

PART I: MECHANICAL SYSTEM

1. GENERAL

1.1 INTENT

1. The intent of this specification and the drawings is to provide a complete and fully operating mechanical system in complete accord with applicable codes. The Mechanical Contractor shall make provisions for labour, material, and equipment necessary to complete the mechanical work within the given schedule.
2. Drawings and specifications are complementary to each other and what is called for in one is binding as if called for by both. Should any discrepancy appear between drawings and specifications that leaves doubt as to the true intent and meaning, obtain a ruling from the Engineer ten days before submitting tender. Failing this, allow for most expensive alternative.
3. Contract documents are diagrammatic only. They are to establish scope, material and quality. They are not detailed installation drawings. Minor details usually not shown or specified and any incidental accessories required for proper installation of the system are to be included in the work.
4. Contractor is to ensure that all intended equipment will fit within given spaces. Make reference to the electrical, mechanical, architectural and structural drawings, when setting out work and before ordering equipment.
5. The Contractor shall visit the site prior to tender and verify existing conditions. New piping and insulation standards shall at least match the existing installation or be higher if specified herein.

1.2 SCOPE OF WORK

1. Remove and dispose of existing oil fired boilers, complete with main piping in the mechanical room, and electrical.
2. Remove and dispose of compressor and all associated pneumatic controls. Replace all pneumatic control valves, actuators and thermostats with new electrical controls and devices.
3. Replace all original building manually operated valves in mechanical room and surrounding control valves at points in basement and main floor.
4. Supply and install new boilers in the basement mechanical room through the existing doors to the mechanical room. Reconnect all fuel piping and electrical to the boilers.
5. Supply & Install new Glycol feeder with pump.

6. Supply and install new cabinet unit heater.
7. Supply and install a new control panel for the air system. Replace all functionality of original pneumatic controls.
8. The scope of work for project includes all work related to removal the asbestos on the heating piping and breaching insulation in the mechanical room.

1.3 CODE COMPLIANCE

1. All work shall conform to current edition of National, Provincial and Municipal Codes, Standards and Acts; and will meet the requirements of Authorities having jurisdiction.

1.4 LIABILITY

1. Assume responsibility for layout of work; and for any damage caused to the Owner or other Tenants by improper execution of work.
2. Protect finished and unfinished work from damage.
3. Take responsibility for condition of materials and equipment supplied and protect until work is completed and accepted. Coordinate deliveries with the general contractor.

1.5 CERTIFICATES

- .1 Give notices, obtain permits and approvals, RCMP security clearance and pay fees so work specified may be carried out. Furnish certificates if requested, as evidence that work conforms to laws and regulations of the authorities having jurisdiction.

1.6 CUTTING AND PATCHING

- .1 All work shall be co-ordinated with other trades especially that related to cutting and patching of required openings; and locations and installation of sleeves, inserts, support, curbs, frames and access doors.
- .2 Obtain approval from structural and electrical engineers before drilling and coring of existing structure.
- .3 Provide X-ray of all required penetrations of the floor. X-ray use for locating in floor rebar and conduit to be done after normal working hours. Take necessary precautions to protect computer equipment when X-raying floors. Coordinate with Owner.

1.7 ALTERNATIVE MATERIALS AND EQUIPMENT

- .1 Contract price shall be based on materials and equipment specified. Approval by Engineer of equipment submitted by the mechanical trade as equal to that specified does not relieve the mechanical trade of any responsibility.

- .2 Revisions required to adapt accepted equals and alternatives shall be included in the contract price. No increase in the contract price will be considered to accommodate the use of equipment other than that specified.
- .3 Certain items of equipment and items of work (such as balancing, water treatment) may not have an approved equal due to the need to have a consistent type or source of maintenance. Refer to specific clauses in this specification.

1.8 SHOP DRAWINGS

- .1 Submit six sets of shop drawings to Engineer for all equipment specified in the specification or drawings for Engineer's review. Do not order equipment or materials until Engineer has reviewed shop drawings.

