



Procurement Services – Public Tenders Office

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Rev 131122

REQUEST FOR PROPOSAL (RFP)

CBI15_469

Design-Build Tender for Fire Sprinkler System Upgrades

Vista Heights, 312 Esplanade, Sydney

Sponsored by the

Cape Breton Island Housing Authority

Housing Nova Scotia

Proponent Meeting
The proponent is invited to attend a Proponent Meeting, as follows: April 22, 2015, 10:00 a.m. Vista Heights, 312 Esplanade, Sydney Attendance is not mandatory.

Important Notes for Bidding:

- This RFP document contains 86 pages, including appendices. Please contact the Public Tenders Office if any pages are missing.

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Glossary of Terms

“**Addenda**” or “**Addendum**” means each amendment to this Request for Proposals (“**RFP**”).

“**Agreement**” will mean an agreement entered into by Cape Breton Island Housing Authority (CBIHA) and the Contractor.

“**Appropriate authority**” or “**appropriate authorities**” unless indicated otherwise, means authorities having jurisdiction. This includes but will not be limited to: Provincial Office of the Fire Marshall, all Municipal authorities, utilities or occupational health and safety officials.

“**As required**” unless indicated otherwise means as required: by referenced standards; by appropriate authorities having jurisdiction; by product manufacturers; by the contract documents and shop drawings; or as required to complete the task and project; or in accordance with industry standard best practices and reasonable judgment.

“**Authorities Having Jurisdiction**” (abbreviated “**AHJ**”) includes provincial and municipal regulators and agencies with legislated powers, as well as public utilities and their representatives.

“**Business Day**” means a standard eight hour day for conducting business.

“**Construction Contractor**” is a person or company who will install the systems and components as directed by the Contractor.

“**Contractor**” is a person or company who has been contracted by CBIHA to carry out the work.

“**Contractor’s Engineer**” is a team of professional engineers, led by a designated Lead Engineer, engaged to perform tasks and undertake responsibilities within their scope of practice. All engineers shall be in good standing and registered to practice in the Province of Nova Scotia.

“**Evaluation Team**” means the committee formed by HNS to evaluate Proposals submitted in response to this Request for Proposals.

“**General**” or “**generally**,” either in text or title, unless indicated otherwise, implies universal requirements unless otherwise indicated, specified, shown, stated or directed.

“**Owner**” is Housing Nova Scotia (HNS) and/or designated agent(s).

“**Project Manager**” refers to the designated staff members of HNS who are responsible for managing project budgets, schedules, documents, contractor activities and payments.

“**Proponent**” refers to any person or entity that submits, or intends to submit, a Proposal in response to this Request for Proposals.

“**Proposal**” is the formal response to the RFP by an individual Proponent or partnership.

“**Provide**” unless indicated otherwise means to design, supply and install.

“**Site**” or “**Subject Property**” means the property upon which the project is located

“**Work**” means individual or multiple tasks issued subsequent to this RFP.

1.0 Introduction

1.1 Department Overview

Housing Nova Scotia (HNS), a Crown corporation of the Province of Nova Scotia (Province), is the entity-owner of the Province's senior and family public housing buildings and units. These housing units are managed and administered by Housing Nova Scotia's five Housing Authorities on a day-to-day basis with technical support and guidance from Housing Nova Scotia's Property and Facilities group. For additional information, visit <http://www.housingns.ca/>

1.2 RFP Overview

Cape Breton Island Housing Authority (CBIHA) and Housing Nova Scotia (HNS) (the "Owner") require the services of a Design-Build Contractor (the "Contractor") to lead, on a Bulk Sum Contract basis, a comprehensive team of technical building professionals and tradespeople, qualified in their area of expertise and possessing experience consistent with the Owner's objective. From system design through construction and project management, to the end of the warranty period, the Contractor shall provide management, technical, engineering and construction services to fulfill the Scope of Work and the Contract arising from this RFP.

The specific services required are the design and installation of upgrades to an existing sprinkler and fire pump system in Vista Heights, a multi-unit seniors' apartment building located at 312 Esplanade, Sydney. The objective of the Work is to bring several areas of the building up to present day code, and to design and possibly implement other items recommended for upgrade. The upgrade design and installation shall be in conformance with Orders and Recommendations as sent to the Owner by the provincial Office of the Fire Marshal, and as described in the following scope of work.

The Contractor's Engineer shall have within its firm a qualified well-experienced sprinkler design engineer who shall work on this Project, and who is professionally registered and licensed to practice in Nova Scotia. The Construction Contractor shall work together with the Contractor's Engineer to provide all required upgrades, additions and changes to the existing fire pump and sprinkler system to provide an acceptable level of protection for Vista Heights that meets with the approval of both the Provincial Office of the Fire Marshal and the municipal AHJ.

The final design package, which shall include all AHJ Ordered and Recommended upgrades, shall be completed and approved by all parties and AHJs within four (4) weeks of Contract award. Construction of Work required to comply with AHJ Orders shall be completed within ten (10) weeks from the date of approval of the design package, pending no major issues. The Proponent shall prepare a proposed schedule for completion of the Recommended Work as part of the Proposal submission.

1.3 RFP Process

Proposals will be received by Cape Breton Island Housing Authority located at 18 Dolbin St., First Floor, Sydney, N.S. until **2:00 P.M. Local Time Tuesday May 5, 2015**. Email quotes are acceptable to: John.Savoy@novascotia.ca. Faxed quotes are acceptable if transmitted to fax number (902) 539-0330.

Enquiries can be made

- i) For Housing Authority:
John Savoy, Purchasing Agent
Cape Breton Island Housing Authority
Email: John.Savoy@novascotia.ca
Tel: 902-539-8520

- ii) For Housing Nova Scotia:
Ramzi Kavar, Building Design Manager
Housing Nova Scotia
Email: Ramzi.Kavar@novascotia.ca
Tel: 902-424-6748

The Proponent is responsible for obtaining any needed clarification of the RFP requirements while the RFP is open. Questions should be directed in writing to the RFP Contacts.

1.4 Contract Award Process & Schedule

The following schedule is issued for guidance:

RFP posted on Procurement Services website	April 16, 2015
Last day for bidders' written questions	April 23, 2015
Final date for issue of addenda (Responses to Questions)	April 27, 2015
RFP Closing Date	May 5, 2015
Design-Build Contract Awarded (if all conditions are met)	May 6, 2015

A pre-bid proponents' meeting and site visit will be held at 10:00 a.m. on April 22, 2015 at Vista Heights, 312 Esplanade, Sydney, N.S.. The Owner's representatives will be present.

1.5 Agreement Duration and Primary Work Location

The Agreement arising from this RFP shall remain in effect for a period of one year following completion of the Work, or until the Contractor's duties under the warranty provisions of all installed equipment and systems are discharged.

HNS reserves the right to issue a subsequent RFP or public tender to address new work as it arises. The decision whether to amend an existing contract and / or to issue a subsequent RFP or tender is at the sole discretion of Housing Nova Scotia.

Location of Work is Sydney, N.S.

2.0 Contractor

2.1 Contractor

The Contractor / Proponent shall be experienced in all aspects of the design and construction tasks described herein. The Contractor shall coordinate the activities of the Contractor's Engineer, Construction Contractor, and all required subconsultants as applicable.

The Contractor shall employ, partner with or subcontract the services of professional engineers experienced with design and installation of automatic fire suppression systems (along with their associated control and emergency power systems) in similar multi-unit tall residential buildings, including mechanical and electrical engineers, and other professional disciplines as required. Engineers shall be in good standing and registered to practice in the Province of Nova Scotia.

The Contractor shall employ, partner with or subcontract the services of a Construction Contractor, who shall be experienced in supply and installation of complete fire protection, sprinkler, and fire pump systems for multi-unit tall residential buildings. Note that the Contractor may act as Construction Contractor if the Contractor possesses the required qualifications.

2.2 Construction Contractor

The Construction Contractor shall be experienced in supply and installation of complete fire protection, sprinkler, and fire pump systems for multi-unit tall residential buildings.

The Construction Contractor shall ensure that work of all trades is conducted by Nova Scotia licensed professionals and apprentices, and that a designated construction supervisor and a licensed tradesperson are present on site for the trade activity taking place at any given time.

2.3 Contractor's Engineer

During design and construction phases, the Contractor's Engineer shall work with the Construction Contractor and any other required engineering consultants to make all the upgrades as per Orders. Similarly for Recommendation upgrades once the Owner has reviewed projected construction costs and has agreed to these work items;

The Contractor's Engineer shall be responsible for the preparation of design, drawings, specifications and construction review of the fire suppression system upgrades as defined in the scope of work. The Contractor's Engineer shall assemble and coordinate a team of engineering personnel as required to provide a complete engineering design, including drawings, specifications and product lists, for the fire suppression system upgrades.

The Contractor's Engineer may either be employed directly by the Contractor, or may be associated with the Contractor through a partnership, subcontract, or other agreement. The Contractor's Engineer will report to both the Contractor and the Owner.

Engineers are ultimately completely responsible for their own drawings and specifications, and are not to include any technical design requirements from this document unless they are completely comfortable with their inclusion in the final drawings and specifications. However, any variance from the technical requirements of this document must be requested in writing from the Owner.

The Contractor's Engineer shall ensure that those conducting the engineering design are professionally registered to practice in Nova Scotia. All documentation, calculations and design drawings for all disciplines shall bear the professional seal of the responsible individuals.

The Contractor's Engineer shall ensure that engineering designs are in compliance with all applicable current standards and codes. The Contractor's Engineer shall specify materials and

equipment that comply with Canadian Standards Association (CSA), Underwriters Laboratories of Canada (ULC), and/or AHJ standards and requirements, as well as the requirements defined in this RFP, its appendices, addenda and contract documents. In the event of conflict, the most stringent requirement shall apply.

Construction documents shall meet the requirements defined in the "Guidelines for Engineering Design Drawings" published by the Association of Professional Engineers of Nova Scotia (APENS).

3.0 Service Requirements

The Contractor will be responsible for completing the Work as described in the following section, and for complying with the General Conditions specified in Appendix B. The requirements in this section will prevail as enduring requirements for service delivery throughout the effective period of any contract(s) resulting from this RFP.

The Contractor will be responsible for working collaboratively with HNS's in-house team members and the Office of the Fire Marshal to achieve the stated outcomes. HNS' project managers will be responsible for providing direction to the Contractor, and for resolving issues related to all aspects of the project.

HNS will provide available information about the building upon request. The Contractor should not make any assumptions regarding the existence of as-built or original construction drawings.

HNS will provide the project requirements and related data, and Owner approvals upon completion of design or construction tasks requiring approval. No acceptance or approval by HNS, whether expressed or implied, will be deemed to relieve the Contractor of any professional or technical responsibilities for all things required under any Contract arising from this RFP.

The final design package, which shall include all AHJ Ordered and Recommended upgrades, shall be completed and approved by all parties and AHJs within four (4) weeks of Contract award. Construction of Work required to comply with AHJ Orders shall be completed within ten (10) weeks from the date of approval of the design package, pending no major issues. The Proponent shall prepare a proposed schedule for completion of the Recommended Work as part of the Proposal submission.

3.1 Scope of Work

The Contractor shall conduct an onsite investigation to assess the existing system configuration in relation to the content of Orders issued by the AHJ, and develop separate, itemized cost estimates for design and installation of both the Required and Recommended upgrades for review and approval by the Owner.

The Contractor, in conjunction with the Contractor's Engineer, shall develop engineering designs and specifications in sufficient detail to enable the Construction Contractor to perform the Work. The Contractor shall then construct or direct the construction of all AHJ Ordered Work, Recommended item #1 in Section 3.1.4, and any other Recommended Work approved by the Owner.

The content of the scope of work outlined below, both general and specific, is not all-inclusive. It shall be the responsibility of the Contractor to provide all engineering and related design work required for the complete design upgrade in order to provide an acceptable level of protection for Vista Heights, and meeting with the approval of all AHJs.

3.1.1 General Scope – Contractor

In conjunction with his/her Construction Engineer (Consultants) and Construction Contractor, the Contractor shall prepare Engineering Design and Construction Documents, including drawings, specifications and product lists, for approval by the Owner. These shall set forth in detail the requirements for the construction of the project. The level of detail of these documents shall be sufficient to convey the design intent, to permit review, to ensure that codes and standards are met, to minimize omissions or conflicts, to provide a record and be helpful in the operation and/or use of the engineered system or facility, and to meet the requirements of authorities having jurisdiction over the project.

The Contractor shall:

- In coordination with the Construction Contractor and Contractor's Engineer, prepare a detailed project plan complete with timelines, critical steps and milestones for construction of AHJ Ordered Work, Recommended item #1 in Section 3.1.4, and any additional Recommended Work approved by the Owner. The project plan shall be prepared using Microsoft Project or other acceptable software. The plan shall be completed within the first week following Contract award, and shall be reviewed and approved by the Owner prior to construction.
- Submit all engineering design, shop drawings and construction documents to obtain approval or comments from the Owner and AHJs;
- Oversee and review engineering designs, shop drawings, and as-built components to ensure that all are in conformance with the contract documents;
- Refer all questions and proposed changes during design and construction to the Owner's Project Manager;
- Obtain all required permits including a building permit from the local municipality having jurisdiction.
- Provide a fire watch and fire safety plan that meet the latest provincial and municipal regulations for periods when the fire protection system, fire sprinkler and fire alarm systems are shut down or impaired. The fire watch and safety plans shall meet AHJ approval.
- Provide certificates, fire alarm panel resizing and verification reports and/or other endorsements of compliance as required for sprinkler systems, fire alarm panel and all associated equipment requiring testing.
- Provide documentation for hydrostatic tests, back-flow preventer flow tests and supervised flow switch tests and any other required tests.
- Ensure that all tests are witnessed by the Project Manager and/or Housing Authority designated official.
- Oversee commissioning and testing of all upgrades and their co-working / integration with the existing fire protection and sprinkler systems and integration with other building systems.
- Partner with the Housing Authority to organize and coordinate an independent inspection between all involved, Contractor, Construction Contractor, Contractor's Engineer and Project Manager, and the AHJs prior to the new system becoming operational and commissioned. All deficiencies discovered shall be addressed and corrected by the Contractor.
- Ensure that all involved, Contractor, Construction Contractor, Contractor's Engineer and Project Manager, attend all inspections requested by the Housing Authority, Local, Municipal and Provincial AHJs.
- Be responsible for providing temporary utilities as required and shall submit a fire safety plan outlining fire protection service measures where needed meeting with local AHJ approval.
- Compile as-built drawings and operation and maintenance manuals from all subcontractors and consultants for generation of electronic and hard copies of as built records.
- Respond to requests from the Owner (and others such as authorities having jurisdiction) and provide additional technical information not shown on the drawings or contained in the specifications.

- Provide written recommendations necessary for the proper execution of the work with reasonable promptness when requested and shall render written recommendations promptly on all claims, disputes and other matters in question.
- Schedule and chair project site meetings. The Project Manager shall attend all meetings. Members of the design team shall attend when topics pertaining to their specialty are to be discussed. The Contractor shall provide the Owner with minutes of the project site meetings.
- Attend regular meetings of the work site committees and also resident maintenance committee meetings consisting of representatives from the various project locations.
- Provide immediately submission material as reviewed and approved by the Contractor's Consultants to the Project Manager for information purposes and for confirmation of conformance to the Contract Documents. The Project Manager shall review submissions such as product lists, product data, shop drawings and samples to ensure they are in full compliance with the Contract Documents.
- Compile as built (record) drawings, and operation and maintenance manuals for the complete fire suppression system, as well as associated systems and components, such as control panels, pumps, generators and switch gear.
- Conduct any further reviews and tests that are considered necessary and appropriate by the Owner and Project Manager. The Project Manager shall carry out site reviews and shall supervise or witness all tests to verify that the Contract work is proceeding in accordance with the Contract and Construction Documents and to ensure that the time required to correct Contractor deficiencies during the facility start-up is minimized. The Project Manager shall notify the Contractor of work that does not conform to the Contract and Construction Documents with recommendations on how the work should be corrected.

3.1.2 General Scope – Contractor's Engineer

The Contractor's Engineer shall:

- Utilize all relevant information pertinent to the existing building automatic fire sprinkler suppression and fire pump system as provided by HNS including scanned original engineering drawings and written Orders and Recommendations as contained in the letter of January 14, 2015 from the Provincial Fire Marshall. As well, investigate as required on site for needed sprinkler system information including data on existing electrical service, mechanical and other building information;
- Use recently-obtained hydrant flow hydraulic measurements of the Municipality water supply as provided for Vista Heights, 312 Esplanade, for the purpose of upgrade design to the existing automatic fire sprinkler fire pump suppression system;
- Perform a design review to determine the most demanding zone's hydraulic requirements;
- Provide the designs, specifications, shop drawings and construction costs per system change / addition including all piping, valve works, controls and zone changes for the upgrades;
- In the replacement of the fire pump controller system, confirm and/or provide room-space ventilation requirements;
- When designing for additions as in the case of new dry systems and what shall be required for the Rogers Telecommunications building fire suppression equipment, etc. provide layout design with consideration given to space / room requirements to hold separate sprinkler equipment. (Space shall be found within the Vista Heights building);

- Confirm and/or provide electrical design and specifications to make changes to accommodate the specified new fire pump, controller and automatic transfer switch electrical needs. Confirm that its emergency electrical service can be provided by the on-site emergency power generator;
- Design shall include confirmation and/or specification of all required flow valve controls for the upgraded stand pipe system, new mains and sprinkler additions and new fire pump system replacement and new zoning;
- Clearly call out complete specifications and requirements for the changes and /or additions to all supervisory, water flow signals and zoning in order to provide successful notification and integration into the existing fire alarm control system. Confirm if the existing FAS control panel is adequate. If not then specify and recommend a new panel(s) that meets with the Owner's requirements;
- Provide a total construction cost estimate breakdown per line item in the specific scope list below, including materials, components and Construction Contractor labour, midway during the engineering stage;
- Provide engineering designs with drawings, specifications, calculations, dimensioned details, shop drawings, components and material lists as required for a complete design review by the Owner prior to submitting these items to the AHJ for approval;
- Coordinate all levels and disciplines of engineering services, and work collaboratively with the Owner's mechanical and electrical buildings engineers;
- Verify all necessary field data, measurements, layouts and obtain any capacity, consumption and as-built information beyond that provided and per existing site conditions;
- Conduct site visits as necessary to determine and to confirm system specifics, and to confirm that specifications for new equipment, materials, and components are compatible with existing fire protection systems and other building systems;
- Ensure that construction specifications clearly indicate contingencies for temporary utilities where building utilities may be disrupted during construction phase;
- Submit engineering designs to the local AHJ and Provincial Fire Marshal to meet with their approval. Coordinate and submit engineering electrical design to Nova Scotia Power Inc. (NSPI) for approval of electrical system changes needed to accommodate the upgrade;
- Modifications to designs shall be made as necessary as requested by the AHJs, NSPI and HNS;
- Present the final engineering stamped design drawings, specifications, calculations, dimensioned details, shop drawings, components and material lists for HNS's final review and approval prior to issuing to HNS a complete design package. Upon final approval they shall be released to the partnered Construction Contractor for completion of the Project;
- Review the construction and inform the Contractor and the Owner of any aspect of the system not installed in accordance with the project drawings and specifications, AHJ requirements or manufacturers' specifications.
- Review the as built drawings and operation and maintenance manuals prepared by the Contractor before distribution to the Owner at project closeout.
- As applicable obtain, complete and submit Design, Construction Inspection Commitment and Field Review of Construction Certificates (relevant schedules A-1 to A-11) as described in the Nova Scotia Building Code Regulations.

