provided for in the Description of Services.

The RDCK, when considering the award of the Contract, will take the above prerequisites and the Bid schedules into consideration.

Bidders shall be competent and capable of supplying the Services. Bidders may be required to provide further evidence of previous experience and financial responsibility as outlined in Schedule 5-List of Previous Experience. A reference check on past experience may be performed.

The evaluation process will be conducted solely at the discretion of the RDCK. The RDCK may decide to utilize other criteria in the review of Bids other than those set forth above; in particular, the price to supply the Services may not be the only or primary criterion that will be utilized by the RDCK. The RDCK reserves the right to make inquiries regarding any or all Bids and to verify all information submitted by Bidders.

The RDCK reserves the right, at its discretion, to negotiate with any Bidder that the RDCK believes has the most advantageous Bid or with any other Bidder or Bidders concurrently. In no event will the RDCK be required to offer any modified terms to any other Bidder prior to entering into the Contract with the successful Bidder, and the RDCK shall incur no liability to any other Bidder as a result of such negotiations or modifications.

Bidders are advised that, after receipt of Bids and prior to award of Contract, Bidders may be required to provide the RDCK with additional information concerning the Bidder or their Bid including, but not limited to, a further breakdown of relevant components of the proposed prices.

The RDCK reserves the right to reject any Bids of a company that is, or whose principals are, at the time of submitting a Bid, engaged in a lawsuit against the RDCK in relation to the supply of goods or services.

The RDCK reserves the right to reject any Bids of a company that owes, or whose principals owe, monies to the RDCK at the time of submitting a Bid.

1.20 Definition of Contract

This Invitation for Tenders should not be construed as an Agreement or Contract to purchase goods or services. The RDCK is not bound to enter into the Contract with the Bidder who submits the lowest priced Bid or with any Bidder. The RDCK will be under no obligation to receive further information, whether written or oral, from a Bidder after the Bid Closing Time.

Neither the acceptance of a Bid nor the execution of the Contract will constitute approval of any activity or development contemplated in any Bid that requires any approval, permit or license pursuant to any federal, provincial, regional district or municipal enactments.

Notice in writing to a Bidder that it has been identified as the Contractor and the subsequent full execution of a written agreement will constitute the Contract for the supply of the Services and no Bidder will acquire any legal or equitable rights or privileges relative to the supply of the Services until the occurrence of both such events.

1.21 Bid Bonds

The RDCK requires all Bidders to provide, with their Bids, security in the form of a bid bond valued at 10% of the total price proposed in the Bid issued by a surety company licensed to carry on the business of suretyship in the Province of British Columbia. The bid bond will be returned to all unsuccessful Bidders once a service contract has been formalized with the selected Bidder.

1.22 Powers Preserved

Except as expressly set out in this Agreement, nothing in this Invitation for Tenders shall prejudice or affect the rights and powers of the RDCK in the exercise of its powers, duties or functions under the *Community*

Charter or the *Local Government Act* or any of its bylaws, all of which may be fully and effectively exercised as if this Agreement had not been executed and delivered.

1.23 Form of Contract

By submission of a Bid, the Bidder agrees that, should it be identified as the successful Bidder, it is willing to enter into the Contract detailed in Appendix B with the RDCK within fifteen (15) days of the date of the Notice of Award. The Contract will include of all documents listed below:

Notice to Proceed
Contract Agreement
Part 2 – Description of the Services
Part 3 - General Contract Conditions
Part 4 - Payment Clauses
Part 5 - Contract Form
Schedule 1 – Description of Services
Schedule 2 – Pricing Schedules
Schedule 3 – Equipment List
Schedule 4 – Proposed Sub-Contractors
Schedule 5 – List of Previous Experience (Contracts)
Schedule 6 – Schedule of Addenda
Schedule 7 – Environmental Attributes
Certificates of Insurance
WorkSafe BC Clearance Letter

By submission of a Bid, the Bidder agrees that, should it be identified as the Contractor, it is willing provide to the RDCK the necessary Insurance Policies and WorkSafe BC Clearance Letter within fifteen (15) days of the date of the Notice of Award.

PART 2 – DESCRIPTION OF SERVICES

2 Description of the Services

This Part shall be read with and shall form part of the Contract to be executed by the parties.

2.1 Services Required

The Services to be supplied to the RDCK consist of the following: Removal and replacement, including supply and installation, of two (2) boilers. A detailed description of the Services and relevant Specifications is set out in Schedule 1.

2.2 Personnel

The Contractor shall, at all times during the term of the Contract, employ a Supervisor charged with the responsibility of supervising the operations of the Contractor. The Supervisor shall represent the Contractor for the supply of the Services, and directions given to him by the RDCK shall be held to have been given to the Contractor. Contact information for the Supervisor shall be given to the RDCK, and the Supervisor shall respond promptly to all requests by the RDCK.

The Contractor shall employ properly qualified and trained equipment operators, labourers and supervisory staff to supply the Services. The Contractor acknowledges that its employees, agents and sub-contractors may come into contact with the public in the execution of the Contract and that it is of primary importance to the RDCK that excellent relations with the public be maintained. All personnel performing work under the Contract shall conduct themselves in a courteous and polite manner towards the public. All Contractor personnel shall wear reflective safety vests and approved safety footwear (or a garment with similar reflective qualities) at all times while performing work under the Contract.

All Contractor personnel shall respond appropriately to environmental management issues that arise during performance of their duties in respect of the supply of the Services (responding to spills, managing found hazardous materials, etc.).

2.3 Contractor's Control of Supply of Services

The Contractor shall have complete control in respect of the supply of the Services and shall effectively direct and supervise the supply of the Services using its best skill and attention. The Contractor shall be solely responsible for all means, methods, techniques, sequences and procedures required for the supply of the Services and for coordinating all parts of the supply of the Services under the Contract.

The Contractor shall carefully examine the Contract Documents and shall promptly report to the RDCK Representative any error, inconsistency or omission they may discover. Although the RDCK may agree to special methods of supplying the Services, the Contractor will not be relieved of their responsibility for the result. The RDCK's agreement with such special methods shall not constitute ground for claims for the Contractor for any additional payment, nor for relief of their responsibility for the methods used.

2.4 Contractor's Responsibilities

All equipment, labour, materials and associated costs for the supply of the Services will be the responsibility of the Contractor. The Contractor shall have the required expertise to supply the Services in a competent manner. The Contractor's responsibilities shall include, but not be limited to the following:

a. The Contractor shall safeguard workers by ensuring clean, functional clothing, protective gloves and footwear, in accordance with Worker's Compensation Board regulations, is worn during the performance of the Contract.

b. The Contractor shall present a positive image to residents by using clean, attractively painted, well maintained vehicles. The Contractor's vehicles shall be maintained in a clean, functional and operational condition with reference to relevant health or sanitary regulations.
c. The Contractor shall prominently display their name, telephone number and vehicle identification number on each vehicle to be used in the performance of the Contract.

PART 3 – GENERAL CONTRACT CONDITIONS

3 General Conditions of Contract

This Part shall be read with and shall form part of the Contract to be executed by the parties.

3.1 Definition of Terms

The following words and terms, unless the context dictates otherwise, shall have the following meanings. Words having a singular number include the plural and vice versa. References to the male gender refer to the female gender as well when appropriate.

"Addenda" or "Addendum" means any addenda or addendum to this Invitation for Tenders pursuant to section 1.17.

"Agreement" or "Contract" means the written Agreement resulting from this Invitation for Tenders to be executed by the RDCK and the successful Bidder as Contractor as described in section 1.23 and on the terms set out in this Invitation for Tenders and Appendix B.

"Bidder" means the individual, partnership, corporation or combination thereof, including joint ventures, who or which sign the Bid submission.

"Closing Location" means the location described in section 1.6 of these Instructions to Bidders.

"Closing Time" means the Closing date and time described in section 1.6 of these Instructions to Bidders.

"Contract Documents" means the Contract, the Contractor's Bid Documents, the Invitation for Tenders documents and such other documents as listed in the Contract, including all amendments and addenda agreed to between the parties.

"Contract Price"	means the price to be paid by the RDCK for the supply of Services under the Contract.
"Contractor"	means the successful Bidder who may be an individual, partnership, corporation or combination thereof, including joint venture, who or which executes the resulting Contract.
"Force Majeure"	shall mean any event or circumstance, excluding lack of funds and labour disruptions, not within the reasonable control of the party claiming the Force Majeure, which prevents or delays that party from meeting an obligation hereunder, and which that party has not been able to overcome by the exercise of due diligence, and including: (a) acts of God, including wind, ice and other storms, lightning, floods, earthquakes, volcanic eruptions and landslides; (b) epidemics, war (whether or not declared), blockades, acts of public enemies, acts of sabotage or terrorism, civil insurrections, riots and civil disobedience; (c) explosion or fire;
"G.S.T"	means the Good and Services Tax administered under the *Excise Tax Act* (Canada) and any successor tax or levy in force from time to time.
"Instructions to Bidders"	means all instructions, requirements, terms and conditions of this Invitation for Tenders and any addenda thereto.
"Intent to Submit"	means the email notification to the RDCK described in section 1.3 of this Invitation for Tenders.
"**Irrevocable Commercial Letter of Credit**"	means the Irrevocable Commercial Letter of Credit described in section 3.26.
"Notice of Award"	means the notice of award of the Contract to the Bidder under this Invitation for Tenders.
"Notice to Proceed"	means the notice described in section 3.10.
"P.S.T"	means British Columbia Provincial Sales Tax and any successor tax or levy in force from time to time, including but not limited to the Services and Services Tax.
"Bid"	means the Bidder's submission.

"RDCK", "Regional District"	means the Regional District of Central Kootenay, a corporation under the *Local Government Act* having its offices and postal address at Box 590, 202 Lakeside Drive, Nelson, BC V1L 5R4.
"RDCK Representative"	means the person designated in section 1.4 of this Invitation for Tenders.
"Requirements"	means all of the requirements set out in the Invitation for Tenders and Instructions to Bidders, Description of Services, General Contract Conditions, Payment Clauses and elsewhere in the Agreement that describes the requirements for the supply of the Services.
"Services"	means all goods or services to be supplied under this Invitation for Tenders and all else necessary for the execution, completion and fulfillment of the Requirements and as described in section 2.1 of this Invitation for Tenders.
"**Site**"	means, if applicable, the place where the Services are to be supplied or undertaken by the RDCK, namely Click here to enter text., as shown in Appendix A
"Specifications"	means the requirements for and technical descriptions of the Services as detailed in Schedule 1.
"Sub-Contractor"	means any sub-contractor of the Bidder, including those Sub-Contractors listed in Schedule 4.
"Supervisor"	means the supervisor employed by the Contractor pursuant to section 2.2.

3.2 Period of Contract

The Contract to be awarded as a result of this Invitation for Tenders shall commence on 11/07/2023.

The aforesaid Contract shall terminate on 31/12/2023.

The Contract may be extended for up to 3 weeks by mutual agreement of both parties.

3.3 Assignment

The Contractor shall not sublet, sell, transfer, assign, or otherwise dispose of the Contract, any portion thereof, or their right, title, or interest therein, or their obligations there under without written consent of the RDCK which consent may be withheld unreasonably, except for an assignment to a bank of the payments to be received by the Contractor from the RDCK.

3.4 Insurance

Any Contract resulting from this Invitation for Tenders will require that the Contractor, without limiting its obligations or liabilities and at its own expense, provide **and maintain throughout the Contract term**, the following insurances and such other insurance coverage as the RDCK may reasonably require with insurers licensed in the Province of British Columbia in forms acceptable to the RDCK. All required insurance shall be endorsed to show the RDCK as an additional insured and provide the RDCK with 30 days' advance written notice of cancellation or material change. The Contractor will provide the RDCK with evidence of the required insurance, in the form acceptable to the RDCK, immediately following execution and delivery of the Contract.

1. Comprehensive General Liability in an amount not less than $5,000,000 inclusive per occurrence, blanket contractual, insuring against bodily injury and property damage and including liability assumed under the Contract. The RDCK is to be added as an additional insured.
2. Automobile Liability on all vehicles owned, operated or licensed in the name of the Contractor in an amount not less than $2,000.000.

The Contractor shall provide proof of insurance coverage, showing the RDCK as an additional insured, on each anniversary date of the Contract.

3.5 Indemnity

The Contractor shall indemnify and save harmless, the RDCK, from and against any and all losses and all claims, demands, payments, losses, costs, damages suits, actions, recoveries, and judgments brought or recovered against them and/or the RDCK by reason of this Invitation for Tenders or any act or omission of the Contractor, its Sub-Contractors, agents, or employees, in the supply or provision of the Services and otherwise in the performance of or failure to perform the Contract, which shall include protecting the Services and protecting the public from hazards arising out of the supply of the Services.

The obligation of the Contractor under this Section shall apply only to the extent that losses, claims, demands, payments, costs, damages suits, actions, recoveries, and judgment claims do not arise solely out of a negligent act or omission of the RDCK, other Contractors or Representatives of the RDCK, as duly appointed by the RDCK.

3.6 Compliance with *Workers Compensation Act*

The Contractor shall ensure compliance, on their part and on the part of all of their Sub-Contractors, with the *Workers Compensation Act* and the Occupational Health and Safety Regulations thereunder.

Prior to supplying any of the Services in the Contract, the Contractor must provide the RDCK with the Contractor's WorkSafe BC number, and must pay and keep current during the term of the Contract, all assessments required by WorkSafe BC in relation to the supply of the Services or the Contract Price. In

any case where pursuant to the provisions of the *Workers Compensation Act*, an order is given to the Contractor, or one of their Sub-Contractors in respect to their operations under the Contract to cease operations because of failure to install or adopt safety devices or appliances or methods as directed, or required by the *Workers Compensation Act* or Regulations there under, or because conditions of immediate danger exist that would be likely to result in injury to any person, and the Contractor is not available or capable of removing the danger to life or equipment resultant from the Contractor's operations then the RDCK may issue a Written Notice to the Contractor and may immediately arrange for the removal of this danger and the Contractor shall be liable for the costs of such arrangements, but such act by the RDCK shall not relieve the Contractor of responsibility for injury, loss of life, or damage which may occur in that situation.

In the event that the Contractor refuses or fails to comply with an order under the *Workers Compensation Act* or Regulations thereunder, so that the supply of the Services is stopped, the RDCK may, upon written notice, terminate the Contract and proceed in accordance with Section 3.12-RDCK's Right to Terminate the Contract.

The Contractor shall, during the term of the Contract, maintain Workers Compensation Insurance in order to fully protect both its employees and the RDCK as may be required by law during the term of the Contract and shall on each anniversary date of the Contract, provide the RDCK with proof of payment of claims in good standing with WorkSafe BC by way of a WorkSafe BC Clearance Letter.

3.7 Health and Safety

The Contractor shall be solely and completely responsible for ensuring safety of all persons and property during the supply of the Services. This requirement shall apply during the Contract period and not be limited to normal working hours.

The Contractor shall be liable for any and all injury or damage which may occur to persons or to property due to any act, omission, neglect or default of the Contractor, or of their employees, workmen or agents.

The Contractor shall satisfy the Manager that a safety program has been developed in accordance with the Occupational Health and Safety Regulations, and Safe Work Practices and Procedures of WorkSafe BC and shall incorporate all of the RDCK's operating requirements and restrictions.

The Contractor shall assign an individual responsible and authorized to supervise and enforce compliance with all safety regulations required in the supply of the Services.

3.8 Intent of Contract Documents

The intent of the Contract Documents is that the Contractor shall provide all materials, supervision, labour, equipment and all else necessary for or incidental to the proper supply of the Services described in the Specifications and all incidental work to supply the Services. This is not an Agreement of employment. The Contractor is an independent Contractor and nothing herein shall be construed to

create a partnership, joint venture or agency and neither party shall be responsible for the debts or obligations of the other.

3.9 RDCK Representative's Authority

The RDCK Representative will observe the supply of the Services in progress on behalf of the RDCK. The RDCK Representative will have the authority to stop the supply of the Services whenever such stoppage may be necessary, in their opinion, to ensure the proper supply of the Services in accordance with the provisions of the Contract.

3.10 Notice to Proceed

Following the execution of the Contract by the Contractor and the provisions of the required Irrevocable Commercial Letter of Credit and insurance policies, a written Notice to Proceed with the supply of the Services will be given to the Contractor by the RDCK. The Contractor shall supply the Services at the time specified in the Contract or, if applicable, begin supplying the Services on the first day of the Term and shall proceed with the supply of the Services regularly and without interruption thereafter throughout the Term, unless otherwise directed in writing by the Manager or RDCK.

3.11 RDCK's Right to Obtain Services from Other Suppliers

If the Contractor should refuse or fail to supply adequate workmanship, products, or machinery and equipment for the scheduled supply of the Services, or neglects to supply the Services properly, or fails to perform any of the provisions of the Contract, then the RDCK, without prejudice to any of its other rights under the Contract, may notify the Contractor in writing, that the Contractor is in default of their contractual obligations, and instruct him to correct the default within forty-eight (48) hours.

If the correction of the default cannot be completed within forty-eight (48) hours as specified, the Contractor shall be considered to be in compliance with the RDCK's instruction if it commences the correction of the default within the specified time, and in addition provides the RDCK with a schedule that is acceptable to the RDCK in its sole discretion for such correction and completes the corrections in accordance with such schedule.

If the Contractor fails to comply with the provisions of this section the RDCK may, without prejudice to any other right or remedy they may have, obtain the supply of Services from another supplier and may deduct the cost thereof from the payment then or thereafter due the Contractor, or may without notice to the Contractor deduct the cost from the amount secured under the Irrevocable Commercial Letter of Credit.

3.12 RDCK's Right to Terminate the Contract

If the Contractor should:

a) be adjudged bankrupt, or make a general assignment for the benefit of creditors, or if a receiver is appointed on account of their insolvency, or
b) fail to make sufficient payments due to their Sub-Contractors, or suppliers, or
c) disregard laws or regulations that apply to the supply of the Services, or the RDCK's instructions, or
d) abandon the supply of the Services, or
e) otherwise violate the conditions of the Contract, the RDCK shall, by written notice, instruct the Contractor to correct the default within forty-eight (48) hours.

If the default is not corrected within forty-eight (48 hours), then the RDCK may, without prejudice to any other right or remedy they may have, terminate the Contract. If notice has been given to the Contractor under Article 3.11-RDCK's Right to obtains Services from other suppliers, then a further notice and time to correct the default is not required and that in addition to correcting the default RDCK may without further notice proceed to terminate the Contract.

If the RDCK terminates the Contract under the conditions set out above, the RDCK shall be entitled to:

a) obtain the supply of the Services by whatever method is deemed expedient but without undue delay or expense;
b) withhold any further payments to the Contractor until the supply of the Services is finished;
c) upon completion of the supply of the Services, determine the full cost of obtaining the supply of the Services including compensation to the RDCK for this additional service and a reasonable allowance to cover the costs of any corrections required under the guarantee, and charge the Contractor the amount by which the full cost exceeds the unpaid balance of the Contract Price; or if such cost of obtaining the supply of the Services is less than the unpaid balance of the Contract Price, pay the Contractor the difference; or if such cost of finishing the supply of the Services is greater than the unpaid balance deduct the difference from the Irrevocable Commercial Letter of Credit.

It is also understood and agreed by and between the parties to the Contract, that in the event of a strike or lockout of the employees of the RDCK taking place during the term of the Contract, during which the supply of the Services may be interrupted or blocked, that the provisions of the Contract requiring payment by the RDCK to the Contractor shall be renegotiated on the basis of the Contractor's actual proven costs for the period.

It is also understood and agreed by and between the parties to the Contract, that in the event of a strike or lockout of the employees of the Contractor taking place during the term of the Contract, during which the supply of the Services may be interrupted or blocked, that the RDCK shall at its option and without penalty or further payment to the Contractor, have the right to unilaterally terminate the Contract, and to remove the Contractor, their employees and equipment from the Site.

3.13 Contractor's Right to Stop Supply of Services or Terminate the Contract

If the supply of the Services should be stopped or otherwise delayed for a period of ninety (90) days or more under an order of any court, or other public authority, and provided that such order was not issued as the result of any act or fault of the Contractor or of anyone directly or indirectly employed by him, the Contractor may, without prejudice to any other right or remedy they may have, by giving the RDCK written notice, hold the RDCK in default.

The Contractor may notify the RDCK in writing that the RDCK is in default of its contractual obligations if the RDCK, subject to requirements of these Contract General Conditions fails to pay to the Contractor when due, any amount due and owing to the Contractor under the Contract. Such written notice shall advise the RDCK that if such default is not corrected within thirty (30) calendar days from the receipt of the written notice the Contractor may, without prejudice to any other right or remedy it may have, stop the supply of the Services and terminate the Contract.

If the Contractor terminates the Contract under the conditions set out above, they shall be paid for all Services supplied and for any loss sustained upon products and construction machinery and equipment, with reasonable profit up to the time that the Contract is terminated. If the Contractor terminates the Contract this is their sole remedy and the RDCK will not be liable for any additional costs or for any loss of profit following termination.

3.14 Sub-Contractors

The Contractor agrees to preserve and protect the rights of the RDCK with respect to any supply of Services or work performed under the Contract and shall:

a) enter into Contracts or written Agreements with the Sub-Contractors requiring them to supply Services and perform work in accordance with and subject to the terms and conditions of the Contract Documents; and
b) be as fully responsible to the RDCK for acts and omissions of the Sub-Contractors and of persons directly or indirectly employed by them as for acts and omissions of persons directly employed by the Contractor.

The Contractor therefore shall incorporate all terms and conditions of the Contract General Conditions into all Sub-Contract Agreements they enter into with their Sub-Contractors, insofar as they are applicable.

The Contractor agrees to employ only those Sub-Contractors proposed by him in writing in Schedule 4-Proposed Sub-Contractors, and accepted by the RDCK for such portions of the supply of the Services as may be designated.