1.9 GUARANTEE

- .1 Provide the Owner with a written guarantee that the equipment installed and work performed shall remain in serviceable condition for a period of one year from the date of final acceptance by the Owner. The warranty shall cover material as well as labour.

1.10 STANDARD OF MATERIALS AND WORKMANSHIP

- .1 Make and quality of materials used are subject to approval by the Engineer. Remove unacceptable materials and install suitable materials in their place.
- .2 Materials shall be new and of uniform pattern throughout, unless noted otherwise.
- .3 Employ only tradesmen properly licensed to perform the specific work.

1.11 RECORD DRAWINGS

- .1 Keep on site an extra set of white prints and specifications, recording changes and deviations daily.
- .2 Upon completion of work, submit final record drawings to the Engineer. These must be submitted within two weeks after acceptance of work. Failure to submit drawings will result in the work being done by the Owner and the cost deducted from the final payment.
- .3 At substantial completion, employ a competent (CADD) drafts person to transfer all deviations, including those called up by addenda, revisions, clarifications, shop drawings, and change orders, on a copy of tender CADD files. From these files plot a set of as-built mylars. Drafting quality shall be same as original drawings.
- .4 The CADD disks may be borrowed from the Engineer. Each "as-built" mylar shall bear the Contractor's identification, the date of record and the notation "We hereby certify that these drawings represent the As-Built Record of Construction." The Contractor's signature and company seal shall be placed below that notation.

1.12 SUBSTANTIAL COMPLETION INSPECTION

- .1 Advise Engineer five days prior to the date inspection is desired. All systems to be fully operational and any deficiencies should be noted to the Engineer.
- .2 All deficiencies shall be completed within two weeks after substantial completion and letter submitted to Engineer within that time advising that the work is complete. Failure to complete work will result in work being done by the Owner and the costs deducted from final payment.

1.13 EXAMINATION OF WORK

- .1 This project involves renovations to existing building, therefore, examine the site and local conditions to determine the difficulties in carrying out the work indicated and specified prior to submitting final price. Extras will not be considered based on the grounds of differences on site.

1.14 COORDINATION WITH ELECTRICAL DIVISION

- .1 Contractor shall review all equipment requiring electrical hook-up with Electrical Contractor and electrical drawings prior to ordering equipment. Ensure proper electrical characteristics are determined for all affected and related work.

1.15 COORDINATION OF SERVICES

- .1 Coordinate with proper utilities for services such as water, sewer, natural gas, and assume all charges.
- .2 Coordinate with the owner to shutdown, disconnect, reroute, or make connection to existing services.

1.16 PERFORMANCE TESTS

- .1 Operate each mechanical system after mechanical and electrical work has been completed, to demonstrate that each system fulfils the requirements of the contract and operates satisfactorily. These are performance tests and must be completed before work can be finally accepted.

1.17 OPERATION AND MAINTENANCE MANUALS

- .1 Provide four copies of manuals prepared by qualified and experienced personnel for use by Owner. Manuals form part of the contract and must be delivered to the Engineer before work will be considered complete. Each manual shall provide the following:
 1. Layman's description of all mechanical systems including operating maintenance and lubrication instructions,