3.1.3 General Scope – Construction Contractor

The Construction Contractor shall:

- During pre and construction phases, the Construction Contractor shall work with his/her partnered sprinkler fire protection engineering consultant team to make all the upgrades as per Orders. Similarly for Recommendation upgrades once the Owner has reviewed projected construction costs and has agreed to these work items;
- Coordinate with the Contractor's Engineer and the Contractor to provide the Owner with a detailed project plan complete with timelines, critical steps and milestones;
- Ensure where building utilities may be disrupted during construction phase that provision is made for providing temporary utilities as required to the approval of the Project Manager and the Contractor shall submit a fire safety plan outlining fire protection service measures where needed meeting with local AHJ approval.

3.1.4 Specific Scope – Contractor's Engineer

The Contractor's Engineer shall produce designs for upgrade additions and changes which have been categorized as "Orders" and "Recommendations" as follows:

Orders

1. Basement shall be sprinklered with its own new main taken off of the stairwell standpipe riser. It shall be fed on its own zone including new valve works, flow station and control wiring to the building fire alarm control system (FAS).
2. Parking lot glycol antifreeze sprinkler system shall be changed out and replaced with an end of line dry pipe system connected to the new proposed wet system main. The dry system shall be on its own zone with a supervisory flow monitoring to the FAS.
3. New fire pump – controller - dedicated transfer switch shall replace the existing. Sizing and specifying of a new fire pump system shall be based on the supply water hydraulic measurements provided. The fire pump and controller combination shall come as a manufacturer approved package and ETL listed, with each component ULC / CUL listed. Design shall include examination of the existing serving electrical system including its switch gear, cabling and system components handling the fire pump system to verify that it shall accommodate the new specified fire pump system. Design shall include all electrical system components feeding the fire pump replacement.
4. With new fire pump, ensure that most demanding portion of the existing and new additions to the sprinkler stand pipe system can be provided with water pressure that meets the latest standard requirements.
5. Elevator two level penthouse existing sprinkler protection shall be separated from the 12th (top) floor zone and made into its own separate zone, including new valve works, flow station and control wiring to the building fire alarm control system (FAS).
6. Rogers Communication building shall be automatic sprinklered underneath with an end of line dry system. Confirm that the new sprinkler lateral shall be taken off the main prior to the serving of the elevator penthouse levels sprinkler protection.
7. Inside of the Rogers Communication building shall be protected automatically with a fire suppression system. The design consultant shall recommend the type of suppression system

that is best suited for the building's communication contents and shall be required to consult with Rogers to obtain their approval.

The sprinkler system addition to the outside and the fire suppression system for the inside of the Rogers Communication building shall be together on its own zone with interconnection to the building FAS. Note there presently is fire detection inside the communication building with connection to building FAS.

Recommendations

1. The building's two stand pipe risers shall be separated from each other, and the interconnection reworked at each floor to produce two independent stand pipes. By doing so, each floor shall have two zones ensuring flow detection for each zone at all floors. There shall be an approved supervised water supply control shut-off valve at the base of each stand pipe riser.
2. Building sprinkler heads shall be changed to residential fast response type sprinkler heads where necessary compatible with the new fire pump system, hydraulic pressures produced and meeting with present day Standards and Codes. Proposed change out of sprinkler heads shall meet with the approval of the Project Manager, HNS and AHJs.
3. Electrical room for each floor shall be fire protected according to latest Standards and Codes. (They presently have fire detection). It is understood from the Provincial fire Marshall's Office that there may be two approaches to achieve approved protection: automatic sprinkler protection or if the electrical room meets the conditions set out in NFPA 13 (2013) Section 8.15.11. The Contractor's Engineer shall investigate and determine what would be the total cost associated with sprinklering: to not only provide and install automatic water-based sprinklers into each electrical room but to make all necessary modifications to each room's present electrical cabinets, switchgear, their cable connections, as well as the cost of shielding (if available for purchase) to protect buss bar openings, in order to prevent accidental spray water from entering / leaking into any electrical switchgear and equipment. Secondly, shall investigate and determine if the alternative to sprinklering can be met, providing all requirements and the costs to make all necessary changes to the electrical rooms to ensure that conditions of the applicable NFPA section(s) are met. Provide findings, costs and recommendations early into the engineering stage of work, such that the Project Manager and HNS can make a timely decision. Upon decision, the Contractor's Engineer shall design all as necessary for the chosen approach meeting with AHJs approval.

3.1.5 Specific Scope – Construction Contractor

The Construction Contractor shall:

- Supply and install all sprinkler and fire pump systems equipment, valves, controls, piping, mechanical, electrical, building construction and all else as required to engineering design drawings, specifications, parts lists, detail shop drawings, to manufacturer instructions and to industry-recognized practice.
- Be responsible for demolition and removal of all that is required in a safe method. Separation of materials and removal from site shall be according to Municipal and Provincial regulations and to the approval of the Project Manager;
- Provide for all electrical and controls to complete changes and additions to sprinkler and fire pump systems.

- Supply and install a new fire alarm panel if so directed by the Contractor and Contractor's Engineer. Size the fire alarm panel with respect to new zone loads and provide complete load documentation. The panel shall comply with all standards and codes, and shall meet with the approval of the municipal and provincial AHJs. The Contractor shall be responsible for all systems and devices connected to the fire alarm control panel.
- Certify all changes and new FAS equipment if any modifications are made such as in the case of additional zones and signal wiring. Then the Contractor shall require to obtain an independent, manufacturer panel certified professional to verify the FAS control panel system changes and the previous existing and to provide certification that all is functioning properly meeting with approval from the AHJs. This report shall be presented to the Project Manager stating and showing all testing.
- Any cutting of existing piping and/or other building materials shall be done by cold methods and to be done in such a manner as to produce the least disturbance to the residents and staff of Vista Heights.
- Be responsible for provision for patching, painting and finishing as required to same or better surrounding conditions. Not exclusive to removal and replacing of sprinkler heads, piping, hatchways, chase work, wall and ceiling work.
- Conduct all work relating to the concealment of pipe, wire, conduit and duct work in finished areas including fire stopping.
- Ensure that any changes and additions to sprinkler system cannot freeze;
- Conduct all related work including as necessary civil, structural, landscaping, roofing, building construction including excavation, trenching, back filling, paving, cutting, coring, patching, finishing and painting as necessary.
- Conduct all related work to reinstate site and building to conditions equivalent or better to which existed prior to work being done.
- Reinstate any disturbed site paving for roadways, parking lot and walkways, whether asphalt pavement or concrete, to new conditions according to Nova Scotia Department of Transportation & Infrastructure specifications.
- Be responsible for testing all entire building sprinkler systems once the upgrades are finished to ensure that upgrades work in-sync with all sprinkler and pump systems, controls and FAS systems an any other building integrated systems.
- Provide a fire watch and fire safety plan that meet the latest provincial and municipal regulations for periods when the fire protection system, fire sprinkler and fire alarm systems are shut down or impaired. The fire watch and safety plans shall meet AHJ approval.
- Provide certificates, fire alarm panel resizing and verification reports and/or other endorsements of compliance as required for sprinkler systems, fire alarm panel and all equipment requiring testing.
- Provide documentation for hydrostatic tests, back-flow preventer flow tests and supervised flow switch tests and any other required tests. Tests shall be witnessed by the Housing Authority.

3.2 Technical Requirements

The installation process shall take into account all factors affecting the sprinkler and fire pump systems such as quantity and layout of wet and dry and other fire suppression sprinkler piping and heads, pipe support, expansion and contraction, water supply hydraulics, fire pump, controller and automatic transfer switch system, pressure-testing, drainage, fire alarm system and supervisory controls, sprinkler coverage to Codes and Standards and Local and Provincial Regulations, including fire-stopping and freeze protection. These factors are not inclusive.

Carry out all associated work including (but not limited to) sprinkler design and fire suppression, fire detection, notification and FAS controls, plumbing, mechanical, electrical, civil, structural, building construction, site reinstate, interior finishes, disposal, cutting (including core drilling), patching, and painting - all approved by the appropriate authorities.

Work of all disciplines and trades to be in accordance with all building codes and regulations in force at the work place, including but not necessarily restricted to any references contained herein. Where any conflict may appear between referenced standards, technical requirements or manufacturer's instructions, the most stringent and/or most superior standard, requirement or instruction will apply.

3.2.1 References

It is the not the intent of the tendered documents to repeat any part of any of the reference standards. The Contractor must be aware of and be responsible for any requirements contained therein.

In the event of any conflict between any requirements in these documents (including any other applicable reference standards) the most stringent requirement will apply. The Contractor shall follow:

- National Building Code of Canada (NBC)
- Model National Energy Codes for Buildings and Houses
- Nova Scotia Building Code
- National Fire Code of Canada (NFC)
- Nova Scotia Fire Safety Regulations
- NFPA 13 Installation of Sprinkler Systems
- NFPA 14 Standard for the Installation of Standpipe and Hose Systems
- NFPA 20 Standard for the Installation of Stationary Pumps for Fire protection
- NFPA 25 Standard for the Inspection, Testing and Maintenance of water - Based Fire Protection Systems
- Canadian Electrical Code of Canada
- CAN/ULC S524 Installation of Fire Alarm Systems
- CAN/ULC S536 Inspection and Testing of Fire Alarm Systems
- National Plumbing Code of Canada
- NS Occupational Health and Safety Code
- All applicable documents and publications by: Underwriters Laboratories of Canada (ULC); Canadian Standards Association (CSA); Canadian Government Standards Bureau (CGSB)
- All documentation and publications available from product manufacturers.
- All other codes and standards referenced herein, either relevant or associated with work of the contract.

- In addition, to the aforementioned standards, relevant electrical and engineering requirements as contained within:
 - Appendix C - Mechanical Design Requirements: Department of Community Services - Province of NS and
 - Appendix D - Electrical Design Requirements: Department of Community Services - Province of NS will apply.

3.2.2 Sprinkler Shop and Record Drawing Requirements

Submit copies of engineering, shop and record drawings to the Owner for review. All review and final drawings shall include, as a minimum:

- Engineer's certification of compliance with referenced standards.
- Automatic Sprinkler Systems: submit sprinkler design on mylar, A0 size sheets. Only one copy of each drawing is required.
- Documents shall be completed in the Imperial system of units.

Shop and record drawings shall clearly indicate:

- Title block information:
 - Name of Housing Authority: Cape Breton Island Housing Authority.
 - Project Location: Vista Heights, 312 Esplanade, Sydney
 - Project # **100206x** and Job # **BJ140137-138** and date.
- Point of compass.
- Ceiling construction.
- Relevant floor plans and other architectural information.
- Location of relevant fire walls and fire separations.
- Occupancy of each area.
- Location and size of blind spaces and closets.
- Any questionable small enclosures and exterior areas in which no sprinkler heads will be installed.
- Make, type and orifice size of sprinklers.
- Temperature rating and location of high temperature sprinklers.
- Number of sprinklers on each riser and on each zone by floor, and total area protected by each zone on each floor.
- Number of sprinklers on each floor (or level).
- Make, type, model and size of valves.
- Water source valving and connections to sprinkler system, mains, connections between existing and new wet systems.
- Total number of sprinklers on each system.
- Cutting length of pipes or centre to centre dimensions.
- Crosses, riser nipples and size.
- Type of hangers, inserts and sleeves.
- Control valves, accessories, fittings, gauges, checks, drain pipes and test pipes.
- Existing fire pump specifications and location identification.
- Excess pressure pump.
- Flow switches, pressure switches, position switches.
- Provision for flushing.
- Stamp and signature of qualified professional engineer licensed to practice in Nova Scotia.
- Fire Department connection.

- Main alarm valves, controls and new or upgraded fire alarm control system tie-ins to sprinkler system.
- Existing systems as required.
- Name and address of contractor.
- All other details or information as may be required.

3.2.3 Products - General

All materials to be new and conforming to the tender documents, FM, CSA, ULC, ETL or approved equivalent, applicable reference standards and the appropriate authorities.

The contractor shall supply all materials required to complete the Work whether explicitly stated or not.

Regarding fire-stopping and sealing, fill all voids through fire separations with fire-stopping compound as required with suitable fire-stopping materials and at proper fire ratings as per codes and per manufacturer directions. Shop product sheets shall be submitted to Project Manager for approval prior to work.

Seal all interior and exterior voids or joints with suitable caulking, grout or water-stopping compound.

Provide signs, nameplates and labels, as lamicoid 1/8 in thick, red face, white core, whether stick-on or hung by tags on chains, for all workable valves, all gages, sensors, pieces of equipment and control devices, equipment and rooms designated having fire suppression equipment.

Regarding painting, all paint products are to be premium quality, unless indicated otherwise, low VOC products in composition, colour and luster to match or harmonize with existing painted surfaces.

3.3 Project Constraints

Finished Areas: Generally, the Contractor must make every effort possible to conceal all pipes, wires and conduit. Where this cannot be accomplished, complete the installation by enclosing in drywall - taped, filled, primed and painted. Exception: sprinkler pipe may be exposed in apartment closets.

Public Corridors or Corridors Connecting Apartments: Locate heads well away from centre of corridor and close to corridor walls. Do not locate head in front of doors or fixtures. Where circumstances permit, make minor adjustments to existing acoustical suspended ceilings if required but only with Project Manager's approval.

Unfinished Areas: pipe, wire, conduit or duct work is permitted to be exposed in unfinished areas.

Generally, 'unfinished areas' include: penthouse, basement areas not including apartments or corridors connecting apartment, exit stairways, janitor's closet, building exterior and concealed (or confined) spaces. Unless stated otherwise, all other areas will be considered 'finished areas'.

Where exposed pipe, wire, conduit or duct work is permitted, group and run parallel or perpendicular to building lines. Run along corners formed between walls and between walls and ceilings or slabs.

The Contractor to provide floor-to-floor fire watch if at any time the existing fire alarm or stand pipe system is not operable. Provide fire watch and an approved fire safety implementation plan that ensures building and resident protection according to the Nova Scotia Fire Safety Regulations. This plan shall be made in cooperation and coordination with the Project Manager. The fire safety implementation plan shall be made available on site if requested by the Housing Authority.

Nothing to run though structural members without written approval from Project Manager.

All work within the building will be done while the apartments are occupied.

Give Project Manager and Housing Authority 72 hrs notice prior to shutting off water to building or carrying out any activities which may lead to discolouration of water.

3.4 Deliverables

In addition to the printed copies specified below, provide all files used to generate the printed copies on a USB memory stick (or “flash drive”) for Owner review and reproduction purposes.

3.4.1 Design Deliverables

Make all drawings and specifications available in electronic format to the Owner for reproduction purposes. Drawings shall be provided in both AutoCAD and PDF format and specifications in MS Word and PDF format with professional stamps and signature in accordance with the Engineers Act of Nova Scotia and Architects Act of Nova Scotia.

Provide three (3) printed copies of all drawings and specifications at each submission stage for review purposes.

Provide three (3) printed copies of all product lists, product data, shop drawings etc. (reviewed and approved by the Contractor's Consultants) as described above.

3.4.2 Operation and Maintenance Manuals

Provide three (3) printed copies, each in a three ring binder clearly marked to indicate the project name and building location. The Project Manager will review and ensure that these are consistent in scope, content and format with the requirements as described elsewhere in the specifications.

3.4.3 Record (As Built) Drawings

Provide three (3) printed copies and three (3) USB memory sticks storing electronic files in ACAD and PDF formats as described above.

4.0 Administrative and Legal Requirements

4.1 Business Registration

Proponents may be required to be registered to carry on business in accordance with applicable laws. For information on the business registration requirements of the Nova Scotia Registry of Joint Stock Companies, please consult, <http://www.novascotia.ca/snsmr/access/business/registry-joint-stock-companies.asp>

The status of a proponent's business registration does not preclude the **submission** of a proposal in response to this RFP. A proposal can be accepted for evaluation, regardless of (i) whether the company is registered, or (ii) whether its business registration is in good standing. However, a contract cannot be awarded unless the successful proponent is registered and in good standing, in accordance with applicable laws.

If the proponent's business is not required to register in Nova Scotia, the proponent will be required to submit registration from their applicable jurisdiction.

4.2 Contract

After the evaluation, the successful proponent(s) will be required to sign the contract that will constitute the legal agreement with the Province for this project and govern all aspects of the services/goods to be delivered. It will incorporate the relevant terms of this RFP and the provisions of the successful proposal as determined by the Province, and any other terms as the Province may require.

4.2.1 Contract Terms

The standard services contract is available online at:

<http://www.novascotia.ca/tenders/media/11414/standard%20services%20contract.pdf>

The Proponent will be required to sign the standard services contract with no allowance for alterations.

4.2.2 Declaration of Contract Intentions

As outlined in Appendix A, the proponent should prepare a declaration of its intentions regarding the contract. The declaration **should be included with your proposal** as a separate document. Failure to include a completed declaration may be grounds for disqualification.

4.3 Resource Management

In the event the Proponent is awarded a Contract subsequent to this RFP, it is understood that the Proponent commits to make the staff, equipment and software described in the Proposal available to conduct the Work when needed, and to take any steps necessary to ensure the ongoing availability of the proposed resources for the duration of the Contract. The Contractor shall seek the Owner's approval for any change in personnel whose curricula vitae were submitted in the Proposal.

4.4 Joint Ventures

HNS acknowledges there may be mutually beneficial business reasons for proponents to partner with other companies in the submission of a joint RFP response. In such cases, all parties are to be identified in the application, and contractor assignment to specific tasks identified, including distinct breakouts for key individual partnering consultants and summaries for each of the partners.

4.5 Change Process

The Contractor shall direct all potential or requested changes in the work to the Project Manager, in written form. The Contractor shall indicate changes that may be necessary by submitting to the Project Manager, documentation outlining reasons for the change, a cost estimate, schedule impact and all specific details.

If the Owner approves of this change, a "Contemplated Change Order" (CCO) shall be issued to the Contractor. The Contractor shall then provide a quotation in the form of a breakdown of costs for the Project Manager's review and recommendation.

If the CCO is accepted by the Owner, the Project Manager shall issue a Change Order (CO) to the contract with the Owner's signature.

All changes shall be made by CO even though a change may not alter the contract amount.

4.6 Contract Closeout

The Project Manager will review the project for substantial performance of the Work, and prepare and distribute a list of outstanding deficiencies with an estimate of their value. When appropriate, the Project Manager will issue a "Certificate of Substantial Performance of the Work".

The Project Manager will review the project for total performance of the Work. When appropriate, the Project Manager will issue a "Certificate of Total Performance of the Work".

Upon completion of the Work, the Contractor shall amend the reproducible drawings and electronic files to accurately portray the constructed status of the Work. These shall be referred to as "Record Drawings". These drawings shall be submitted to the Owner. Record Drawings shall be amended to the same standard of information as provided on the original construction documents.

4.7 Warranty Phase

Throughout the standard one-year construction warranty period, the Contractor shall, if requested, support and assist the Project Manager in identifying or resolving deficiencies that are or could become items for correction under warranty provisions.

The Project Manager and Contractor shall perform a site review of the project within 30 days of the expiry of the warranty period. The Project Manager shall develop and distribute a list of items for correction under the warranty provisions.

4.8 Other Important Provisions

4.8.1 Conflict of Interest

All queries of every nature from residents, public news media, local citizen groups, etc. must be referred to HNS.

4.8.2 Public Affairs

All queries of every nature from residents, public news media, local citizen groups, etc. must be referred to HNS.

4.8.3 Insurance and Liability

The Contractor shall indemnify and hold harmless HNS, HNS's employees and agents, from any and all claims, demands, actions and costs whatsoever for which the Contractor is legally liable that may arise, directly or indirectly out of any negligent act or omission of the Contractor, his Sub-Contractors, or his or their employees or agents, in the performance of this Agreement by the Contractor.

4.8.4 Invoicing

Invoices are to be submitted to CBIHA within 30 days of completion of the service. If an invoice is not submitted within 30 days the proponent loses the right to collect payment against the invoice/service rendered.