The RDCK may, for reasonable cause, object to the use of a proposed Sub-Contractor and require the Contractor to employ another that is acceptable to the RDCK. Under these circumstances, the RDCK will advise the Contractor, in writing, of its objection to a Sub-Contractor. The Contractor shall provide the

names of alternate Sub-Contractors for that part of the supply of the Services, each of whom must be acceptable to the RDCK. The Contractor and the RDCK will then agree as to which new Sub-Contractor shall be used.

Nothing contained in the Contract General Conditions shall create any contractual obligation between any Sub-Contractor and the RDCK.

Sub-Contractors shall not further sub-contract any portion of the supply of the Services that is the subject of their sub-contract without prior written approval of the RDCK, which may not be withheld unreasonably.

3.15 Private Land

If applicable, it shall be the Contractor's responsibility to ascertain the boundaries within which the supply of Services must be confined. The Contractor shall not enter upon lands other than those provided by the RDCK for any purpose without obtaining prior written permission of the land-owners and occupiers. A copy of the written permission is to be provided to the RDCK prior to entry upon private lands.

The Contractor shall not enter upon lands owned by others on which the RDCK has easements or rights-of-entry without having received the prior written authorization of the RDCK for such entry. It shall be the Contractor's responsibility to ascertain from the RDCK the conditions on which easements of rights-of-entry have been granted on private lands and to abide by these conditions throughout.

3.16 Dispute Resolution

All claims, disputes or issues in dispute between the RDCK and the Contractor shall be decided by mediation or arbitration if the parties agree, or failing agreement, in a court of competent jurisdiction within the Province of British Columbia. All procedures for the resolution of disputes arising in relation to the Contract shall be governed by the laws of British Columbia, Canada.

In the event that the parties agree to arbitration, the arbitration shall be governed by the rules of the British Columbia International Arbitration Centre, except that the Arbitrator(s) shall be agreed upon by the parties, and failing agreement by the parties, shall be appointed by a court of competent jurisdiction within the Province of British Columbia, Canada.

Arbitration will take place in the Southern Interior of British Columbia and be governed by the laws of the Province of British Columbia, Canada.

3.17 Taxes and Duties

The Contractor shall pay all government sales taxes, customs duties and excise taxes with respect to the Contract including but not limited to any GST or PST. The Contractor is required to identify any applicable tax separately on all invoices and the RDCK is liable to pay this amount to the Contractor. Where an

exemption of government sales taxes, custom duties or excise taxes is applicable to the Contract by way of the Contractor filing claims for, or cooperating fully with the RDCK and the proper authorities in seeking to obtain such refunds, the procedure shall be established in a Supplementary Condition.

3.18 Staff Resources and Management

The Contractor shall, at all times during the term of the Contract, have a Supervisor charged with the responsibility of supervising the operations of the Contractor and shall maintain a local office at all times and a telephone staffed during all working hours throughout the duration of the Contract.

The Contractor shall employ properly qualified and trained equipment operators, labourers and supervisory staff for the operation of the Contract and shall make available a sufficient number of staff to complete the supply of the Services. Failure or delay in the performance of the Contract due to the Contractor's inability to obtain personnel of the number and skill required shall constitute a default of the Contract.

The Contractor shall ensure that no person will be discriminated against because of race, colour, sex, age, religion or origin. Wages and hours of labour employed shall be in accordance with all applicable federal, provincial and municipal enactments. The Contractor shall, at all times, enforce discipline and good order among their employees, and shall not employ on the Site any unfit person or anyone not skilled in the work assigned to them. Any persons employed on the Site, who become intoxicated, intemperate, disorderly, incompetent or willfully negligent, shall, at the written request of the RDCK Representative, be removed from the Site and shall not be employed again in any portion of the supply of the Services without the approval of the RDCK Representative.

3.19 Right to Audit

Upon reasonable notice the Contractor and/or any Sub-Contractors shall provide the RDCK and its internal auditors, external auditors, its regulators and such other entities/persons as the RDCK may designate, with unrestricted access at reasonable times to the data and records relating to the supply of the Services, including but not limited to the Contractor’s marketing and sale of the recyclable material, the amounts charged to the RDCK by the Contractor, and the amounts of any commodity value rebates that are payable. Such access will be provided in order to verify the accuracy of charges and invoices for the Services supplied.

3.20 Change in the Services

The RDCK, without invalidating the Contract, may make changes by altering, adding to, or deducting from the Services. The Contractor shall proceed with the supply of the Services as changed and the Services shall be supplied under the provisions of the Contract. No changes shall be undertaken by the Contractor, without written order from the RDCK, except in an emergency endangering life or property, and no claims for additional compensation shall be valid unless the change in writing was so ordered.

If such changes affect the requirements of the Contract, they will be so specified at the time of ordering the changes. The value of the addition or deduction from the Contract Price, and the method of determining such value, shall be by unit prices or combinations of unit prices as specified in Schedule 2-Pricing Schedules, or use one of more of the following methods in deciding such value:

(a) by unit prices submitted in the Bid
(b) by unit prices submitted by the Contractor and accepted by the RDCK
(c) by lump sum on the Contractor's estimate and accepted by the RDCK
(d) on a force account basis as specified hereinafter.

3.21 Contract Performance Reviews

From time to time as deemed necessary, the Manager may request that the Contractor participate in a Contract performance review. Documented performance arising from such reviews may be used as basis for alteration of the description of Services or suspension/termination of the Contract.

3.22 Rights of Waiver

A waiver of any breach of or provision of the Contract will not constitute or operate as a waiver or any other breach of any other provision, nor will any failure to enforce any provision herein operate as a waiver of such provisions or of any other provisions.

3.23 Duty of Care

The Contractor acknowledges that the RDCK, in the preparation of the Contract documents, provision of oral or written information to Bidders, review of Bids or the carrying out of the RDCK's responsibilities under the Contract, does not owe a duty of care to the Contractor and the Contractor waives for itself and its successors, and waives the right to sue the RDCK in tort for any loss, including economic loss, damage, cost or expense arising from or connected with any error, omission or misrepresentation occurring in the preparation of the Contract documents, provision of oral or written information to Bidders, review of Bids or the carrying out of the RDCK's responsibilities under the Contract.

3.24 Severability

All sections of the Contract are severable one from the other. Should a court of competent jurisdiction find that any one or more sections herein are void the validity of the remaining paragraphs hereof will not be affected.

3.25 Compliance with Permits, Laws and Regulations

The laws and regulations of the place where the Services are supplied shall govern.

The Contractor shall give all required notices and comply with all laws, ordinances, regulations, codes and orders of all authorities having jurisdiction relating to the supply of the Services, to preservation of public

health, and to construction safety. If the Contractor observes anything in the Contract Documents to be at variance with the foregoing, they shall promptly notify the RDCK, in writing, and await the RDCK instructions. If the Contractor supplies any Services or performs any work, knowing it to be contrary to such laws, ordinances, regulations, codes or orders, and without giving notice requesting instructions from the RDCK, they shall bear all costs arising there from.

The Contractor shall, at their own expense, procure all permits, licenses and certificates required by law for the supply of the Services.

The Contractor will give all notices and obtain all the licenses and permits required to supply the Services. The Contractor will comply with all laws applicable to the supply of the Services and performance of the Contract.

Any Contract resulting from this Invitation for Tenders will be governed by and will be construed and interpreted in accordance with the laws of the Province of British Columbia.

3.26 Security for Supply of Services

Unless otherwise agreed in writing by the RDCK may, in its absolute discretion, the Contractor shall provide to the RDCK security for the performance of its obligations under the Contract in the form of an Irrevocable Commercial Letter of Credit in the amount of 10% of the Contract Price detailed in Schedule 2 of this Invitation for Tenders, which security shall be issued by a financial institution within the RDCK that is acceptable to the RDCK in its absolute discretion and in form and substance approved by the RDCK.

3.27 Force Majeure

In the event that either party is rendered wholly or partly unable to perform its obligations hereunder as a result of an event of Force Majeure, then subject to the RDCK's right of termination under Article 3.12-RDCK's Right to Terminate, the Contract, that party will be excused from whatever performance is affected by the event of Force Majeure, to the extent so affected, provided that:

(a) the non-performing party promptly after the occurrence of the event of Force Majeure gives the other party notice describing the particulars of the occurrence;
(b) the suspension of performance is of no greater scope and of no longer duration than is required by the event of Force Majeure;
(c) the non-performing party uses reasonable commercial efforts to remedy its inability to perform; and
(d) when the non-performing party is able to resume performance of its obligations hereunder, that party will give the other party written notice thereof.

PART 4 – PAYMENT CLAUSES

4 Payment Clauses

This Part shall be read with and shall form part of the Contract.

4.1 Payment for Services

This Part sets out the method of measurement and payment to compensate the Contractor for the supply of the Services.

Payment will be made by the RDCK to the Contractor within thirty (30) days of submission by the Contractor of complete service detail for the Services supplied in the previous month during the term of the Contract.

4.2 Goods and Services Tax

The Contractor shall identify the GST as separate line item on all invoices.

4.3 Payment Withheld or Deducted

The RDCK may withhold payment on any Progress Payment as may be necessary or prudent to protect itself from loss on account of:

a) the Contractor is not making satisfactory progress with the supply of the Services;
b) defective Services which are not remedied;
c) if applicable, there are claims of lien, or liens (or a lien) filed against any premises of which the Services are supplied or being supplied, or reasonable evidence of the probable filing of such claims of lien or of filing or registration of liens (or a lien) as a result of the failure of the Contractor to make payment properly to Sub-Contractors or for materials, labour, or otherwise;
d) damages caused to another party by the Contractor;
e) any other evidence of loss or danger of loss on the part of the RDCK, resulting from of the Contractor's operations.
f) the RDCK has corrected deficiencies under section 3.11-RDCK's Right to obtain Services from other suppliers.

4.4 Monies Due to the RDCK

The Contractor's payment for any commodity value to the RDCK, if any is required by the Contract, will be provided to the RDCK monthly.

All monies payable to the RDCK by the Contractor under any stipulation herein or as provided in section 3.11-RDCK's Right to obtain Services from other suppliers, or section 4.5-Liquidated Damages, may be retained by the RDCK out of any monies due, or which may become due, from the RDCK to the Contractor under this or any other Contract with the RDCK, or the RDCK may demand payment to the RDCK by the Contractor, or the RDCK may deduct monies from the Irrevocable Commercial Letter of Credit. The RDCK shall have full authority to withhold any amount or estimated amount, if circumstances arise which may indicate the advisability of so doing, though the final sum to be retained may be unascertained.

The RDCK may also, at its discretion, calculate into the monies due to the RDCK, the RDCK's staff time plus a 10% overhead in any event where the RDCK has had to correct deficiencies as per section 3.11-RDCK's Right to obtain Services from other suppliers.

4.5 Liquidated Damages

In case the Contractor fails to commence or complete the supply of the Services in accordance with the Contract, and to the satisfaction of the Manager, within the time or times specified, the Contractor shall pay to the RDCK a sum of the annual Contract Price divided by 365 for each and every day that the Services have not been supplied after the times specified; which sum or sums, in view of the difficulty of ascertaining the losses which the RDCK will suffer by reason of delay in the supply of Services, is hereby agreed upon and fixed as a reasonable measure of the RDCK's costs and determined by the parties hereto as the liquidated damages that the RDCK will suffer by reason of said delay and default, and not as a penalty. The RDCK may deduct and retain the amounts of such liquidated damages as per section 4.4-Monies Due to the RDCK.

4.6 Negotiations During Contract Term

If the RDCK requires changes to the supply of the Services, negotiations for payment to the Contractor for Services not specified herein shall be based on a comparison of similar Services that are specified herein, and as specifically measured by the increase or decrease in process time required, manpower, equipment, etc., each of which will be specifically identified, fully itemized, and at the discretion of the Manager, justified. If similar comparison is not practical, then the item will be specifically negotiated, based on time required, manpower, equipment, etc., each of which will be specifically identified and fully itemized.

BID FORM

INVITATION FOR TENDERS

Nelson and District Community Complex Pool Boilers Replacement
CLOSING DATE & TIME: 2:00 PM, 02/08/2023

NAME: Nelson and District Community Complex Pool Boilers Replacement

ADDRESS: _____

ADDRESS: _____

DATED: _____

TO:	**Regional District of Central Kootenay** **Box 590, 202 Lakeside Drive** **Nelson, BC V1L 5R4**

The Bidder has carefully examined the Site where the Services will be supplied or used and the Contract Documents for the Removal and replacement, including supply and installation, of two (2) boilers.

The undersigned Bidder understands the conditions under which the Services are to be supplied and offers to provide all necessary labour, machinery, tools, equipment, apparatus and other means of construction and do all work and furnish all materials called for by the Contract Documents in the manner prescribed herein and in accordance with the Regional District's requirements, for the rates quoted in Schedule 2-Pricing Schedules and in accordance with the other Schedules of this Bid.

The immediately following schedules, entitled Schedules 1 to 6, shall be read with and form part of this Bid as if embodied herein. The Bid includes all addenda numbers _____ to _____ inclusive.

The Bidder understands and agrees that:

(a) the proposed rates specified in Schedule 2-Pricing Schedules include all taxes, duties and all other additional charges on any materials, equipment and labour, except the GST which shall be charged separately;

(b) payment will be made only for the supply of Services specified in the Contract. Payment will be made according to the rates proposed in Schedule 2-Pricing Schedules;

(c) The lowest or any Bid will not necessarily be accepted. The RDCK reserves the right in its absolute discretion to: accept the Bid which it deems most advantageous and favorable in the interests of the RDCK; and waive informalities in, or reject any or all Bids, in each case without giving any notice. In no event will the RDCK be responsible for the costs of preparation or submission of a Bid;

If there is only one compliant Bid received by the Closing Time, the RDCK reserves the right to accept the Bid or cancel the Bid process with no further consideration for the sole Bid. This includes the right to cancel this Invitation for Tenders at any time prior to entering into the Contract with the Contractor. The RDCK reserves the right to cancel at any time before award of the Contract without being obliged to any Bidder – not just where there is only one compliant Bid; and

(d) The RDCK reserves the right, at its sole discretion to waive irregularities and informalities in any Bid and to seek clarification or additional information on any area of any Bid when it is in the best interest of the RDCK to do so. The RDCK, however, may at its sole discretion reject or retain for consideration Bids which are non-conforming because they do not contain the content or form required by these Instructions to Bidders or because they have not complied with the process for submission set out herein.

The Bidder agrees as follows:

(a) If the undersigned is notified in writing of the acceptance of their Bid, it agrees that within fifteen (15) days of the date of the Notice of Award they will enter into an Agreement and execute the Contract for the supply of the Services and guarantees completion of the Contract in accordance with the Contract Documents;

(b) Within fifteen (15) days from the date of the Notice of Award of this Bid, to furnish to the Regional District, the specified insurance and WorkSafe BC clearance letter for the performance of the Contract;

(c) To begin supply of the Services on the date specified in the Notice to Proceed;

(d) Except as expressly and specifically permitted in these Instructions to Bidders, no Bidder shall have any claim for any compensation of any kind whatsoever, as a result of participating in this Invitation for Tenders, and by submitting a Bid each Bidder shall be deemed to have agreed that it has no claim; and

(e) The RDCK reserves the right, at its discretion, to negotiate with any Bidder that the RDCK believes has the most advantageous Bid or with any other Bidder or Bidders concurrently. In no event will the RDCK be required to offer any modified terms to any other Bidder prior to entering into the Contract with the successful Bidder, and the RDCK shall incur no liability to any other Bidder as a result of such negotiations or modifications.

_____

Signature of Bidder

Authorization

I/we hereby certify that the prices and dates and other information contained in this Bid are correct, and that the signatures below are those of duly authorized officers of our company having the power necessary to make such a Bid.

It is hereby agreed that once the Bids for the Contract have been opened, this Bid and the offer constituted thereby shall not be revoked before EITHER acceptance thereof by the Regional District OR the expiration of ninety (90) calendar days after the opening of Bids for the Contract, whichever shall first occur.

SIGNED, SEALED AND DELIVERED by:

_____

Name of Bidder (Company)

		In the presence of:
_____	)	_____
Name (printed)	)	Witness Name (printed)
_____	)	_____
Authorized Signature	)	Witness Signature
_____	)	_____
Address (printed)	)	Address (printed)
_____	)	_____
Address (printed)	)	Address (printed)
_____ _____	)	_____ _____
Telephone Fax	)	Telephone Fax

DATED at _____ this _____ day of _____, 20_____.

SCHEDULES

Schedule 1 - Description of Services
Schedule 2 - Pricing Schedules
Schedule 3 - Equipment List
Schedule 4 - Proposed Sub-Contractors
Schedule 5 - List of Previous Experience (Contracts)
Schedule 6 - Schedule of Addenda
Schedule 7 - Environmental Attributes

SCHEDULE 1 – DESCRIPTION OF SERVICES

To provide all services required to remove two (2) existing boilers and to supply and install two (2) boilers and all associated work after the installation of the two (2) boilers. Refer to the drawings and specifications for further details. Contractor shall minimize downtime of boiler switch over to limit impact on operations. Contractor to coordinate schedule of switchover based on equipment lead time. Provide ample notice to allow for adjustments to facility programming.

This shall generally include work in the following area(s):

I. Regional District of Central Kootenay, Nelson and District Community Complex – two (2) new boilers in Mechanical Room 120A

This includes but is not limited by the generality of the following:

I. Work for Mechanical Trade
II. Testing and Commissioning

SCHEDULE 2 – PRICING SCHEDULES

This section shall be read with and shall form part of the Contract Form. The Bidder hereby proposes the following prices to provide all materials, supervision, labour, equipment and all else necessary for the proper supply of the Services. Costs of a general nature that do not pertain to any one item shall be pro-rated among all items. No claim for extra payment on the grounds that the Services supplied could not be properly charged to items within the Description of Services will be considered.

DESCRIPTION	TOTAL
Two Boilers	$
Boiler Venting	$
Electrical	$
Integration Work to DDC	$
SUBTOTAL	$
GST	$
PST	$
TOTAL	$

Signature of Bidder

SCHEDULE 3 – EQUIPMENT LIST

The Bidder proposes to use the equipment listed below in supplying the Services covered by the Contract (list only the major pieces of equipment to be used):

NUMBER OF UNITS	BRIEF DESCRIPTION OF EQUIPMENT (STATE ITS USE, MAKE, AGE AND GENERAL CONDITION)	CHECK WHETHER	
		OWNED BY BIDDER	RENTED OR LEASED

The Bidder must provide a brief description of the contingency plan in the event of equipment unavailability, failure or breakdown, or in the event that greater than anticipated volumes of material are generated by the RDCK.

Signature of Bidder

SCHEDULE 4 – PROPOSED SUB-CONTRACTORS

The Bidder shall provide the name and address of the Sub-Contractor that the Bidder intends to employ on each item of work specified below.

Any changes or additions to this list must be submitted to the Manager for approval before sub-contracting the supply of the Services.

ITEM OF WORK TO BE SUB-CONTRACTED	NAME, ADDRESS AND TELEPHONE NUMBER OF PROPOSED SUB-CONTRACTOR

(If additional space is required use reverse side of this page.)

Signature of Bidder

SCHEDULE 5 – LIST OF PREVIOUS EXPERIENCE (CONTRACTS)

The Bidder shall fill in details below of the most recent contracts they have undertaken with the supply of Services of a nature similar to this proposed Contract.

It is the intention of Regional District of Central Kootenay to use the information given below to assess the experience of the Bidder in the appropriate supply of Services. The RDCK may contact the references given below before awarding the Contract.

Bidder's Experience on Projects of a Similar Nature

Project: _____ Value: _____

Owner: _____ Phone Number: _____

Description: _____

_____

Project: _____ Value: _____

Owner: _____ Phone Number: _____

Description: _____

_____

Project: _____ Value: _____

Owner: _____ Phone Number: _____

Description: _____

_____

_____

Signature of Bidder

SCHEDULE 6 - ADDENDA

It is herewith acknowledged that the following Addenda have been received and form part of the Bid.

ADDENDUM NO. _____ DATED _____

ADDENDUM NO. _____ DATED _____

ADDENDUM NO. _____ DATED _____

ADDENDUM NO. _____ DATED _____

ADDENDUM NO. _____ DATED _____

_____

Signature of Bidder

SCHEDULE 7 – ENVIRONMENTAL ATTRIBUTES

The Regional District of Central Kootenay has committed to reducing corporate emissions and achieving carbon neutral operations under the provisions of the Provincial Climate Action Charter. Bidders are requested to provide details on what, if any, environmental attributes they will incorporate into the supply of the Services. Consideration of environmental attributes will form part of the overall evaluation of Bids.

Examples of environmental attributes include but are not limited to:

- Bidder's corporate efforts to reduce greenhouse gas emissions;
- Bidder's use of alternative fuels in transportation operations;
- Bidder's use of cleaner burning diesel engines in vehicles; and
- Bidder's effort to limit the carbon footprint.

(If additional space is required use reverse side of this page.)