2. Certification of all equipment where required by local codes and authorities,
 3. Shop drawings and maintenance bulletins,
 4. List address and telephone numbers of all equipment suppliers and contractors.
 5. Performance details for all equipment including curves for fans and pumps with actual operating points noted.
- .2 Secure and assemble all necessary literature describing the operation and maintenance of all equipment provided. Complete and transmit documentation for review to Engineer two months prior to final inspection.
 - .3 Provide four (4) 8.5 in. x 11 in. capacity, expanding spine catalogue binders, bound with heavy fabric, hot stamped lettering front and spine.
 - .4 Index binder according to the following system:
 1. Tab-1.0 Mechanical Systems: Title page with clear plastic protection cover.
 2. Tab-1.1 List of Mechanical Drawings:
 3. Tab-1.2 System Descriptions: Provide complete description of the operating sequence for all systems. Include detailed system description, with individual components described, explanation of how components interface with others and to the complete system, location of thermostats, controllers or operating variances, and controller operating set points.
 4. Tab-1.3 Operating Division:
 - .1 Provide complete and detailed operation of major components and systems.
 - .2 Provide information on location of components, how to energize switches and controls, how components interface with other components, operation of controls including operational sequence, operational changes for summer of winter operation, how to accomplish the changeover, complete trouble shooting sequence, emergency operating sequences in event of major component failure, and safeguards to indicate if equipment goes off-line.
 5. Tab-1.4 Maintenance and Lubrication Division:
 - .1 Provide general maintenance and lubrication schedule for major components to include daily, weekly, monthly, semi-annual and yearly checks and tasks.

- .2 Explain how to execute maintenance tasks required for typical equipment such as bearings, drives, motors, and filters.
- .3 Compile this information for equipment and separate from shop drawings.
6. Tab-1.5 List of Equipment Suppliers and Contractors: Provide list of equipment suppliers and contractors, including address and telephone number. Outline procedures for purchasing parts and equipment.
7. Tab-Certification (2.0, 2.1, ...): Include copy of test data on degreasing and flushing of heating system, analysis of system water taken at time system was put into operation, hydrostatic or air tests performed on piping systems, equipment alignment certificates, copy of balancing data for air and water systems, copy of valve tag identification and pipe colour code, inspection approval certificates for plumbing system, heating and ventilation systems and operational tests on oil-fired equipment.
8. Tab-Shop Drawings and Maintenance Bulletins (3.0, 3.1...):
Provide materials received in compliance with clause "Shop Drawings".
- .5 The divider tabs shall be laminated mylar plastic and coloured according to Section. The colouring is as follows: Mechanical Systems - 1.0 - 1.5 Orange; Certification - 2.0 - 2.4 Green; Shop Drawings & Maintenance - 3.0 - 3.17 Yellow. Plastic tabs with typewritten card insertions will not be accepted

1.18 BALANCING

- .1 Completely balance the hydronic system, shown as part of this contract, including heating coils.
- .2 Submit two copies of the report to Engineer within two (2) weeks after substantial completion. Failure to submit the report within the specified time will result in the work being done by the Owner and the costs deducted from final payment.
- .3 Balancing shall be performed to the following accuracies:

Hydronic-Terminals	±10%
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1.19 COOPERATE WITH THE BALANCING AGENCY AS FOLLOWS:

- .1 Make corrections as required by Balancing Agency.
- .2 Allow Balancing Agency free access to site during construction phase. Inform Balancing Agency of any major changes made to systems during construction and provide a complete set of record drawings for their use.

- .3 Verify set points during balancing.
- .4 Provide Balancing Agency a complete set of mechanical drawings and specifications.

1.20 BALANCING VALVES AND DAMPERS

- .1 Provide and install balancing valves, and other materials requested by the Balancing Agency and/or necessary to properly adjust or correct the systems to design flows, without additional cost to Owner.

1.21 PAINTING AND IDENTIFICATION

- .1 Paint all exposed pipes with colours to match interior finishes.
- .2 Stencils:
 - 1. Standard fibreboard stencils, prepared for required applications with letter sizes generally complying with recommendation of ANSI A13.1 for piping and similar applications but not less than 1/4" high letters for ductwork and not less than 3/4" high letters for access door signs and similar operational instructions.
- .3 Stencil Paint:
 - 1. Standard exterior type stencilling enamel; black, except as otherwise indicated; either brushing grade or pressurized spray-can form and grade.
- .4 Wrap-Around Plastic Identification:
 - 1. All plumbing/mechanical piping identification shall adhere to ANSI A13.1-1981 (or latest edition).
 - .1 Interior piping, all locations, shall utilize Seton "Setmark" or equal pipe markers.
 - .2 Exterior piping in exposed locations such as manholes/tunnels, at pad mounted chillers etc., shall utilize Seton "Ultra-Mark" or equal pipe markers.
 - .3 All pipe markers shall be snap around whenever possible. Markers shall be located at each wall, floor or ceiling penetration, whether exterior or interior, and every 50 ft. thereafter.
 - .4 Markers shall be fully legible from floor level showing medium contained in pipe, and directional arrows.
- .5 Provide 3/4" diameter brass tags, secure to valve stems with key chain. Provide typed valve directories.