All invoices for Contractor services shall be fully supported, itemized statements including:

1. Details of the work performed
2. Details of incurred costs and expenses
3. Listings of the number of hours worked by persons assigned to the project
4. The hourly rates charged for each person assigned to the project.

4.8.5 Accuracy of Information

While Housing Nova Scotia has made a reasonable effort to ensure the accuracy of the RFP, it is not guaranteed or warranted by HNS to be accurate, nor is it necessarily comprehensive or exhaustive. HNS gives no representation as to the accuracy or completeness of any background or reference information or documents prepared by third parties and made available to proponents. Proponents will have no claim whatsoever against HNS or its representatives with respect to such information.

4.8.6 Ownership and Use of Documents

All documents prepared by the Contractor are instruments of service and are the property of HNS, whether the work be executed or not. HNS reserves the right to use the work executed for any other purpose without the written permission of the Contractor.

5.0 Proposal

To help ensure consistency in proponent responses and facilitate the evaluation process, the proposal should be prepared and packaged as outlined in the sections that follow. Please print double-sided whenever possible and limit promotional and/or marketing materials to the information specifically requested in this RFP.

5.1.1 RFP Proposal Package

A complete proposal package is comprised of the elements below, presented in the order listed:

- ❑ One (1) **Letter of Introduction** – This should identify the Proponent and be signed by a signing officer for the Proponent in order to bind the Proponent to the statements made in the Proposal. The Letter of Introduction shall also include:
 - ❑ A **summary of the Proponent's experience** in the design and construction of complete fire protection, sprinkler, and fire pump systems for multi-unit tall residential buildings, including years of experience performing such work.
 - ❑ The name and experience of the Proponent's **Construction Contractor** (if different from the Proponent), and their experience in supply and installation of complete fire protection, sprinkler, and fire pump systems for multi-unit tall residential buildings.
- ❑ One (1) **preliminary project schedule**, indicating the Proponent's ability to complete the design package for all AHJ Ordered and Recommended upgrades within the required four (4) week timeframe, and to complete construction of AHJ Ordered Work within the required ten (10) week timeframe;
- ❑ One (1) **proposed schedule** for completion of the Recommended Work. Note that Recommended item #1 in Section 3.1.4 shall be constructed under any Contract arising from this RFP, in addition to any other Recommended Work approved by the Owner.
- ❑ One (1) **curriculum vitae** of the **Proponent's manager** who will lead the delivery of all services included in this RFP.
- ❑ One (1) **curriculum vitae** of the **Proponent's site superintendent or foreman** who will manage and supervise onsite activities.
- ❑ One (1) **curriculum vitae** of the **lead engineer who will act as Contractor's Engineer**. This individual may be directly employed by the Contractor, or associated with the Contractor through partnership or subcontract. The individual shall be a qualified well-experienced sprinkler design engineer who is professionally registered and licensed to practice in Nova Scotia.
- ❑ One (1) **Business Registration Profile**
- ❑ **Proof of Errors & Omissions and liability insurance**, and/or other insurance required by their professional association. The Contractor will provide HNS with acceptable evidence of all required insurance prior to the commencement of the work and will promptly provide HNS a certified true copy of each policy
- ❑ One (1) **Letter of Good Standing on Workers Compensation Participation Coverage Recognition Documentation** – Contractor shall submit the latest Letter of Good Standing for his/her business.
- ❑ One (1) **Construction Safety Certificate** of Recognition Documentation – Contractor shall submit his/her business' Safety Certificate or Letter of Good Standing;
- ❑ One (1) **sealed cost proposal envelope**, containing one (1) **fixed price cost proposal** (section 5.2.1).

5.1.2 External Packaging

Label the external packaging enclosing the submitted materials as follows:

Proponent's name
RFP CBI15_469

Title: **Proposal – Design-Build Tender for Fire Sprinkler System Upgrades, Vista Heights**

5.2 Pricing Response

5.2.1 Fixed Price Cost Proposal

Prepare a fixed price for delivery of the proposed services. Provide appropriate details to support these figures, including estimates of the work effort and a breakout of expected expenses. Highlight opportunities for cost savings in providing the services or supplying and installing the required materials.

Note that Recommended item #1 in Section 3.1.4 shall be constructed under any Contract arising from this RFP. The decision on whether to proceed with supply and installation of the remaining AHJ Recommended Work shall be at the Owner's sole discretion.

Service or Deliverable	Level of Effort (person-hours or person-days)	Fixed Price
Engineering Design of Fire Sprinkler System Upgrades		\$
Supply & Install AHJ Ordered Work		\$
Supply & Install Recommended Item #1 in Section 3.1.4		\$
Supply & Install Remaining AHJ Recommended Work		\$
	TOTAL	\$

6.0 Evaluation of Proposals

6.1 General Information

The Evaluation Team will consist of representatives of Housing Nova Scotia, and may include other representatives as deemed appropriate by HNS. It is understood and accepted by the proponent that all decisions about the degree to which a proposal meets the requirements of this RFP are in the sole determination of this Evaluation Team.

To assist in the evaluation of Proposals, the Evaluation Team may, but is not required to seek clarification from a proponent with respect to their proposal. Such clarification will not offer the proponent the opportunity to change or provide new information. To the extent possible, requests made by the Evaluation Team will be sent from the email addresses of the RFP Contacts.

The Evaluation Team reserves the right to consider the Housing Authority's past experience with the Proponent and/or its management, including compliance with the terms and conditions of past contracts between the Housing Authority or the Government of Nova Scotia and the Proponent, and the experience and qualifications of the Proponent's senior management and project management.

The Contract will normally be awarded to the Proponent who submits the lowest bulk sum price, and who fulfils all other stated requirements. However, CBIHA and HNS reserve the right to reject the lowest or any bid.

Appendix A: Declaration of Contract Intentions

The successful proponent(s) will be expected to sign a legal agreement with CBIHA that will govern all aspects of the services to be delivered. Provisions in the proposal that contradict any of the terms of the contract will be as if not written and do not exist.

The proponent shall prepare a declaration to inform CBIHA of its intentions regarding the contract, as shown below. This should be prepared as a short document (preferably on a single page) and should be included in the proposal. **The declaration does not need to be signed.**

Declaration of Contract Intentions
RFP #: CBI15_469 On behalf of _____, I certify that we/I have read and understand the proponent name terms of the contract. If accepted as a successful proponent for this RFP, we/I accept the contract terms and will sign the contract without changes.

Appendix B: General Conditions
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ARTICLE 1 DEFINITIONS

- .1 The Contract Documents consist of the Agreement, the General Conditions of the Contract, the General Instructions, the Project Outline, and the Appendices including all modifications thereof incorporated in the documents before their execution. These constitute the Contract when signed by the Housing Authority and Contractor.
- .2 The term "Subcontractor" includes only a person, firm or corporation having a contract for the execution of a part or parts of the work included in the general contract, and a person, firm, or corporation furnishing materials called for in the general contract and worked to a special design according to the plans and specifications, but does not include one who merely furnished material so worked.
- .3 Instructions shall be deemed to have been duly given if issued in writing, at the option of the Housing Authority, by either:
 - .1 forwards by Registered mail a letter to the Contractor, to the last business address known to the Housing Authority, in which case instructions shall be deemed to have been duly given on the day this letter is deposited in the mail, or;
 - .2 delivering a letter by hand to the Contractor at either: the address set out in the Bid document, the Head Office of the Contractor, or to any officer of the Contractor, in which case acceptance shall be deemed to be the day the letter is delivered.
- .4 The term "Work" of the Contractor or subcontractor includes all labour and materials shown or described in the Contract Documents and in the Construction Documents (drawings and specifications prepared by the Contractor's Consultants).
- .5 The term "Other Contractors" means any person or firm or corporation employed by or having a contract directly or indirectly with the Housing Authority otherwise than through the Contractor.
- .6 National Building Code, National Research Council of Canada, shall apply unless otherwise indicated in the drawings or project specifications.
- .7 Municipal by-laws shall apply where they supersede CMHC Technical Builder's Bulletin.
- .8 The Contract is deemed to be "substantially performed"
 - .1 when the work or improvement is ready for use or is being used for the purpose intended; and
 - .2 when the work to be done under the Contract is capable of completion or correction at a cost of not more than two and one-half per cent of the Contract price.

ARTICLE 2 PROJECT CONSTRAINTS

- .1 Owner's Occupancy: Full and on-going activities shall be maintained at the buildings during the course of the work. Regular operations of the Owner must be accommodated at all times. The Contractor shall keep doors and entrances clear at all times unless the use of same has been prearranged with the Project Manager.
- .2 All heating, domestic hot water, electrical and life safety systems must remain active 24 hours per day throughout the construction period. Only minimal short-term disruptions of building services will be permitted during the construction period. Coordinate with and obtain written approval from the Project Manager prior to the shutdown of any building system.

- .3 Regular working hours in buildings shall be from Monday 8:00 AM to Friday 5:00 PM. Work may also take place during weekend hours, with prior arrangement and written approval from the Project Manager. Provide the Project Manager a minimum of 48 hours written notice of the intent to work weekend hours. Final approval of times when the Contractor is permitted access to the sites remains with the Project Manager. The Project Manager may revise the hours of work without penalty from the Contractor.

ARTICLE 3 DETAIL DRAWINGS AND INSTRUCTIONS

- .1 The Project Manager shall furnish as necessary for the execution of the Work additional instructions, by means of drawings or otherwise. All such additional instructions shall be consistent with the Contract Documents. The Work shall be executed in conformity therewith and the Contractor shall do no work without such additional instructions. In giving such additional instructions, the Project Manager shall have authority to make minor changes in the Work, not inconsistent with the Contract.
- .2 The Contractor and the Project Manager, if either so requests, shall jointly prepare a schedule, subject to change from time to time in accordance with the progress of the work, fixing the dates at which the various detail drawings will be required, and the Project Manager shall furnish them in accordance with the schedule. Under like conditions, a schedule shall be prepared, fixing the dates for the submission of shop drawings, for the beginning of manufacture and installation of materials and for the completion of the various parts of the work.

ARTICLE 4 COPIES FURNISHED

- .1 The Housing Authority shall furnish to the Contractor, signed duplicated of the Agreement.

ARTICLE 5 SHOP DRAWINGS

- .1 The Contractor shall furnish to the Project Manager at proper times, all shop and setting drawings or diagrams which the Project Manager may deem necessary in order to make clear the work intended or to show its relation to adjacent work of other trades. The Contractor shall make any changes in such drawings or diagrams which the Project Manager may require consistent with the Contract, and shall submit two copies of the revised prints to the Project Manager one of which shall be returned to the Contractor and the other retained by the Project Manager. When submitting such shop and setting drawings the Contractor shall notify the Project Manager in writing of changes made therein from the Project Manager's drawings or specifications. The Project Manager's approval of such drawings, or of the revised drawings, shall not relieve the Contractor from responsibility for errors made by the Contractor therein or for changes made from the Project Manager's drawings or specifications not covered by the Contractor's written notification to the Project Manager. All models and templates submitted shall conform to the spirit and intent of the Contract Documents.
- .2 For this Design-Build project the shop drawings reviewed and approved by the Contractor's Consultants shall be immediately submitted to the Project Manager for information purposes and for confirmation of conformance to the Contract Documents.

ARTICLE 6 DRAWINGS AND SPECIFICATIONS

- .1 The Contractor shall keep one copy of all drawings and specifications of the work, in good order, available to the Project Manager and to his/her representatives.

ARTICLE 7 OWNERSHIP OF DRAWINGS AND MODELS

- .1 All drawings, specifications and copies thereof and all models furnished by the Project Manager are his/her property. They are not to be used on other work and with the exception of the signed Contract set of the drawings and specifications, are to be returned to him on request on the completion of the work.

ARTICLE 8 SAMPLES

- .1 The Contractor shall furnish for the Project Manager's approval such samples as he/she may reasonably require. The work shall be in accordance with approved samples.

ARTICLE 9 PROJECT MANAGER AND CONTRACTOR

- .1 The Project Manager shall be responsible for administering the Contract, but the Contractor shall have complete control of the Work on site (subject to 11).

ARTICLE 10 PROJECT MANAGER'S DECISIONS

- .1 The Project Manager shall decide on questions arising under the Contract Documents, whether as to the performance of the work or the interpretation of the specifications and drawings, but should the Contractor hold such decisions to be at variances with the Contract Documents, or to involve changes in work already built, fixed, ordered or in hand in excess of the contract or to be given in error, he/she shall notify the Project Manager in writing before proceeding to carry them out.

ARTICLE 11 FOREMAN, SUPERVISION

- .1 The Contractor shall keep on the Work, during its progress a competent foreman and any necessary assistants, all satisfactory to the Project Manager. The foreman shall not be changed except with the consent of the Project Manager, unless the foreman proves to be unsatisfactory to the Contractor and ceases to be in his/her employ. The foreman shall represent the Contractor in his/her absence and directions on minor matters given to him shall be held to be given to the Contractor. Important directions shall be given in writing to the Contractor. The Contractor shall give efficient supervision to the Work, using his/her best skill and attention.

ARTICLE 12 MATERIALS, APPLIANCES, EMPLOYEES

- .1 Unless otherwise stipulated, the Contractor shall provide and pay for all materials, labour, water, tools, equipment, light and power necessary for the execution of work.
- .2 Unless otherwise specified, all materials shall be new. Both workmanship and materials shall be of the quality specified.
- .3 The Contractor shall not employ on the Work any unfit person or anyone not skilled in the work assigned to him.

ARTICLE 13 INSPECTION OF WORK

- .1 The Housing Authority or the Project Manager on his/her behalf and their representative shall at all times have access to the work wherever it is in preparation or progress and the Contractor shall provide proper facilities for such access and for inspection.

- .2 If the specifications, the Project Manager's instructions, laws, ordinances or any public authorities require any work to be specially tested or approved, the Contractor shall give the Project Manager timely notice of its readiness for inspection, and if the inspection is by an authority other than the Project Manager, of the date and time fixed for such inspection. Inspections by the Project Manager shall be promptly made. If any work should be covered up without approval or consent of the Project Manager, it must if required by the Project Manager, be uncovered for examination, and made good at the Contractor's expense.
- .3 Re-examination of questioned work may be ordered by the Project Manager. If such works are found in accordance with the Contract, the Housing Authority shall pay the cost of re-examination and replacement. If such works are found not in accordance with the Contract, through the fault of the Contractor, the Contractor shall pay such cost.

ARTICLE 14 CORRECTION BEFORE FINAL PAYMENT

- .1 The Contractor shall promptly remove from the premises all material condemned by the Project Manager as failing to conform to the Contract whether incorporated in the Work or not, and the Contractor shall promptly replace and re-execute his/her own work in accordance with the Contract and without expense to the Housing Authority and shall bear the expense of making good all work of other contractors destroyed or damaged by such removal or replacement.
- .2 If the Contractor does not remove such condemned materials or work within the time fixed by written notice, the Housing Authority may remove and may store such materials at the expense of the Contractor. If the Contractor does not pay the expense of such removal within five days thereafter, the Housing Authority may, upon ten days' written notice, sell such materials at auction or at private sale and shall account for the net proceeds thereof, after deducting all costs and expenses incurred in the removal, storage and sale of the material and any other costs and expenses that should have been borne by the Contractor.

ARTICLE 15 DEDUCTIONS FOR UNCORRECTED WORK

- .1 If in the opinion of the Project Manager, it is not expedient to correct defective work or work not done in accordance with the Contract Documents, the Housing Authority may deduct from the Contract price the difference in value between the Work as done and that called for by the Contract, the amount of which shall be determined in the first instance by the Project Manager.

ARTICLE 16 GUARANTEE WARRANTY

- .1 Warranty coverage shall be provided by a guarantee warranty on all materials and workmanship for a period of one year from the date of completion. Performance of the Contractor over the one-year period shall be guaranteed by the retention by the Housing Authority of one percent (1%) of the contract price, or \$2,500, whichever amount is greater.
- .2 The Contractor shall in addition to any specific warranty or guarantee called for, warrant and guarantee, for a period of one year from the date of completion, all work performed and called for on the drawings and the specifications including any additional work approved and accepted as an extra to the Contract. The Contractor shall at his/her own expense, rectify any defects latent or patent that arise, as a result of poor, or improper workmanship, or defective materials, fixtures or apparatus during this one-year period. Performance of the Contractor over the one-year period shall be guaranteed, by the retention, by the Housing Authority of one per cent (1%) of the contract price, or \$2,500, whichever amount is the greater. Neither the final certificate nor payment thereunder, nor any provisions in the Contract shall relieve the

- Contractor from the responsibility for faulty materials or workmanship which shall appear during this one-year period.
- .3 Cracks in plaster, drywall, masonry, stucco, and concrete which occur during the warranty period will be considered defects in workmanship and materials, and shall be rectified at the Contractor's expense including the expense of repainting necessary to complete the finished product. Where touch-up painting does not match existing paint, the entire surface shall be repainted.
 - .4 Neither the final certificate, nor payment under this contract, nor any provisions in the contract shall relieve the Contractor from responsibility for latent defects in materials or workmanship which appear after this one year warranty period.
 - .5 In the event that the Contractor places in use certain apparatus, machinery or electrical equipment, prior to the completion date, it shall remain the Contractor's responsibility to maintain the guarantee period as stated above, regardless of the possibility that the manufacturers' guarantee may have expired previously.
 - .6 Notwithstanding the provisions of this , if any statute in force in the Province of Nova Scotia creates a more extended liability for faulty materials or workmanship, the provisions of such statutes shall apply.
 - .7 For the purposes of this , completion of the project shall be the latter of either the date of project handover, or the date of the certificate of substantial completion.

ARTICLE 17 PROTECTION OF WORK AND PROPERTY

- .1 The Contractor shall maintain continuously adequate protection of all his/her work from damage and shall protect the Housing Authority's property from all injury arising in connection with this Contract. He/She shall make good any such damage or injury, except such as may be directly due to errors in the Contract Documents. He/She shall protect adequately adjacent property as required by law and the Contract Documents.

ARTICLE 18 EMERGENCIES

- .1 The Project Manager has authority to stop the progress of the Work whenever in his/her opinion such stoppage may be necessary to ensure its proper execution. In an emergency affecting or threatening the safety of life, or of the structure, or of adjoining property, he/she has authority to make such changes and to order such work extra to the Contract or otherwise as may in his/her opinion be necessary.

ARTICLE 19 CONTRACTOR'S LIABILITY INSURANCE

- .1 The Contractor shall maintain such insurance or pay such assessments as will protect him and the Housing Authority from claims under Workers Compensation Acts. In addition, the Contractor shall maintain insurance to protect him and the Housing Authority from any other claims for bodily injury or property damage. This insurance coverage shall be Comprehensive General Liability at least as broad as the Insurers Advisory Organization Form GL-2002 including a rider for products and completed operations coverage for one year following completion of all works. Endorsements must also be provided for Broad Form Property Damage, Cross Liability Clause and 30 days' notice of any cancellation by registered mail.
- .2 The use of explosives must be covered by the policy, if blasting by explosives is required.
- .3 The contractor shall also maintain liability insurance for all owned and non-owned automobiles, either licensed for highway use or unlicensed.

- .4 The limits of liability coverage shall be not less than \$2,000,000 inclusive for bodily injury or property damage per occurrence. Certificates of such insurance showing the Housing Authority as named insured shall be filed with the Housing Authority and shall be subject to approval as to adequacy of protection. Such insurance shall be maintained until the Project Manager certifies that the Work is complete.
- .5 The Contractor's liability policy shall be endorsed with an undertaking from the insurance company that such insurance shall not be cancelled or changed without twenty-one days prior notice by registered mail to the Housing Authority.