Signature of Bidder

APPENDIX A – SITE PLAN

APPENDIX B – CONTRACT

Regional District Central Kootenay

NELSON & DISTRICT COMMUNITY COMPLEX
POOL BOILERS UPGRADE

KAMLOOPS OFFICE
202-1339 McGill Road
Kamloops, BC, V2C 6K7

RPE File 23195-T
June 2023

END OF SPECIFICATION TABLE OF CONTENTS

OWNER (FOR TENDER CLOSING)	**REGIONAL DISTRICT OF CENTRAL KOOTENAY** COMMUNITY SERVICES 202 LAKESIDE DRIVE NELSON, BC V1L 6B9 Contact: RYAN RICALTON FACILITY MANAGER e-mail: rricalton@rdck.bc.ca
OWNER (PROJECT MANAGER)	**REGIONAL DISTRICT OF CENTRAL KOOTENAY** COMMUNITY SERVICES 202 LAKESIDE DRIVE NELSON, BC V1L 6B9 Contact: CRAIG STANLEY REGIONAL MANAGER – OPERATIONS AND ASSET MANAGEMENT Telephone: (236)532.2030 e-mail: cstanley@rdck.bc.ca
SITE	**NELSON AND DISTRICT COMMUNITY COMPLEX** 305 HALL ST NELSON, BC V1L 5X4 Contact: Telephone: (604) 584-4754 Fax: (604) 584-3261
PRIME AND MECHANICAL CONSULTANT	**ROCKY POINT ENGINEERING LTD.** 202-1339 MCGILL ROAD KAMLOOPS, BC V2C 6K7 Contact: MATTHEW WALLACE, P.Eng. Telephone: (778)471.6472 e-mail: matthew.wallace@rpeng.ca

END OF PROJECT PARTICIPANTS

THIS PAGE REPRESENTS THE

CANADIAN CONSTRUCTION DOCUMENTS COMMITTEE

STIPULATED PRICE CONTRACT CCDC-2 (2020)

END OF STIPULATED PRICE CONTRACT
SECTION 00700

1 SCOPE OF WORK

.1 Provide new, complete, operational and tested mechanical systems for heating, controls, and plumbing, as described herein, indicated on the drawings and in full conformance with applicable codes, standards and ordinances.

.2 Provide all labour, materials and products as specified, as required to accomplish this work.

.3 The scope of HVAC work for this project generally includes:

.1 Natural gas-fired heating boilers.

.2 Hydronic heating pumps

.3 Heating water piping and pipe insulation

.4 Pre-operational pipe cleaning and Chemical treatment

.5 Direct digital controls

.6 Water systems balancing

.7 Verification of systems operation and controls

.4 Plumbing work will include the following:

.1 Natural gas piping and hook-up of the heating boilers

.5 Demolition and builder’s work will include the following:

.1 Other demolition, painting, remediation, etc, as described in the specifications and on the drawings, to accommodate the Work.

.6 Electrical work will require the following:

.1 Electrical power supply to mechanical equipment

.2 Removal and replacement of miscellaneous electrical devices, including some new equipment

.7 The mechanical contractor shall act as the Prime Contractor for this project, responsible for the coordination of all trades required to carry out the work as described herein.

.8 If existing asbestos is discovered which will be affected by the work of the Contract, immediately notify the Consultant. All work related to existing asbestos shall be handled in accordance with the requirements of WorkSafeBC (Workers' Compensation Board of British Columbia).

2 CASH ALLOWANCES

.1 Cash Allowances are to be INCLUDED in the Base Amount of Tender for the following items.

.1 Cash Allowance No. 1 - For AutoCad drafting of Record Drawings, INCLUDE in the submitted tender a Cash Allowance amount of $2,000.00.
.2 tender a Cash Allowance amount of $20,000.00.

.2 The Cash Allowance amounts stated do NOT include Contractor's overhead and profit. The Cash Allowances pertain strictly to the work provided specific to the Cash Allowance (ie: commissioning, structural work, etc). The Contractor's overhead and profit for work pertaining to the Cash Allowances are to be included in the Contractors base tender.

.3 The Cash Allowance amounts stated do NOT include Value added Taxes (GST).

.4 Refer also to GC 4.1 of the Stipulated Price Construction Contract and Appendix E of the Form of Tender.

END OF SECTION 01050

1 SCHEDULING OF THE WORK

.1 Within seven working days of award of contract provide to the Consultant a detailed schedule describing the sequence and timing of the work.

.2 Boiler switchover to be closely coordinated with the facility programming and fall pool maintenance shutdown.

2 COORDINATION OF THE WORK

.1 Coordinate all mechanical work with the work of other sections to avoid conflict.

.2 Locate distribution systems, equipment and materials to eliminate interference, conserve headroom and leave maximum usable space.

.3 The drawings are approximately to scale. They establish a scope of work only and are not intended as detailed installation instructions. Methods of construction required to attain the scope of work indicated on the drawings, confirmation of site measurements and attaining a level of quality as described in the specification are the responsibility of the Contractor

.4 Route piping and ductwork in an orderly manner. Generally follow routes parallel and perpendicular to building structure.

.5 If interference should occur the Consultant will review relocation of equipment and materials regardless of installation order. No installation shall proceed without complete coordination between all trades.

.6 Make any necessary minor changes or additions to runs of ducts or pipes, etc., to accommodate structural conditions without additional charge or expense to the Owner.

.7 Alter location of ducts or pipes at the direction of the Consultant without charge to the Owner, so long as the change is made before installation and does not necessitate additional materials.

3 CONTRACTOR'S RESPONSIBILITIES

.1 It shall be the General Contractor's responsibility to plan, schedule and perform the work and to coordinate the work of all sub-trades. The General Contractor shall be responsible for any damage caused to the Owner or other Contractors by failure to perform these duties.

.2 Protect work performed and areas of the existing building from damage caused by carrying out of work. Pay particular attention to protection of building vapour barriers, waterproof membranes and existing interior and exterior surfaces. Where necessary to protect building surfaces using tarpaulins, plastic sheet, drop-cloths, etc. Repair any damage caused by the work to the satisfaction of the Owner and the Consultant.

.3 Be responsible for the condition of all materials and equipment supplied to the site.

.4 Obtain copies of the following Owner's policies and procedures, and ensure adherence to the requirements of these by all employees of the Contractor and sub-Contractors working on the site.

.1 Harassment

.2 Smoking

.3 Parking

.4 Security

.5 Safety

.6 Criminal Record

.5 Be responsible for security of the property and equipment within the building, where that property or equipment can be impacted by the contractor's negligence or failure to secure the building.

.6 Coordinate with the Owner any requirement to shut down mechanical systems or utility services to accommodate service connections. Do not shut down any such services without written consent from the Owner.

.7 Any work that will generate excessive noise, odour or dust, or that may set of building fire detection equipment or alarms must also be scheduled with the Regional District Maintenance Department to ensure a minimal impact to all ongoing school activities.

4 SEQUENCING OF THE WORK

.1 The required sequence of changeover from existing to new heating equipment is as follows:

.1 Verify existing boiler flow rate and discharge temperature. Verify supply water temperature after boiler connection at 100% flow condition.

.2 Install all new mechanical equipment, ductwork, piping, etc. During this phase of the work none of the new equipment will be operational.

.2 Contractor to minimize down time of boiler switchover in order to minimize the impact on the facility programming. Contractor to coordinate date of switchover with the facility staff.

.3 Perform system start-up, balancing and commissioning.

.4 Remove all redundant equipment, piping and ductwork.

.5 Where existing materials are required to be removed earlier in the described sequence, to allow installation of new materials and equipment, contact the consultant to discuss a strategy for removal from service of existing equipment.

END OF SECTION 01150

1 CODES, STANDARDS AND PERMITS

.1 Obtain and pay for any permits required for the work to be carried out.

.2 The work shall be in performed in accordance with the regulations of the following authorities:

.1 2018 British Columbia Building Code

.2 Canadian Standards Association

.3 Provincial Electrical Inspector. Electrical work to the requirements of the Canadian Electrical Code and the Provincial Electrical Inspector. Electrical equipment shall bear CSA and ULC labels attesting that equipment meets the testing standards of these agencies.

.4 Provincial Gas Inspector.

.5 Provincial Boiler Inspector.

.6 Natural Gas and/or Propane installations shall conform to the requirements of CAN/CSA-B149.1-15, “Natural Gas and Propane Installation Code. “

.7 Worksafe BC (WCB)

.3 Ventilation systems and equipment shall be installed and conform to the followings standards.

.1 ASHRAE

.2 SMACNA

.3 Equipment manufacturers and suppliers recommendations.

.4 Installation and equipment shall conform to the requirements of the plans and specifications.

2 INSTALLATION REQUIREMENTS

.1 Installation and equipment shall conform to the requirements of the plans and specifications.

.2 Install equipment in locations shown with minimum interference with other services or free space.

.3 All HVAC equipment shall be fully enclosed within Mechanical Service rooms. Remove and replace improperly installed equipment to satisfaction of the consultant at no extra cost.

.4 Piping and ductwork shall be installed in such a way as to conserve head room and interfere as little as possible with the free use of space through which they pass. Service lines shall run parallel or perpendicular to building lines. All duct

and pipes at ceiling level shall be kept as tight as possible to beams or other limiting structural members. All pipes and ducts shall be coordinated in elevation to ensure that they are concealed in the ceiling space.

.5 Provide seismic restraints for all equipment, piping and ductwork when required by code.

.6 The Mechanical Contractor shall coordinate with the General Contractor locations of pipe trenches, roof openings and wall openings to accommodate ducts and pipes, cutting and patching of beams, walls, floor slabs and masonry work necessary for hanger rods, brackets and sleeves.

.7 Relocate improperly located holes and sleeves.

.8 Drill for expansion bolts, hanger rods, brackets, and supports.

.9 Obtain written approval from Consultant before cutting or burning structural members. This work shall be carried out by the specialist trade only.

.10 Provide openings and holes required in precast members for mechanical work. Cast holes larger than 100 mm in diameter tight to columns shall not exceed 200 mm in diameter. Cast or field cut holes smaller than 100 mm.

.11 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.

.12 HVAC and plumbing systems shall be of institutional quality

3 INSPECTIONS OF THE WORK

.1 Do not conceal any installation prior to review by the consultant or the appropriate inspection authority. Ensure 72 hours written notice is provided to each of these parties prior to requirement for an inspection of the work. This includes any pressure tests of piping, ductwork or safety devices.

.2 Provide certificates and inspection reports received from applicable authorities with jurisdiction, verifying that work installed conforms to necessary codes and standards.

4 GUARANTEE-WARRANTY

.1 The Contractor shall furnish a written warranty stating that all work executed will be free from defects of material and workmanship for a period of one year from the date of total performance.

.2 The warranty shall include any part of equipment, units or structures furnished hereunder that show defects in the works under normal operating conditions and/or for the purpose of which they were intended.

.3 The Contractor further agrees that they will, at their own expense, promptly investigate any mechanical or control malfunction, and repair or replace all such

defective work, and all other damages thereby which becomes defective during the time of the guarantee-warranty.

5 TRADE QUALIFICATIONS

.1 Installation must be carried out by skilled tradesman holding a valid TQ license, or apprentices working under the supervision of a licensed tradesman. When apprentices are working, the licensed tradesman for each discipline must be on the site. These requirements apply to the installation of the following components of the project:

.1 Pipefitting for hydronic heating systems

.2 Pipefitting for plumbing systems

.3 Gasfitting

.4 Welding

.5 Electrical

.2 Should the Contractor opt to use apprentices on the project a minimum level of supervision of one Journeyman for each two Apprentices must be maintained.

.3 The Journeyman must be on site at all times. The Apprentices must not work without the direct supervision of a Journeyman.

.4 The Contractor shall submit names and qualifications of all personal (including sub-trades) intended for this project within twenty one (21) days of contract award. The Owner reserves the right to accept or reject any individual proposed for the project, on the basis of qualifications.

.5 All welding carried out at the project must be done by welders whose certificates are current. Welding certificates must be submitted within 21 days of contract award indicating the following minimum qualifications.

.1 Piping ASME Certification - MCABC 1A.

.2 Welding Code B52.1.

.3 All field welding to be in accordance with CSA B31.1.

.6 Contractor to submit gas installation qualifications. The minimum requirement is for a Type 'A' licence.

.7 A quality assurance programme shall be submitted by the Contractor within 21 days of contract award. The programme shall be reviewed by the Consultant. Upon acceptance the programme shall be implemented for the duration of the contract.

END OF SECTION 01200

1 SHOP DRAWINGS

.1 Provide PDF copies of shop drawings for the equipment listed below, in accordance with MCA-BC standards.

.2 Shop drawings shall indicate all aspects of the construction and operating performance of the product proposed.

.3 Identify materials and equipment by manufacturer trade name and model number. Include copies of applicable brochure or catalog material.

.4 Clearly mark submittal material using arrows, underlining or circling to show specific model numbers if equipment sheets are generic, differences from specified products, ratings, capabilities and options being proposed. Cross out non-applicable materials.

.5 Specifically note on the submittal specified features such as special tank linings, pumps, seals, material, or painting.

.6 Include dimensional and technical data sufficient to check if equipment meets requirements. Include wiring, piping, and service connection data and motor sizes.

.7 Shop drawings shall be endorsed by the General Contractor and Mechanical Sub-contractor indicating that the shop drawings have been reviewed and submitted without qualifications.

.8 Provide for:

.1 Boilers

.2 Water systems chemical treatment

.3 Controls

.4 Firestopping

2 OPERATING AND MAINTENANCE MANUALS

.1 The Operating and Maintenance manuals are to be submitted in hard cover three ring binders. The front cover and spine of the binders are to bear the text

“MECHANICAL SYSTEMS OPERATING AND MAINTENANCE MANUAL – NELSON & DISTRICT COMMUNITY COMPLEX”

.2 The TAB Agency is to provide two hard copies and a digital copy in PDF format of an Operating and Maintenance Manual for the completed installation. Manuals will be indexed as follows:

Part 1 – Description of Systems:

.1 Title page indicating project title and the names, addresses, telephone and fax numbers of the Owner, Mechanical Engineer, General Contractor,

Mechanical Contractor and the agency preparing the manuals.

.2 Description of systems, including description of system operation and components comprising the system. Describe systems operation and sequence of control operation, including start-up, shutdown and intended response of system components to controlling devices.

Part 2 – Maintenance and Test Information

.3 Maintenance procedures and lubrication requirements, including preventative maintenance procedures, lubrication schedules and a belt schedule.

.4 List of equipment manufacturers and suppliers and sub-contractors used on the project.

.5 Copies of hydrostatic tests performed on

.1 Natural gas piping
.2 Heating piping

.6 Copies of Inspection Certificates for

.1 Natural gas piping

.7 Balancing reports for air and water systems provided by TAB Contractor

.8 Equipment verification checklists provided by TAB Contractor. Checklists are to be provided for:

.1 Boilers
.2 Pumps
.3 Controls

.9 Controls end-to-end check verification lists provided by Controls Contractor

.10 Equipment start-up reports.

.11 Certificate of Guarantee

Part 3 - Shop Drawings

.12 Include a copy of all Shop Drawings. Version included is to be the version given “Reviewed” status by the Consultant.

.13 Control shop drawings to be “As-Built” version, and include all system schematics, points lists and sequence of operations

3 RECORD DRAWINGS

.1 Maintain a set of record drawings at the site. Record drawings shall be neatly maintained on a set of prints plotted by the Contractor. The Mechanical Consultant will provide a PDF copy of all plans.

.2 Drawings are to be maintained in an up to date condition at all times, recording all changes and deviations to the installation from those indicated on the construction issue drawings. 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

.2 Include all revision drawings, supplementary drawings, change orders, addenda and site revisions, etc. on the as-built drawings.

.3 The Contractor is to include in the submitted bid price a Cash Allowance of $2,000.00 to cover the cost of retaining a drafting agency to transfer the changes from the site record drawings to electronic drawing files. Refer also to the Clause CASH ALLOWANCES in Section 01050.

.4 When the electronic drawing files are revised with the changes previously recorded on site by the Contractor, the Contractor will have a set of hard copy prints of the electronic drawings plotted, add the notation “Certified Record Drawings”, and date and sign the drawings. Both hard copy and electronic drawing files are to be submitted for the Consultants review prior to turning over to the Owner.

END OF SECTION 01250

1 EQUIPMENT STORAGE AND PROTECTION

.1 The Owner will designate storage areas for tools and equipment. The Contractor shall assign and coordinate storage facilities for sub-Contractors within these designated areas.

.2 Prevent damage of material and equipment during delivery, handling, storage 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.

.3 All mechanical materials and equipment stored on site shall be kept in a dry storage area and stored in accordance with supplier's instructions.

.4 Operate, drain and flush out bearings and refill with new change of oil, before final acceptance.

.5 Thoroughly clean piping, ducts and equipment of dirt, cuttings, and other foreign material.

.6 Protect bearings and shafts during installation. Grease shafts and sheaves to prevent corrosion. Supply and install necessary extended nipples for lubrication purposes.

.7 Provide temporary filters on all return air grilles and in all ventilation systems if the units must be run before the building is in a clean, operating condition.

.8 Touch-up damaged factory finished surfaces using primer or enamel to match original. Do not paint over nameplates under any circumstances.

2 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including other than that caused by Owner of other Contractors.

.2 Remove waste materials from site at daily regularly scheduled times dispose of as directed by Regional District. Do not burn waste materials on site.

.3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.4 Provide on-site containers for collection of waste materials and debris.

.5 Provide and use marked separate bins for recycling.

.6 Dispose of waste materials and debris off site.

.7 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.

.8 Store volatile waste in covered metal containers and remove from premises at end of each working day.

.9 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

.10 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.11 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surface nor contaminate building systems.

.12 If in the opinion of the Owner or the Consultant adequate cleanup is not maintained, cleaning will be performed by Owner's forces and the Contractor will be back charged at a rate of $50.00 per hour plus supplies and equipment for all such cleaning required.

3 FINAL CLEANING

.1 The Regional District will inspect all areas prior to handover to ensure suitable for occupancy. The Contractor is to clean again at own expense if the Regional District is not satisfied that the area is suitable for occupancy. This applies to both interim and final completion dates.

.2 When work is substantially performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining work.

.3 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

.4 Prior to final review remove surplus products, tools, construction machinery and equipment.

.5 Remove waste products and debris other than that caused by owner or other contractors.

.6 Remove waste materials from site at regularly scheduled times, do not burn waste materials on site.

.7 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

4 SITE SAFETY

.1 All work shall be carried out in a safe and orderly manner, consistent with applicable Worksafe BC (WCB) safety regulations.

.2 Provide any required scaffolds, hoists and ladders require to safely carry out the work.

.3 The Contractor shall provide and keep up to date a Fire Safety Plan in accordance with Part 8 of BCBC and to satisfy the requirements of the local Authorities.

5 REDUNDANT EQUIPMENT

.1 The Owner does not wish to retain any of the existing mechanical equipment, ductwork or piping removed from the building during the demolition work.

.2 Remove these materials from the site and dispose of in a manner conforming to Worksafe BC and environmental codes and standards

END OF SECTION 01300

1 CONTRACTOR'S ACCESS TO BUILDINGS

.1 Access to the building shall be co-ordinated through the Regional District Facilities and Maintenance Department. Telephone (236) 532-2030.

.2 Keys are available to be signed out for inside and outside access. Keys will be registered to the Contractor and must be returned at completion of the project. Lost keys will require the Regional be re-keyed at the Contractors expense.

.3 Except during weekends and scheduled holidays all work described in contact documents must be performed outside of regular working hours to allow the building to function without interruption.

.4 Contractor to confirm with the Owner that work will only commence each day at 7:00 AM and will end by 7:00 PM and that any areas worked in during a particular shift must be cleaned to the satisfaction of the Owner and made ready for the next day's operation by 10:00 PM.

.5 All Contractors are required to wear photo ID, bearing the logo of the employer and the employees name and photograph, at all times when working while the school is occupied.

2 CONTRACTOR'S USE OF THE BUILDING

.1 Sanitary Facilities: The washrooms within the buildings may be used by the Contractor, but must be maintained in a clean and orderly manner. If the Owner deems that maintenance of the washrooms is unacceptable, the Contractor will be required to provide temporary washroom facilities for the duration of the project. Be responsible for all damages thereto.

.2 Water Supply: The water supply may be used by the Contractor provided damage to piping or valves does not occur. Be responsible for all damages thereto.

.3 Temporary Power and Light: The permanent power and lighting system of the building or portions thereof may be used subject to approval of the Owner and the Consultant. Be responsible for all damages thereto.

.4 Telephone and Internet: The Contractor shall make provision for his own hook-ups for any required telephone or internet service required for the duration of the contract. Permanent telephone and internet equipment in the building are for occupant use only.

.5 Noise Control

.1 Conform to Municipal Noise Control Bylaws including hours of work.

.2 Workers shall refrain from use of loud and vulgar language. Non-compliance to this policy will result in the specific worker(s) involved being required to immediately leave the site and to be permanently removed from any subsequent involvement on this project by the Contractor.

.3 Use of loud radios shall be prohibited.

.6 Smoking Policy

.1 The Owner has a no-smoking policy anywhere on the property, including in service and mechanical rooms, attics, crawlspaces, basements and the school fields.

.2 All construction personnel will be required to conform to this policy.

.3 The Contractor shall be responsible for enforcement of this requirement.

3 EXTERIOR ROADWAYS

.1 Provide access to work areas and maintain until the work is completed. Restore all areas at completion of work to original or specified conditions. Discuss and agree on access routes with the Maintenance Staff and Relevant Authorities before starting work. Obtain necessary Permits.

END OF SECTION 01400

1 SUBMITTALS

.1 Operation and Maintenance Manuals

.1 Provide preliminary copies of Operation and Maintenance Manuals for the Consultant's review at the time Substantial Completion is requested. Manuals to conform to the requirements described in Section 01250. Air and Water Balance reports must be included in this submission of the manuals. Substantial Completion will not be granted without this requirement being met.

.2 Final O+M manuals, including final commissioning reports, letters of warranty and all required inspection certificates are to be submitted at or before the time of Total Completion. Total Completion will not be granted without this requirement being met.

.2 Record Drawings

.1 Provide marked-up copies of record drawings for the Consultant's review at the time Substantial Completion is requested. Substantial Completion will not be granted without this requirement being met.

.2 Provide digital copies of record drawings and a hardcopy set authorized by the Contractor as "As-Built" at the time Total Completion is requested. Total Completion will not be granted without this requirement being met.

2 SUBSTANTIAL PERFORMANCE INSPECTION

.1 Prior to requesting an inspection for Substantial Performance, the Contractor shall verify in writing that all the following items have been provided and that beneficial use of the building is available to the Owner.

.1 All systems shall be certified in writing as complete and fully operational.

.2 A complete list of items that are 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 inspection will not be performed.