- .6 Identify electric starting switches, thermostats controlling motors and equipment supplied under this division with lamacoid plates having 1/4" minimum letter size.

1.22 FIRE-STOPPING

- .1 Fire-stop all pipe and duct penetrations through floors and walls, designated as fire and/or smoke separations.
- .2 Fire-stopping materials to meet ULC CAN 2S115. Acceptable Materials: by "Tremco" or "National Fire stopping".
- .3 Preparation of surfaces and installation of fire-stopping materials shall be carried out as per manufacturer's instructions.

1.23 FLASHING AND ROOF CURBS

- .1 Provide curbs, flash and counter flash where mechanical equipment passes through weather or waterproofed walls, floors and roofs. Install roof mounted equipment on factory supplied roof curbs.
- .2 Where equipment is located without vibration isolation fittings all such equipment shall be rigidly fixed with holding down bolts of sufficient strength to restrain seismic action.
 1. Holding down bolts shall be packed within slots to prevent movement prior to restraint commencing.
 2. Bolts shall be of sufficient strength to withstand overturning of the equipment during seismic disturbance.

1.24 METRIC CONVERSION

- .1 All units in this division are expressed in SI units. Soft metric conversions are used throughout.
- .2 Equivalent Nominal Diameters of Pipes - Metric and Imperial.
 1. Where pipes are specified with metric dimensions and only Imperial sized pipes are available, provide equivalent nominal Imperial sized pipe as indicated in the table, and provide at no extra cost adapters to ensure compatible connections to all metric sized fittings, equipment and piping.
 2. When CSA approved SI Metric pipes are available and are provided, the contractor shall provide at no extra cost adapters to ensure compatible connections between the SI Metric pipes and all new and existing pipes, fittings and equipment.

EQUIVALENT NOMINAL DIAMETERS OF PIPE					
mm	Inches	mm	Inches	mm	Inches
3	1/8	65	2½	375	15
6	1/4	75	3	450	18
10	3/8	100	4	500	20
15	1/2	125	5	600	24
20	3/4	150	6	750	30
25	1	200	8	--	--
30	1¼	250	10	--	--
40	1½	300	12	--	--
50	2	--	--	--	--

2. PIPING

2.1 PIPE MATERIAL

- .1 Service: Hot Water Heating; Glycol Heating.
Material: Steel Schedule 40, A53 Grade B; Type "L" Hard Copper.
- .2 Service: Equipment drains and overflows.
Material: Steel Schedule 40, Galvanized, A120.

2.2 PIPE CONNECTIONS

- .1 Hot water and glycol: Screwed joint steel piping up to and including 2" mm. Weld piping 2½" and larger including branch connections. Use dielectric type couplings when joining dissimilar metal pipes.
- .2 Use lead free solder for soldering domestic water copper pipe.
- .3 Cast iron with hub and spigot, gasket and clamp-up to 10".

2.3 PIPE HANGERS AND SUPPORTS

- .1 All piping shall be firmly supported and securely braced. Provide copper plated hangers and supports for copper piping and galvanized hangers and supports for galvanized piping.
- .2 Use of perforated straps is not permitted for pipe hangers.
- .3 Provide ring type hangers for piping up to 1½" and clevis type hangers for piping over 1½".