ARTICLE 20 FIRE INSURANCE

- .1 The Contractor shall maintain and pay for fire insurance in the joint names of the Housing Authority and the Contractor totalling not less than 100 per cent of the Contract Award Amount, so that any loss under such policies of insurance will be payable to the Housing Authority
- .2 and the Contractor as their respective interests appear, and he/she shall furnish a copy of such policy to the Housing Authority. Should a fire loss be sustained, the Contractor shall act on behalf of the Housing Authority and himself for the purpose of adjusting the amount of such loss with the insurance companies. As soon as such adjustment has been satisfactorily completed, the Contractor shall proceed to repair the damage and complete the Work and shall be entitled to receive from the Housing Authority in addition to the total Contract price, the amount at which the Housing Authority's interest has been appraised in the adjustment made with the insurance companies as referred to above, said amount to be paid to the Contractor as the work of restoration proceeds. Any loss or damage by fire which may occur shall not affect the rights and obligations of either party under the Contract Documents except that in such event the Contractor shall be entitled to a reasonable extension of time for the performance of the work. Upon completion of the Work or on occupancy by the Housing Authority, whichever shall first occur, the Contractor's obligation (if any) to maintain the fire insurance shall cease, and the Housing Authority shall assume full responsibility for insuring the whole of the Work against loss or damage by fire. The date of such transfer of responsibility shall be the date on which the Housing Authority is notified of the issue by the Project Manager of this Final Certificate, or the date the Housing Authority occupies the premises, as the case may be.

ARTICLE 21 CONTRACT SECURITY

- .1 The successful contractor must submit a Performance Bond and a Labour and Material Bond, each in the amount of 50 per cent of the Contract, such Performance Bond and Labour and Material Bond are to be delivered to the Housing Authority prior to signing of the Contract and shall be on the form enclosed as part of these documents, or to like effect.
- .2 Where the contract amount is less than \$1,000,000, the Housing Authority will accept a certified cheque, bank draft, or Government of Canada Bearer Bonds, in an amount of 10 per cent of the Contract price.
- .3 If the successful Bidder elects to provide security other than the Performance, Labour and Material Bonds and has provided security in the form of Government of Canada Bearer Bonds, certified cheque, or bank draft, then said security must be fully paid for, assigned to the Housing Authority and deposited with the Housing Authority in trust. Contracts in excess of \$1,000,000 can only be secured by Performance, Labour and Material Bonds.
- .4 If the Work is taken out of the Contractor's hands, or if the Contract is terminated pursuant to the General Conditions, or if the Contractor is in breach or in default under the Contract, the Housing Authority may negotiate the security deposit, in the case of bonds, or Term Deposit Certificate, or convert the security deposit to its own use, in the case of negotiable security, and the amount realized by the Housing Authority shall be deemed to be a debt payable by the Housing Authority to the Contractor and the Housing Authority

shall have the right of set-off against the debt any sum or amount which the Contractor may be liable to pay to the Housing Authority and the balance of the debt, if any, after the right of set-off has been exercised, and if such balance, in the opinion of the Project Manager, is not required for the purposes of the Contract shall be paid by the Housing Authority to the Contractor.

- .5 If the Contractor is not in breach of, or default under, the Contract at the time the Project Manager's Interim Certificate of Completion is issued by the Regional or Project Manager, the Housing Authority will return the security deposit to the Contractor. Notwithstanding the above, the Housing Authority, may, under circumstances where it is considered advantageous, release the security deposit to the Contractor prior to 100 percent completion but in no event at less than 90 percent completion. Such a release at less than 95 percent completion of the project shall be submitted to the Housing Authority and have approval.

ARTICLE 22 CASH ALLOWANCES

- .1 The Contractor shall include in the Contract sum all cash allowances mentioned in the Specifications, which allowances shall be expended in whole or in part as the Project Manager shall direct, the amount of the Contract sum adjusted in conformity therewith. The Contract sum includes such sums for expenses and profit on account of such cash allowances as the Contractor requires. The Contractor shall not be required to employ for any such work, persons against whom he/she has a reasonable objection.

ARTICLE 23 CHANGES IN WORK

- .1 The Housing Authority or the Project Manager, without invalidating the Contract may make changes by altering, adding to, or deducting from the Work, the Contract sum being adjusted accordingly. All such work shall be executed under the conditions of the original contract except that any claim for extension or reduction of time caused thereby shall be adjusted at the time of ordering such change.
- .2 Except as provided in 18, no change shall be made unless it is made pursuant to a written order from the Project Manager, and no claim for an addition to or a deduction from the Contract sum shall be valid unless so order.

ARTICLE 24 VALUATION OF CHANGES

- .1 The valuation of any changes in the work shall be determined in one or more of the following ways:
 - .1 By estimate and acceptance in a lump sum, submitted with subcontractors and suppliers' signed quotations and breakdown of estimates for material and labour.

For changes where the individual trade cost is anticipated to be less than \$1000, the requirement for the detailed cost breakdowns may be waived but the individual trade quotation must be supplied.
 - .2 By unit prices agreed upon or as listed in the Contract.
 - .3 Cost of work and percentage or by cost and fixed fee.
- .2 In cases of additional work to be paid for under method .3, the Contractor shall keep and present in such form as the Project Manager may direct, a correct account of the net cost of labour and materials, together with vouchers. The Project Manager shall certify to the amount due to the Contractor including the profit and overhead as described in the Schedule. Pending final determination of value, payments on account of changes shall be made on the Project Manager's certificate.
- .3 In determining methods 1.1 or 1.3 above, the labour costs shall be calculated by the actual estimated hours at an hourly rate calculated as follows:

The hourly labour rate shall be the total payroll costs including hourly wage, statutory contributions to UIC, WCB and CPP and other applicable labour burdens paid directly by the employer such as vacation pay, holiday pay and pension plan.

The Owner reserves the right to verify the payroll costs by independent audit.

The following percentages shall apply to the total payroll costs:

- small tools/expenditures 5% (on payroll costs)
- site supervision 5% (on payroll costs)

- .4 In determining methods 1.1 and 1.3 above, overhead and fees shall be calculated as follows:

The cost of any authorized change shall be determined by the net total of labour and material or equipment as outlined in 3.1, 3.2 and 3.3 on which the percentage mark-up shall be determined as follows:

For Each Change Up to \$5,000:

Subcontractors own work - Overhead & Fee- 15% total
General Contractors' own work - Overhead & Fee- 15% total
General Contractor on Subcontractors work - 10% total
(No percentage markup shall be applied to deductions)

For Each Change Above \$5,000:

Subcontractors own work - Overhead & Fee - 10% total
General Contractors' own work - Overhead & Fee- 10% total
General Contractor on Subcontractors work - 8% total
(No percentage markup shall be applied to deductions)

ARTICLE 25 CLAIMS AGAINST CONTRACTOR, SUBCONTRACTORS OR SUPPLIERS

- .1 The Contractor shall ensure that subcontractors, suppliers, and all others supplying labour, materials or services to the project are promptly paid. Such payments shall be made at the time payment for the same are made to the Contractor by the Housing Authority.
- .2 Should the Housing Authority be advised that a subcontractor, or supplier, has not been paid for material, service, or labour provided to the project, the Housing Authority may hold back, in addition to any other holdback stipulated in this Contract, sufficient monies as the Housing Authority deems necessary to make such payments.
- .3 This right to hold back additional monies shall apply where:
- .1 Contractor, subcontractors, or suppliers have been adjudged bankrupt,
 - .2 Contractor, subcontractors, or suppliers have made a general assignment,
 - .3 Contractor, subcontractors, or suppliers have had a receiver appointed,
 - .4 payment for work is in dispute,
 - .5 for any other reason, payment has not been made.
- .4 It is the responsibility of the Contractor, his/her successor, trustee, receiver or assigns to settle all such claims and liens made on the Housing Authority and the Housing Authority shall hold all monies retained until advised by the claimants that the accounts have been settled. If claims are not settled by the Contractor or successors within a reasonable time, the Housing Authority may pay for labour, services and materials claimed, whether supported by liens or not, from any date to any date and to any amount which may be claimed, or the Housing Authority may make application to the courts, to pay any amounts held for such claims into court for the court to determine who should be paid and in what amount. Any monies so paid by the Housing Authority shall be deducted from any monies that may be due, or that thereafter may become due, to the Contractor or successor.

- .5 Before final settlement is made for work executed and materials furnished under the Contract, the Contractor shall furnish evidence, satisfactory to the Housing Authority, that the work and all its parts are free and clear from lawful claims or liens under any law, for labour, services, materials and otherwise. The Contractor must also furnish evidence that no claim exists, in respect to which a claim or lien upon the Work could, or might attach. The Contractor shall indemnify and hold harmless the Housing Authority, and all his/her property from any kind of liens, accruing from labour and services performed and materials supplied in or about the Work.

ARTICLE 26 PAYMENTS

- .1 Cash payments equal to percentage stipulated in the agreement of the value of the work done, as valued by the Project Manager, will be made to the Contractor monthly, as the work progresses, on the written Certificate of the Project Manager that the Work, for or on account of which the certificate is granted, has been duly executed to his/her satisfaction, and stating the value of such work as computed by him, and insurance policies for the project are in force; the said certificate shall be a condition precedent to the right of the Contractor to be paid the said percentage, or any part thereof. No such monthly payment shall be construed to be an acceptance of any defective work or improper materials.
- .2 Whenever the Work is performed completely, according to the Builders Lien Act and according to the plans and specifications and to the satisfaction of the Project Manager, the Project Manager shall make and certify the final estimate for the same. The Housing Authority will then pay to the Contractor after 65 days have expired from the execution of the said final certificate the remainder which shall be found to be due, excepting therefrom such sum or sums as may be lawfully deducted or retained under any of the provisions of the Contract. The written Certificate of the Project Manager certifying to the final completion of the said work to his/her entire satisfaction shall be a condition precedent to the right of the Contractor to receive or to be paid the balance due, of any part thereof. The right is reserved by the Housing Authority to reject the whole or any part of the work, should the said certificate be found to be inconsistent with the terms of the Contract, or otherwise improperly given.
- .3 The Project Manager's progress certificates, and the payment of progress estimates based upon the same, shall not be construed as an acceptance or approval of the work but only as temporary advances to the Contractor; and he/she shall be bound, notwithstanding such progress estimates, to well and truly complete, finish and hand over in good condition, and to the entire satisfaction of the Project Manager, by the time specified and in accordance with the terms and conditions of the specification, the whole of the work included therein; and all the percentage retained by the Housing Authority shall be retained until the said full and satisfactory completion has been formally certified by the Project Manager.

ARTICLE 27 LIENS

- .1 The Contractor shall be bound by the terms of the Builders=Lien Act.

ARTICLE 28 PERMITS, NOTICES

- .1 The Contractor shall obtain and pay for all necessary permits or licenses required for the execution of the Work (but this shall not include the obtaining of permanent easements).
- .2 The Contractor shall give all necessary notices and pay all fees required by law and comply with all laws, ordinances, rules and regulations relating to the Work and to the preservation of the public health and safety and if the specifications and drawings are at variance therewith any resulting additional expense incurred by the Contractor shall constitute an addition to the Contract price.

ARTICLE 29 PATENT FEES

- .1 The Contractor shall pay all royalties and license fees and shall save the Housing Authority harmless from loss on account of suits or claims which may arise by reason of the work for infringement of patents.

ARTICLE 30 USE OF PREMISES

- .1 The Contractor shall confine his/her apparatus, the storage of materials and the operations of his/her workmen to limits indicated by law, ordinances, permits or directions of the Project Manager and shall not unreasonably encumber the premises with his/her materials.
- .2 The Contractor shall not load or permit any part of the structure to be loaded with a weight that will endanger its safety. The Contractor shall enforce the Project Manager's instructions regarding signs, advertisements, fires and smoking.
- .3 Where is limited parking available for the Contractor on site, the Contractor shall make arrangements with the Project Manager.

ARTICLE 31 CLEANING UP

- .1 The Contractor shall at all times keep the premises free from accumulation of waste materials or rubbish caused by the employees or work, and at the completion of the work he/she shall remove all his/her rubbish form and about the building and all his/her tools, scaffolding and surplus materials, and shall leave his/her work "Broom Clean" or its equivalent, unless more exactly specified. In case of dispute the Housing Authority may remove the rubbish and charge the cost to the Contractor as the Project Manager shall determine to be just. Particular attention shall be made to construction debris and to any consequential indirect dirt that may affect residents' and staff building areas.

ARTICLE 32 CUTTING, PATCHING, DIGGING

- .1 The Contractor shall do all cutting, fitting or patching of work that may be required to make parts come together properly and fit to receive or be received by work of other contractors shown, or implied by, the Contract Documents and Construction Documents and make good, as the Project Manager may direct.
- .2 Any cost caused by ill-timed work shall be borne by the party responsible therefor.
- .3 The Contractor shall not endanger any existing work by cutting, digging, or otherwise and shall not cut or alter the work of any other contractor save with the consent of the Project Manager.
- .4 Submit a written request to the Project Manager (and do not proceed without his written approval) in advance of cutting or alteration which affects:
 - .1 The structural integrity of any element.
 - .2 The integrity of weather-exposed or moisture-resistant elements.
 - .3 The efficiency, maintenance, or safety of any operational element.
 - .4 The visual qualities of sight-exposed elements.
 - .5 The work of the Owner or a separate contractor.
- .5 Execute cutting, fitting and patching required to make the work fit properly together with other work.
- .6 Where new work connects with existing and where existing work is removed, altered or cut, patch and make good to match existing work.

- .7 Obtain the Project Manager's written approval before cutting for access into existing walls, ceilings and floors (be aware that some localities may contain asbestos containing materials). Provide access doors for continuous access to these areas. Patch and make good to match existing.
- .8 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly. Fit work airtight to pipes, sleeves, ducts and conduits.

ARTICLE 33 DELAYS

- .1 If the Contractor should be delayed in the completion of Work by any act or neglect of the Housing Authority or Project Manager or of any employee of either, or by any other contractor employed by the Housing Authority or by changes ordered in Work, or by strikes, lockouts, fire, unusual delay by common carriers or unavoidable casualties or by any other cause or any kind beyond the Contractor's control or by any cause within the Contractor's control which the Project Manager shall decide as justifying delay, then the time of completion shall be extended for such reasonable time as the Project Manager may decide.
- .2 No such extension shall be made for delay occurring more than seven days before claim therefor is made in writing to the Project Manager, provided, however, that in the case of a continuing cause of delay, only one claim shall be necessary.
- .3 If no schedule is made under 4, no claim for delay shall be allowed on account of failure to furnish drawings until two weeks after demand for such drawings and not then unless such claim be reasonable.
- .4 The Project Manager shall not, except by written notice to the Contractor, stop or delay any part of the main Contract work pending decision of proposed changes.

ARTICLE 34 ASSESSMENTS AND DAMAGES FOR LATE COMPLETION

- .1 The work of the Contract is completed on schedule provided the Contract is "substantially performed" on or before the date for completion under II, .3 in the Agreement, or the latest revision to this date authorized by change order. Any period of time required for "substantial completion" in excess of the above-noted latest date shall be considered a period of delay.
- .2 During this period of delay, the Contractor shall be liable to the Housing Authority for damages in an amount equal to the aggregate of:
- .3 all salaries, charges, and travelling expenses of Housing Authority staff and outside consultants overseeing the performance of the work,
- .4 the costs incurred by the Housing Authority as a result of the inability to use the completed work during the period of delay,
- .5 all other expenses, including interest charges, and damages incurred or sustained by the Housing Authority during the period of delay as a result of the work not being completed.
- .6 The Housing Authority reserves the right to waive, in whole or in part, the amount payable by the Contractor under this .

ARTICLE 35 HOUSING AUTHORITY'S RIGHT TO DO WORK

- .1 If the Contractor should neglect to prosecute the work properly or fail to perform any provisions of this Contract, the Housing Authority, after three days' written notice to the Contractor, may without prejudice to any other remedy he/she may have, make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the Contractor.

ARTICLE 36 OWNER'S RIGHT TO TERMINATE CONTRACT

- .1 If the Contractor should be adjudged as bankrupt, or if he/she should make a general assignment for the benefit of his/her creditors, or if a receiver should be appointed on account of his/her insolvency or if he/she should, except in cases recited in 33, refuse or fail to supply enough properly skilled workmen or proper materials after having received seven days' notice in writing from the Project Manager to supply additional workmen or materials, or if he/she should fail to make prompt payment to subcontractors for material or labour, or persistently disregard laws, ordinances or the instructions of the Project Manager, or otherwise be guilty of a substantial violation of the provisions of the contract then the Housing Authority may, without prejudice to any other right or remedy, by giving the Contractor written notice, terminate the employment of the Contractor and take possession of the premises and of all materials, tools and appliances thereon and finish the work by whatever method which may be deemed expedient, but without undue delay or expense. In such case the Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the contract price shall exceed the expense of finishing the work such excess shall be paid to the Contractor. If such expense shall exceed such unpaid balance the Contractor shall pay the difference to the Housing Authority.

ARTICLE 37 CONTRACTOR'S RIGHT TO STOP WORK OR TERMINATE CONTRACT

- .1 If the work should be stopped under an order of any court, or other public authority, through no act or fault of the Contractor or of anyone employed by him, then the Contractor may, upon three days' written notice to the Housing Authority and the Project Manager stop work or terminate this contract and recover from the Housing Authority payment for all work executed and any loss sustained upon any plant or material with reasonable profit and damages.

ARTICLE 38 MUTUAL RESPONSIBILITY OF CONTRACTORS

- .1 Should the Contractor suffer damage by any act, neglect or default of any other contractor employed by the Housing Authority upon the work, the Housing Authority shall be responsible therefore but shall be subrogated to the rights of the damaged Contractor against the contractor causing the damages. The Contractor shall make his/her claim in writing against the Housing Authority within forty-eight (48) hours after the happening of the event causing such damage to the Contractor.
- .2 Should the Contractor cause damage to any other contractor on the Work, the Contractor agrees, upon due notice, to settle with such other contractor by agreement if he/she will so settle. If such other contractor sues the Housing Authority on account of any damage alleged to have been so sustained the Housing Authority shall notify the Contractor, who shall defend such proceedings at his/her own expense and if any judgement against the Housing Authority arises therefrom, the Contractor shall be responsible and shall pay such judgement promptly together with all costs incurred by the Housing Authority.

ARTICLE 39 SEPARATE CONTRACTS

- .1 The Housing Authority reserves the right to let other contracts in connection with the undertaking of which the Work is a part and the Contractor shall connect properly and co-ordinate his/her work with that of other contractors. If any part of the Contractor's work depends for its proper execution or result upon the work of another contractor, the Contractor shall report promptly to the Project Manager any defects in the Work of such other contractor as may interfere with the proper execution of the Contractor's work. Should the Contractor fail so to inspect and report he/she shall have no claim against the Housing Authority by reason of the defective or unfinished work of any other contractor except as to latent defects not reasonably noticeable at the time of the commencement of the Contractor's work.

ARTICLE 40 ASSIGNMENT

- .1 The Contractor shall not assign the Contract or assign any monies due to accruing under the Contract under any circumstances.

ARTICLE 41 SUBCONTRACTS

- .1 The Contractor must use the subcontractors listed in the Bid. If the change of any names on this list is considered necessary by the Contractor, this request, giving reasons for the change, shall be submitted in writing to the Project Manager and the proposed change will be official after written approval by the Project Manager. If additional subcontractors are required for the principal parts of the Work, the Contractor shall notify the Project Manager in writing of the names of the subcontractors proposed and shall not employ any to whom the Project Manager may reasonably object.
- .2 If the change of any names on such list is required by the Project Manager, and the work has to be awarded to a higher bidder, the Contract Price shall be increased by the difference between the two bids.
- .3 The Project Manager shall on request furnish to any subcontractor wherever practicable, evidence of the amounts certified to on his/her account.