.3 The Contractor shall be fully responsible to accumulate all necessary data from this Sub-trades and suppliers and present it in the specified format for the approval by the Consultant.

.2 If the Contractor requests an inspection for Substantial Completion and it is deemed by the Owner and/or Consultant that items not identified on the Contractor supplied list are not complete, the Contractor shall bear the Consultant's cost for subsequent site inspections.

3 PERFORMANCE VERIFICATION OF INSTALLED EQUIPMENT

.1 Installed mechanical equipment whose performance is questioned by the Consultant, may be subject to performance verification as specified herein.

.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.

.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.

.7 Should test results reveal that equipment does not meet specified performance requirements, 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 requirements.

.2 Replacement equipment will be subject to performance verification as well, using same testing procedures on originally installed equipment.

.3 Contractor shall pay all costs resulting from performance verification procedure.

4 INSTRUCTION OF OPERATING STAFF

.1 The commissioning agent will coordinate and run a training and instruction session for facility operating and maintenance personnel. Training time to be a minimum of fours hours and include instruction on complete start-up sequence of all systems and equipment and review of all modes of operation, as indicated in the control sequence of operations.

.2 Instruction to be during regular work hours.

.3 The following sub-Contractors are required to participate and assist with the demonstration and training session

.1 Controls
.2 Balancing

.4 The Contractor shall submit to the Consultant a document signed by Owner or his representative, stating:

.1 The Owner has received satisfactory instruction in operation and maintenance of all equipment and systems.

.2 Operation and maintenance manuals have been reviewed with Owner.

.3 Specified spare parts of components, keys, removable handles and the like, have been turned over to the Owner.

5 TURNOVER OF EQUIPMENT

.1 The Owner does not wish to retain any of the existing mechanical equipment, ductwork or piping removed from the building during the demolition work.

.2 Remove these materials from the site and dispose of in a manner conforming to Worksafe BC and environmental codes and standards

6 KEYS AND SECURITY ITEMS

.1 Return all keys to the Owner

END OF SECTION 01450

1 QUALITY ASSURANCE

.1 The general trades work described below is to be performed by skilled tradesmen holding valid TQ licenses, or apprentices working under the supervision of a licensed tradesman.

.2 When apprentices are working, the licensed tradesman for each discipline must be on the site.

2 PAINTING

.1 All painting work shall conform to the standards of the Master Painters and Decorators Association. (MPDA).

.2 Solvents to be odour free.

.3 Paint materials shall meet the flame spread and smoke developed ratings indicated in Part 3 of the British Columbia Building Code, latest edition.

.4 Paint products shall comply with CGSB standards.

.5 Touch-up damaged finished equipment surfaces.

.6 Surfaces shall be prepared as recommended in Chapter 2 and Chapter 3 of the Architectural Standards Manual of the MPDA.

.7 Natural gas piping shall be painted where exposed with solvent based primer and finish coat.

.1 Colour to be yellow, to CGSB 505-101

3 ROOFING

.1 Installation of new boiler venting is required by this project. The roofs are not under warranty. A roofing contractor who is a member of the Roofing Contractor's Association of British Columbia must be retained to perform roofing work related to the installation of these mechanical units.

.2 Smoking shall be prohibited on the roof and in the immediate vicinity of propane tanks, glues and solvents.

.3 The Contractor must have adequate fire extinguishing equipment on hand. A minimum of five 20 lb. multipurpose dry chemical extinguishers is required. There must be at least one fire extinguisher within 20 ft. horizontal travel distance of any torch applied roofing equipment. For larger roof areas, additional protections such as charged hose lines or additional extinguisher(s) may be required. The Contractor should be made aware of the location of fire hoses if they are available as well as the location of outside faucets from domestic water supply.

.4 The Contractor or any supervisor on the job site must carry a phone and be aware of the location of the nearest accessible phone.

.5 Any fires, even if extinguished, must be reported to both Facilities Services and

the local Fire Department.

.6 A minimum one-hour fire watch must be provided after completion of all hot work. All roof areas shall be checked for hot spots and signs of smoldering. The inside of the building immediately adjacent to the work shall also be checked for signs of fire or smoke.

.7 Caution will be exercised when working around openings, penetrations or flashings. Extreme caution shall be exercised when working around exhaust vents, which may have grease or lint accumulations. Such accumulations shall be cleaned before roofing work is started.

.8 Torches shall be used according to manufacturer's instructions. Torch stands should be used to direct flame upward when momentarily not in use. Torches should not be used where flame impingement cannot be fully viewed. Open flames should not be left unattended. Torches should not be used near gas lines, electrical wires or flammable liquids. All equipment should be inspected regularly and kept in good working order

.9 Where practical, tar kettles and other heating appliances should be operated on grade rather than on the roof.

.10 Unfinished work shall be fully covered by tarpaulins or plastic sheeting which is properly secured.

.11 Roofing materials shall not be left unsecured at the job site where they may be dislodged by wind.

.12 Drainage systems shall be cleared of construction debris or excess tar when work is complete.

4 FIRESTOPPING

.1 Refer to Section 15340

END OF SECTION 01500

1 SCOPE OF WORK

.1 Provide new, complete, operational and tested mechanical systems for heating, controls, and plumbing, as described herein, indicated on the drawings and in full conformance with applicable codes, standards and ordinances.

.2 Provide all labour, materials and products as specified and as required to accomplish this work.

.3 The following general Divisions of the specification comprise the mechanical work of this project. The mechanical systems shall meet the performance guidelines of the following specifications.

.1	15000	Mechanical General Requirements
.2	15100	Testing, Adjusting and Balancing
.3	15200	Noise, Vibration and Seismic Control
.4	15300	Insulation
.5	15400	Plumbing Systems and Equipment
.6	15600	Heating Systems and Equipment
.7	15900	Controls

.4 Refer to the Table of Contents, Section 00001, for reference to specific specification sections included under each of the general Divisions noted above.

2 SUBMITTAL REQUIREMENTS

Shop Drawings

.1 Provide PDF copies of shop drawings for the equipment listed below, in accordance with MCA-BC standards.

.2 Shop drawings shall indicate all aspects of the construction and operating performance of the product proposed.

.3 Identify materials and equipment by manufacturer trade name and model number. Include copies of applicable brochure or catalog material.

.4 Clearly mark submittal material using arrows, underlining or circling to show specific model numbers if equipment sheets are generic, differences from specified products, ratings or capabilities, and options being proposed. Cross out non-applicable materials.

.5 Specifically note on the submittal specified features such as special tank linings, pumps, seals, materials or painting.

.6 Include dimensional and technical data sufficient to check if equipment meets specified requirements. Include wiring, piping, service connection data and motor

sizes.

.7 Shop drawings shall be endorsed by the General Contractor and Mechanical Sub-contractor indicating that the shop drawings have been reviewed and submitted without qualifications.

.8 Submit shop drawings for the following equipment:

.1 Boilers

.2 Water systems chemical treatment

.3 Controls

.4 Firestopping

Operating and Maintenance Manuals

.1 Refer to Division 01 for requirements of Operation and Maintenance manuals.

Record Drawings

.1 Maintain a set of record drawings at the site. Record drawings shall be neatly maintained on a set of prints plotted by the Contractor. The Mechanical Consultant will provide a PDF copy of all plans.

.2 Drawings are to be maintained in an up to date condition at all times, recording all changes and deviations to the installation from those indicated on the construction issue drawings. 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.

.2 Include all revision drawings, supplementary drawings, change orders, addenda and site revisions, etc. on the as-built drawings.

.3 The Contractor is to include in the submitted bid price a Cash Allowance of $2,000.00 to cover the cost of retaining a drafting agency to transfer the changes from the site record drawings to electronic drawing files. Refer also to the Clause CASH ALLOWANCES in Section 01050.

.4 When the electronic drawing files are revised with the changes previously recorded on site by the Contractor, the Contractor will have a set of vellum prints of the electronic drawings plotted, add the notation “Certified Record Drawings”, and date and sign the drawings. Both vellum and electronic drawing files are to be submitted for the Consultants review prior to turning over to the Owner.

3 ALTERATION WORKS

.1 Where utilities are removed, relocated, or abandoned, cap, valve, plug or by-pass to make complete and working installation.

.2 "Making good" is defined as providing new surfaces identical to the ones removed or disturbed and matching adjacent surfaces with no visible difference

between new and existing. Where re-painting of a surface is required, paint to the entire surface between the nearest adjacent corners, ie: the entire plane of the surface containing the disturbed area.

.3 Where concealed conditions differ from those indicated on the drawings the Contractor shall immediately inform the Consultant.

4 INSTRUCTION OF OWNER'S OPERATING STAFF

1 Provide training and instruction to facility operating and maintenance personnel. Training time to be a minimum of fours hours and include instruction on complete start-up sequence of all systems and equipment and review of all modes of operation, as indicated in the control sequence of operations.

2 Instruction to be during regular work hours.

3 The following sub-Contractors are required to participate and assist with the demonstration and training session

.1 Controls

.2 Balancing

4 The Contractor shall submit to the Consultant a document signed by Owner or his representative, stating:

.1 The Owner has received satisfactory instruction in operation and maintenance of all equipment and systems.

.2 Operation and maintenance manuals have been reviewed with Owner.

.3 Specified spare parts of components, keys, removable handles and the like, have been turned over to the Owner.

5 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.

.2 Furnish any certificates necessary as evidence that the work installed conforms with the law and regulations of all authorities having jurisdiction.

6 ASBESTOS

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

.2 If existing asbestos is discovered which will be affected by the work of the Contract, immediately notify the Consultant. All work related to existing asbestos shall be handles in accordance with the requirements of WorkSafeBC (Workers' Compensation Board of British Columbia)

END OF SECTION 15010

1 PRODUCTS – CONDITIONS FOR ACCEPTANCE

.1 Base Bid means an item is specified by manufacturer and model number meets the specifications in all respects regarding performance, quality of material and workmanship and is acceptable to the Consultant without qualification. Base Bid equipment is as listed in the Specification and Mechanical Equipment Schedules and on the Drawings.

.2 Approved Equal means the Consultant has deemed the manufacturer capable of producing material, fixture or equipment of comparable quality. Products supplied by an approved equal must match the specified product in performance, approximate dimensions, quality of material and quality of workmanship. If in the opinion of the Consultant material submitted for review does not meet these criteria, satisfactory material from the equal manufacturer shall be provided, or the Contractor will revert to the Base Bid product.

.3 Alternate means the Consultant may deem a manufacturer capable of producing substitute material, fixture, or equipment which will fulfill project requirements but may differ in material, quality, performance, characteristics, methods of construction or mode of operation. Alternate equipment suggested by bidders will be indicated as a separate item, with applicable cost differences from the specified product(s). The bidders tender will include a product supplied by a manufacturer indicated in the approved equals list as a part of the bidders base tender price.

.4 The use of an equal or alternate products shall in no way relieve Division 15 from the responsibility of furnishing all work that may be required by reason of different space, weight or electrical requirements from that of the specified manufacturer. If, in the opinion of the Consultant, such work is necessary and is not carried out in a manner, which will ensure satisfactory operation and performance of the equipment, then the specified manufacturer shall be used.

.5 Request for review from manufacturers of materials, fixtures and equipment who are not listed as equal and wish to be accorded "equal" status, shall be made at least seven (7) days prior to close of tender. Such material, fixtures, and equipment shall meet the requirements for an equal as described in the Standard of Acceptance. All information required by the Consultant to evaluate proposed manufacturer shall furnish the proposal at the time of the request.

.6 Mechanical systems have been designed based on equipment from the Base Bid manufacturer. The onus shall be on the Mechanical Contractor in conjunction with the equal or alternate supplier(s) to ensure that their equipment will meet the required performance characteristics, electrical characteristics, as well as fit properly into allotted space including allowing for the required access and service spaces. Any additional costs incurred as a result of modifications to the system or room layout, or modifications required by other trades shall be borne by the Mechanical Contractor.

.7 Provide within 24 hours a list of equipment and manufacturers to be used on this project. This list shall not be deviated from unless delivery, performance, or dimension issues require a change to be reviewed by the Consultant.

.8 If shop drawings of any product submitted are rejected on technical reasons after

three submissions, the Contractor at no additional expense to the Owner shall revert the specified product and manufacturer for this project.

2 PRODUCTS – BASE BID AND APPROVED EQUAL MANUFACTURERS

Automatic Air Vent	Hoffman, Braukman, Sarco, Armstrong, Maid-O-Mist
Boilers	Viessmann, AERCO, Cleaver Broooks
Chemical Water Treatment	Chem-Aqua, Pace, IPAC, Enercon, Calgon, Betz-Dearborne
Chimneys (Boilers)	Selkirk-Metalbestos, Van Packer, Ecco, HeatFab, ICC, ProTech,
Control Dampers - Low Leakage	American Warming, Tamco, Ruskin
Controls - DDC	Delta
Ductwork – Round and Oval Spiral	Spiro-Lock, Ecco
Filters	Farr, Continental, Cambridge, AAF
Firestopping and Smoke Seals	3M, Tremco, Hilti
Flow and Pressure Switches	Potter, System Sensor
Identification – Pipe and Duct	3M, SMS, Duramark, Bradley
Insulation – Piping and Duct	3M, Dow, Fibrex, Knauf, Johns-Manville, Owens Corning, Pittsburgh Corning, Manson, Roxul, Fibreglass Canada, Certainteed
Insulation Jacketing	Childers, Fiberglas, Johns-Manville
Low Water Cutoffs	McDonnell Miller (Float type with manual reset)
Pipe Couplings - Grooved	Victaulic, Grinnell, Shur Joint, Gruvlok
Pipe Fittings and Flanges	Crane, Grinnell, Jenkins
Pipe Supports and Hangers	Crane, Unistrut, Myatt, Grinnell, Sarco, Hunt, Taylor
Pressure Gauges	Weiss, Ashcroft, Trerice, Marsh, Winter, Miljoco
Pressure Reducing Valves	Watts, Singer

Pressure Relief Valves	Watts, Singer, Braukmann, Conbraco, Sarco
Slack Cable Restraints	Square M, Vibra Sonic, VMC-Korfund
Strainers	Red & White, Sarco, Armstrong, Mueller, Watts, Conbraco
Testing, Adjusting and Balancing Agencies	Inland Technical Services Ltd.
Thermometers	Weiss, Ashcroft, Trerice, Marsh, Winter, Miljoco
Valves (Ball, Gate, Globe, Check)	Red & White/Toyo, Grinnell, Watts, Kitz, Crane, Milwaukee, Conbraco
Valves (Butterfly)	Red & White/Toyo, Grinnell, Kitz, Crane, Milwaukee, Keystone, DeZurik, Lukenheimer
Valves (Balancing)	Armstrong, DeZurik, Grinnell
Valves (Circuit Balancing)	Tour & Anderson, Bell & Gossett, Armstrong, Griswald, Hattersley
Vibration Isolation	Mason, Vibron, VMC-Korfund, Mason, LoRez

3 TEMPORARY USE OF EQUIPMENT

.1 Permanent systems and equipment are not to be used during construction period without prior written consent from the Owner.

.2 Heating systems may be used for temporary heating within the limitations specified below.

.3 Equipment used during the construction period is to be thoroughly cleaned and overhauled. Replace worn or damaged parts so equipment is in perfect condition, to the satisfaction of the Owner and the Consultant.

.4 Provide proper care, attention and maintenance for equipment while in temporary operation. If in the opinion of the Consultant sufficient care and maintenance is not being given to equipment and systems, the Consultant reserves right to forbid further use.

.5 Temporary use of systems and equipment shall in no way affect the guarantee-warranty period on all mechanical systems installed, which comes into effect from the date of Substantial Performance.

.6 Replace all filters in air systems and seals in pumps used during temporary operation just prior to turnover to the Owner.

4 ELECTRIC WIRING AND MOTORS

.1 All electrical equipment supplied by the Mechanical contractor shall bear CSA label. Obtain special inspection labels required by Provincial Authority having jurisdiction for equipment that does not have a CSA label and/or a ULC label.

.2 All electrical equipment and wiring shall conform to requirements of Canadian Electrical Code, the Provincial Electrical Inspector and specified standards.

.3 All electrical motors shall conform to CEMA and CSA standards for hard, continuous service, designed to limit temperature rise to 40 deg C for open housing and 50 deg C for drip proof housing, and operate 1200 or 1800 RPM unless otherwise specified. Do not use air over ratings.

.4 Motors shall have ball or roller type bearings with grease lubrication fittings.

.5 All belt-driven motors shall be mounted on adjustable bases with adjusting screws so that proper belt tension can be obtained.

.6 Motor noise criteria shall not exceed NC-60.

.7 Motors shall meet or exceed BC Hydro Power Smart High Efficiency standards.

.8 All motors shall meet or exceed requirement necessary for variable frequency drive applications when this technology is used.

.9 It shall be the responsibility of Division 15 to supply high efficiency motors with proper voltage characteristics to suit electrical distribution systems and suitable construction such as explosion-proof, dust-proof, part wind starting, etc., as required to suit operating conditions. Division 15 is responsible of complete working installation and must coordinate all electrical and control work.

.10 Division 16 will provide and install all power wiring and connection of such to motor driven mechanical equipment.

.11 Division 16 will provide and install motor starters for electric motors except where equipment is furnished with integral starters.

.12 Division 15 shall provide and install all control wiring required to operate the mechanical systems, whether line or low voltage.

5 IDENTIFICATION

.1 Piping

.1 Identify fluids in piping with markers showing name, pipe size and service, including temperature and pressure where relevant, and with arrows to indicate flow direction.

.2 Use CGSB 23-GP-3a and CSA B53 color codlings and identification systems, using CGSB 1-GP-12c Color Coding System Schedule.

.3 Standard of Acceptance: WH Brady identification tapes, bands, and markers.

.4 For retrofit projects match existing identification system present in building.

.2 Valves and Controllers

.1 Provide aluminum or lamacoid tags with stamped code lettering and numbers filled with black paint and secured to items.

.2 Provide for all operable valves on all piping systems.

.3 Provide a valve list showing the tag number, the location of the valve and its use, for inclusion in the Operation and Maintenance Manuals.

.3 Equipment

.1 Provide factory supplied and installed nameplate on each piece of equipment.

.2 Provide registration/approval nameplates (ie. CSA, ULC, ASME) in accordance with the requirements of authorities having jurisdiction.

6 START UP OF MECHANICAL SYSTEMS AND EQUIPMENT

.1 Give the Consultant 72 hours written notice of date of start-up or commissioning of equipment or systems.

.2 From the time of equipment or systems commissioning there shall be a three week stabilization period during which the Contractor shall ensure that all systems are functioning as intended. After the three week stabilization period, provide written confirmation that systems are fully compliant with requirements of the contract documents. This will be a requirement of Substantial Performance of the work.

7 REDUNDANT EQUIPMENT

.1 The Owner does not wish to retain any of the existing mechanical equipment, ductwork or piping removed from these buildings during the demolition work.

.2 Remove these materials from the site and dispose of in a manner conforming to Worksafe BC (WCB) and environmental codes and standards

END OF SECTION 15020

1 CODES, STANDARDS AND PERMITS

.1 Obtain and pay for any permits required for the work to be carried out.

.2 The work shall be in performed in accordance with the regulations of the following authorities:

.1 2018 British Columbia Building Code

.2 Canadian Standards Association

.3 British Columbia Safety Authority

.1 Gas Inspection Branch

.2 Boiler Inspection Branch

.3 Electrical Inspection Branch

.4 Worksafe BC (WCB)

.5 Municipal Building Inspector and Fire Marshall

.6 Natural Gas and/or Propane installations shall conform to the requirements of CAN/CSA-B149.1-15, “Natural Gas and Propane Installation Code“

.3 Ventilation systems and equipment shall be installed and conform to the followings standards.

.1 ASHRAE

.2 SMACNA

.3 Equipment manufacturers and suppliers recommendations.

2 INSTALLATION REQUIREMENTS

.1 Installation and equipment shall conform to the requirements of the plans and specifications.

.2 Install equipment in locations shown with minimum interference with other services or free space.

.3 All HVAC equipment except shall be fully enclosed within Mechanical Service rooms. Remove and replace improperly installed equipment to satisfaction of the consultant at no extra cost.

.4 Piping and ductwork shall be installed in such a way as to conserve head room and interfere as little as possible with the free use of space through which they pass. Service lines shall run parallel or perpendicular to building lines. All duct and pipes at ceiling level shall be kept as tight as possible to beams or other limiting structural members. All pipes and ducts shall be coordinated in elevation to ensure that they are concealed in the ceiling space.

.5 Provide seismic restraints for all equipment, piping and ductwork when required by code.

.6 The Mechanical Contractor shall coordinate with the General Contractor locations of pipe trenches, roof openings and wall openings to accommodate ducts and pipes, cutting and patching of beams, walls, floor slabs and masonry work necessary for hanger rods, brackets and sleeves.

.7 Relocate improperly located holes and sleeves.

.8 Drill for expansion bolts, hanger rods, brackets, and supports.

.9 Obtain written approval from Consultant before cutting or burning structural members. This work shall be carried out by the specialist trade only.

.10 Provide openings and holes required in precast members for mechanical work. Cast holes larger than 100-mm in diameter tight to columns shall not exceed 200-mm in diameter. Cast or field cut holes smaller than 100-mm.

.11 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.

.12 HVAC and plumbing systems shall be of institutional quality.

3 INSPECTIONS OF THE WORK

.1 Do not conceal any installation prior to review by the consultant or the appropriate inspection authority. Ensure 72 hours written notice is provided to each of these parties prior to requirement for an inspection of the work. This includes any pressure tests of piping, ductwork or safety devices.

.2 Provide certificates and inspection reports received from applicable authorities with jurisdiction, verifying that work installed conforms to necessary codes and standards.

4 GUARANTEE-WARRANTY

.1 The Contractor shall furnish a written warranty stating that all work executed will be free from defects of material and workmanship for a period of one year from the date of total performance. Warranty shall include any part of equipment, units or structures furnished hereunder that show defects in the works under normal operating conditions and/or for the purpose of which they were intended.