2.4 PIPE SUPPORT SPACING

Pipe Size (in)	Rod Diameter (in)	Spacing (ft)
1	3/8	6
3/4 to 1½	3/8	8
2 to 2½	3/8	10
3 to 4	5/8	12
6 to 12	7/8	14

2.5 EXPANSION COMPENSATION

- .1 Provide expansion compensators, guide and anchors where required and where indicated.

3. VALVES

3.1 HOT WATER HEATING VALVES

- .1 Ball valves up to 2". Bronze body, bronze ball, threaded ends, twin-seal EPDM seats and seal, "O ring", lever handle, rating 300 psi at 250°F water. Jenkins Fig. 31.
- .2 Gate valves up to 2" shall be bronze, solid wedge, rising spindle, 200 psi W.O.G., threaded ends, Jenkins Fig. 810. Solder ends, Jenkins Fig. 813. Valves 2½" and up shall be iron body bronze mounted, outside screw and yoke, solid wedge design, with flanged ends, 150 psi, W.O.G. Jenkins Fig. 454.

- .3 Globe valves up to 2" shall be bronze composition disc type fitted with Jenkins Fig. 110 discs, 150 psi steam, threaded ends Jenkins Fig. 106B, solder ends Jenkins Fig. 106BP. Valves 2½" and up shall be iron body, bronze mounted outside screw and yoke, renewable composition disc type 200 psi W.O.G., Jenkins Fig. 142.
- .4 Check valves up to 2" shall be bronze swing check with bronze disc capable of being reground, 250 psi W.O.G., threaded ends, Jenkins Fig. 4092. Solder ends, Jenkins Fig. 4093. Valves 2½" and up shall be iron body bronze mounted swing checks with flanged ends 150 psi W.O.G., Jenkins Fig. 587.

4. HOT WATER SPECIALITIES

4.1 AUTOMATIC AIR VENTS

- .1 Provide automatic air vents from the pipe passing through the garage area. Provide 3 mm brass needle valve at top of chamber.

5. INSULATION

5.1 PIPING INSULATION

- .1 All cold piping to be insulated with fine fibrous glass insulation with factory applied vapour barrier jacket, moulded to conform to piping, "K" value at 24°C maximum 0.035 w/m °C Recover with ULC labelled thermocanvas.
- .2 All hot piping to be insulated with fine fibrous glass insulation with factory applied general purpose jacket, moulded to conform to piping, "K" value at 24°C maximum 0.035 w/m °C Recover with ULC labelled thermocanvas.

Insulation Thickness

Piping to be Insulated	Pipe Size	(mm)
Hot Water/Glycol Heating	All Sizes	40
Vents within 3 linear metres and Roof Outlet	All Sizes	25

6. CONTROLS

6.1 GENERAL CONTROLS

- .1 Replace all pneumatic controls with equivalent functioning electric controls to allow removal of compressor.

6.2 HEATING CONTROLS

- .1 Replace zone valves for all pneumatically controlled heating zones in perimeter radiation cabinets and air system reheat coils.
- .2 Replace all pneumatic thermostats with new electric thermostats as shown on drawings (existing line voltage electric thermostats can be left in place).
- .3 Run all necessary control wiring between zone control valves and associated thermostat to replace pneumatics. Remove pneumatic tubing back to nearest wall, floor or ceiling.

6.3 AIR SYSTEM CONTROLS - EXISTING

- .1 Replace existing air systems pneumatic control panel with electric controls to meet requirements of sequence of operations. Readouts may be relocated to associated ductwork or equipment where practical, providing readouts can be read by personnel standing on the ground in a normally accessible location.

6.4 AIR SYSTEM CONTROLS - NEW

- .1 New controls for air systems to operate as follows. All required components are new and are to be included in contract:
 1. Air systems F-1.01(Supply) and F-2.01 (Return):
 - Serving rooms 001 to 021 and room 125.
 - F2-01 to run when F-1.01 is running, and shut off when F-1.01 is off.
 - Fans to run on an occupancy schedule 8 hours a day, 5 days a week Monday through Friday, and have a 4 hour override push button timer to be located in the offices area for off-hours operation.
 - Return air temperature sensor will control the heating coil installed at F-1.01.
 - O/A Damper for F-1.01 to open to provide minimum outside air to space when fans are running. Damper to close when fans are shut off.