ARTICLE 42 RELATIONS OF CONTRACTOR AND SUBCONTRACTOR

- .1 The Contractor agrees to bind every subcontractor by the terms of the General Conditions, drawings and specifications as far as applicable to his/her work.

ARTICLE 43 TAXES

- .1 The Contractor shall not include in the Bid Amount, Harmonized Sales Tax (HST), but shall pay HST on all materials and services on which the tax is charged. The Contractor shall show the amount of HST to be paid on the Bulk Sum Price separately.

ARTICLE 44 PROGRESS ESTIMATES

- .1 Progress claims submitted for payment must be broken down in accordance with the Housing Authority's standard progress claim form.
- .2 Claims for material on site but not installed, must be supported by suppliers' invoices showing their unit prices, including provincial and municipal taxes. The amount for HST shall also be included separately. When material has been taken from contractors' or subcontractors' general stock on hand they shall supply invoices priced at current trade prices without contractors' or subcontractors' profit.

ARTICLE 45 CONSTRUCTION SAFETY

- .1 The Contractor will be held responsible for the enforcement of all applicable provisions of the Nova Scotia Occupational Health and Safety Act and its Regulations, and all other safety measures as required by authorities having jurisdiction and take reasonable and required precautions to protect public and those employed in work from bodily harm and to protect adjacent properties.

ARTICLE 46 ASBESTOS SAFETY REQUIREMENTS

- .1 The Contractor shall ensure that:
 - .1 the Housing Authority procedures contained in the Safe Work Practices and the Asbestos Management (Interim) Policy and Procedures are followed for all Type 1 Minor Low Risk Asbestos Work at all locations per the Asbestos Inventory Listing. (Asbestos Safe Work Practices, Asbestos Management (Interim) Policy and Procedures and Asbestos Inventory Listing attached). All contractors involved in the drilling, cutting or disturbing of existing ceiling, wall and floor material, in Housing Authority Properties 1986 or older, for any purpose, including drilling or cutting holes for repairs or upgrades on these properties shall assume that asbestos containing materials are present within, unless the Asbestos Inventory Listing explicitly states that tests have been completed and no asbestos is present.
 - .2 only workers trained and authorized in Type 1 Minor Low Risk Asbestos Work Procedures are assigned to work involving exposure to Type 1 Minor Low Risk Asbestos Containing Material.
 - .3 any work that the contractor encounters that could potentially involve Type 2 or 3 Asbestos Containing Material shall be reported by the contractor immediately to the Housing Authority so that the Housing Authority can take the appropriate action. No work involving the disturbance or the removal of Type 2 (moderate) and Type 3 (major) Asbestos shall be undertaken by contractor.
 - .4 all asbestos-containing waste material is disposed of in a manner approved by DEL and local authorities.

End of Section

**Appendix C: Mechanical Design Requirements: Department of
Community Services**
(Begins on following page)

PROVINCE OF NOVA SCOTIA

Department of Community Services

MECHANICAL
DESIGN REQUIREMENTS

May 2009

Division 13 Special Construction

13851 Fire Alarm System

- 1 Provide a complete fire alarm system as required by the Provincial Building Code as a minimum.

13900 Fire Protection

- 1 Codes, Standards and Approvals
 - 1.1 The design and installation shall comply with the latest requirements of NFPA and the NFC.

Division 15 Mechanical

15010 Mechanical General

- 1 General Requirements
 - 1.1 The mechanical installation shall be consistent with accepted practice for the type of facility with respect to quality and application of materials. There shall be no varying from this document on any items unless written request is made to DCS and written permission is obtained from DCS.
 - 1.2 The installation shall provide for safe maintenance procedures for maintenance personnel with minimum contact with the general population along with minimum disruption of services.
 - 1.3 Equipment and materials shall be new and CSA certified for the application. Work and materials shall be in accordance with all authorities having jurisdiction.
 - 1.4 Supply tools, equipment and personnel to demonstrate and instruct building operating and maintenance personnel in operating, adjusting, trouble-shooting and servicing of all systems and equipment.
 - 1.5 Complete operations manuals and record drawings for all equipment and systems shall be provided by the contractor.
 - 1.6 Mechanical design engineer shall coordinate with the architect to ensure designated fire

rated walls and/or partitions have not been compromised by the mechanical systems.

- 1.7 Electrical equipment and wiring supplied by Mechanical (eg. as part of or serving a pump, fan or air handling unit) shall also meet the Electrical requirements of the this document.

2 System Selection and Design Criteria

2.1 Mechanical systems shall:

- 2.1.1 Be compatible with architectural, structural, electrical and other projects systems.
- 2.1.2 Be simple, proven systems selected to provide maximum reliability and maintainability with consideration for the availability of parts and service.
- 2.1.3 All mechanical systems shall be designed to be energy-efficient and to minimize owning, operating and maintenance costs for both summer and winter load requirements. Analyze these life cycle costs when evaluating system and equipment alternatives.
- 2.1.4 Use a minimum amount of new energy consistent with required performance standards.
- 2.1.5 Be installed with adequate space for proper maintenance. Have consolidated layouts using minimum space consistent with maintenance and servicing requirements.
- 2.1.6 Have adequate provisions for testing, adjusting and balancing (TAB) and all other phases of commissioning.
- 2.1.7 Be fail-safe with all equipment of a quality consistent with anticipated building life expectancy and/or required reliability of service.
- 2.1.8 Professional judgment shall be used in the application of these criteria with respect to economy, safety and legal aspects.

3 Layouts of Mechanical Systems

- 3.1 All piping, ducting and other services, except gas piping and fuel oil lines, shall be concealed in ceilings, chases, shafts, furred spaces or partitions. This shall not apply in boiler rooms, chiller rooms, mechanical equipment rooms, basements or storage spaces not occupied by personnel. Also, run pipe and duct mains in corridors rather than above normally occupied rooms.
- 3.2 Exposed will mean "not concealed". "Concealed" shall include mechanical services in ceiling spaces, trenches, chases, shafts, furred spaces or partitions. Services in tunnels are not considered to be concealed.
- 3.3 Seal all voids and openings and provide fire-stopping at fire rated walls and floors.
 - 3.3.1 Where pipes or ducts pass through non fire-rated walls, floors and partitions seal openings between pipes, ducts and the construction and make air-tight (smoke and/or acoustic seal) by applying appropriate insulation and caulking compound.
 - 3.3.2 Where pipes or ducts pass through fire-rated walls, floors and partitions maintain fire

rating integrity. See also Ductwork section.

- 3.4 Unless otherwise specified, terminate sleeves flush at walls and ceilings. Slabs in potentially wet areas (e.g. mechanical rooms, kitchens, laboratories) are to be sleeved with Schedule 40 pipe extending 1" above the finished floor. This does not apply to concrete floors on grade.
 - 3.5 Piping and ductwork shall not be installed in any space used as an electrical switchgear or transformer room or electrical closet, except if required to service the space.
 - 3.6 Piping or ductwork installed above motor control centres or surface mounted panel boards is discouraged. If no other routing is possible, maintain a minimum 24" clearance, with all piping to have a drip tray installed underneath.
 - 3.7 Water and waste pipes shall not be installed in exterior walls.
 - 3.8 Pipes, ducts and other utilities shall not be embedded in fireproofing or any column or other structural member. Neither shall they run between the fireproofing and the structural member so protected.
 - 3.9 Layouts shall be fully co-ordinated with all other disciplines, trades and sub-trades.
 - 3.10 The number of openings through waterproof membranes shall be kept to an absolute minimum. Openings through waterproof membranes subject to hydrostatic pressures shall be fully co-ordinated with structural designs.
- 4 Spatial Considerations for Mechanical Equipment
- 4.1 The Designer/Builder shall ensure compliance in allocation of space for boilers, chillers, mechanical equipment and distribution systems to meet this section.
 - 4.2 Locate all mechanical equipment, including but not limited to air handling (HVAC) units, boilers, etc. in mechanical rooms.
 - 4.3 All flammable or combustible materials, not directly related to the furnace or boiler shall be kept and handled in separate rooms.
 - 4.4 Boiler Rooms
 - 4.4.1 Boiler rooms shall be separate from mechanical equipment rooms containing air handling equipment, so as to eliminate any possibility of fumes from combustion equipment entering HVAC systems.

4.5 Sizes

4.5.1 In determining sizes of boiler rooms and mechanical equipment rooms, consideration shall include, but not necessarily be limited to, minimum requirements for installation, maintenance, servicing, removal and replacement of mechanical equipment.

4.6 Some of the criteria which will affect consideration of locations include, but are not necessarily limited to, the following:

4.6.1 Proximity to heating and cooling loads and the requirement to minimize energy transport factors and the size and complexity of the conveyance system (eg. air ducts and heating piping).

4.6.2 Accessibility for installation, operation, maintenance, servicing, removal and replacement.

4.6.3 Need for, and restrictions in the location and height of, a chimney.

4.6.4 Quality of outside air and location of outside air intakes.

4.6.5 Quality of air to be exhausted and location of exhaust air terminals.

4.6.6 Requirements of applicable codes, standards and regulations.

4.6.7 Necessity for safety to the building population.

4.6.8 Air handling units shall not be located over or beside sleeping quarters. Other spaces such as washrooms, storage rooms etc. shall be used as sound and vibration buffers.

4.6.9 Boiler rooms shall be located on the lowest building level. Other arrangements may be considered but will be allowed only with written permission from DCS.

5 Ventilation Design Considerations

5.1 Fuel fired equipment (e.g. boilers) shall be kept in separate rooms from air handling equipment.

5.2 Give consideration to heat and noise transmission from equipment to occupied spaces.

6 Air Distribution Design Considerations

6.1 General

6.1.1 All supply, return and exhaust air systems shall be completely ducted from the air handling equipment to the ceiling supply diffusers and ceiling return/exhaust grilles.

6.1.2 The location of air intake louvres shall be carefully considered relative to prevailing wind pressure and direction. Ensure that air intakes are not adversely affected by hot roof surfaces or by foul and hazardous exhaust discharge such as car, truck and bus exhausts, chimneys and building exhaust louvres. Also locate intakes to avoid drawing in combustive material and to minimize the hazard from fires in other structures.

6.2 Exhaust Systems

- 6.2.1 Exhaust fans shall be located near the point of air discharge to the outside, so that the exhaust ductwork is maintained at a negative pressure, thereby reducing the probability of contaminants infiltrating into the building.
- 6.2.2 Odourous/contaminated exhausts, for example, washrooms, janitors closet, boiler room and recycle room exhausts, shall discharge at the building roof and are not permitted to be sidewall exhausted. However, small individual washroom exhausts may be sidewall exhausted, provided that the exhaust outlet is a minimum of 10 feet from any building opening (including windows, air intakes etc.).

7 Heating Design Considerations

7.1 General

- 7.1.1 Zone for most economical sizes and flow arrangements, and for effective thermostatic control of space temperatures.
- 7.1.2 Piping systems shall be designed using the two pipe reverse return principle, unless written permission to do otherwise is obtained from DCS.
- 7.1.3 Systems shall be designed and installed to prevent thermal shock to the heating boilers. Piping layout and equipment shall be provided to ensure proper mixing and maintain a minimum water flow and temperature through the heating boilers, in no circumstances less than the boiler manufacturer's recommendations.

- 7.2 Provide 100 % standby pumping back-up on circulation loops to space heating units.

8 Accessibility For Operation and Maintenance

8.1 General

- 8.1.1 All mechanical equipment and components shall be located so as to be readily accessible for servicing and maintenance, and so as to be easily isolated, removed and replaced.
- 8.1.2 Interference to building occupants: Maintenance and servicing of mechanical equipment and services shall be performed without undue interference with normal work performed by the building occupants.

8.2 Access Doors and Panels

- 8.2.1 Access doors or panels shall be installed wherever valves, water hammer arresters, plumbing cleanouts, trap primers, drain points, automatic and manual air vents, and where any equipment and system components requiring servicing, inspection or adjusting etc. are not accessible. Where equipment may be required to be removed for repair or servicing, adequate access must be provided.
- 8.2.2 All openings shall be of sufficient size for both removal and maintenance of the

concealed equipment, and shall be a minimum size of 12" x 12" for hand access and 24" x 24" for body access.

8.2.3 Doors shall open greater than 90 degrees, have concealed hangers, anchor straps and screwdriver cam locks.

8.2.4 Doors in block walls or in tile shall be sized to suit masonry unit module.

8.2.5 In fire rated walls and ceilings, access doors and panels shall be fire rated.

8.3 Mechanical Equipment

8.3.1 Where possible, all piping connections, filter access, electrical wiring connections, motor and drive shall be on the same side of the equipment.

8.3.2 Minimum clearance around each item of equipment for servicing, maintenance, removal and replacement shall be the greater of either 48" or 20" plus the size of the largest replacement component.

8.3.3 Install equipment, rectangular cleanouts and similar items parallel to or perpendicular to building lines.

8.4 Ceiling Spaces

8.4.1 Ceiling space mounted equipment (e.g. exhaust fans) are to be within 36" of the finished ceiling so that they can be safely accessed.

8.5 Piping Connections

8.5.1 Piping connections shall be arranged so that the component can be isolated, removed and replaced simply by dismantling unions or flanges on the equipment in question, without disturbing, dismantling or shutting down any other services.

8.6 Space for Removal and Replacement

8.6.1 There shall be adequate aisle space and paths of egress, including corridors, vestibules, elevators, areaways, light wells, etc.

8.6.2 Elements of equipment shall be located so that they can be serviced or replaced without dismantling any other services or elements.

8.6.3 Avoid service and replacement access interference with removable partitions.

8.7 Equipment Connection

8.7.1 Provide piping with isolating shut-off valves, so that servicing of components does not interfere with the building services.

9 Tests

9.1 The following are supplementary conditions to tests specified in other sections of this document.

- 9.1.1 Insulate and conceal work only after testing and approval by the mechanical design engineer. Conduct tests in presence of mechanical design engineer or person authorized by mechanical design engineer. All tests results shall be recorded on appropriate typewritten forms and be signed and dated by the person carrying out the test as well as the mechanical design engineer or person authorized by the mechanical design engineer.
- 9.1.2 Bear costs including retesting and making good. Replace defective material or equipment and repair joints using new material.
- 9.1.3 Prior to tests, isolate all equipment or components which are not designed to withstand test pressures or test medium.
- 9.1.4 Pipe Pressure
 - 9.1.4.1 General - maintain test pressure without loss for a minimum of two hours unless otherwise specified.
 - 9.1.4.2 Test fuel oil systems to CSA B139 and authorities having jurisdiction.
 - 9.1.4.3 Test drainage, waste and vent piping to National Plumbing Code of Canada and authorities having jurisdiction. Ensure a minimum 10' head of water is provided above the highest point of the DWV system. DWV piping shall be tested for a minimum of one hour with water, or two hours with air. In addition, an underground piping ball test shall be conducted in the presence of the mechanical design engineer and DTPW mechanical inspector, preferably before the piping is backfilled. Provide a minimum of four working days notice of the time for this test.
 - 9.1.4.4 Test domestic hot, cold and recirculation water piping at 1-1/2 times the system operating pressure or minimum 125 psi, whichever is greater.
 - 9.1.4.5 Test all hydronic systems at 1-1/2 times the system operating pressure or minimum 125 psi, whichever is greater.
 - 9.1.4.6 Test propane systems to CSA B149 and authorities having jurisdiction.
- 9.1.5 Test backflow preventors in accordance with local water utility or municipality.
- 9.1.6 Test domestic water quality as specified in Section 15140.
- 9.1.7 Test boilers as specified in Section 15500.

15060 Hangers and Supports

- 1 Pipe Hangers and Supports
 - 1.1 Provide all hangers required for the proper support of piping. Hangers shall be steel adjustable clevis type, epoxy coated or copper plated where in contact with copper piping.
 - 1.2 For plumbing systems, cold pipes less than 1¼" and all hot pipes shall have line size clevis hangars. Cold pipes 1¼" and larger shall have insulation protection shields and oversized hangers with calcium silicate, Buckaroos or plastic stand-offs between the pipe and the shield.

- 1.3 Hangers to be within 12" of at least one end of each elbow.
- 1.4 In concrete construction, use self drilling inserts at proper centers securely anchored in concrete.
- 1.5 All piping to be hung so that if equipment, i.e. pumps, were disconnected or removed, pipe would remain in place without sagging or requiring additional hanging.
- 1.6 Vertical pipes shall be supported at each floor by means of iron hooks or clamp hangers placed directly below hub or fittings.

2 Duct Hangers and Supports

- 2.1 Duct hangers and supports shall follow the recommendations of the SMACNA Duct Manuals.
- 2.2 Provide all hangers required for the proper support of ducting.
- 2.3 For ducts 20" (500 mm) and smaller, 1" (25 mm) wide strap hangers are acceptable.

15072 Mechanical Noise and Vibration Isolation

- 1 Aim of noise and vibration control shall be to ensure that mechanical equipment and systems operate at the lowest sound and vibration level consistent with the functional requirements of the project.

15075 Mechanical Identification

- 1 Manufacturers Nameplates
 - 1.1 Each piece of equipment shall have a metal nameplate mechanically fastened to equipment, with raised or recessed letters. Nameplates to be located so that they are easily read. Do not insulate or paint over plates.
 - 1.2 Include registration plates (e.g. pressure vessel, Underwriters' Laboratories and CSA approval) as required by respective agency and as specified. The supplier shall indicate size, equipment model, manufacturer's name, serial number, voltage, cycle, phase and power of motors.

- 2 Buried Pipe Identification
 - 2.1 Use detectable Identoline underground warning tape colour coded to pipe service for full length of pipe.
 - 2.2 Bury to manufacturers recommendations.
 - 2.3 Identify all systems, equipment, components, controls and sensors. Inscription to identify function.

15081 Pipe Insulation

- 1 Insulate all piping that operates at less than 60 F or more than 104 F (infloor radiant feeds less than 104 F do not require insulation). All piping insulation shall be jacketted and piping/fittings/components operate at less than 60 F shall have insulation with a vapour barrier jacket. Insulation and and jacket material shall be suitable for the operating temperature of the pipe.
- 2 Pipe Insulation Thickness
 - 2.1 For heating systems piping, refer to Part 5 and Table 5.2.4.3 of the Model National Energy Code for Buildings 1997. For domestic hot water systems, refer to Part 6 and Table 6.2.3.1 of the Model National Energy Code for Buildings 1997. DCS's additional requirements are as follows:
 - 2.2 Piping systems not covered by the Model National Energy Code but requiring insulation are as follows:
 - 2.2.1 Domestic cold water systems shall be provided with minimum ½" (13 mm) insulation on ½" pipe and minimum 1" (25 mm) insulation on pipe ¾" and over.
- 3 Installation
 - 3.1 Pipe insulation must be kept clean and dry.
 - 3.2 Unless specifically noted otherwise insulation shall not stop at walls and floors.
 - 3.3 Both longitudinal and butt joints may be made with factory applied pressure sensitive vapour proof adhesive.
 - 3.4 The exposed surface and any surface that be exposed of any insulation assembly by cutting through material in any direction shall have a flame spread rating not greater than 25 without evidence of continued combustion, and the insulation materials shall also have a smoke developed classification of not higher than 50 when tested in accordance with ASTM E84.
 - 3.5 If the coverings and linings are to be applied with adhesives, they shall be tested as assembled with such adhesives; or the adhesives used shall have a flame spread rating not over 25 and a smoke developed rating not higher than 50.

15083 Equipment Insulation

- 1 Insulate all equipment that operates at less than 60°F (15 °C) and more than 104°F (40 °C)
- 2 Equipment Insulation (above ambient temperature)
 - 2.1 Insulate domestic hot water tanks with 2" thick sectional semi-rigid mineral fibre, 4.5 lbs./cu. ft.
 - 2.2 Insulation for curved surfaces shall be 2" flexible mineral fiber blanket to CAN/CGSB 51.11, or 2" thick sectional semi-rigid, as noted above.