.2 The Contractor further agrees that they will, at their own expense, promptly investigate any mechanical or control malfunction, and repair or replace all such defective work, and all other damages thereby which becomes defective during the time of the guarantee-warranty.

5 TRADE QUALIFICATIONS

.1 Installation must be carried out by skilled tradesman holding a valid TQ license,

or apprentices working under the supervision of a licensed tradesman. When apprentices are working, the licensed tradesman for each discipline must be on the site. These requirements apply to the installation of the following components of the project:

.1 Pipefitting for hydronic heating and cooling systems

.2 Pipefitting for plumbing systems

.3 Gasfitting

.4 Welding

.2 Should the Contractor opt to use apprentices on the project a minimum level of supervision of one Journeyman for each two Apprentices must be maintained.

.3 The Journeyman must be on site at all times. The Apprentices must not work without the direct supervision of a Journeyman.

.4 The Contractor shall submit names and qualifications of all personal (including sub-trades) intended for this project within twenty one (21) days of contract award. The Owner reserves the right to accept or reject any individual proposed for the project, on the basis of qualifications.

.5 All welding carried out at the project must be done by welders whose certificates are current. Welding certificates must be submitted within 21 days of contract award indicating the following minimum qualifications.

.1 Piping ASME Certification - MCABC 1A.

.2 Welding Code B52.1.

.3 All field welding to be in accordance with CSA B31.1.

.6 Contractor to submit gas installation qualifications. The minimum requirement is for a Type 'A' licence.

.7 A quality assurance programme shall be submitted by the Contractor within 21 days of contract award. The programme shall be reviewed by the Consultant. Upon acceptance the programme shall be implemented for the duration of the contract.

END OF SECTION 15030

1 CONTRACTUAL RELATIONSHIP

.1 The Chemical Treatment Specialist will be retained and paid by the Mechanical Contractor but must be the agency the Owner typically deals with

.2 The Contractor is to obtain and include a price for Chemical Treatment work provided by Enercon Water Treatment.

2 SCOPE OF CHEMICAL TREATMENT WORK

.1 Quality Assurance

.1 At completion of the heating water installation thoroughly flush the system and retain a water treatment specialist to chemically treat the system. The chemical treatment sub-trade will supply for installation by the mechanical contractor a chemical pot-feeder and all chemicals and coupons required for the operation of the system until the expiry of the one-year warranty from the time of Substantial Completion.

.2 During the one-year warranty period, at 6 months and 12 months from the date of Substantial Completion, the chemical treatment sub-trade will monitor the levels of chemical treatment in the heating system and add chemicals as required to maintain the required levels of treatment necessary for control of nitrates and chromates and to provide adequate corrosion protection.

.3 The water treatment chemicals and treatment process shall be supplied and performed by the Contractor. This work shall be supervised by the Water Treatment Specialist who, upon completion shall certify that the process is satisfactory and submit a report outlining the cleaning operation and the treatment process for inclusion in the Operations and Maintenance manual.

.4 Notify Consultant 72 hours prior to chemical cleaning so that work may be verified and inspected.

.2 Submittals

.1 Submit shop drawings including proposed chemicals, quantities, calculations, procedures and equipment to be supplied. Provide written operating instructions and system schematics.

.2 Provide written report containing log and procedure of system cleaning, giving times, dates, problems encountered and condition of water.

3 EXECUTION

.1 Pre-Operational Cleaning and Chemical Treatment

.1 All systems must be chemically cleaned and flushed before water treatment is added. This includes partial or complete filling for pressure testing.

.2 Provide drain connections to drain system in one hour.

.3 All drains for chemical treatment shall be piped to the sanitary sewer.

.4 After all components of the piping system have been pressure tested and proven to be in full operational condition and leak free, flush entire system with fresh, clean make-up water to remove loose mill scale, sediment and construction debris.

.5 After initial flushing has been completed, clean all strainer screens. **DO NOT FLUSH SYSTEMS THROUGH THE BOILERS**

.6 System pumps may be used for cleaning, provided that pumps are dismantled and inspected, worn parts repaired with new gaskets and seals installed. Submit used seals.

.2 Cleaning and Chlorination of Potable Water Piping

.1 All domestic water piping shall be thoroughly flushed so that it is free from scale, sediment, construction debris etc.

4 PRODUCTS

.1 Materials

.1 System Cleaner: Use a Sodium Metasilicate, Sodium Nitrite and a wetting agent compound which in solution removes grease and petroleum products. Concentration level to be determined by Water Treatment Specialist. (PACE Chemicals Ltd. – PURGEX L-24 or approved equal)

.2 Closed System Treatment (Hot Water, Chilled Water): Use all-organic based corrosion inhibitor. Maintain levels at 60 to 100 ppm. (PACE Chemicals Ltd. – BAR COR CWS-105 or approved equal.) *Note: The use of Nitrite only, Molybdate only or Sulphite only will not be accepted.*

.3 Materials which may contact finished areas must be colourless.

5 EXISTING GLYCOL SYSTEM

.1 Pre-mixed Solution

.1 Supply and install propylene glycol, complete with corrosion inhibitors, to the following concentrations:

.1 Building Heating System: for all piping, provide a sufficient glycol to achieve a solution with 40% concentration of propylene glycol (by volume).

Freezing Points of Propylene Glycol – Water Mixtures		
Percent Propylene Glycol (Weight by %)	**Freezing Point (°F)**	**Freezing Point (°C)**
0	32	0
10	26	-3
20	20	-7
30	10	-12
36	0	-18
40	-5	-20
43	-10	-23
48	-20	-29
52	-30	-34
55	-40	-40
58	-50	-46
60	-60	-51

6 TEST KITS

.1 Provide test kits to determine proper systems treatment, including but not limited to the following:

.2 Closed System Test Kit

.1 To determine proper level of inhibitor in closed system treatment. (PACE chemicals Test Kit #105 or approved equal.)

.3 Glycol System Specific Gravity Test Kit

.1 To determine freezing point of glycol systems. To contain a suitable hydrometer cylinder, a 300 mm specific gravity hydrometer equivalent to Kessler Model 8350 with scale range of 1.000 – 1.110 at .001 specific gravity increments and a 305 mm brass armoured, mercury-filled thermometer equivalent to Kessler Model 2048/3252 with scale range of -35°C to +50°C. Provide a chart showing the specific gravity of the specified solution by volume, at a specified temperature. (PACE Chemicals Test Kit #127 or approved equal.)

END OF SECTION 15050

1 EQUIPMENT MANUFACTURERS

.1 Each of the following manufacturer's representatives are required to provide start-up services for their equipment, and to cooperate with the Testing, Adjusting and Balancing (TAB) Agency in initial review of equipment performance.

.1 Certified, 'A' ticketed representative of the boiler manufacturer

.2 Each of the manufacturer's representatives are to provide a written report indicating the operation of their equipment is in conformance with specified parameters and is to their satisfaction. The TAB Agency is to include these reports in the Operation and Maintenance manuals.

END OF SECTION 15110

1 CONTRACTUAL RELATIONSHIP

.1 The TAB Agency will be retained and paid by the Mechanical Contractor.

2 SCOPE OF BALANCING WORK

.1 Verify existing flow rates through boilers

.2 Verify discharge temperature at 100% flows

.3 Balancing of heating water systems

.4 Submission of water balance report

3 REFERENCE STANDARDS AND QUALITY ASSURANCE

.1 Air and water systems balancing will be performed by an agency that has demonstrated experience in balancing mechanical systems of this scope. Refer to Section 15020 for listing of agencies approved to perform this work.

.2 Air systems balancing shall be in general accordance with the AABC “National Standards for Field Measurement and Instrumentation” and ASHRAE standards.

.3 All measuring instruments utilized by the balancing agency shall be accurate, with recent documented calibration test results. Supply such test results if requested by the Consultant.

.4 The balancing agency shall include for two eight-hour days of time on site following occupancy of the building to perform spot checks and make adjustments requested by the Owner or Consultant.

4 SUBMITTAL REQUIREMENTS

.1 The TAB agent will provide a report, in both hard copy and PDF digital format, for inclusion in the Operating and Maintenance Manuals, describing the final balanced operating conditions of the mechanical systems outlined below.

.2 A preliminary copy of the report is to be submitted for the Consultant’s review two weeks prior to Substantial Performance, and the final version submitted at the time of Substantial Performance. Submission of the final report will be a requirement of declaration of Substantial Performance.

5 WATER SYSTEMS BALANCING

.1 Heating Water System

.1 Existing System Verification

1. Contractor to verify flow rates of existing boilers.

2. Contractor to verify discharge temperature of HWS at 100% flow rate.

.2 Systems Requiring Balancing

1. Boiler primary circuits

.3 Indicate in the balance report:

1. Operating performance (design vs actual) for all primary circuit pumps.

2. Temperature and pressure drops in the primary loops.

.4 Procedures

1. Use a portable differential pressure meter in conjunction with circuit balancing valves to determine flow rates and pressure drop characteristics of required water systems.

2. Balance water flow rates to between 100% and 105% of design requirements

3. Use the following sequence to adjust water volumes to design amounts in individual systems

.1 Set balance valves.

.2 Do not use service or shut-off valves for balancing water systems.

4. Mark the final balance position of heating water balancing valves.

END OF SECTION 15120

1 CONTRACTUAL RELATIONSHIP

.1 The TAB Agency will be retained and paid by the Mechanical Contractor.

.2 The Contractor's responsibility will be to coordinate the timing for the TAB work when it is required, and to cooperate with the TAB processes. This will include assistance with:

.1 The Controls Contractor will provide documentation confirming physical end-to-end checks all control points have been performed.

.2 When requested the Controls Contractor will assist the TAB agency in verifying software programming language.

.3 When requested the Controls Contractor will assist the TAB agency in simulating system operation by opening and closing control valves and dampers and enabling motor driven mechanical equipment

.4 Coordinate and supervise the start-up of the various pieces of equipment and systems. Utilize the start-up services of the manufacturer's representatives listed in Section 15100.

.5 Ensure that all the equipment is operating in a satisfactory manner.

.6 Resolve inter-contractor co-ordination problems. Where problems become apparent during the commissioning process, work at the identification and resolution of these problems.

2 SCOPE OF VERIFICATION WORK

.1 The TAB agency shall provide the following scope of services to review, inspect and verify all mechanical systems installed under this contract are operating in conformance to the design intent.

.1 Review of the drawings and specifications as issued for construction, and confirmation to the Owner and Consultant that the TAB agent understands the intended and design intent and specified sequence of operations. The TAB agent shall allow adequate time to review with the Owner and Consultant the design intent of the project and the intended operation.

.2 Verification of condition and operation of installed equipment and reporting on such as indicated below.

.3 Review of the air and water balance report, and coordination with the balancing agent to ensure that all systems are functioning as intended.

.4 Participating in end-to-end checks on all specified sequence of operations, working in conjunction with the DDC contractor. Initial each device listed on the Control system checkout sheets provided under section 15910 to verify these end to end checks were carried out.

.5 Co-ordinate and supervise the start-up of equipment and systems as specified below. Utilize the start-up services of the manufacturers

representative where specified. Ensure that the equipment is operating in a satisfactory manner.

.6 Resolve inter-contractor coordination problems. Where problems become apparent during the TAB process, work at the identification and resolution of these problems.

.2 Organize and conduct the demonstration to the Owner of all mechanical equipment and systems supplied under this contract. The demonstrations shall occur only after the operation and testing has been successfully completed. Equipment suppliers and the balancing agent shall participate in the demonstration as required. The DDC contractor must attend the systems demonstration.

.3 The TAB agent bears the responsibility to ensure the mechanical installation functions as intended, or to indicate if certain components of the systems cannot operate as intended, why such is the case and what is recommended to rectify the problems.

.4 The TAB agent will coordinate the work of the mechanical contractor, electrical contractor, balancing agent and controls contractor, including organization and chairing of any meetings required between these parties to resolve and coordinate the TAB process. The co-operation of all trades is essential for an efficient and planned process. A team comprising the above parties is recommended along with an owner’s representative.

.5 The TAB agent will be responsible for verification of the performance and operation of all equipment supplied under the Division 15 contract, as well as the building fire protection and life safety systems (joint Division 15 and 16).

.6 The TAB agency shall possess computers, cables, and software needed to operate the building control system. This requires the TAB agency to be properly licensed and/or trained to run the Control contractor’s software.

3 QUALITY ASSURANCE

.1 The TAB process shall be consistent with the "Code of Practice for Commissioning Mechanical Systems in Buildings".

.2 Within seven days of tender closing provide the name, qualifications, and experience of the TAB coordinator to the Owner and Consultant.

.3 At the time of the schedule submittal, also submit proposed testing recording sheets and procedures for review.

.4 Hold regular meetings during the TAB process and provide minutes of such meetings within seven days. Minutes of the meeting shall be issued to all Contractors involved, the Consultant, and the Owners representative.

.5 The TAB Agency shall include for TWO eight-hour days of time on site following occupancy of the building to perform checks and recommend adjustments if requested by the Owner or Consultant.

4 DOCUMENTATION

.1 The TAB agent will provide a report, in both hard copy and PDF digital format, for inclusion in the Operating and Maintenance Manuals, verifying correct operation of all mechanical systems in the building, including trend logs of system operating conditions.

.2 The report will include a statement that all systems are operational and functioning as intended, checklists indicating tests and control checks carried out on each system, and that control operation of each system is operating as intended. Or if this is not the case, why such is not the case and suggested procedures to rectify the situation.

.3 A preliminary copy of the report is to be submitted for the Consultant's review two weeks prior to Substantial Performance, and the final version submitted at the time of Substantial Performance. Submission of the final report will be a requirement of declaration of Substantial Performance.

.4 Submission of the final report will be a requirement of declaration of Substantial Performance.

5 SYSTEMS

.1 Heating Water System

.1 General System Requirements

1. Verify the physical completion of the installation.

2. Verify pressure tests are completed and check for any leaks in the installation.

3. Verify installation of all required control equipment, including temperature and pressure sensors, required wells, flow switches, etc.

4. Verify the flushing and chemical cleaning of the system and correct installation and operation of chemical treatment equipment.

5. Verify correct sequencing of all control functions, including coordination of such with the DDC contractor.

.2 Pumps

1. Verify correct direction of rotation of pump impellers.

2. Verify alignment of pump impellers.

3. Verify pumps are adequately greased and lubricated.

4. Verify seals are functioning correctly.

END OF SECTION 15130

1 CONTRACTUAL RELATIONSHIP

.1 The TAB Agency will be retained and paid by the Mechanical Contractor.

.2 The Contractor's obligation for manuals is to provide the following documentation to the TAB agency:

.1 TWO clean, paper copies of

.1 A copy of all Shop Drawings. Version included is to be the version given "Reviewed" status by the Consultant.

.2 "As-Built" controls shop drawings

.3 Manufacturer's equipment start-up reports for:

.1 Boilers

.2 A digital copy in Microsoft Word format of

.1 Controls end-to-end check verification lists provided by Controls Contractor

.2 Hydrostatic tests performed on

.1 Natural gas piping
.2 Heating piping

.3 Inspection certificates for

.1 Natural gas piping

.4 Certificate of Guarantee

.5 List of equipment manufacturers and suppliers and sub-contractors used on the project.

.6 A valve schedule. Refer also to Section 15020.

2 OPERATING AND MAINTENANCE MANUALS

.1 The Operating and Maintenance manuals are to be submitted in hard cover three ring binders. The front cover and spine of the binders are to bear the text

"MECHANICAL SYSTEMS OPERATING AND MAINTENANCE MANUAL – NELSON & DISTRICT COMMUNITY COMPLEX"

.2 The TAB Agency is to provide two hard copies and a digital copy in PDF format of an Operating and Maintenance Manual for the completed installation. Manuals will be indexed as follows:

Part 1 – Description of Systems:

.1 Title page indicating project title and the names, addresses, telephone and fax numbers of the Owner, Mechanical Engineer, General Contractor, Mechanical Contractor and the agency preparing the manuals.

.2 Description of systems, including description of system operation and components comprising the system. Describe systems operation and sequence of control operation, including start-up, shutdown and intended response of system components to controlling devices.

Part 2 – Maintenance and Test Information

.3 Maintenance procedures and lubrication requirements, including preventative maintenance procedures, lubrication schedules and a belt schedule.

.4 List of equipment manufacturers and suppliers and sub-contractors used on the project.

.5 Copies of hydrostatic tests performed on

.1 Natural gas piping
.2 Heating piping

.6 Copies of Inspection Certificates for

.1 Natural gas piping

.7 Balancing reports for air and water systems provided by TAB Contractor

.8 Equipment verification checklists provided by TAB Contractor. Checklists are to be provided for:

.1 Boilers
.2 Pumps
.3 Controls

.9 Controls end-to-end check verification lists provided by Controls Contractor

.10 Equipment start-up reports.

.11 Certificate of Guarantee

Part 3 - Shop Drawings

.12 Include a copy of all Shop Drawings. Version included is to be the version given “Reviewed” status by the Consultant.

.13 Control shop drawings to be “As-Built” version, and include all system schematics, points lists and sequence of operations

3 SYSTEMS DEMONSTRATION AND OPERATOR TRAINING SERVICES

.1 General

.1 The TAB Agency shall organize and conduct a demonstration to the Owner's maintenance staff of all mechanical equipment and systems supplied under this contract. The demonstrations shall occur only after the operation and testing has been successfully completed.

.2 The Contractor shall ensure equipment suppliers and the DDC Contractor attend and assist in the systems demonstration.

.3 The demonstrations shall be conducted during regular working hours (Monday to Friday between 8:00 AM and 4:00 PM) and shall be adequately scheduled with the Owner and other participating equipment suppliers and Contractors.

.4 The initial demonstrations and training sessions shall be 16 hours in duration. The TAB agency shall allow for ONE eight-hour day of time on site following occupancy of the building to subsequent operator training requested by the Owner or Consultant.

END OF SECTION 15140

1 SCOPE OF WORK

.1 Vibration spring isolators for motor driven fans and pumps with electric motors 1/2 HP and greater and on associated piping and ductwork.

.2 Braided steel flexible connections for steel piping

2 VIBRATION ISOLATION - GENERAL

.1 Do not bridge isolation elements.

.2 For isolated equipment provide vibration isolation to withstand without failure or yielding a static load of 2g minimum, acting through the centre of gravity.

.3 For all equipment mounted on vibration isolators, provide a minimum clearance of 50-mm (2 inches) to other structures, piping, equipment, etc.

.4 Supply all of the vibration isolation equipment by one approved supplier. The vibration isolation supplier shall provide assistance to the contractor as necessary during the course of installation of isolation equipment

.5 Vibration isolator housings are considered a safety guard with respect to isolated equipment and any contained compressed springs. Include "Fail Safe" seismic restraint in all vibration isolation designed to hold mechanical equipment and springs in place

.6 Isolators shall be of the following types, as required, supplied by the manufacturers named, or other acceptable manufacturers listed or approved.

3 PAD ISOLATORS

.1 Neoprene/steel/neoprene pad isolators, manufactured from "Bridge bearing quality neoprene", as defined by CSA Standard CAN3-S6-M78 Section 11.10. Select type 1 pads for a 2.5 mm (0.1") static deflection or greater. Bolt down equipment mounted on neoprene pad isolators using neoprene grommets. Design is based on Vibron Vibropad VSV or Mason WMW.

4 RUBBER FLOOR ISOLATORS

.1 Rubber/neoprene-in-shear isolators designed to meet specified seismic requirements. Select isolators for a 4-mm (0.15") minimum static deflection, and bolt to structure. In case of rubber isolators, provide protection in the design of the isolator to avoid contact of the rubber element to oil in the mechanical room. Design is based on Trelleborg Type RAEM or Mason RAA or ND.

5 FLEXIBLE PIPE CONNECTIONS

.1 Hoses shall be installed on the equipment side of the shut-off valves horizontally and parallel to the equipment shafts wherever possible.

END OF SECTION 15220

1 SCOPE OF WORK

.1 Seismic restraint of piping systems

.2 Seismic restraint of duct systems

.3 Seismic restraint of non-motor driven equipment

2 SEISMIC RESTRAINT - GENERAL

.1 Provide restraints on all ceiling hung isolated equipment, piping and ductwork in accordance with National Building Code of Canada and SMACNA “Guidelines for Seismic Restraints of Mechanical Systems and Plumbing Piping Systems.”

.2 Design seismic restraints to meet the structural requirements of the British Columbia Building Code

3 SEISMIC RESTRAINT OF PIPING SYSTEMS

.1 Provide seismic restraint for all piping systems installed under this contract with the following exceptions:

.1 Natural gas piping less than 25 mm (NPS 1) diameter.

.2 Water piping in mechanical equipment rooms of 32 mm (NPS 1-1/4) diameter and smaller.

.3 All other piping of 65 mm (NPS 2-1/2) diameter and smaller.

.4 All piping suspended by individual hangers 300 mm (12 inches) or less in length from the top of pipe to the bottom of the support for the hanger.

.5 All piping suspended by hangers 300 mm (12 inches) or less in length from the top of the duct to the bottom of the support for the hanger.

4 SEISMIC RESTRAINT OF DUCT SYSTEMS

.1 Provide seismic restraint for all ductwork systems installed under this contract with the following exceptions:

.1 All rectangular air handling ducts less than 0.56 sq. meters (6 sq. ft.) in cross sectional area.

.2 All round air handling ducts less than 710 mm (28 inches) in diameter.

.3 All ducts suspended by hangers 300 mm (12 inches) or less in length from the top of the duct to the bottom of the support for the hanger.

5 SEISMIC RESTRAINT OF NON-ISOLATED EQUIPMENT

.1 Bolt all non-isolated equipment, to the structure. Design anchors and bolts for 2g applied horizontally through the centre of gravity.

.2 Applicable to

.1 Boilers

.3 The use of perforated steel strap hangers to attach tanks to walls is not permitted for this project.