- Thermostat in rooms 006 and 007 to control associated reheat coil to provide air re-heating to the supply air to these areas.
2. Air system F-3.01:
- Serving rooms 127 to 133.
 - To run 24 hours a day.
 - Thermostat in room 126 to control associated reheat coil to provide heating to the supply air to these areas.
3. Exhaust fans
- EF-1, EF-2, EF-3, Ef-4, and EF-5 to run for 15 minutes every 4 hours.
 - Each fan to provided with override push button to be located at the exhaust fans control panel in room 125 for continuous operation based on the occupancy:
 - EF-1 when room 131 is occupied.
 - EF-2 when room 133 is occupied.
 - EF-3 when one room of rooms 127 to 129 is occupied.
 - EF-4 when more than one room of rooms 127 to 129 is occupied.
 - EF-5 when more room 124 is occupied.
 - EF-6 to be controlled by the same occupancy schedule timer of air system F-1.01 and F-2.01. occupied operation to turn fan on for 15 minutes every hour.
 - Each timer control override push button switch to be labelled with the associated room number(s) with durable, permanently affixed typewritten labelling.

PART II: ASBESTOS REMOVAL

1. GENERAL

1.1 SUMMARY

Comply with requirements of this Section when performing following Work:

1. Removal or disturbance of asbestos-containing insulation identified on mechanical room piping and chimney.
 - .1 Piping: Approximately 60m of pipe 65mm and smaller diameter and including approximately 20 elbows.
 - .2 Chimney: Approximately 4.5m of 300mm pipe.
 - .3 Insulation consists of friable asbestos-containing material, with asbestos concentration up to 75%.
 - .4 All asbestos work to be performed in accordance with WSCC Northwest Territories & Nunavut Code of Practice on Asbestos Abatement (2012) practices for **High Risk** Abatement Activities.

1.2 REFERENCES

1. Canadian Standards Association (CSA International)
2. Department of Justice Canada
3. Canadian Environmental Protection Act (CEPA), 1999.
4. Health Canada/Workplace Hazardous Materials Information System (WHMIS)
5. Material Safety Data Sheets (MSDS).
6. Transport Canada (TC).
7. Underwriters' Laboratories of Canada (ULC)
8. U.S. Department of Health and Human Services/Centers for Disease Control and Prevention (CDC)/National Institute for Occupational Safety and Health (NIOSH).
9. NIOSH 94-113-August 1994, NIOSH Manual of Analytical Methods (NMAM), 4th edition.
10. Workers' Safety & Compensation Commission (WSCC)
11. Northwest Territories & Nunavut Code of Practice on Asbestos Abatement (2012).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

Before beginning work:

1. Obtain from appropriate agency and submit to Engineer necessary permits for transportation and disposal of asbestos waste. Ensure that dump operator is fully aware of hazardous nature of material being dumped and proper methods of disposal. Submit proof satisfactory to Engineer that suitable arrangements have been made to receive and properly dispose of asbestos waste.
2. Submit proof satisfactory to Engineer that all asbestos workers have received appropriate training and education by a competent person on hazards of asbestos exposure, good personal hygiene, entry and exit from Asbestos Work Area, aspects of work procedures and protective measures while working in Asbestos Work Areas, and the use, cleaning and disposal of respirators and protective clothing. Submit proof of attendance in form of certificate.
3. Ensure supervisory personnel have attended asbestos abatement course, of not less than two days duration, approved by Engineer. Submit proof of attendance in form of certificate. Minimum of one Supervisor for every ten workers.
4. Submit layout of proposed enclosures and decontamination facilities to Engineer for review.
5. Submit Territorial and/or local requirements for Notice of Project form, including WSCC form.
6. Submit proof of Contractor's Asbestos Liability Insurance.
7. Submit proof satisfactory to Engineer that employees have respirator fitting and testing. Workers must be fit tested (irritant smoke test) with respirator that is personally issued.
8. Submit Worker's Compensation Board status and transcription of insurance.
9. Submit documentation including test results, fire and flammability data, and Material Safety Data Sheets (MSDS) for chemicals or materials including but not limited to following:
 - .1 Encapsulants.
 - .2 Amended water.
 - .3 Slow drying sealer.