15100 Plumbing General

- 1 Codes, Standards and Approvals
 - 1.1 The more stringent requirements of the 2005 National Plumbing Code of Canada and these requirements shall be used for the design.
 - 1.2 Connection to municipal water supply shall have municipal approval.
- 2 General Design Considerations
 - 2.1 Provide isolating valves for :
 - 2.1.1 For each piece of equipment.
 - 2.1.2 For each group of fixtures or each bathroom and for each riser.
 - 2.1.3 Whenever required by local plumbing code.
 - 2.1.4 For sections of large buildings.
 - 2.1.5 For all branches of water mains.

15122 Thermometers and Pressure Gauges

- 1 Thermometers
 - 1.1 Adjustable type 9" graduated scale, metal casing, calibrated in degrees F and degrees C range to suit the normal operating temperature of the fluid.
 - 1.2 Locate and install thermometers to facilitate reading.
 - 1.3 For plumbing systems, install thermometers on the outlet of all DHW tanks.
 - 1.4 For air systems, provide thermometers on all ducts and air handling unit sections to and from heating and cooling coils and heat recovery devices.
- 2 Pressure Gauges
 - 2.1 Gauges shall be 4½" diameter, cast aluminum, close type black finished ring and clear glass window, calibrated in both imperial and metric. Dials shall have white finish with jet black embossed figures and graduations.
 - 2.2 Locate and install pressure gauges to facilitate reading.
 - 2.3 For heating systems provide gauges at the outlet of all main heat exchange equipment.

15130 Pumps

1 General

- 1.1 Pumps shall be centrifugal type with quiet operating characteristics and maximum speed of 1750 rpm. Pumps shall have mechanical seals and sleeve bearings.
- 1.2 A flat curve pump selected slightly to left of midpoint of pump capacity curve is recommended. A steep curve pump can be considered if the system has high head loss terminal unit sub-circuits and no modulating valves.
- 1.3 Pump motors shall be non-overloading over published rating curve.
- 1.4 Pump construction shall permit complete servicing without disassembly of piping or motor connections. Pump connections shall be flanged.

2 In-Line Circulator Pumps

- 2.1 Horizontal mount, centrifugal, close coupled, mounted in-line. Casing shall be cast iron except bronze casing for domestic hot and cold water services. Impeller shall be bronze or cadmium plated steel.

15140 Plumbing Piping, Cleaning and Disinfection

- 1 All manhole covers and storm drainage gratings shall have spanner wrench or other positive lock-down features. All utility access points, culverts and other storm drainage devices in excess of eight inch diameter shall be fitted with bar grilles.
- 2 All solder for drainage, vent and domestic water piping to be lead free.
- 3 Drainage and Vent Systems
 - 3.1 Sanitary, storm and vent pipe above grade shall be DWV copper for sizes under 2", cast iron or DWV copper for sizes 2" and over. Cast iron shall conform to CAN B70. Fittings to be same material as pipe. Mechanical joints may be used above grade. Seal between cast iron and copper shall be made with an appropriate fitting. Right angle connections in drain pipes shall be made with Y branches and 1/8 bends, the use of 90° tees and elbows shall be avoided. Urinal piping and associated vent pipe to 4 feet above finished floor.
 - 3.2 PVC-DWV for above grade pipe is also acceptable where permitted by code.
 - 3.3 Minimum pipe size used below grade shall be 2".
 - 3.4 Sanitary pipe below grade shall be PVC-DWV or cast iron.
 - 3.5 Storm pipe below grade shall be PVC-SDR 35, PVC-DWV or cast iron.

- 3.6 Joints for below grade cast iron pipe shall be hub and spigot with lead and oakum or self locking rubber compression gaskets (Bibby Bi-Seal or equal products which require approval in writing from DCS). Mechanical joints may also be used below grade.
- 3.7 Each fixture shall be provided with individual trap. Stacks less than 3" where carried through the roof, shall be increased to a least 3" before passing through the roof.
- 3.8 Stacks 3" and larger shall be increased at least one size before passing through the roof.

4 Domestic Water Systems

- 4.1 Water piping to be Type "L" copper for domestic hot, cold and recirculation systems above ground. Buried piping to be soft copper type K with no buried joints. Cross linked polyethylene (PEX) pipe and PEX-aluminum-PEX (eg. Kitec) may be considered for run outs to individual plumbing fixtures where permitted by code (obtain specific written permission from DCS).
- 4.2 Silfos solder shall be used for pipe 2½" and larger.
- 4.3 Copper pipe 2½" and larger may be roll grooved. Grooved couplings shall be designed with angle bolt pads to provide a rigid joint, complete with EPDM flush seal gaskets. Provide unions at tanks, fixtures and other equipment.
- 4.4 If roll groove piping system is used, all couplings and fittings shall be of the same manufacturer.
- 4.5 Ball valves shall be used for shut-off applications 2" and smaller.

5 Piping Installation

- 5.1 Install pipe straight, parallel to building lines, and close to walls and ceilings, with specified pitch. Use standard fittings for direction changes. The water supply mains shall generally run near the ceiling of the lowest story.
- 5.2 Install groups of piping parallel to each other; spaced to permit application of insulation, identification, and service access.
- 5.3 Prohibited Locations: No water piping shall be placed in floor fills, structural slabs, in transformer vaults, electrical or server rooms, or over switch boards or electrical panels.
- 5.4 Where pipe sizes differ from connection sizes of equipment, install reducing couplings close to equipment. Reducing bushings are not permitted.
- 5.5 Brass and copper pipe and tubing shall be free from surface damage. Replace damaged pipe or tubing.
- 5.6 Ream ends of pipes and tubes before being made up.
- 5.7 Lay copper tubing so that it is not in contact with dissimilar metal and will not be kinked or collapsed.
- 5.8 Use non-corrosive lubricant or Teflon tape applied to male thread.
- 5.9 Cut grooved pipe ends square, with seating surface clean and free from indent and score marks.

- 5.10 Install di-electric couplings wherever piping of dissimilar metals are joined.
 - 5.11 All piping shall be run concealed in pipe spaces, chases and ceiling spaces where practical. Piping that is run exposed in finished areas shall be located in corners and furred in under work of the appropriate section for indicated furring.
 - 5.12 Transition from plastic to copper or cast iron to take place not further than 3" above slab.
 - 5.13 Wipe all pipes of soldering flux as the joint is completed. All drainage mains below grade shall be run at minimum 2% slope.
 - 5.14 See 15010 for testing requirements.
- 6 Cleaning and Disinfection
- 6.1 After system pressure testing is complete, flush and disinfect domestic water system to requirements of authorities having jurisdiction.
 - 6.2 Maintain manual and automatic valves in full open position during cleaning process.
 - 6.3 Upon completion, contractor to provide laboratory test results on the domestic water quality (tests as per authorities having jurisdiction) to mechanical design engineer. Tests shall be as per the requirements of the Nova Scotia Department of Environment and Labour. Mechanical design engineer shall review the test results and forward recommendations to DCS on the acceptability of the domestic water system.

15180 Hydronic Piping and Accessories

- 1 Pipe and Fittings
 - 1.1 Hot water heating.
 - 1.1.1 Pipe
 - 1.1.1.1 2" and Smaller: BW steel, Sch. 40 ASTM A53, Grade B.
 - 1.1.1.2 2½" and Larger: ERW steel, Sch. 40, ASTM A53, Grade B.
 - 1.1.1.3 Copper Tube: Type L hard drawn.
 - 1.1.2 Joints:
 - 1.1.2.1 2" and Smaller: Screwed
 - 1.1.2.2 2½" and Larger: Welded, Flanged
 - 1.1.2.3 Copper Joints: Solder, Tin-antimony 95:5.
 - 1.1.2.4 Roll grooved joints (using Victaulic couplings or equal product which requires approval in writing from DCSW) are also acceptable for hot water heating, chilled water, glycol, condenser water and diesel cooling piping.
 - 1.1.2.4.1 Victaulic #77, complete with EPDM gaskets at elbows only.
 - 1.1.2.4.2 Victaulic #07, complete with EPDM gaskets at straight run of pipe.
 - 1.1.2.4.3 Note: Victaulic #77 not permitted for headers at pump supply and return and vertical risers at connections to coils.
 - 1.1.3 Fittings

- 1.1.3.1 2" and Smaller: Standard Malleable Iron, Banded Threaded, 125 lb. class.
 - 1.1.3.2 2½" and Larger: Sch. 40 Steel Butt Welded ASTM A234, Grade A, Weld-0-Lets or equal.
 - 1.1.3.3 Copper Fittings: Wrought copper.
 - 1.1.3.4 Roll grooved (using Victaulic or equal product which requires approval in writing from DCS) fittings and tees.
 - 1.1.3.5 Unions: 2" and Smaller: Class 150 malleable iron, brass to iron seats.
 - 1.1.3.6 Flanges
 - 1.1.3.6.1 All: Class 150 steel slip-on or weld neck type, raised face, ASTM A181.
 - 1.1.3.6.2 Victaulic (or equal product which requires approval in writing from DCS).
 - 1.1.3.6.3 Bolts: Stud bolts, carbon steel, heavy hex nuts.
 - 1.1.3.6.4 Gaskets: All - 1/16" thick Cranite or approved equal.
- 1.2 Branch connections shall be made using pipe cut into the main and/or weld-o-lets where the main is twice the diameter of the branch, otherwise welding tees shall be used. Alternatively, use the Victaulic hole cut piping system.
- 1.3 If roll groove piping system is used, all couplings and fittings shall be of the same manufacturer.
- 1.4 Piping Installation
- 1.4.1 Arrange and install piping approximately as indicated, straight, plumb, and as direct as possible. Form right angles or parallel lines to building walls.
 - 1.4.2 Locate groups of pipe parallel to each other spaced at a distance to permit applying full insulation and access for servicing valves.
 - 1.4.3 Grade forced water piping 1" per 60'-0" so that when the system is filled, the air in the mains and risers shall be carried to venting high points and drains at low points.
 - 1.4.4 Provide air vents at all high points in the piping system. Air vents shall be installed at an accessible place in order to facilitate maintenance.
 - 1.4.5 Provide shut-off valves in risers and main branches at point of takeoff from the supply or return main, individual equipment units at inlets and outlets to permit removal for repairs without interfering with remainder of the system, and in equipment by-passes.
 - 1.4.6 Keep piping free from scale and dirt. Protect open pipe and whenever work is suspended during construction, to prevent foreign bodies entering or lodging, using temporary plugs, burlap or other approved materials for protection. All elbows shall be long radius.
- 2 Valves
- 2.1 Each valve type to be of one manufacturer and shall have the manufacturer's name and pressure rating clearly marked on the outside of the body.
 - 2.2 The metals used in the bodies, bonnets, yokes, and discs of all the bronze valves shall

conform to ASTM B62. In iron body valves, the cast iron shall conform to ASTM A126 Class B.

- 2.3 Composition discs on all valves shall be suitable for the service and shall be as recommended by the manufacturer.
- 2.4 Use globe valves for by-passes that are the same size as control valves and pressure reducing stations. Use ball valves for pipe 2" and smaller.
- 2.5 Balancing Valves
 - 2.5.1 Provide circuit balancing valves on returns from force flow heaters, unit heaters, heating coils and wall mounted radiators.
 - 2.5.2 Locate valves for easy access. Do not locate stems below horizontal.

3 Hydronic Specialities

3.1 Air Vents

- 3.1.1 At every high point in piping system, provide automatic air eliminators in order to avoid air pockets in the system. Air vents shall be installed at an accessible place with the aid of necessary piping in order to facilitate maintenance.
- 3.1.2 Provide manual air vents at high points of the system and return bends to permit draining.
- 3.1.3 Use automatic float type vents at difficult to get at points only and provide drip point. A collecting standpipe is recommended at any high point which might cause air binding.
- 3.1.4 Provide a mini ball valve for shut-off and servicing of the vent.
- 3.1.5 Arrange the piping so that the air purging will follow the direction of water flow in branches and risers.

3.2 Safety and Relief Valves

- 3.2.1 Provide ASME rated direct spring loaded type, lever operated non-adjustable factory set discharge pressure as indicated. Provide relief valves on pressure tanks, heating convertors and where indicated. System relief valve capacity shall equal make-up pressure reducing valve capacity. Equipment relief valve capacity shall exceed input rating of connected equipment.
- 3.2.2 Locate and install so that they can be taken apart without breaking piping connections.

3.3 Expansion Tank

- 3.3.1 Provide diaphragm type for acceptance volume up to 35 US gallons, and bladder type for acceptance volume over 35 US gallons.
- 3.3.2 Pre-charged expansion tank shall be complete with air control fitting and water make-up accessories, from the same manufacturer.
- 3.3.3 The tank system connection shall be at or near the pump suction.
- 3.3.4 Use ¾ inch minimum pipe size for tank connection to system. Minimize length of

horizontal piping.

3.4 Water Make-up System

3.4.1 Water make-up connection must have an approved backflow device.

3.4.2 Locate water make-up feed connection at the point of no pressure change.

4 System Pressurization

4.1 The fill pressure at the system pump intake shall be the saturation pressure of water 15 degrees F above the system design operating temperature.

4.2 This minimum pressure shall ensure at least 4 psig at the top of the system.

4.3 Locate the boilers and a system relief valve on the suction side of the pump.

4.4 Standard pressure settings of 35 psig for relief valve and 12 psig for automatic fill valve are suitable for water temperatures up to 230° F and static heads up to 18 feet.

15192 Propane Gas System

- 1 Provide a complete propane distribution system including connection to exterior propane tank(s). Coordinate tank installation (size of tank(s), location etc.) with DCS/building operator and their propane service contractor.
- 2 System shall be in accordance with applicable codes and authorities having jurisdiction. Installation shall be carried out by a licensed propane installer.
- 3 Above grade pipe shall be Schedule 40 black steel with socket welded joints or Type K copper with silfos joints. As noted in 15075 paint the entire propane piping system yellow.
- 4 Pipe supports and hangers shall be as per authorities having jurisdiction with pipe running outside on roofs to be mechanically fastened to the roof structure (eg. Thaler anchors) . Supporting the pipe on wood sleepers placed on top of the roof is not permitted.
- 5 Provide a reinforced cast-in-place structural concrete slab base for the tank(s) and chain-link fencing (minimum height 8'-0") around the tank(s) c/w lockable access gate. Also provide concrete filled metal bollards to protect tank(s) from vehicles.
- 6 Gas outlets shall be provided with pins, lugs etc. secured to the mounting benches to prevent tampering with the system and release of propane gas.

15300 Fire Protection

- 1 Refer to Division 13, Section 13900 Fire Protection

15401 Plumbing Specialties

- 1 All plumbing specialties (other than gaskets) shall be metallic. Exposed metal parts in finished areas shall be chrome plated or stainless steel.
- 2 Domestic Hot Water
 - 2.1 Unless otherwise required by the program, the domestic hot water service shall be nominal 120°F (50°C) and available at all fixtures in the building at all times.
- 3 Water Hammer
 - 3.1 Air chambers sized in accordance with branch pipe size and length, water velocity and flow pressure may be provided if provision is made for recharging by including an isolation valve, hose bibb and pet cock. Otherwise water hammer arresters shall be used. Install one or more per each group of fixtures as recommended.
 - 3.2 Water hammer prevention devices shall be sized and shown on the plumbing drawings.
- 4 Meters
 - 4.1 Provide each service connection with a meter, including where the source is other than municipal (e.g. provide meter where well used). Connections shall be provided in accordance with local requirements. Provide a pressure gauge downstream of the meter.
 - 4.2 For all meters provide a strainer upstream. Also provide a valved bypass around the meter and a valve and union on both the inlet and outlet connections.
- 5 Drains
 - 5.1 Floor Drains - Minimum outlet and drain line size from floor drains shall be 3".
 - 5.2 Floor drains located in boiler rooms may be ganged together into a running trap at the exit from the room.
 - 5.3 Finished areas - Cast iron body complete with adjustable strainer, nickel bronze top, integral seepage flange, ½" seal primer tapping.
 - 5.4 Unfinished areas - Cast iron, Dura coated complete with dome strainer, cast iron top, integral seepage flange, ½" seal primer tapping.
- 6 Cleanouts
 - 6.1 In addition to those required by code, an easily accessible cleanout shall be provided at each 135 degree change in direction in main soil or waste pipe and at the base of each stack. All cleanouts shall be of the same nominal size as the pipes up to 4" and not less than 4" for larger pipes.
 - 6.2 Provide cleanouts to allow for complete cleaning or clearing of building plumbing system.
 - 6.3 Provide P-traps with removable dips below all sinks or drainage Y's with copper end cleanouts in trap arm piping between trap and wall or in vertical waste piping prior to the floor penetration.
 - 6.4 Cleanouts are to comply to the most stringent of either code requirements or the criteria

- described above.
- 6.5 Cleanouts shall be complete with gas-tight expansion plug.
 - 7 Pressure/Temperature Relief Valve
 - 7.1 Bronze body, maximum temperature of 200°F at 125 lbs. working pressure. A relief valve or expansion tank is required on domestic hot water systems.
 - 8 Vacuum Relief Valve
 - 8.1 Provide on domestic cold water supply to domestic hot water tanks.
 - 9 Backflow Preventers
 - 9.1 Protect the entire water distribution system against contamination due to backflow from non-potable sources. Provide a single reduced pressure type backflow preventer for services up to 2" and two reduced pressure type backflow preventers for services larger than 2".
 - 9.2 Provide each connection to fixtures or equipment for which approved air gap or vacuum breaker is not shown, or specified elsewhere with the fixture or equipment itself, with a reduced pressure type backflow preventer (and dump valve). Discharge shall be piped to a drain.
 - 9.3 All reduced pressure backflow preventers installed in a location where the line pressure is alternately decreasing and increasing (e.g. deep well with storage tanks) shall be complete with a check valve in the supply piping to the backflow preventer. The backflow preventer shall be designed to dump when reverse flow occurs.
 - 9.4 Refer to AWWA manual for cross connection control.
 - 10 Backwater Valves
 - 10.1 Fixtures shall be protected with an accessible backwater valve or shutoff valve where required (only those below the level of the street service shall be protected). Backwater valves shall comply with the National Plumbing Code of Canada.
 - 11 Wall Hose Bibbs
 - 11.1 Shall have thread spout, bronze construction, chrome plating and be complete with backflow protection.
 - 11.2 Wall hydrants shall be installed so that any part of the exterior of the building may be reached with 100 feet of hose.
 - 12 Roof Drains
 - 12.1 Where municipality requires controlled run-off, coordinate ponding and weir type roof drains with architect.
 - 12.2 Make provision for rain water leader thermal expansion. Pay particular attention when the piping is PVC-DWV.
 - 12.3 Roof drain domes to be aluminum or cast iron.

15411 Plumbing Fixtures and Trim

- 1 General
 - 1.1 Vitreous china plumbing fixtures shall be white and the product of one manufacturer.
 - 1.2 Stainless steel plumbing fixtures shall be the product of one manufacturer
 - 1.3 Trim shall be of one manufacturer.
 - 1.4 Exposed plumbing brass and metal work shall be heavy triple chromium plated.
 - 1.5 Provide union connections at all faucets.
 - 1.6 Note that other project requirements may mean modification of the items listed below with additional features and/or limitations. For example, barrier free and energy related (MNECB, CBIP etc.) requirements may necessitate the use of certain fixtures and/or trim. Mechanical design engineer to consult with DCS.