END OF SECTION 15230

1 SCOPE OF WORK

.1 Heating water piping

2 QUALITY ASSURANCE

.1 Install insulation to the requirements of the latest edition of the British Columbia Insulation Contractors Association Standards Manual for Mechanical Insulation. Code numbers quoted refer to this specification for installation standards. Code numbers quoted refer to this specification for installation standards.

.2 Provide materials conforming to British Columbia Building Code requirements for maximum smoke developed rating of 50 and flame spread rating of 25.

.3 Provide insulation as per ASHRAE 90.1-2016 requirements.

3 HEATING WATER PIPE INSULATION

.1 For heating water piping with fluid operating temperature from 60°C to 93.3°C (141°F to 200°F).

.1 Insulation shall have a minimum conductivity of 0.0360 W/m-K (0.25 BTU-in/h-ft²-°F).

.2 Provide 38-mm (1-1/2 inches) thick mineral fibre thermal insulation on all heating water piping 32-mm (1-1/4 inches) or smaller.

.3 Provide 50-mm (2 inches) thick mineral fibre thermal insulation on all heating water piping 38-mm (1-1/2-inches) to 150-mm (6 inches).

.4 Provide 88-mm (3-1/2 inches) thick mineral fibre thermal insulation on all heating water piping 200-mm (8-inches) or larger.

.2 All insulation to be type A-2 as defined by BCICA Quality Standards specification 1501-H.

.3 Where exposed piping shall be covered with either a continuous white PVC jacket or a canvas covering with white PVC elbows to protect insulation from damage.

.1 Exposed pipe is defined as the following:

.1 Installed below ceilings

.2 Installed below structure or underside of roof where no ceiling is installed

.3 In boiler and mechanical service rooms

.2 Concealed pipe is defined as:

.1 Installed above dropped ceilings

.2 Installed inside walls

.3 Installed inside furred vertical or horizontal pipe chases

.4 Insulate over pipe flanges to provide continuous insulated surface.

.5 Wherever insulation is not applied to the heating water system, such as on gauge stems, pumps, air separators, unions and valves, apply a coating of non-toxic, liquid thermal insulation such as Robson Thermal Thermalite-SG to prevent potential for burns. Apply to manufacturers recommendations.

.6 Where exposed on the roof pipe insulation shall be covered with a continuous aluminum jacket.

4 FASTENINGS, ADHESIVES, COATINGS

.1 Provide all wire insulation fastenings, staples, adhesive tapes, contact adhesives and barrier coatings as required for a complete, neat insulation installation and finish.

.2 Insulation Fastenings

.1 16 gauge galvanized or copper wire

.3 Jacket Fastenings

.1 Thermocanvas: Staples, compatible jacket finishing tape with contact adhesive as recommended by jacket supplier.

.2 PVC Covering: Staples and PVC self adhesive tape.

.4 Adhesives

.1 Vapour barrier jacket adhesive: Bakelite 230-39, Childers CP-82 or Foster 85-20.

.2 Fabric adhesive: Bakelite 120-18, Childers CP-52 or Robson Thermal White Lag.

.5 Finish Jackets

.1 Thermocanvas jacket: S. Fattal Thermocanvas or Robson Thermal Flamex FR Canvas.

.2 All Service jacket: Knauf ASJ, Manson AP or fibreglass ASJ

.6 Cement

.1 Fibrex Supercote or Ryder Thermokote

.7 Preformed PVC Covers

.1 Supplied by S. Fattal, Childers or Knauf

5 EXECUTION

.1 No insulation is to be applied prior to all hydrostatic testing of pipe installations and confirmation from the Consultant and the Building Inspector that all piping is installed in conformance with code and specification requirements.

.2 Clean and degrease piping and hanger rods to assure proper adhesion of insulation materials.

.3 Ensure that insulation is clean and dry during installation and application of all finishes.

.4 Install insulation with smooth and even surfaces.

.5 Apply insulation materials, accessories and finishes in accordance with manufacturer's recommendations.

.6 Protect insulation of exposed pipes passing through floors with 1.3 mm galvanized iron jacket to 300 mm (12 inches) above finished floor.

.7 Terminate insulation at unions and flanges on low temperature systems, at pipe hangers with insulation cement, to CGSB 51-GP-6, trowelled on and with a smooth bevelled finish.

.8 Allow for radial expansion of pipe and permit pipe to move longitudinally inside insulation and to expand and contract without opening up joints between sections.

END OF SECTION 15310

1 QUALITY ASSURANCE

.1 Wherever piping, ductwork or conduit penetrates fire rated assemblies provide an installation of a firestopping and smoke seal system.

.2 Materials used are to be asbestos-free and capable of maintaining an effective barrier against flame, smoke and gases in compliance with the requirements of

.1 CAN4-S115-M, “Standard Method of Fire Tests of Firestop Systems.”

.2 British Columbia Building Code Section 3.1.7

.3 Acceptable Products

.1 3M Brand Fire Barrier Penetration Sealing System.

.2 Johns Manville Firetemp Products

.3 Passive Fire Protection Products

.4 Install in strict accordance with manufacturers printed specifications, including field quality control after installation.

.5 Only an approved specialist firm, employing skilled tradesman experienced in firestopping and smoke seals application, shall carry out the work of this section.

.6 Contractor shall submit to Consultant, suitable document signed by the manufacturer or his representative, stating:

1. The Contractor has received sufficient installation instruction from the manufacturer or his representative

2. Manufacturer or his representative witnessed installation procedures on site.

.7 Follow manufacturers published installation instructions precisely including field quality control after installation.

.8 The Contractor shall remove up to four (4) firestopping assemblies for random inspection if requested by the Consultant, and replace at no cost to the Owner.

2 RELATED WORK

.1 Firestopping and smoke seals at penetration through fire rated wall and floor assemblies, other than mechanical system penetrations: Section 07270.

.2 Firestopping and smoke seal around electrical service penetrations of fire rated wall and floor assemblies: Division 16. Electrical.

3 WORK INCLUDED

.1 Furnish all labour, material, equipment and services necessary to supply and install firestopping and smoke seals around mechanical service piping, duct penetrations and conduit through fire rated wall and floor assemblies.

4 SHOP DRAWINGS

.1 Submit shop drawings and product data in accordance with Section 15010.

.2 Submit shop drawings to show proposed material, reinforcement, anchorage, fastenings, and method of installation. Construction details shall accurately reflect actual job conditions.

.3 Submit manufacturer's product data for material and prefabricated devices. Provide descriptions sufficient for identification at job site. Include manufacturer's printed instructions for installation.

5 PRODUCT DELIVERY, STORAGE AND HANDLING

.1 Deliver and store all materials in original wrappings and containers with manufacturer's seals and labels intact and as recommended by the approved manufacturer.

.2 Protect materials from environmental conditions as required by manufacturer's recommendations.

.3 Conform to manufacturers recommended temperatures, relative humidity and substrate moisture content for application and curing of firestopping and smoke seal materials.

.4 Protect works of other trades against soiling and damage arising out of this work.

.5 At completion replace and repair any defective work and leave perfect.

6 MATERIALS

.1 Firestopping and Smoke Seal Systems: Asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of CAN/ULC-S115-M or ULI 1479 and ASTM 814, and not to exceed opening sizes for which they are intended.

.2 Fire resistance rating of installed firestopping assembly shall not be less than the fire resistance rating of surrounding floor and wall assembly as indicated (as scheduled)

.3 Primers: To manufacturer's recommendation for specific material, substrate and end use.

.4 Water (if applicable): Potable, clean and free from injurious amounts deleterious substances.

.5 Damming and Back-Up Materials, Supports and Anchoring Devices: To manufacturer's recommendations, and in accordance with an assembly being installed as per a listed system by an accredited testing agency.

.6 Use sealant around single pipes and ducts.

.7 Use foam for multiple pipe installation through a common opening

7 PREPARATION

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are dry and frost free.

.2 Clean and prepare surfaces in contact with firestopping materials and smoke seals to manufacturer's instructions.

.3 Maintain insulation around pipes and ducts penetrating fire separation.

.4 Prime surfaces in accordance with manufacturer's instructions.

.5 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

.6 Mix materials in strict accordance with manufacturer's directions.

.7 Ensure components are mixed thoroughly and that a qualified worker prepares those components.

8 INSTALLATION

.1 Install firestopping and smoke seal material and components that have been tested by certified testing agencies, ULC, CUL, or Intertek, and manufacturer's instructions to provide a flame rated seal not less than the fire resistance rating of the surrounding wall or floor assembly. Temperature ratings may be required in certain instances and should be specified by the engineering or architectural authority.

.2 Install to mechanical service through – penetrations to formed, sleeved or cored openings in fire rated wall and floor assemblies.

.3 Seal holes or voids made by through-penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

.4 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.5 Prepare all surfaces so they are clean, dry, and frost free, as per manufacturer's published recommendations.

.6 Tool or trowel exposed surfaces of fire stopping or seals to a neat finish.

.7 Remove excess compound promptly as work progresses and upon completion.

9 CURING

.1 Cure materials in accordance with manufacturer’s directions.

.2 Do not cover up materials until proper curing has taken place.

10 INSPECTION

.1 Remove excess materials and debris and clean adjacent surfaces immediately after application.

.2 Remove temporary dams after initial set of firestopping and smoke seal materials.

.3 The Contractor shall remove up to four (4) firestopping assemblies for random inspection if requested by the Consultant, and replace at no extra cost to Owner.

.4 If this review of installation procedures indicates the work has not been performed in accordance with manufacturer’s recommendations the Owner/Consultant reserve the right to have all firestopping assemblies removed and re-installed.

11 SCOPE OF FIRESTOPPING WORK

.1 Applicable to piping, ductwork and control conduit or wiring penetrating:

.1 The walls or ceiling of the boiler room

END OF SECTION 15340

1 SCOPE OF WORK

.1 Sanitary drainage and vent piping

2 CODES, STANDARDS AND APPROVALS

.1 The installation shall conform to Part 7 of the 2018 British Columbia Building Code.

.2 Do not conceal any plumbing installation, whether buried or within walls, prior to review by the Consultant and the local plumbing inspector. Ensure 72 hours written notice is provided to each of these parties prior to requirement for an inspection of the work.

.3 Route piping installation in an orderly manner, as indicated on the drawings. Generally follow routes parallel and perpendicular to building structure.

3 SANITARY DRAIN AND VENT PIPING

.1 Sanitary Drain and Vent Piping Inside Building

MATERIAL	CODE REF	CONFORM TO	FITTINGS
PVC (DWV)	BCBC 7.2.5.10 BCBC 7.2.5.11	CAN/CSA B181.2-M	
Type DWV Copper	BCBC 7.2.7.4	ASTM B306	Wrought copper With 50-50 solder
Cast Iron	BCBC 7.2.6.1	CAN/CSA B70-M	MJ with SS bands and clamps

The use of combustible drainpipe is restricted by clause 3.1.9.4(3) of the British Columbia Building Code. Use of combustible piping in penetrations through fire rated assemblies requires provision of firestop assemblies installed in accordance with CAN4-S115-M.

4 INSTALLATION OF SANITARY DRAIN AND VENT PIPING

.1 General Requirements

.1 Grade sanitary piping as indicated on the drawings.

.2 Install neoprene pads under clamps where vertical sanitary piping rests on floor systems.

.3 Piping penetrations through drywall (other than fire rated walls) should be ¼ inch oversized and gap caulked with silicone sealant. For fire rated walls refer to the requirements for Firestopping.

.4 Ensure no joints of dissimilar metals are provided. Install dielectrically

isolated fittings where dissimilar metallic materials meet.

.5 Install acid waste pipe in accordance with manufacturers recommendations.

.2 Pipe Hangers

.1 For non-combustible pipe 3 inch diameter and larger use steel ring and clevis type hangers attached to galvanized steel rods to support all suspended piping.

.2 The use of perforated band iron is not permitted.

.3 Hangers for copper pipe shall be copper plated and plastic dipped, or pipe wrapped with Polyken tape at hangers.

.4 Install hangers for copper pipe with a maximum separation as indicated in table below and where required elsewhere to avoid sag in pipe installation**.** Provide sheet metal shields to protect insulation from being crushed at hanger locations on cold water installations.

Pipe diameter	Rod diameter	Steel	Copper
Up to 19mm	10mm	1.8m	1.8m
25mm to 32mm	10mm	2.4m	1.8m
38mm to 50mm	10mm	3.0m	2.4m
65mm to 75mm	13mm	3.6m	2.4m
100mm to 130mm	16mm	3.6m	2.4m
150mm	19mm	3.6m	

.5 Maximum hanger spacing for any size cast iron pipe is 1.5m (5 feet).

.6 Provide galvanized steel, continuous threaded hanger rods.

.7 Inserts

.1 Insert shall be malleable iron case or galvanized steel shell with expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms.

.2 Size inserts to suit threaded hanger rods.

.3 Drilled concrete insert shall be Hilti Model HSL or HVA.

.4 All inserts shall be ICBO approved. Use only ICBO design load ratings.

END OF SECTION 15420

1 SCOPE OF WORK

.1 Natural gas piping for boilers B-1 and B-2

2 CODES, STANDARDS AND APPROVALS

.1 Natural gas installation shall conform to the requirements of CAN/CSA-B149.1, “Natural Gas and Propane Installation Code.”

.2 Route piping installation in an orderly manner, as indicated on the drawings. Generally follow routes parallel and perpendicular to building structure.

3 NATURAL GAS PIPE

.1 Pipe: Schedule 40 black steel

.2 Joints

.1 50-mm (2-inch) and smaller: Threaded.

.2 65-mm (2.5-inch) and larger: Continuously welded

.3 Steel fittings

.1 Malleable iron: screwed, banded, class 150 to ANSI/ASME-B16.3

.2 Welding: Butt-welding to ANSI/ASME-B16.9

.3 Unions: Malleable iron, brass to iron. Ground Seat. Screwed to ASTM A47M.

.4 Nipples: Schedule 40, to ASTM A53.

.4 Natural gas pressure reducing valves for boilers to be suitable for boiler turndown ratio.

4 PIPE HANGERS

.1 Install hangers for steel pipe with a maximum separation as indicated in table below and where required elsewhere to avoid sag in pipe installation**.**

Pipe diameter	Rod diameter	Steel	Copper
Up to 19mm	10mm	1.8m	1.8m
25mm to 32mm	10mm	2.4m	1.8m
38mm to 50mm	10mm	3.0m	2.4m
65mm to 75mm	13mm	3.6m	2.4m
100mm to 130mm	16mm	3.6m	2.4m
150mm	19mm	3.6m	

.2 Provide galvanized steel, continuous threaded hanger rods.

.3 Inserts

.1 Insert shall be malleable iron case or galvanized steel shell with expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms.

.2 Size inserts to suit threaded hanger rods.

.3 Cast-in-place concrete insert shall be galvanized malleable iron or steel Grinnell Fig 281 or Fig 282 or Unistrut.

.4 Drilled concrete insert shall be Hilti Model HSL or HVA.

.5 All inserts shall be ICBO approved. Use only ICBO design load ratings.

5 TESTING

.1 Tests on natural gas systems shall consist of a hydraulic test of 1050 kPa (150 PSIG) for 8 hours with no loss of pressure.

END OF SECTION 15440

1 QUALITY ASSURANCE

.1 Gas fired equipment shall meet all requirements of CSA and CGA codes and standards.

.2 Boilers and burners must be CSA certified as one unit

.3 Boilers to comply with provincial regulations and bear CSA Approval Seal

.4 Boilers shall have Canadian CRN numbers

.5 A certified, ('A' ticketed) representative of the boiler manufacturer is required to provide start-up, testing, correct operating set-up of the equipment and training of the Owner's operating and maintenance staff. Provide a written report to the Consultant indicating the operation of the units is in conformance with all code requirements and the specified operating parameters and that the Owner's staff has received training in the operation and maintenance of the equipment.

.6 Boilers are to be guaranteed against defects in material and/or workmanship for a period of 12 months from the date of start-up or 18 months from the date of shipment, which ever comes first. In addition the boiler pressure vessel shall be warranted against damage resulting from thermal stress for a period of 20 years from date of shipment provided the boiler is operated and maintained in accordance with the conditions specified in the owner's Operator and Maintenance Manual.

2 HIGH EFFICIENCY CONDENSING GAS FIRED BOILERS

.1 Scope

.1 Provide high efficiency condensing boilers, control and trim, hot water connections, fuel connections, electrical connections, control and power.

.2 Provide flues and flue stack connections as required and shown on the plans

.2 Submittals

.1 Submit shop drawings indicating capacity rating, physical dimensions, wiring diagrams, materials of construction, code compliance, etc.

.2 Provide (4) sets of operating sets and maintenance manuals with complete description of installation and operation of boilers

.3 Boiler Construction. The water heating condensing boiler shall be of gas fired design, featuring high-quality stainless steel and titanium alloy self cleaning, scale formation resistant heat exchanger and a full modulating gas burner with positive pressure flue discharge. CSA efficiency requirements: 96.7 - 98.3% or better efficiency. Each boiler shall be capable of 3:1 turndown or better rate without loss of combustion efficiency. The boiler shall allow 490C temperature differential across the boiler with minimal operation temperature of 00C.

.4 Boiler Heat Exchanger. design of the heat exchanger shall be used to obtain

maximum surface without compromising self-cleaning and scale formation resistant capabilities.. Defined gaps between passes shall be sized to promote laminar flue gas flow for efficient heat transfer. ASME maximum allowable working pressure (MAWP): 30 psig; ASME maximum operational water temperature (Adjustable High Limit): 850C; ASME maximum water temperature (Fixed High Limit): 210°F (99°C).

.5 Burner. The gas burner shall be constructed from high-grade stainless steel for universal use with natural gas or propane gas featuring 3:1 or better turn down ratio without compromising combustion efficiency. Minimum capability of 15:1 turn down ratio.

.6 Controls.

.1 The boilers shall be complete with packaged electronic controls capable of accepting remote 0-10V input (including 0-1V input disabling the system) and/or interface to cascade control (for multiple boiler installations) c/w 0-10V input and outdoor reset capability featuring user interface control panel with graphic output.

.2 The boiler control shall self-adjust to varying operating environments and shall have priority for both electrical and fuel savings in its self-learning, site-adaptation logic. Control strategy shall be adjustable to specific boiler design, trim and output. Both boiler and cascade controls feature self-diagnostic function, external enable, external disable and alarm output.

.3 Boiler control in multi-boiler applications shall operate isolation valve for enhanced system efficiency.

.4 Cascade control shall operate up to two mixing valve circuits, DHW circuit and provide alarm output.

.5 The system shall feature LON or BACNET interface (OPTIONAL).

.7 Wiring. Wire and cable entry to boiler shall be facilitated by strain relieves to protect electrical wires. All internal cable connections shall be equipped with unique plugs to facilitate easy service.

.8 Venting. Each boiler shall be equipped with individual boiler manufacture designed and supplied flue gas venting. The boiler shall operate under Category IV positive vent pressure conditions for direct vent operation. Venting shall be of 1mm thick stainless steel, feature condensate disposal and have 2” clearance to combustibles.

.9 Direct Combustion Air: Each boiler shall be equipped with the necessary accessories for direct combustion air intake installation. Room air installation will not be accepted.

.10 Clearances. The boiler shall be rated for zero (0") clearance to combustibles.

.11 Drain. The boiler shall have a gravity drain with condensate neutralization

.12 Boiler Trim. Each boiler shall incorporate low water safety device and dual over temperature protection including a manual reset in accordance with ASME

section IV and CSD-1. The boiler shall not require flow switch. Sensor failure detection and self-diagnostic system with alarm and fault code indication shall be standard equipment.

.13 Standard of Acceptance: Viessman Vitocrossal Model 200 CI2-2000. Refer to Section 15020 for approved equals list.

END OF SECTION 15610

1 STEEL PIPE FOR HYDRONIC SYSTEMS

.1 Pipe material to be schedule 40 steel.

.2 Screwed fittings for piping 50-mm (2-inch) and under, with full cut standard taper threads.

.3 Flanged or grooved mechanical couplings for piping 65-mm (2-1/2-inch) and over.

.4 Welding fittings shall comply with the latest edition of the following standards.

.1 ANSI B16.9 and B16.25.

.2 ASTM Designation A234.

.5 Ream piping to clean scale and dirt from inside and outside surfaces prior to installation.

.6 Provide eccentric pipe reducers for heating water lines, installed to prevent collection of air pockets.

.7 Ensure no joints of dissimilar metals are provided. Brass adapters can be provided where joining dissimilar materials.

2 BOILER CONDENSATE PIPING

.1 Pipe material to be steel pipe to copper.

.2 Pipe Fittings – Copper Pipe

.1 Cast bronze: to ANSI B16.18 or wrought copper and bronze: to ANSI B16.22

.3 Flanges – Copper Pipe

.1 Brass or bronze: to ANSI B16.15 or cast iron: to ANSI B16.4

.4 Pipe Joints:

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

.2 Provide dielectric couplings on all systems except closed loop systems wherever pipes of dissimilar metals are joined.

.5 Hangers and Supports:

.1 For copper pipe, Grinnel Fig. CT-65 (copper plated) or Grinnell Fig. 260 epoxy coated.

3 ROUTING OF HEATING WATER PIPE

.1 New heating water piping is located in the boiler room.

4 REDUNDANT PIPE

.1 Redundant heating water pipe is required to be removed.

5 VENTING AND DRAINING

.1 Provide 20 mm drain valves at all low points in the piping to allow drainage of system.

.2 Provide air vents at all high points, with 12-mm (1/2-inch) isolation valve.

.3 Vents to be manual type at locations outside the mechanical room, (ie: at all unit ventilator and reheat coils). Construct from a short vertical section of 50mm diameter pipe to form air chamber. Provide 3mm brass needle valve at top of chamber.

.4 Vents to be automatic type in service rooms where floor drains are available.

6 PIPE HANGERS

.1 Use steel ring and clevis type hangers attached to galvanized steel rods to support all suspended piping. The use of perforated band iron or wire is not permitted.