1.4 QUALITY ASSURANCE

Regulatory Requirements: comply with Federal, Provincial/Territorial and local requirements pertaining to asbestos, provided that in case of conflict among those requirements or with these specifications more stringent requirement applies. Comply with regulations in effect at time work is performed.

1.5 WASTE MANAGEMENT AND DISPOSAL

1. Separate waste materials for recycling.
2. Remove from site and dispose of packaging materials at appropriate recycling facilities.
3. Place materials defined as hazardous or toxic in designated containers.
4. Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
5. Disposal of asbestos waste generated by removal activities must comply with Federal, Provincial, Territorial and Municipal regulations. Dispose of asbestos waste in labeled containers as described in WSCC Northwest Territories & Nunavut Code of Practice on Asbestos Abatement (2012) practices for **High Risk** Abatement Activities.
6. Provide manifests describing and listing waste created. Transport containers by approved means to licensed landfill for burial.

1.6 EXISTING CONDITIONS

1. Results of tests of asbestos-containing materials to be handled, removed, or otherwise disturbed and disposed of during this Project are bound into this specification at end of this Section. These are for general information only and are not necessarily representative of asbestos-containing materials covered within scope of this Project.
2. Notify Engineer of suspect asbestos containing material discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material until instructed by Engineer.

1.7 SCHEDULING

Not later than ten (10) days before beginning Work on this Project, including set-up procedures, notify following in writing:

1. Appropriate Regional or Zone Director of Medical Services Branch, Health Canada.
2. Regional Office of Labor Canada.
3. Provincial/Territorial, Department of Labor.
4. Disposal Authority.
5. WSCC (Asbestos Project Notification Form bound into this specification at end of this Section).
6. Inform sub-trades of presence of asbestos containing materials identified in Existing Conditions.

7. Submit to Engineer copy of notifications prior to start of Work.

1.8 PERSONNEL TRAINING

Before beginning Work, provide to Engineer satisfactory proof that every worker has had instruction and training in hazards of asbestos exposure, in personal hygiene including dress and showers, in entry and exit from Asbestos Work Area, in aspects of work procedures including glove bag procedures, and in use, cleaning, and disposal of respirators and protective clothing.

Instruction and training related to respirators includes, at minimum:

1. Proper fitting of equipment.
2. Inspection and maintenance of equipment.
3. Disinfecting of equipment.
4. Limitations of equipment.
5. Instruction and training must be provided by competent, qualified person. Supervisory personnel to complete required training.

2. PRODUCTS

2.1 MATERIALS

1. Polyethylene: minimum 0.15 mm thick unless otherwise specified; in sheet size to minimize joints.
2. FR polyethylene: minimum 0.15 mm thick, woven fibre reinforced fabric bonded both sides with polyethylene.
3. Tape: fiberglass - reinforced duct tape suitable for sealing polyethylene under both dry conditions and wet conditions using amended water.
4. Wetting agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether, or other material approved by Engineer, mixed with water in concentration to provide adequate penetration and wetting of asbestos containing material.
5. Waste Containers: contain waste in two separate containers.
 1. Inner container: 0.15 mm thick sealable polyethylene bag (or where glove bag method is used, glove bag itself).
 2. Outer container: sealable metal or fiber type where there are sharp objects included in waste material; otherwise outer container may be sealable metal or fiber type or second 0.15 mm thick sealable polyethylene bag.