- 2 Water Closets
 - 2.1 Water closets shall be vitreous china, wall mounted in all areas.
 - 2.2 All water closets shall have siphon jet bowl and regular rim.
 - 2.3 All water closets shall have white, solid plastic seats with antibacterial properties. Water closets shall have covers for seats.
 - 2.4 Water closets shall be low flow type (6 litres/flush).

- 3 Lavatories
 - 3.1 Countertop - Self rimming, stainless steel, overflow, seal to be putty, caulking or concealed vinyl gasket (undercounter mount also acceptable).
 - 3.2 Provide faucet with aerator.

- 4 Fixture Carriers
 - 4.1 Select carriers to support fixtures without strain on piping. Supports shall be such that 200 lb. weight will not loosen or distort mounting.

- 5 Service and Mop Sinks
 - 5.1 Floor mounted molded mop service basin c/w stainless steel back and suitable trim.

- 6 Stainless Steel Sinks
 - 6.1 Type 302 SS, self-rimming, single or double compartment with undercoating, crumb cups, holes drilled in ledgeback.
 - 6.2 Chrome plated supply with swing spout and aerator.

- 7 Fixture Installation
 - 7.1 Connect fixtures complete with supplies and drains, separately trapped, supported level and square. Each fixture shall have shut-off valve and union connections on supplies.
 - 7.2 Hot water faucets shall be on left. Mixing faucets shall have opposite action and pressure balanced mixing valves shall have check valves on supplies. Fixtures on outside walls

shall have supplies from floor; other fixtures shall be serviced from wall.

- 7.3 Exposed piping, valves and metal to vitreous china fixtures shall be chrome plated with plated escutcheons. Exposed piping, valves and metal to stainless steel fixtures shall be spray painted chrome, if not chrome plated.
- 7.4 All joints between plumbing fixtures and walls or floors are to be caulked.

15500 Boilers

- 1 Primary heat generation shall be provided by hot water boilers rated for and certified for oil firing. The boilers shall also be rated for and certified for firing of natural gas. Plates/decals on boilers to indicate these certifications.
- 2 Domestic hot water shall be heated by the main building heating plant with this plant incorporating sufficient capacity to provide indirect domestic hot water heating. A separate domestic hot water boiler serving indirect domestic hot water heaters shall be provided where the summer load is below the minimum safe turn down ratio of the smallest main building heating plant boiler. Other systems/equipment may be considered but will be allowed only with written permission from DCS.
- 3 The main boiler hydronic systems shall utilize treated fresh water.
- 4 Boiler shall fire light oil (and be certified for future natural gas firing) and be complete with all standard accessories minimum 2" thick insulation (on all sides, top and bottom) under sectional preformed metal jacket (both readily removable and reinstalled), float operated low water cut-off, pressure gauges, automatic water feeder, ASME safety relief valve, and all necessary controls for safe automatic operation. The boiler-burner combination must be approved as a package from an accredited testing organization (eg. ULC) and documentation of this approval shall be reviewed and confirmed by the mechanical design engineer.
- 5 Low water cut-offs shall be piped with test-n-check valves and air vent for testing of the low water cut-offs without draining down the boiler.
- 6 All boiler temperature and pressure gauges shall be calibrated in both metric and imperial and shall be the dual temperature and pressure type.
- 7 Units shall be complete with necessary control transformers in a pre-wired control panel. Control panels shall be complete with wiring diagrams.
- 8 Boiler-burner combination shall be factory rated and guaranteed to operate at a minimum fuel to hot water efficiency of 80% for firing rates of 40% to 100%.
- 9 The boiler-burner shall be started up and put into operation by factory trained

representatives of the manufacturers (who must be a licensed burner mechanic). The complete boiler package shall be tested to check construction, operation and function of all controls, and performance. A written report of the start-up shall be provided to DCS indicating CO₂, smoke, pressure, and flame readings (readings shall be taken with an electronic analyzer with a copy of the actual test print out included in the report). The licensed burner mechanic shall also sign the report.

- 10 The design and installation shall be such that the minimum return water temperature to the boilers and maximum temperature differential between the supply and return water (under all operating conditions) is per the boiler manufacturers recommendations.

15531 Forced Air Furnaces

- 1 Primary heat generation shall be provided by forced air furnaces rated for and certified for oil firing. The furnaces shall also be rated for and certified for firing of natural gas. Plates/decals on furnaces to indicate these certifications.
- 2 Furnace shall fire light oil (and be certified for future natural gas firing) and be complete with all standard accessories minimum 2" thick insulation (on all sides, top and bottom) under sectional preformed metal jacket (both readily removable and reinstalled), and all necessary controls for safe automatic operation. The furnace-burner combination must be approved as a package from an accredited testing organization (eg. ULC) and documentation of this approval shall be reviewed and confirmed by the mechanical design engineer.
- 3 All furnace temperature gauges shall be calibrated in both metric and imperial and shall be the dual temperature and pressure type.
- 4 Units shall be complete with necessary control transformers in a pre-wired control panel. Control panels shall be complete with wiring diagrams.
- 5 The furnace-burner shall be started up and put into operation by factory trained representatives of the manufacturers (who must be a licensed burner mechanic). The complete furnace package shall be tested to check construction, operation and function of all controls, and performance. A written report of the start-up shall be provided to DCS indicating CO₂, smoke, pressure, and flame readings (readings shall be taken with an electronic analyzer with a copy of the actual test print out included in the report). The licensed burner mechanic shall also sign the report.

15550 Breeching and Chimneys (#2 Fuel Oil or Natural Gas)

- 1 Mechanical engineer to size breeching and chimneys to handle peak gas flow at the design gas temperature and excess air so that the over fire boiler draft will be as per manufacturers recommendation, and as per code and CSA Standards.
- 2 Chimney stack's height shall be as per manufacturers recommendation, and as per code and CSA Standards. Mechanical engineer must determine if conditions warrant a higher stack.
- 3 Breeching
 - 3.1 Shop fabricated, 14 gauge all welded mild steel, or prefabricated, double walled insulated systems as per chimney section. Prefab systems must be rated for use as a breeching.
 - 3.2 Attach to boiler using fully sealed flanged connection.
 - 3.3 Suspend breeching at 6' centres and at each joint on horizontal runs.
- 4 All Fuels Pressure Chimney
 - 4.1 ULC labelled, 1000° F (continuous) rated, all fuels.
 - 4.2 Sectional, prefabricated, double wall with minimum of 1" mineral wool insulation with mated fittings and couplings.
 - 4.3 To ensure gas tightness, all joints shall be flanged and chimney systems shall be factory tested and approved to 60" w.c.
 - 4.4 Liner shall be minimum 0.0345" thick, 316 stainless steel.
 - 4.5 Shell shall be 304 stainless steel.
 - 4.6 90° Tee, straight pipe and flue connector are to suit the application.
 - 4.7 Support chimneys at bottom (preferably above base tee), and install guides and flashing components, as required.
 - 4.8 Install flashings on chimneys, as required.
 - 4.9 Install cones, cleanouts and drains, as required.
 - 4.10 All fasteners and screws used to assemble chimney to be stainless steel.
 - 4.11 Follow manufacturer and SMACNA installation and recommendations for shop fabricated components. Chimneys shall be offset from boilers complete with base cap and drain.
 - 4.12 Install chimney to manufacturers recommendations complete with all required components. Particular attention shall be paid by the design engineer and contractor to the overall integrity of the breeching and chimney system and its penetration through the building structure. Design engineer to provide written confirmation of his visual inspection of the complete system (before it concealed by insulation and/or the building construction).
- 5 Accessories
 - 5.1 Cleanouts shall be bolted, gasketed type, full size of breeching, as indicated. Provide so that all section of breeching can be cleaned and inspected.

- 5.2 Hangers and supports shall be in accordance with the recommendations of the Sheet Metal and Air Conditioning Contractors National Association Inc. (SMACNA) and the chimney manufacturer.
- 5.3 Exit cone, storm collar, guy system (if applicable including guy section, wire and tensioners), flashing components, alignment guide, wall support, basetee, drain cap, drain shall be in accordance with the chimney manufacturers recommendations.
- 5.4 Base cap and drain are to be accessible and have a disconnect and trap.
- 5.5 Ensure wire guy tensioners allow for expansion and contraction of new chimney. A suitable galvanized structural steel guy frame above the roof line is also acceptable if guying is required.
- 5.6 Apply at least one coat of corrosion resistant primer and paint to fabricated supports made of ferrous metal.
- 5.7 Apply cold galvanized zinc metal touch-up as required on galvanized metal work.

15560 Fuel Handling Systems

- 1 Boiler fuel shall be number two oil.
- 2 Fuel Oil Tank Systems Reference Standards
 - 2.1 Supply and installation oil storage tanks and accessories shall be in accordance with the following standards:
 - 2.1.1 Most recent editions of CSA B139, CSA B139S1, ULC S601, CAN4-S602.
 - 2.1.2 Nova Scotia Department of Environment (DOE) - Petroleum Storage Regulations and Construction Standards for Installation and Removal of Petroleum Storage Systems.
- 3 Installation Requirements
 - 3.1 Fuel oil storage tank shall be installed by a certified tank installer (Class I License). Tank shall be registered as per DOE Petroleum Storage Tank Regulations. Copy of registration shall be forwarded to DCS.
- 4 Piping
 - 4.1 Installed and protected as per CAN 4-S603.1M, latest edition, Appendix B.
 - 4.2 Above Grade.
 - 4.2.1 Above grade oil lines shall be Schedule 40 black steel pipe, ASTM B53 with socket weld fittings or Type L hard copper with silfos joints.
 - 4.2.2 Above grade black steel pipe located outdoors shall be primed and painted with corrosion resistant coatings.
 - 4.3 Below Grade
 - 4.3.1 Buried pipe shall be double wall, continuous polyethylene piping consisting of a ULC listed flexible inner primary pipe encased within a ULC listed flexible outer containment pipe.

- 5 Accessories
 - 5.1 Vent shall be fitted with a screened elbow and Vent-A-Larm.
 - 5.2 Fuel oil filter shall be heavy duty type, simplex filters at pump suction.
 - 5.3
- 6 Tanks
 - 6.1 General
 - 6.1.1 Provide a CSA certified above ground exterior oil tank. Size tank for minimum one week oil storage capacity at design winter temperature.
 - 6.2 Concrete Work
 - 6.2.1 Concrete tank pad or pavers shall be structurally reinforced.

15720 Air Handling Units

- 1 Packaged air handling units (including heat recovery ventilators) shall be designed in accordance with the latest ASHRAE Standard 62 "Ventilation for Acceptable Indoor Air Quality".
- 2 Filters - refer to Section 15861
- 3 Fans
 - 3.1 Shall be selected to allow for reduced fan speeds and therefore reduced sound power levels.
- 4 Energy Recovery Systems
 - 4.1 General
 - 4.1.1 Analysis shall be carried out by the mechanical designer so that it is clear the heat recovery system selected will minimize owning, operating and maintenance costs over the life of the building.
 - 4.1.2 Install to manufacturer's recommendations.
- 5 Mechanical designer shall inspect all air handling units and air distribution systems for cleanliness prior to start-up of systems. No systems shall be started until they are cleaned to satisfaction of the designer and until filters (temporary or permanent) are in place.

15760 Heating Units

- 1 Wall Fin Radiation

- 1.1 Fin tube radiation shall be of the non-ferrous type, aluminum fins, 1¼" seamless copper tube, enclosure shall be constructed of minimum 16 gauge steel complete with hanger, brackets, etc.
- 1.2 Performance shall be based on 180°F average water with a 20°F temperature drop and 65°F entering air.
- 2 Cabinet Heaters
 - 2.1 Coils shall be copper tube extended surface type with mechanically bonded aluminum fins.
 - 2.2 Fans shall be quiet operating, forward curved, centrifugal blowers properly balanced to provide quiet operation, direct drive by silent operating non-radio interference vibration isolated capacitor motors of standard manufacture.
 - 2.3 Cabinets shall be minimum 16 ga. steel, phosphatized, prime coated for finishing after installation.
 - 2.4 All units shall have a three (3) speed switch and manual starter accessible through an access door in the front cover.
 - 2.5 Units shall be controlled by a thermostat/temperature sensor with a metal cover and guard mounted on the opposite wall.
 - 2.6 Heaters shall be wall mounted only. Airflow to be in on the front panel at the top and out at the bottom panel. Heaters shall have recessed installation.

15770 Electric Heating

- 1 The use of electric heating must be approved in writing by DCS before proceeding.
- 2 In electrically heated buildings, evaluate and determine the type of heat source required including but not limited to the following:
 - 2.1 Natural Convection Heaters
 - 2.1.1 Baseboard heaters.
 - 2.1.2 Draft barrier heaters.
 - 2.1.3 Architectural convection heaters.
 - 2.1.4 Electric furnaces.
 - 2.2 Forced Air Heaters
 - 2.2.1 Wall unit heaters.
- 3 Baseboard type heaters are to be low watt density. Cabinets shall be finished with two coats of baked enamel in ivory colour.
- 4 All electric type heaters shall be controlled by wall type thermostats. Integral type thermostats are not permitted.
- 5 Electrical heating systems shall have a high temperature cut-out that will automatically

discontinue current to the heating elements if the temperature exceeds the maximum safe limits.

15811 Ductwork

- 1 Galvanized sheet metal ductwork shall be specified for supply, return of ventilation and forced air heating systems and washroom exhaust air systems.
- 2 Classification shall be in accordance with SMACNA (fan static pressure shall determine classification).
- 3 Construction
 - 3.1 Ductwork shall be to ASHRAE and SMACNA. (see below for additional requirements)
Ductwork shall be galvanized steel, lock forming quality to ASTM A525M, Z90 zinc coating.
 - 3.2 Clean ductwork, plenums and equipment prior to start-up.
 - 3.3 Longitudinal seams shall be to SMACNA Standard Fig. 105 Types L-1 to L-5.
 - 3.4 Duct Joints
 - 3.4.1 Joints shall be to ASHRAE and SMACNA.
 - 3.4.2 Manufactured joint systems (Ductmate and Nexus) are also acceptable.
 - 3.5 Ductwork shall be free from pulsation or objectionable noises.
 - 3.6 Install duct elbows having a throat radius 1½ times the diameter.
 - 3.7 Where ducts pass through walls or floors, coordinate with architectural/structural disciplines to ensure integrity of the construction. At fire dampers and where ducts pass through floors, provide a continuous galvanized steel angle iron frame minimum size 1½” x 1½” x ¼”(or as per fire damper manufacturer requirements) which shall be bolted to the construction and made air-tight to the same by applying appropriate caulking compound. Sheet metal at these locations shall be bolted to the angle iron.
 - 3.8 During construction, seal all openings with polyethylene and tape at all times to prevent entrance of dirt, dust, etc.
 - 3.9 Round Ducts
 - 3.9.1 Concealed round branch ducts up to 14" diameter may be constructed with longitudinal or spiral lock seams. Long radius elbows shall be used where space permits. Where 90° take-offs are necessary, conical “Ts” shall be used.
 - 3.9.2 Round ducts shall be galvanized steel of the following minimum gauges:

Duct Diameter	Spiral Duct Gauge	Plain Duct Gauge
8" and smaller	28	24
9"-14"	26	24
 - 3.10 Duct Sealing
 - 3.10.1 Sealing shall be in accordance with SMACNA pressure classifications.
 - 3.10.2 All duct joints and connections shall be made airtight with duct sealant, tape or a combination thereof (method depends on the classification), applied according to

the manufacturer's recommendations as the ducts are being constructed.

- 3.10.3 Duct sealant shall be:
 - 3.10.3.1 Water and oil resistant
 - 3.10.3.2 Compatible with duct materials.
 - 3.10.3.3 Rated at 25 or less for flame spread and 50 or less for smoke developed.
 - 3.10.3.4 Non toxic, low VOC emission.
- 3.10.4 Duct tape shall be:
 - 3.10.4.1 Polyvinyl treated, open weave fibreglass, 2" (50 mm) wide.
- 3.10.5 Method
 - 3.10.5.1 Surfaces shall be cleaned and treated in accordance with manufacturer's recommendations.
 - 3.10.5.2 Apply sealant in accordance with SMACNA and manufacturer's recommendations.
 - 3.10.5.3 Where tape is required by the classification, bed tape in sealant (overlapping the area to be sealed by 2") and recoat with minimum of 1 (one) coat of sealant to the manufacturer's recommendations, and closing all openings in the weave.
- 4 Flexible Ductwork
 - 4.1 Flexible ductwork shall be used for acoustical purposes on ventilation system only.
 - 4.2 There is to be no more than a 15 degree change in direction in flexible ductwork. For changes in direction of more than 15 degrees, use rigid ductwork for the change (i.e. provide sheet metal elbows at air terminals).
 - 4.3 Flexible ducts shall be:
 - 4.3.1 UL listed for Class I air duct material, UL-181.
 - 4.3.2 In accordance with NFPA Standard 90A.
 - 4.3.3 Constructed of a non-collapsible, corrosion resistant, spring steel helix bonded to a vinyl inner liner and covered with a factory applied, wrapped, glass fiber acoustic insulation and vapour barrier jacket.
 - 4.3.4 Capable of operating at pressure from 10" positive to 1" negative.
 - 4.3.5 Capable of operating at temperatures from 0° F to 200°F.
 - 4.3.6 Install flexible ductwork fully extended and use only foil tape, not grey fabric tape, to seal ends of flexible ductwork.
- 5 Storage of Ductwork
 - 5.1 All ductwork shall be stored indoors and tightly wrapped/covered in poly. Storing ductwork outdoors under tarps is not permitted.

15820 Ductwork Accessories

- 1 Air Louvres and Screens
 - 1.1 Apply louvres that minimize entry of snow and water into the equipment. Louvres to have drainable blades.
 - 1.2 Provide galvanized wire mesh 'bird' screen with each louver.

- 1.3 Locate air intake louvres a minimum of 48" above grade level. Consider local snow fall and drifting or other conditions which may warrant increasing height above grade level.
- 2 Fire Resistance
 - 2.1 Fire-resistive ceilings may be provided with duct openings complying with UL testing.
 - 2.2 Provide fire dampers where required according to the Province of Nova Scotia Fire Marshall.
 - 2.3 Fire Dampers
 - 2.3.1 Fire dampers shall be ULC approved and labeled, and lock in a closed position when released by approved fusible links.
 - 2.3.2 Shop fabricated fire dampers shall not be accepted, the dampers shall be a manufactured item.
 - 2.3.3 Each damper shall be provided with a suitably located access panel with removable covers to allow resetting of dampers.
 - 2.3.4 Fire dampers shall be located within the fire separation.
 - 2.3.5 Provide galvanized steel angle frames, sized as per manufacturer's recommendation, on the outer perimeter of all fire damper installations, on both sides of the penetration.
 - 2.3.6 Fire dampers shall be complete with corrosion resistant springs, bearings, bushings and hinges.
- 3 Cabinet Fans
 - 3.1 Centrifugal direct drive fan.
 - 3.2 Galvanized steel housing.
 - 3.3 Disconnect within the fan housing.
 - 3.4 Acoustically lined housing.
- 4 Packaged Exhausters
 - 4.1 Wall and roof exhausters shall be complete with disconnect switch.
 - 4.2 Exhausters shall be direct or belt drive and shall be constructed in such a manner that motors, disconnects, etc. are readily accessible.
 - 4.3 Each roof exhauster shall be mounted on a wooden curb; ensure that weather tight flashing is provided. Curb height shall be a minimum of eighteen inches (18") above the top of the finished roof.

15852 Grilles, Registers, and Diffusers

- 1 Air supply to a space shall be distributed to the occupied zone as per ASHRAE and also the grille and diffuser manufacturer's recommendations. Ensure that proper air distribution and occupant comfort are achieved through appropriate air outlet application, quantity, selection and location.
- 2 All grilles and diffusers shall be of one manufacturer, where possible.