.2 Provide sheet metal shields to protect insulation from being crushed at hanger locations. Install piping to allow for expansion and contraction and provide adequate clearance around pipe hangers to allow installation of pipe insulation.

.3 Hangers for copper pipe shall be copper plated and plastic dipped, or pipe wrapped with Polyken tape at hangers.

.4 Install hangers for steel and copper pipe with a maximum separation as indicated in table below and where required elsewhere to avoid sag in pipe installation**.** .

Pipe diameter	Rod diameter	Steel	Copper
Up to 19mm	10mm	1.8m	1.8m
25mm to 32mm	10mm	2.4m	1.8m
38mm to 50mm	10mm	3.0m	2.4m
65mm to 75mm	13mm	3.6m	2.4m
100mm to 130mm	16mm	3.6m	2.4m
150mm	19mm	3.6m	

.5 Provide galvanized steel, continuous threaded hanger rods.

.6 Inserts

.1 Insert shall be malleable iron case or galvanized steel shell with expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms.

.2 Size inserts to suit threaded hanger rods.

.3 Cast-in-place concrete insert shall be galvanized malleable iron or steel

Grinnell Fig 281 or Fig 282 or Unistrut.

.4 Drilled concrete insert shall be Hilti Model HSL or HVA.

.5 All inserts shall be ICBO approved. Use only ICBO design load ratings.

7 FREEZE PROTECTION

.1 Do not install heating water piping in exterior walls or unheated areas of the building.

8 INSTALLATION OF CONTROLS EQUIPMENT

.1 The Contractor is TO install equipment supplied by the Controls contractor for digital controls, including control valves, piping wells for temperature and pressure sensors and flow meters. The Controls Contractor is responsible for wiring of such devices. Refer also to Section 15920.

.2 The Contractor is to install equipment supplied by the Controls contractor for non-DDC applications, including flow switches, pressure switches and safety devices. The Controls Contractor is responsible for wiring of such devices. Refer also to Section 15910.

.3 The Contractor is to supply and install wells for non-DDC pressure and temperature gauges indicated in this section

9 FIRESTOPPING

.1 Refer to Section 15340

10 PRESSURE TESTING

.1 Test heating water piping at a pressure of 860 kPa (125 PSIG).

.2 Demonstrate the test pressure does not fluctuate for a period of eight hours. Have test witnessed by the Consultant or the Owner’s designated representative.

11 VALVES

.1 Provide valves as indicated below and on the drawings. The valve designations apply to Red & White valves, equivalent products from alternate approved manufacturers listed in the approved equals list in Section 15020 are also acceptable.

.1	Gate valves	Model 206
.2	Ball valves	Model 5544
.3	Horizontal check valves	Model 236
.4	Strainers	Model 380B
.5	Drain valves	Model 5046

.6 Butterfly valves — Not Permitted

.2 Provide 13-mm isolation valves for all air vents and gauges.

.3 All valves must have the manufacturer's name and recommended pressure rating clearly stamped on the valve body.

.4 Provide all valves for heating water service rated for 860 kPa (125 PSIG) service.

.5 Chained caps are required on all drain valves.

.6 Provide isolation ball valves on both the heating water supply and heating water return lines serving ALL hydronic heating appliances (heating coils, force flow heaters, radiant panels, radiation, etc.). All required isolation valves may or may not be shown on the mechanical drawings and / or mechanical details. It is the Contractor's responsibility to provide the required isolation valves whether they are shown on the drawings and / or details or not.

.7 Provide threaded unions on all piping connections to control valve assemblies. Install unions to facilitate the quick maintenance removal and replacement of control valve piping assemblies.

12 BALANCING VALVES

.1 Circuit Balance Valves

.1 Install on the return line at the following locations:

.1 Boiler primary circuits

.2 Install Armstrong model CBV or approved equivalent circuit balance valves with read-out ports, position read-out and memory and insulated valve body packaging at the following locations:

13 PRESSURE GAUGES

.1 Provide pressure gauges for the following locations:

.1 Suction and discharge of pumps

.2 Entering line to boilers

.3 Expansion Tanks

.2 Magnehelic Gauges - 90mm diameter dial in case, diaphragm actuated, black figures on white background, front recalibration adjustment. Inclined type manometer and tubing, static pressure tips, and mounting assembly.

.3 Photohelic Gauges - 120/1/60 adjustable photohelic pressure gauge c/w 90mm dial in case, external 4 - 20 Ma signal for connection to remote system.

.4 Provide pressure gauge taps in all unit ventilator and reheat coil supply and return connections.

14 THERMOMETERS

.1 Provide stem type thermometers at the following locations:

.1 Inlets and outlets of boilers

.2 Main supply and return lines of building secondary heating circuits.

.2 Thermometers shall have 225 mm scale with adjustable angle setting, readout in deg C and deg F.

.3 Provide thermometer wells at all unit ventilator and reheat coil supply and return connections. Wells shall be machined from brass bar stock and complete with cap and chain and 13-mm NPT thread.

15 PRE-OPERATIONAL CLEANING AND CHEMICAL TREATMENT

.1 Refer to Section 15050

16 GROOVED MECHANICAL PIPING SYSTEM

.1 Victaulic is acceptable in all locations on hot water to -30 F to 250 F, compressed air lines, equipment drains and overflows.

.2 Couplings: 1.5” to 12” Contractor shall use Victaulic Style 107 Quick Vic or Style 07 “Zero Flex” rigid couplings in all applications except where flexible Style 177 Quick Vic or Style 77 couplings are approved by the Engineer for use at equipment connections: i.e. pumps, chillers, cooling towers. An installation diagram will need to be approved by Engineer prior to installation.

.3 Gaskets shall be manufactured by Victaulic, and shall be verified as suitable for the intended service prior to installation.

.1 Grade “EHP” EPDM for water and oil-free air services -30°F to + 250°F. (UL classified in accordance with ANSI/NSF-61 for hot & cold potable water services.)

.4 Field Grooved Joints:

.1 For grooved joints, pipe ends shall be clean and free from indentations, projections and roll marks in the area from pipe end to groove for proper gasket seating.

.2 Contractor shall verify the pipe and grooves meet Manufacturer’s current specifications. Groove depth dimension “C” shall be verified by using a Pi tape. A copy of Manufacturer’s product field installation hand book shall be present on site during construction and shall be read by tradesman before installing products.

.3 Grooving tools shall be manufactured by Fitting Company. The tools shall be used in strict accordance with the latest Manufacturer’s instructions.

Contractor will make sure that the correct rolls are used for each pipe type and system.

.4 Install all products in accordance with the latest installation instructions as published by the Manufacturer of the product.

.5 The grooved coupling manufacturer's factory trained representative shall provide on-site training for contractor's field personnel in the use of grooving tools, application of groove, and installation of grooved joint products. The manufacturer's direct representative shall periodically visit the jobsite and review installation. Contractor shall

END OF SECTION 15630

1 GENERAL

.1 Scope of Work

.1 Installation of all controls hardware, wiring and programming of software as required for a completely operational, commissioned control and monitoring installation for the mechanical systems described herein.

.2 The HVAC control system shall be based on Direct Digital Control, hard-wired, with electronic sensors and actuators.

.3 The system, provided shall comply with the requirements of the latest version of ANSI/ASHRAE Standard 135 “Data Communication Protocol for Building Automation and Control Networks”

.4 Provide a building automation system consisting of all required electronic panels, field devices, wiring, control valves, control dampers, programming and system graphics and user interface for the renovation/addition. The new system shall interface to the existing control system and the existing system graphics is to be updated with the new systems added. The system is to achieve the control, monitoring and diagnostics capability identified in this specification, the sequence of operation and points list.

.5 The system installed will be manufactured by Delta Controls and installed by a contracting firm licensed as a Delta vendor

.6 The Controls Contractor shall coordinate the requirements of all mechanical and electrical equipment to be controlled and be responsible for the coordination and interface requirements between the Controls, HVAC and Electrical Systems, as well as existing conditions.

.7 All new DDC controllers to be BTL listed.

.8 All new electrical control components shall be CSA and ULC approved.

.9 The Owner will provide a high speed internet connection for remote access.

.10 The DDC system shall simultaneously accommodate more than one operator working on the system.

.11 Provide complete dynamic color graphical user interface.

.12 Provide at least one licensed copy of the successful vendors OWS software or as many copies required to meet the project requirements.

.13 Wiring:

.1 Provide all control wiring, whether line or low voltage, all system components, devices, actuators, relays, etc. as necessary for operation of the system.

.2 Include for all wiring associated with the heating boilers, including low water cut-offs and high temperature limits.

.3 Include for line voltage wiring and required switches for manually controlled exhaust fans. Refer to Section 15915.

.4 Include for all wiring and pneumatic controls requirement of dust extraction systems (DC-1, DC-2 and DC-3). Refer to Section 15870.

.5 All wiring shall conform to the requirements of Division 16000 and the Canadian Electrical Code.

.6 Control wiring to be a minimum of 18 gauge, run in conduit or as plenum rated cable where described below.

.14 For existing sites undergoing upgrades, subject to prior approval by the Owner existing components maybe re-used such as relays, control panel enclosures, valves, damper actuators, temperature sensors, air proving switches, devices, components, wiring, conduit, etc., for line or low voltage interlocking.

.15 When upgrading existing sites upgrade status monitoring for fans and pumps from the existing control relays to analog current sensors. For each motor program analog currents values to provide on/off/trouble indication. Fan currents are to be measured and recorded as a REMARK statement in the control coding for future reference in establishing the on/off/trouble indications. For fans that operate on low medium and high speeds the fan currents are to be measured and recorded as a REMARK statement in the control coding for future reference. These measured values will be used to establish on/off/trouble indications for operation at any of the selected speeds. System graphics are to visually indicate “ON”, “Off”, and “Status does not equal Command” for controlled equipment.

.16 Commission the control system installed, including

.1 VISUAL end-to-end checks on all actuated devices

.2 Provide verification and calibration check sheets for all actuated devices for inclusion in the Operation and Maintenance manual.

.3 Cooperate with the Testing, Adjusting and Balancing (TAB) agency for the following operations

.1 Actuating of control valves and dampers to assist with air and water systems balancing

.2 Provide access to programming and software code for review

.3 Assist with random end-to-end checks for verification of controls operation

.4 Provide remote access to the TAB agency for the duration of the warranty period.

.17 Provide a minimum of 16 hours training and instruction to the Owner’s maintenance personnel. This should occur in two phases - 8 hours after

completion and 8 hours after 3 months of operation, at mutually agreeable times.

.18 The Contractor is to include for two service visits during the warranty period. One at the start of the first heating season and one at the start of the first cooling season after substantial completion.

.19 Provide for inclusion of the Operation and Maintenance manual complete As- Built control drawings, sequences of operation, product data sheets for all newly installed products and end-to-end verification check sheets. Control drawings are to completely replace all existing control drawings for projects undergoing retrofit.

.20 Provide and install point labels / baggage tags for all connected DDC points. The labeling standard Panduit LS9 Labeller or equal

.21 The Controls Contractor is to coordinate all shutdowns and system switchovers with the Owner prior to the activity taking place. Allow 2 weeks notice to allow adequate time for the Owner to coordinate the activity.

.22 The Controls Contractor is to include supply of any required software licences to allow the Owner to access and operate newly installed equipment.

.2 System Description

.1 General Requirements

.1 The Control System shall be an on-line network of distributed, communicating microprocessor based stand-alone controllers, field sensors, control devices, enclosures and interconnecting conduit and wire.

.2 The networked components of the system shall make up a BACNet network - including at least a high speed and/or other LAN's interconnecting BACNet devices. Those devices on the BACNet inter-network shall communicate utilizing the BACNet protocol on BACNet LAN types.

.3 Actuation of control devices shall be electronic. Fail-safe actuation shall be provided on all control dampers and primary equipment valves when property damage is possible without fail-safe operation.

.2 Basic System Architecture

.1 The system components shall include but not be limited to:

.1 Third Party Application Software

.2 Panels and Enclosures

.3 Field Sensors

.4 Controlled Devices

.5 Interconnecting Wire & Cabling

.6 Network LAN's & Communication Protocols

.7 Interfaces for Hardwire Connection to Variable Frequency Controls, Chillers and Lighting

.8 Serial interface to other system listed below:

.2 Field Sensors and Control Devices shall connect to peer-to-peer, fully programmable B-BC, B-AAC & B-ASC as required to achieve the point monitoring and control sequences specified by the Consultant.

.3 All devices are to be monitored by B-OWS. Controlled devices are to be electronically actuated.

.4 Each mechanical system shall have a controller that shall be connected to all field sensors and control devices for that system.

.5 Sensors and Control devices shall be UL listed.

.3 Quality Assurance

.1 Control System components shall be manufactured by firms regularly engaged in manufacture of equipment of the types and sizes required.

.2 The Controls Contractor shall be a licensed contractor specializing and experienced in control system installations for not less than 5 years and with experience in networked microprocessor based commercial HVAC and Electrical control systems installation with point counts equal to this project.

.3 All employees of the Controls Contractor involved in the engineering, programming, and commissioning of the DDC system shall have successfully completed the manufacturer's classes on the control system. Provide proof of certification copies through to the Design Authority or to the Owner if requested.

.4 The BACNet inter-network shall be based on the manufacturer's standard integrated hardware and software product offering, which has been installed and fully operational in similar service for not less than 2 years.

.5 To the extent practical, all equipment of the same type serving the same function shall be identical and from the same manufacturer.

.6 Meet the requirements of all governing and applicable local or national standards and codes, except when more detailed or stringent requirements are indicated by the Contract Documents, including the requirements of this Section and the following:

.1 The latest version of the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Standard 135 "Data Communication Protocol for Building Automation and Control Networks"

.2 National Institute of Standards And Technology NIST IR 6392 Annex B Profiles of Standard BACNet Devices

.3 Underwriters Laboratories UL 916: Energy Management Systems.

.4 Institute of Electrical and Electronic Engineers (IEEE) 142 Recommended Practice for Grounding of Industrial and Commercial Power Systems

.5 Electronics Industries Associations

.1 EIA-232 Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange

.2 EIA-485 Standard for Electrical Characteristics of Generator and Receivers for use in Balanced Digital Multi-point Systems

.6 Federal Communications Commission- Part J for class "A" application.

.4 System Performance

.1 The system shall conform to the following performance standards:

.1 Graphics shall display with a minimum of 50 dynamic current data points and within 2 seconds of the request.

.2 The maximum time between the command of a binary object by the operator and the reaction by the device shall be 2 seconds. Analog objects shall start to adjust within 2 seconds of being commanded to change.

.3 All changes of state or change of analog values shall be transmitted such that no reporting of a value is more than 2 seconds old.

.4 The maximum time from when an object goes into alarm to when it is annunciated at the B-OWS shall not exceed 2 seconds.

.5 B-BC, B-AAC, & B-ASC shall be able to execute control loops at a selectable frequency at least 5 times every second. The controller shall scan and update the process value and output generated by this calculation at this same frequency.

.6 All B-OWS on the network shall receive alarms within 5 seconds of each other.

.1 Each controller/sensor combination shall be selected and designed to perform within the accuracy and repeatability limits specified herein.

.2 Unless noted otherwise in these Specifications the overall combined system accuracy of sensors, controllers and readout

devices shall be as noted in the following.

Measured Variable	Reported Accuracy
Space temperature	+/-0.5 deg C
Water temperature	+/-0.5 deg C
Delta-T	+/-0.15 deg C
Water flow	+/-2% of actual valve
Water pressure	+/-1PSI (Note 2)
Electrical Power	±2% of Range (Note 3)
Note 1: (10% to100% of scale) (cannot read accurately below 10%)	
Note 2: for both absolute and differential pressure	
Note 3: * not including utility supplied meters	

.3 Overall combined system repeatability of sensors, controllers and readout devices for a particular application shall be plus or minus 2 percent of full scale of the operating range. Repeatability of overall combined system of sensor, controller and readout device in a control loop application will be plus or minus 5 percent of full scale of the operating range.

.4 Long-term electronic drift shall not exceed 0.4 percent per year.

.7 The system to have an ultimate capacity of at least 2,000,000 points.

.8 All components provided as part of this system shall operate under indoor ambient environmental conditions of: 35 to 122 °F dry bulb and 10 percent to 95 percent relative humidity, non-condensing as a minimum. Outdoor conditions shall be -30°F to 150°F and 0 percent to 100 percent relative humidity. Sensors and control elements shall operate under the ambient environmental temperature, pressure, humidity, and vibration conditions encountered for the installed location. B-OWS equipment, such as CRTs and printers, shall, unless designated otherwise, operate properly under ambient environmental conditions of 45 to 90 °F and a relative humidity of 10 percent to 90 percent.

.9 Networked components of the system shall be able to operate at 90-percent to 110-percent of nominal voltage rating and shall perform an orderly shutdown below 80-percent.

.10 All sensors and control devices exposed directly to a controlled media shall be rated to withstand 150 percent of maximum conditions found where in contact with the controlled media, and shall be constructed of material suitable for the media sensed.

.5 Submittals

.1 Indicate at the beginning of each submittal known substitutions and deviations from requirements of Contract Documents.

.2 Submit the following within 30 days of Contract award:

.1 A complete bill of materials of equipment to be used, indicating manufacturer and model number.

.2 A schedule of all control valves including the valve size, dimensions, model number (including pattern and connections), close-off rating, flow, CV, pressure rating and location.

.3 A schedule of all control dampers, including damper size, pressure drop, manufacturer and model number.

.4 Provide manufacturers cut sheets for major system components. When manufacturer's cut sheets apply to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted or clearly indicated by other means. Include:

.1 Proposed Control System architecture riser diagram.

.2 Provide a BACNet Product Implementation Conformance Statement (PICS) or BIBB table for each BACNet device type in the submittal.

.3 Color prints of complete set of graphics with a list of points for display.

.3 Contractor shall submit shop drawings and manufacturers' standard specification data sheets on all hardware and software to be provided. Submittals shall contain the following information:

.1 Bill of materials showing manufacturer, model number, and description for each control component.

.2 System architecture one-line diagram.

.3 Schematic flow diagram of each air and water system showing fans, coils, dampers, valves, pumps, heat exchange equipment and control devices. Include sequence of operation including alarm and emergency sequences, equipment interlocks, and manual override capabilities.

.4 Indicate all required electrical wiring. Identify sources for all power to each device.

.5 Details of control panels, including controls instruments and labeling.

.6 Application Programming

.1 Complete input output point schedule identifying, function, type, location, and identification code.

.2 Description of system operation under failure conditions.

.4 Project Record Documents: upon completion of installation submit the following for the Owner's review, prior to inclusion in the Operation and Maintenance manuals. "As–Built Documents" should include:

.1 Project Record Application Engineering Drawings.

.2 Operating and Maintenance (O&M) Manual including:

.1 Operators' Manual with system manufacturers complete operations manual.

.2 Programming Manual including:

.1 Documentation on application and DDC programs.

.2 Information required for independent programming of system.

.3 Point schedules; include all points, real and virtual.

.4 Hard copy of all analogue calibration settings for Inputs, Outputs, Variables and PID Loops.

.5 Hardcopy of every graphic with a signoff of all verified and commissioned points, and a summary of deficient items per graphic.

.3 Maintenance Manual including the following:

.1 Routine preventive maintenance procedures, corrective diagnostic troubleshooting procedures, and calibration procedures.

.2 Parts lists with manufacturers catalog numbers and ordering information.

.3 One set of magnetic media containing files of all color graphic screens created for the project.

.4 A list of recommended spare parts with part numbers and supplier.

.6 Calibration, Start-Up, Verification and Acceptance

.1 Calibration and Start-Up

.1 Calibrate all components of the control system prior to acceptance testing.

.2 Upon completion of the installation, all control equipment supplied under this contract shall be calibrated and adjusted to place the system in automatic operation.

.3 Verify that each control panel has been installed according to the shop drawings and test, calibrate and bring on-line each control device.

.4 Allow for time on site as required to coordinate

.1 With the TAB Agency's balancing contractor, to initiate operation of equipment and to open and close valves and dampers to allow Balancing Agent to balance air and water systems

.2 With the TAB Agency's verification contractor, to tune mechanical sequences and demonstrate correct systems performance.

.3 With the Chemical Treatment agency, to position control valves to ensure chemical flushing of all piping and terminal heating and cooling components is accomplished

.2 Verification

.1 Verify the overall networked system performs as specified.

.2 Carry out end-to-end checks for all control points, verifying their proper operation. End-to-end checks are defined as VISUAL confirmation that an input or output signal from the DDC system results in correct operation of physical system components, not assumed operation as implied by output status indicated on system interface screens or graphics. Produce documentation indicating the date and results of all end-to-end checks, including calibration factors entered.

.3 Subsystems not controlled electronically shall also be tested and commissioned.

.3 Demonstration and Acceptance Testing

.1 Complete sequences of operation shall be demonstrated to the TAB Agency and the Owner's representative prior to substantial completion.

.2 Using the documented calibration and commissioning test data the Owner and /or his representative shall select, at random, results to be demonstrated. At least 95 percent of the results demonstrated must perform as specified and documented on commissioning data sheets or the system must be re-calibrated and re-commissioned before being re-tested.

.3 After the acceptance tests is complete a seven-day endurance test period shall begin. If the system functions as specified throughout the endurance test period requiring only routine maintenance and

adjustment, the system shall be accepted. If during the endurance test period the system fails to perform as specified and cannot be corrected within eight hours, the Owner may request that the endurance tests be repeated after problems have been corrected.

.4 For completion, all device and wire tagging is to be complete. All Box covers are to be installed and labeled with the contractor's identification stickers. Power circuits identified. Panel lamacoids and panel stuff sheets are to be installed. As Built documentation complete. Analog inputs, analog outputs and analog variables placed on trend logs. Digital inputs, digital outputs and digital variable control flags placed on runtime logs.