- 3 All diffusers, grilles and registers shall be free of fluttering, chattering and vibration.
- 4 Install in accordance with manufacturer's instructions.

15861 Air Filters and Filter Gauges

- 1 Filter media shall be UL listed, Class I or Class II, as approved by local authorities. Ensure that filter sections are supported with acceptable documentation with respect to resistance to air flow at design air velocities.
- 2 The filter selections shall be based on published ratings of dust holding capacity, arrestance, and efficiency. Ratings shall be based on ASHRAE. 52.2 criteria.
- 3 Panel Filters
 - 3.1 Extended surface high loft pleated media, moisture resistant frame, with the media bonded to the frame. Minimum MERV 6 efficiency.
- 4 Locate filters for straight-through unrestricted air flow to eliminate turbulence, dead air spaces and eddy currents. Construct and install filters to prevent passage of unfiltered air.
- 5 Ensure proper and safe access to filter for servicing.
- 6 Replace filters used during testing and commissioning period. Filter media to be new and clean at the time of acceptance

15900 Controls

- 1 Building System Controls - General
 - 1.1 Thermostats
 - 1.1.1 Room thermostats shall be fully proportional with an adjustable throttling range not exceeding 30°C with two dial stop pins to limit setpoint range. Thermostats shall be single or dual temperature direct or indirect acting as required. All thermostats shall be provided with bi-metallic dial thermometers. Thermostats to be mounted in accordance with barrier free requirements of the Nova Scotia Building Code Regulations Act.
 - 1.1.2 Electric Thermostats
 - 1.1.2.1 Shall be line voltage or low voltage type suitable for the application. Low voltage thermostats shall have heat anticipation. Ratings shall be adequate for the applied load.
 - 2 Warranty
 - 2.1 Warrant all controls equipment parts and labour against defects and workmanship for one (1) year.

15950 Testing, Adjusting and Balancing

1 Air Distribution Systems

- 1.1 Test and balance all air supply, return, and exhaust systems. Balancing must be performed by trained personnel who shall keep records on each trial balance.

2 Water Circulating Systems

- 2.1 Balance water flow through all equipment including heating coils. Upon completion of the balancing, and supply three (3) copies of the balancing reports. Contractor may be called upon to completely re-balance the systems. Record design and actual temperatures, pressures and flow rates.
- 2.2 Use the metering stations to obtain water flows in main piping systems. Provide pump curves for each pump showing plotted design conditions and field conditions and water on and off temperatures at each major piece of equipment. Provide schematics for all systems with all metering points numbered.

3 Mechanical Designer's Verification

- 3.1 Mechanical design engineer shall verify in writing a minimum of 30% of each type of measurement provided in the balancing reports.

**Appendix D: Electrical Design Requirements: Department of
Community Services**
(Begins on following page)

PROVINCE OF NOVA SCOTIA

Department of Community Services

ELECTRICAL
DESIGN REQUIREMENTS

October 16, 2009

Electrical General Requirements

- 1 Provide a riser diagram for each system on the drawings. All items are to be grouped by floor level. Identifying outlets as “typical” is acceptable. Risers are not required for a single dwelling unit.
- 2 All electrical controls (thermostats, light switches, TOL switches, etc.) located in public areas are to have appropriate measures (keys, plastic guards, etc.) implemented to prevent unauthorized manipulation.
- 3 All switchboards, panels, disconnect switches, power/voice/data/CATV/multimedia outlets, MCC's, transformers, control panels, magnetic starters, TOL's, time clocks, are to be provided with “lamicoid” nameplates.

Outlet Boxes, Conduit Boxes & Fittings

- 1 When installing flush boxes in metal drywall partitions where the grouping of multiple device boxes is required, support the box between the studs with a box mounting bracket. Caddy RBS series box mounting brackets or Caddy SGB series box brackets or equal are approved for this application. Where a single flush box is installed, this box may be supported by the wall stud without any additional support required.
- 2 All various types of systems, including lighting and power, whose wiring is to be installed on any exposed types of surfaces are to always be completely installed in raceway as per the following guidelines:
 - A. Use EMT conduit in unfinished areas.
 - B. Use aesthetic type surface raceway in finished areas where it is impossible to conceal conduits.
 - C. Ceiling mounted conduit/raceway is to be secured directly to overhead structure and/or related structural steel as high as possible in the ceiling space, and as close as practicable to the underside of the deck.
 - D. Wall mounted conduit/raceway is to be secured directly to, or directly on, exposed walls.
 - E. AC-90 and/or other types of systems pliable cables are not to be installed on exposed walls and/or ceilings without the benefit of conduit/raceway. This applies to all systems, including control wiring.

Electrical Power Conductor and Cables

- 1 Wiring for circuits exceeding 50 volts to ground shall be minimum size #12 AWG, soft drawn stranded copper, of 98% conductivity rated at (600 volts) unless specifically indicated otherwise. Wires #10 AWG and smaller shall be permitted to be solid. Wires #8 AWG and larger shall be stranded.
- 2 Feeders utilizing aluminum conductor material (ACM) shall not be utilized in any part of the building's distribution system downstream from the main incoming circuit breaker.
- 3 Bonding and grounding conductors shall always be copper.
- 4 Current carrying and neutral conductors for all systems rated 600 volts and less, shall have RW90 - XLPE type insulation rated accordingly.
- 5 Grounding and bonding conductors sized up to and including #10 AWG, are to have green coloured RW90 X-link insulation. Type TW75 c/w green coloured insulation is acceptable for all sizes #8 AWG and larger.
- 6 The tie-wrapping of the neutral conductor with its respective phase conductors is to be made at the closest point of entry "within" all panelboards, pull boxes, junction boxes, outlet boxes, etc.
- 7 All branch circuits which do not have neutral conductors, are to have their respective phase conductors tie-wrapped together in accordance with previously described methods.
- 8 Limited use of NMD-90 type cable will be considered as an alternate:
 - A. In exclusively wood frame structures as branch circuit wiring for general lighting and power circuitry, where installed "concealed" in walls and ceilings.
 - B. Each light fixture installed in wooden frame construction is to have a separate outlet box flush installed behind same.
 - C. Moulded type vapour barrier is to be used on interior boxes installed on exterior walls. The use of plastic is not permitted.
 - D. All surface wiring in service rooms (mechanical / electrical / furnace rooms, etc.) shall be in EMT.
 - E. Flexible connections for mechanical equipment shall utilize AC90 cable except in wet locations where liquid tight flexible metal conduit and approved connectors shall be used.
 - F. Exterior light fixtures and receptacles are to be mounted in/on appropriate boxes. Moulded plastic leveling boxes are to be used on beveled / contoured / flexible walls or siding.
 - G. Circuits protected by arc fault circuit interrupters are to be clearly identified.

- H. Pig tail leads are required at all receptacles where 2 or more cables are present.
 - I. Cables shall enter surface mounted panelboards through the sides or bottom only and shall exit the wall within 6" of same.
- 9 All Teck cable is to be terminated with proper Teck connectors.
- 10 All types of "armoured" cables are to be installed concealed, parallel and perpendicular to building lines and shall be adequately secured to the building structure at not less than 60" intervals or as otherwise indicated, in such manner as to ensure they are protected from potential types of mechanical damage occurring. Install independent supports for cabling in ceiling spaces, and do not use those of other trades. Do not secure cables to mechanical systems piping, ducts, or suspended ceiling support wires. The laying of "un-supported" cables directly atop the ceiling grid system is strictly prohibited.
- 11 Receptacles for computer use are to be wired as per the following:
- A. Quadraplex type receptacle, or two (ganged together) 120V U-Ground duplex receptacles grouped together in common (2) gang device box, are to be on the "same" branch circuit and provided for each work station, maximum 3 workstations per circuit.
 - B. Provide "same size" branch circuit neutral conductor as accompanying phase conductor where neutral is separate, or dedicated to same circuit.
 - C. Provide an "oversized" branch circuit neutral conductor where phase sharing with two or three other computer related branch circuits occurs.
 - D. Not more than 2 servers are to be fed from same branch circuit.
 - E. The location of receptacles and related communications outlets shall be co-ordinated with equipment layout, and indicated accordingly on drawings.

Grounding and Bonding for Electrical Systems

- 1 The "feed" bonding conductor shall be secured (wrapped around unbroken) to the grounding screw of each outlet/device box, before connecting to the other grounding conductors, and/or providing a "pig-tail" lead for device terminations.
- 2 All ground wires are to be twisted together with a screw-on type wire connector, and then placed in rear of outlet box in such manner as to minimize obstructions.

Hangers and Supports for Electrical System

- 1 Supporting of electrical systems raceway shall be independent of any non-electrical systems supports.
- 2 The use of tie-wraps for “supporting” purposes, is strictly prohibited and will be strictly enforced. They may “only” be utilized to secure various systems wiring “in-place,” but in no instance are they to be used as a substitute for approved type metal straps, clamps, etc.

Panelboards - Breaker Type

- 1 Panelboards are to be c/w factory installed bonding terminal strips. Where more than one bonding terminal strip is present in any one panel, both shall be hard-wired together using identical size bonding conductor as one accompanying the panel feeder conductors.
- 2 Each branch circuit shall be clearly identified on a typewritten directory, with directory being protected by a clear plastic cover.
- 3 Branch circuit panelboards are to be fitted with lock type doors.
- 4 Panelboards shall be centrally located within the servicing area to “minimize” excessive lengths of branch circuit wiring runs.
- 5 Branch circuit panelboards shall not be fed from other branch circuit panelboards.

Low Voltage Distribution Equipment

- 1 All receptacles are to be of “one” manufacturer throughout the project.
- 2 Receptacles to be specification grade, suitable for back-wiring of #10 AWG conductors.
- 3 “Pig-tail” type leads are to be installed on conductors in all device or outlet boxes where feeding through to other receptacles. “Daisy-chain” or looping through of conductors from one device to another is not acceptable. Provide separate pig-tail conductor leads for final termination to each receptacle for phase, neutral and bond conductors.
- 4 Provide “housekeeping” receptacles throughout buildings at a maximum 10m spacing. All rooms shall contain at least one “housekeeping” receptacle. These receptacles are to be rated 120V, 20A, T-slot type.

- 5 There shall be at least one exterior U-Ground receptacle installed on wall adjacent to every entry into a building, with each being fed from a “separate” 20A, single pole GFCI circuit breaker or faceless GFCI. These receptacles are to be rated 120V, 20A, T-slot type.
- 6 Unless otherwise noted, provide a 15A, 120V duplex receptacle adjacent all washroom sinks. Feed from a 15A, 1P GFCI breaker or faceless GFCI.
- 7 Receptacles requiring GFCI protection are to be fed from a GFCI circuit breaker or faceless GFCI.
- 8 All kitchens are to be wired similar to residential kitchens except that each split circuit shall be dedicated to one duplex receptacle only.

Enclosed Switch and Molded Case Circuit Breakers

- 1 Circuit breakers shall be bolt-on type only. Multi-pole breakers are to have single handle. Tie-bars are not permitted.
- 2 Under no circumstances are the use of “mini” type circuit breakers acceptable.

Transient Voltage Surge Suppression (TVSS)

- 1 Provide integral TVSS protection at the electrical power service entrance for all buildings where computerized or other electronic related equipment is in use.

Lighting

- 1 All light fixtures shall be “specification grade” and energy efficient.
- 2 Interior fluorescent fixture ballasts shall be electronic, “small can” type, CSA & CBM certified, energy efficient, complete with minimum 0.88 ballast factor and THD less than 20%, sound rating “A” and 95% minimum power factor.
- 3 Fluorescent lamps shall be reduced mercury type, long life, T8, 2,950 initial lumens, 2,800 design lumens, 24,000 hour rated life, and CRI minimum of 86. Lamps shall be designed to pass the Federal TCLP test.
- 4 Provide exterior lighting where required for driveways, walks, parking areas, and building perimeters. Exterior lighting shall be controlled using a photocell.

- 5 Exterior lighting to be LEED dark skies compliant.
- 6 Existing PCB type ballasts are to be disposed of according to Government legislation concerning the removal and disposal of hazardous waste.
- 7 Provide fluorescent task lighting above all sinks.
- 8 All exterior entrance doors shall be provided with a dedicated lighting fixture for security purposes.

Exit Signs and Emergency Lighting

- 1 Exit signs and emergency lighting layouts shall be shown on the same drawings as the fire alarm layouts so as to keep the electrical life safety systems on the same drawings.
- 2 Provide exit and emergency lighting as required by the Provincial Building Code as a minimum.
- 3 Exit lights shall be die cast, soft designer look, LED type complete with DC backup. Specification grade. Faceplate to be fastened with appropriate screws.
- 4 Provide a (10) year life warranty.
- 5 The exit sign is to be normally powered from the highest voltage available from an un-switched leg of a local lighting circuit. The emergency power socket for the LED lighting is to be powered from the DC power supply from the closest emergency lighting unit.
- 6 Provide emergency lighting as required by the Provincial Building Code as a minimum.
- 7 Units shall be connected to the same circuit as the general lighting fixtures for that area. Remote heads shall cover only those areas on the same branch circuit as the emergency battery unit is fed from.
- 8 Units shall incorporate sealed maintenance free batteries complete with solid state charger, automatic self-diagnostic circuitry, test switch, and LED indicators for “on” and “charge”.
- 9 Batteries are to “each” have a (10) year life warranty.

Fire Detection and Alarm System

- 1 If a complete fire alarm system is required by the Provincial Building Code, as a minimum provide a riser diagram on the drawings showing all equipment.
- 2 All fire alarm systems are to be of the addressable type.
- 3 Utilize combination horn/strobe signaling devices with a configurable “high” and “low” output.
- 4 In addition to NBC requirements, provide:
 - A. Separately zoned thermal detectors in boiler rooms.
 - B. Separately zoned smoke detectors in “all” electrical rooms and/or closets where panelboards are present.
 - C. Separately zoned smoke detectors in elevator shafts.

Electrical and Telephone Service

- 1 Overhead service lines shall not cross over parking lots, driveways, sidewalks, playgrounds, sports fields, or any part of a building, with the exception of single dwelling unit.
- 2 Both electrical and telephone services are to match either both overhead or both underground. Installation should be to the approval of the Authority Having Jurisdiction.

Service Equipment and Service Entrance Boards

- 1 Provide minimum electrical service of 100-Amp, single phase, 120/240-Volts for each dwelling unit.
- 2 The main electrical service shall provide for minimum 25% load growth plus an allowance for future expansion.

Appendix E: Provincial Fire Marshal Letter: Orders and Recommendations
(Begins on following page)

January 14, 2015

Todd Routledge
Cape Breton Island Housing Authority
P.O. Box 1372
Sydney, NS B1P6K3

RE: Vista Heights, 312 Esplanade Street, Sydney, NS

Dear sir:

As a result of our on site meeting and discussions on December 17, 2014 and after reviewing the letter from AH Roy and Associates dated October 22, 2014 concerning the automatic sprinkler system and reviewing the fire pump test reports for the past three years this office offers the following comments:

1. Fire pump - The pump is reported to be approximately 38 years old, believed to have been installed original to the building. The annual fire pump test results for the past 3 years were provided and reviewed. The results were incomplete for all years provided. The make/model/capacity of the pump, measurement of the pump speed, measurement of ampere readings, net pressure, correction for speed variation in pump operation were not provided in any of the reports. In addition, the report for this past year stated that the gauges needed to be replaced - how could an accurate fire pump test be conducted if the gauges were faulty? The pump test results were all over the graph with no apparent discussion or recommendation from the contractor to review the results. The bottom line with regard to the operation of the fire pump is this, the least that could be said is that due to the missing information and use of reportedly faulty gauges for the last test we do not know if the fire pump is functioning to its design capacities or not. There are two options here, as far as the standards are concerned: there is no requirement to replace equipment on the basis of age as long as it is capable of providing the rated capacity it was designed and installed to provide. An accurate complete flow test should answer this question. The other is to replace the fire pump with a new unit. The letter from AH Roy and Associates discusses an upgrade of the pressure at the top of the standpipe risers. There is no requirement to increase this pressure to the current standard requirement of 100 psi in an existing building unless there are extenuating circumstances such as a change of occupancy or the replacement of the fire pump. While this is by no means a bad idea and this office would certainly support such a move we are unable to require the change as long as the original equipment is capable of providing the pressure and volume required when the building was built. The only caveat to this would be if current equipment used by the local fire department in this building would require the additional pressure to work properly and safely (ie: nozzles requiring pressures greater than the original design pressure of 65 psi). In this case the upgrade could be ordered by this office.

2. Fire pump controller - the controller is reportedly also original to the building. It appears that the controller has been altered since its installation and as a result would no longer be considered to be an approved unit. It could be returned to its original designed state if parts are available in which case it would be acceptable to this office. If however, parts are not available or the repair of the unit is cost prohibitive considering its age then a new controller complete with the required dedicated transfer switch would have to be installed to replace the existing unit. If this happens to be the case then consideration should be given to replacing the fire pump as well as the replacement of the entire unit may be cost effective over all, particularly if an upgrade to the higher pressure at the top of the risers turns out to be required.

3. Antifreeze system - this office concurs with the recommendation of the AH Roy and Associates letter recommending the replacement of the antifreeze system protecting the parking area with a small dry pipe sprinkler system. There have been some significant changes to the standards regarding antifreeze systems. In a nut shell, it has been discovered that in certain concentrations antifreeze has a tendency to separate from the water solution and when discharged on a fire could aggravate the condition until the antifreeze is discharged and water begins to flow. The use of approved antifreeze is advocated by the standard but to date approved solutions have not been located. In addition, pre-mixed antifreeze solutions which have been approved protect the systems against freezing to approximately -28 degrees Celsius. The minimum recorded temperature according to Environment Canada web site over the past approximately 50 years has been -27.3 degrees Celsius.

4. Basement level sprinkler protection - this office concurs with the AH Roy letter that automatic sprinkler protection for this level shall be on a separate zone from the feed mains to the stairwell risers as indicated.

5. Cross connection of standpipe risers - two cross connected combined sprinkler and standpipe risers have been installed in the stairwells of this building. Current day standards prohibit the cross connection of standpipe risers through the sprinkler system piping because there is little hydraulic value in this cross connection and if there is a requirement to shut down the sprinkler system on a particular floor then two valves have to be shut down to curb the flow of water delaying the process and increasing the water discharge from the system. While this office fully supports the splitting of the system so there is only one control valve per floor we have no legislative support to require that this work be done at this time. This office also supports the replacement of the ordinary style sprinkler heads with residential fast response type sprinkler heads in all applicable cases due to their much improved life safety for the people living in the building through their increased sensitivity and decreased response times to fire.

6. Floor level electrical rooms - a review of these rooms has revealed that there are unprotected and unshielded buss bars located in each of these rooms. The rooms have no sprinkler protection but have been provided with detection. Automatic sprinkler protection should be provided in all areas of a building but only if its presence does not offer or create a greater hazard by being installed in an area. The availability of shielding should be investigated and if available should be installed along with automatic sprinkler protection for these rooms. If shielding is not available then the presence of early detection may have to suffice in this instance. Further discussion on this subject will no doubt be required.

7. Elevator penthouse - A single zone serving both levels of the elevator penthouse would be acceptable to this office as discussed during this review on site.
8. Roger's cell building - automatic fire protection shall be installed to protect the inside as well as beneath the raised floor platform of this building installed on a steel frame work on the roof of this building.

In the interest of fire safety, this office requires a response to this letter with in 30 days of its receipt indicating that all requirements contained therein have been completed or requesting additional time.

Should there be any questions regard the contents of this letter or other matters of life safety from fire, do not hesitate in contacting this office

Yours truly,



DAVID CANDOW

Deputy Fire Marshal

cc: File Copy
Ed Lake, P.Eng., Director of Property & Facilities
Doug MacKenzie, Deputy Fire Marshal