.4 Operational Training Program

.1 The Contractor shall furnish the services of competent instructors who will give instruction on the adjustment, operation, and maintenance of the control system provided.

.2 This Contractor shall conduct two separate four hour operational training programs for the building operating crew. Training shall be done on the owners Control System and shall include:

.1 General equipment layout.

.2 Sequences of operation.

.3 Maintenance and repair.

.4 Troubleshooting.

.5 Preventative maintenance.

.6 Sensor calibration.

.7 Proper use of service material, and tools.

.5 temperature control as required by the LEED commissioning team.

.7 Coordination and Work by Other Trades

.1 By Electrical Contractor:

.1 All power wiring to mechanical equipment, including line voltage wiring for controls which directly switch the power to single phase motors.

.2 Supply and installation of 120 VAC power outlets to each group of VAV boxes.

.3 Installation and wiring of variable frequency drives supplied by the Controls Contractor. (For pumps P-1, P-2, P-3 and P-4)

.4 Installation and wiring of variable frequency drives supplied by equipment manufacturers. (For air handling units AHU-1 and AHU-2)

.5 Supply and installation of a 120 volt AC power circuit for use by the controls contractor in the Boiler Room

.6 Supply and installation of a 120 VAC circuit in the boiler room for use as primary power for the DDC system.

.7 Supply and installation of a CAT5e connection from the main floor control panel to the building Intranet router.

.2 By Mechanical Contractor

.1 Installation of all valves, temperature wells, flow meters, and flow switches supplied by the Controls Contractor.

.8 Warranty, Maintenance, Normal and Emergency Service

.1 The Contractor shall warranty the Control System to be free from defects in workmanship and material under normal expected service and use for a period of one (1) year from date of final acceptance by the Owner.

.2 During this period, the Contractor shall furnish all labor to repair or replace all items or components that fail due to defects in workmanship or material at no charge or reduction in service to the owner. Provide this service within 24 hours of notice from the Owner's representative.

.3 Manufacturer shall provide a five-year warranty for all B-BC, B-AAC and B-ASC controllers.

2 PRODUCTS

.1 Alarming and Event Notification

.1 B-OWS terminal shall provide audible, visual, and printed means of alarm and event notification.

.2 System shall provide log of notification messages. Alarm log shall be archived to the hard disk of the system B-OWS.

.3 Alarm messages shall be in user-definable text (English or other specified language) and shall be entered either at the B-OWS terminal or via remote communication.

.4 An alarm summary shall be available to show all alarms whether or not they have been acknowledged.

.5 System shall provide ability to prioritize and differentiate communications for at least 6 different levels of alarms

.6 Alarm messages shall be fully customizable in size, content, behavior and sound.

.7 Critical Alarm messages shall also be emailed.

.2 Weekly and Annual Scheduling

.1 Provide separate schedules for each day of the week, and provide at least four On/Off periods per day.

.2 Provide the ability for the operator to designate any day of the year as an exception schedule.

.3 Provide the capability for the operator to define up to special or holiday schedules.

.4 There shall be a provision with proper password access to manually override each schedule.

.5 Provide the capability to designate any schedule to be “Executed Once” then automatically cleared.

.6 Systems will be setup for the following common schedules:

.1 Annual Schedules

.1 Facility Closed

.2 Override Days

.3 Boiler Enable

.4 Cooling Enable

.2 Weekly Schedules

.1 School Occupancy

.2 Boiler Operation

.3 Lighting – for multiple zones

.4 Perimeter Security, Parking, Interior, Gyms, Separate Interior Security Zones, and Administration.

.5 Gym Occupancy

.3 Trend Log Graphing

.1 Any system point either real or calculated shall be assignable to the historical trending program by gathering historical samples of object data stored in the field equipment (global controllers, field controllers).

.2 All trend log information shall be displayable in text and graphic format, and shall be able to be printed in black & white or color. Long-term archives shall be stored onto a dedicated machine or server.

.4 Runtime Log Information

.1 The system shall monitor equipment status and generate maintenance

messages based upon user designated run time. All Digital outputs and Digital inputs shall be monitored with Runtime logs.

.2 The DDC system will programmed to prevent all controlled equipment from simultaneously restarting after a power outage. The order in which equipment (or groups of equipment) is started; along with the time delay between starts shall be user-selectable.

.3 All binary output points shall be protected from short cycling. This feature shall allow minimum on time and off-time to be selected.

.5 System Configuration, Set-Up and Definition.

.1 Device and network status shall be displayed for any device on the BACNet.

.2 All control strategies and energy management routines shall be stored in the controller and shall be definable by the operator.

.3 B-OWS shall be able to back-up and restore the programming and data for any BACNet device on the BACNet. Users shall also have the ability to manually execute downloads of any or all portions of a device database.

.4 Provide a context sensitive, on-line help system to assist the operator in operation and editing of the system.

.5 Provide the tools to create, modify, or debug all application programming.

.6 Color Graphics

.1 Provide a color graphics package to allow the user to generate custom dynamic graphics for graphical representation of system design and system parameters. Graphic images may reside on the B-OWS or server; however, all dynamic data and attributes must reside in the controller.

.1 A listed set of symbols and graphic slides shall be provided to allow operators to select from the graphics table to assist in graphic generation.

.2 All color graphic display shall be dynamic with current point data automatically updated from the BACNet to the B-OWS workstation without operator intervention.

.2 The operator shall be able to manually adjust digital, analog or calculated values in the system, adjust values of control loops, and command points to local mode or release points to automatic mode.

.3 The windowing environment of the B-OWS shall allow the user to simultaneously view several graphics at the same time to analyze total building operation, and/or to allow the display of a graphic associated with an alarm to be viewed without interrupting work in progress.

.4 Graphic generation software shall be provided to allow the user to add, modify, or delete system graphic displays. The system shall provide

libraries of pre-engineered screens and symbols depicting mechanical system components.

.5 The contractor shall provide all graphics.

.6 The system shall be provided with fully automatic diagnostic procedures for verification of field communication. In the event of communications failure, the system shall AutoDial the condition to a remote operator. AutoDial out will repeat alarms while the situation remains unacknowledged.

.7 Control Summaries, Reports and Logging

.1 The system shall provide self-documentation reporting to summarize control strategies for any point or any user selected group of points within the Control System.

.2 The B-OWS shall provide reporting and logging functions for user defined point value and status information.

.3 The B-OWS reporting package shall allow the user to configure the point information display in custom format.

.8 LAN Types and Communications

.1 This Control System shall comprise a BACNet, as described in Part 1.

.2 Each BACNet device shall operate on the BACNet physical/data link protocols specified for that device. Physical/data link protocol types utilized for communications exchange throughout the system will be limited to those LAN types described in the ANSI/ASHRAE Standard 135-1995, BACNet. BACNet LAN types are the following:

.1 BACNet/IP.

.2 Ethernet (10Mps/100 Mps) (IEEE 802.3) via 10BASE-T, 10BASE-2, 10BASE-5, and 10BASE-F.

.3 Master Slave/Token Passing (MS/TP) via RS-485.

.4 Point-to-Point via RS-232 or Modem connection.

.3 The Controls Contractor shall provide all communication media, connectors, repeaters, modems, switches, hubs, bridges and routers and half-routers necessary for the BACNet.

.9 General Field Devices

.1 All control relays shall be UL listed plug-in type with dust cover and with contacts and coils rated for the application.

.2 Relays used for in-line control start/stop of line voltage motors and shall have a current rating at least 1.5 times full load amps.

.3 Control transformers shall be CSA and US listed. Primary and secondary

sides shall be fused in accordance with the NEC or shall be class 2 current limiting type.

.4 Voltage/Current to Pneumatic Transducer shall be non-bleed type 0-5V or 0-10V input and output pressure to match spring range of controlled device.

.5 Emergency shut-off switches shall be heavy duty, two-position push-pull, maintained contact, illuminated, 1-3/8 inch in diameter mushroom style push button switch. Provide hinged easy open protective clear cover to prevent accidental operation of switch.

.10 Interconnecting Wire and Cable

.1 Wire & cable for power, interlock, communications, sensor, and control device wiring shall be as specified in Div 16, the National Electric Code, Network Standards, control system manufacturer recommendations, and applicable local codes.

.2 All control wiring shall be in conduit in accordance with Division 16 Section "Raceways and Boxes".

.11 Analog Temperature Sensors

.1 Temperature sensors shall be linear precision elements either Resistance Temperature Device (RTD) or Thermistor type.

.2 Single point duct temperature sensor shall consist of 316 stainless steel sensing element, junction box for wiring connections and gasket to prevent air leakage or vibration noise.

.3 Averaging duct temperature sensor shall consist of a copper or stainless steel averaging element, junction box for wiring connections and gasket to prevent air leakage or vibration noise.

.4 Liquid immersion temperature sensor shall include thermowell, sensor and connection head for wiring connections.

.5 Outside air temperature sensor shall consist of a single device sensor, ventilated non-metallic sun shield, utility box for terminations, and watertight gasket to prevent water seepage.

.6 Space temperature sensor shall consist of an element within a ventilated cover. Sensors located in mechanical areas, plenums, lobbies, or other public spaces shall be simple sensor with no setpoint adjustment.

.1 Provide occupant setpoint adjustment (+ - 1.5 Deg C) for sensors in occupied areas such as classrooms and administration.

.2 Provide nonadjustable sensors for the Gymnasium and typically unoccupied areas such as corridors, storage rooms and washrooms.

.3 Include the following options inherent to the equipment provided.

.1 Override switch

.2 LAN connection
.3 Service tool connection
.4 LCD display.

.7 All sensors which are not located in public spaces and are associated with B-ASC or B-AAC that are located in normally inaccessible locations shall be the same. Sensors accuracy shall be unaffected by wiring up to 250-feet.

.8 Insulated mounting base shall prevent temperature of mounted wall or drafts due to outside wall mounting from effecting sensor temperature.

.9 Sensor guards shall protect sensor from damage.

.10 Provide brass or stainless steel thermo-wells for each immersion type temperature sensor and switch.

.11 Outside Air Mount: Provide element with non-corroding watertight enclosure and fitting for conduit connection.

.12 Duct Mount Probe: Provide element with handi-box for terminations, flange and 233 mm long element holder for duct insertion.

.13 Duct Mount Averaging: Provide 2438 mm averaging element with handi-box for terminations, flange for duct insertion and adequate support to prevent vibration.

.14 Pipe Well Mount Probe: Provide a threaded brass or stainless steel temperature well filled with thermal transmission grease sized to match temperature probe.

.12 Switching Temperature Sensors

.1 Low limit thermostat shall be of the vapor pressure remote element, automatic reset type with adjustable set point. Sensing element shall be 20 feet long. The device shall respond to the lowest temperature to which any 1 foot of the 20 foot long element is exposed.

.2 Capillary Type Thermostats shall have liquid or vapor-filled thermal system consisting of stainless steel or copper sensing element, connected to a fully compensating capillary tube, and operating bellows or spiral.

.3 Surface Mounted Thermostats shall be line voltage on-off type suitable for strapped mounting to pipe.

.4 Wall Mounted Thermostats shall be line voltage on-off type suitable for wall mounting.

.13 Analog Current Sensitive Relays

.1 Provide a sealed unit incorporating the current transformer and relay with dry contact output for motors with a rating of ½ HP or less.

.2 Provide a current transformer with analog output calibrated such that power consumption can be calculated and trended for all motors with a rating of greater than ½ HP.

3 EXECUTION AND INSTALLATION

.1 General

.1 Control System component locations are the responsibility of the System Contractor. All control system components shall be installed in locations as required to properly sense the controlled medium and shall be easily accessible for adjustment and service. All components shall be installed in accordance with the component manufacturer's recommendations.

.2 The system shall be installed such that all wiring, communication, analog or digital, input or output shall be capable of sharing single conduit runs without affecting signal performance.

.3 The Contractor shall protect all work and material from damage by his/her work or workers, and shall be liable for all damage thus caused.

.4 The Contractor shall be responsible for his/her work and equipment until finally inspected, tested and accepted. The Contractor shall protect his/her work against theft or damage, and shall carefully store material and equipment received on site that is not immediately installed.

.5 After completion of installation, calibrate and commission all components provided as part of the Control System and demonstrate proper sequence of operation in compliance with Section 1.6. Equipment not operating correctly shall be field corrected or replaced.

.2 Control System Application Software

.1 At the time of acceptance all operating system, Third party and Control System Application software shall be at least the latest version available.

.2 The Application software provided shall incorporate the feature described fully implemented and optimized to provide the sequences described, minimize energy consumption and prolong equipment life.

.3 The following naming convention shall be standards for the naming of BACNet Devices on the BACNet inter-network. The convention for object names viewed by B-OWS shall consist of a string made up of components indicating, as appropriate, the building location, the building, the system, the subsystem, and point function of the object.

.4 When programming the system BACNet addressing rules will be strictly adhered to. All addressing strategies will have to be approved by the Owners representative prior to terminating any LAN types.

.5 All analog and binary values shall be programmed with appropriate alarms.

.6 Except as specified otherwise, throttling ranges, proportional bands, and cycle differentials be centered on the associated set point.

.7 All set points unless otherwise indicated are adjustable and shall be programmed for all control loops.

.8 Each control loop or interlock for all mechanical system including terminal unit systems shall be programmed with a control loop specific graphical trend to trend all values associated with each specific control loop or system interlock.

.9 Where any sequence or occupancy schedule calls for more than one motorized unit to start simultaneously, the system shall start commands shall be staggered by 60-second (adjustable) intervals to minimize inrush current.

.10 Scheduling shall be developed for each mechanical system to the following:

.1 Occupied: 7:30 AM- 6:00PM – Monday to Friday

.2 Unoccupied: All other times and all statutory holidays.

.11 Optimal start/ stop programs shall be applied to all regularly scheduled mechanical and electrical systems.

.12 Trend logs shall be implemented for every analog hardware and software point on the system. Point trends shall be grouped into logically interrelated points for individual mechanical systems. Initial set-up shall be to log values once every 15 minutes.

.13 Runtime logs shall be implemented on every digital hardware and virtual point on the system.

.14 B-OWS Graphics

.1 All sensors, control devices and set points shall be visible on a B-OWS in graphical form.

.2 All mechanical systems shall have a programmed real time color graphic for primary graphical user interface.

.3 Individual floor plan graphics will be programmed for each floor or area of the building. All space sensors and their associated setpoints will be visible on floor plan graphics and system graphic.

.15 Each floor plate graphic to have school map with hot points for navigation.

.16 Floor plates shall indicate both Architectural and School room numbers or shall provide some method of switching between room numbering schemes.

.3 Control Enclosures and Sub-Panels

.1 All system components not designed for or required to be field installed shall be mounted in a control enclosure. Those components shall be sub panel mounted except components that are mounted on the panel face.

Provide on/off power switch with over-current protection for control power sources in each local enclosure.

.2 All control enclosures shall be located so visual observation and adjustment can be accomplished while standing flatfooted on the floor in a convenient location adjacent to the equipment served. Label all control system components.

.3 Copies of the “As-built” application engineering for the system served shall be legible and laminated in clear plastic and suspended within enclosure.

.4 All B-BC, B-AAC and B-ASC shall be mounted in an enclosure.

.4 Interconnecting Wire and Cable

.1 General

.1 It shall be the System Contractor's responsibility to provide all wiring required for a complete Control System.

.2 Control system wiring and cabling installed for this project shall include but may not be limited to the following:

.1 Include all power wiring required not indicated on the electrical plans and specifications.

.2 Power to all actuators and, where required, sensors.

.3 Provide all wiring and cabling for network communications except for owner provided LAN’s/WAN’s.

.4 All sensor and control device input and output wiring.

.5 All interconnecting cabling between and amongst network devices, PCs printers, modems, etc.

.6 Interlock wiring between devices, and between motor starters.

.7 All other necessary wiring for fully complete and functional system as specified.

.8 Field mounting and wiring of control devices applicable to the Control System but specified elsewhere shall be field installed by System Contractor including, but not limited to:

.1 Wiring of unit heater thermostats.

.2 Cooling tower basin heater, water level and vibration control wiring.

.9 Install piping, wiring/cabling parallel to building lines.

.3 Maximum allowable voltage for control wiring shall be 120-volts.

.4 All wiring shall be installed as continuous links, where possible. Any required splices shall be made only within an approved junction box or other approved protective device.

.5 Verify integrity of all wiring to ensure continuity and freedom from shorts and grounds.

.6 This Contractor shall terminate all control and/or interlock wiring and shall maintain updated (as-built) wiring diagrams with terminations identified at the job site.

.2 Power Wiring and Cabling

.1 Power wiring for all enclosures and equipment, including branch circuit wiring from circuit breaker panels shall be the responsibility of the System Contractor.

.2 All B-OWS equipment shall be served from isolated ground receptacles via UPS by dedicated branch circuits.

.3 All other enclosures, sensor and control devices shall be fed from separate circuits in the electrical distribution panels and shall not be served from the typical floor receptacle or lighting circuits.

.3 Network Wiring and Cabling

.1 Network installation shall conform to standards for the LAN types and cabling types selected. Specific network rules inherent to the ANSI/AHRAE Standard 135-1995, BACNet will be followed. Those include but are not limited to:

.1 Only one path can exist from any BACNet device to another.

.2 Each BACNet device connected to an inter-network LAN must have a unique device instance (0-4,194,303).

.3 Each inter-network LAN must have a unique Network Number (1-65,545).

.2 Primary LAN Network wire and cable shall be run in metallic conduit separately from all other wiring.

.3 Other LAN Network wire and cabling shall be installed separate from any wiring over thirty (30) volts.

.4 All communications shielding shall be grounded as per Networked System manufacturer's recommendations. All RS-485 network cabling shall done using low capacitance cable – Beldon no. 9841 or equivalent for FT4 applications or 98241 or equivalent for FT6 applications.

.5 Contractor may elect to run unshielded cable if noise immunity is ensured by other means. Contractor will be fully responsible for noise immunity and rewire with shielded cable if electrical or RF noise

affects performance.

.5 Analog Temperature Sensors

.1 All wires attached to sensors shall be air sealed in their conduits or in the wall to stop air transmitted from other area affecting sensor readings.

.2 Install and properly support all enclosures and sensing elements as much as possible in the center of duct cross section and in straight duct runs. In condensing environments use stainless steel flanges to support sensing elements.

.3 Sensors mounted on air ducts having exterior insulation shall be provided with handy-box mounting with insulating material firmly fitted around hand-box.

.4 Sensors for mixed air and air streams greater than 6 square feet or 24 inches in either direction shall be averaging type. Provide a minimum of 1 linear foot of sensor per 4 square feet of duct area or equal to duct width where installed, whichever is longer.

.5 Temperature sensors installed in piping or tanks shall be in separable thermo-wells. Sensors shall be inserted into thermo-wells with conductive fluid. Assembly shall allow removal of sensor without loss of fluid.

.6 At a minimum one outside air temperature sensor shall be installed. It shall be mounted outside on a northern exposure as high as serviceable on the building. The sensor shall be mounted within a ventilated enclosure to shield the sensor from the effects of the sun.

.7 Zone temperature sensors located on perimeter walls shall have insulated mounting bases to prevent false room temperature readings.

.8 Where wall sensors are mounted in an area subject to damage provide suitable metal guard.

.9 Where wall sensors are mounted in public spaces with adjustable set points provide suitable security guard.

.10 Provide matched temperature sensors for differential temperature measurement. Differential accuracy shall be within 0.1 deg C (0.2 deg F).

END OF SECTION 15910

1 CONDENSING BOILER PLANT

.1 Sequence of Operation

.1 Start-up and shutdown of the system will be controlled by DDC schedule.

.2 The DDC system shall include an outdoor air temperature sensor and survey building heating requirements to provide the boiler system with 0-10V reset signal.

.3 All boilers will be operated by DDC. The two condensing boilers (B-1 and B-2) will be operated in tandem and in modulating mode to maximize operating efficiency..

.4 The DDC input shall change the desired set point no faster than 2 deg C per minute, unless going into shutdown.

.5 A signal to start any of the boilers should include confirmation that the related primary circuit pumps are running. The boiler supplier will provide a flow switch, to be installed by the Mechanical Contractor and wired by the Controls Contractor to confirm this requirement.

.6 Provide individual boiler outlet supply water temperature sensors.

.7 If alarm points are provided on boilers from the factory, wire back to DDC controller.

.8 Provide firing status of each boiler

.9 Boiler Emergency Shutdown Switch

.1 The controls contractor shall connect the new boilers to the manually operated switch at each entrance/exit point to the boiler room. Upon activation of the switch, all power supplies to all of the boilers in the room shall be killed.

.2 One set of contacts shall be wired to kill power to all of the boilers in the room. The second set of contacts shall be monitored by the DDC system. The DDC system shall initiate an alarm when the switch is activated.

.2 Interface to Manufacturer Supplied Cascade Controller

DO Heating Enable
DI Alarm
AI Condensing boiler common header supply water temperature
AI Condensing boiler common header return water temperature
AO 0-10 VDC Reset

Based on outdoor air temperature to enable boilers, the following schedule is a suggested starting point that may require modification due to local site operating conditions

OAT > 20 C (68 F)	All Boilers Off
OAT < 20 C (68 F)	Enable condensing boilers in series

.3 Heating Plant DDC Points List

AI Outdoor air temperature (Existing)

DO Boiler B-1 Enable (Existing)
DI Boiler B-1 Status (Existing)
DO Primary Pump BP-1 Enable (Existing)
DI Primary Pump BP-1 Status (Existing)
AI Boiler B-1 supply water temperature (Existing)
DI Boiler B-1 flame failure alarm (Existing)

DO Boiler B-2 Enable (Existing)
DI Boiler B-2 Status (Existing)
DO Primary Pump BP-2 Enable (Existing)
DI Primary Pump BP-2 Status (Existing)
AI Boiler B-2 supply water temperature (Existing)
DI Boiler B-2 flame failure alarm (Existing)

AI Common header supply water temperature (Existing)
AI Common header return water temperature (Existing)

END OF SECTION 15920