3. Labeling requirements: affix preprinted cautionary asbestos warning, in both official languages, that is visible when ready for removal to disposal site. Label containers in accordance with WSCC Northwest Territories & Nunavut Code of Practice on Asbestos Abatement (2012) practices for **High Risk** Abatement Activities. Label in both official languages.
6. Glove bag:
 1. Acceptable materials: safe-T-Strip products in configuration suitable for Work, or Alternative material approved by addendum during tendering period in accordance with Instructions to Tenderers.
 2. The glove bag to be equipped with:
 - .1 Sleeves and gloves that are permanently sealed to the body of the bag to allow the worker to access and deal with the insulation and maintain a sealed enclosure throughout the work period.
 - .2 Valves or openings to allow insertion of a vacuum hose and the nozzle of a water sprayer while maintaining the seal to the pipe, duct or similar structure.
 - .3 A tool pouch with a drain.
 - .4 A seamless bottom and a means of sealing off the lower portion of the bag.
 - .5 A high strength double throw zipper and removable straps, if the bag is to be moved during the removal operation.
7. Tape: tape suitable for sealing polyethylene to surfaces under both dry and wet conditions using amended water.
8. Slow - drying sealer: non-staining, clear, water - dispersible type that remains tacky on surface for at least 8 hours and designed for purpose of trapping residual asbestos fibers.
9. Sealer: flame spread and smoke developed rating less than 50.

3. EXECUTION

3.1 PREPARATION

1. Work Areas:

1. Containment and decontamination areas to be based on WSCC Northwest Territories & Nunavut Code of Practice on Asbestos Abatement (2012) practices for **High Risk** Abatement Activities.
 2. Provide containment area, including decontamination area, to the approval of the Engineer and WSCC.
 3. Provide proposed layout to Engineer and WSCC for review minimum 14 days prior to start of asbestos work.
2. Decontamination procedures:
1. Decontamination procedures to be based on WSCC *Northwest Territories & Nunavut Code of Practice on Asbestos Abatement* (2012) practices for **High Risk** Abatement Activities.
 2. Follow decontamination procedures approved by Engineer and WSCC.
 3. Provide procedures for review minimum 14 days prior to start of asbestos work.

3.2 SUPERVISION

1. Minimum of one Supervisor for every ten workers is required.
2. Approved Supervisor must remain within Asbestos Work Area during disturbance, removal, or other handling of asbestos containing materials.

3.3 ASBESTOS REMOVAL

1. Asbestos removal procedures to be based on WSCC Northwest Territories & Nunavut Code of Practice on Asbestos Abatement (2012) practices for **High Risk** Abatement Activities.

3.4 FINAL CLEANUP

1. Cleaning procedures to be based on WSCC Northwest Territories & Nunavut Code of Practice on Asbestos Abatement (2012) practices for **High Risk** Abatement Activities.

3.5 RE-ESTABLISHMENT OF OBJECTS AND SYSTEMS

When cleanup is complete:

1. Re-establish objects and furniture moved to temporary locations in course of Work, in their proper positions.
2. Re-secure mounted objects removed in course of Work in their former positions.
3. Re-establish mechanical and electrical systems in proper working order. Install new filters.
4. Repair or replace objects damaged in the course of Work, as directed by Engineer.

3.6 AIR MONITORING

1. From beginning of Work until completion of cleaning operations, Engineer to take air samples on daily basis outside of work area enclosure in accordance with WSCC Northwest Territories & Nunavut Code of Practice on Asbestos Abatement (2012) practices for **High Risk** Abatement Activities.
 1. Contractor will be responsible for monitoring inside enclosure in accordance with WSCC Northwest Territories & Nunavut Code of Practice on Asbestos Abatement (2012) practices for **High Risk** Abatement Activities and applicable Provincial/Territorial Occupational Health and Safety Regulations.
 2. Use results of air monitoring inside work area to establish type of respirators to be used. Workers may be required to wear sample pumps for up to full-shift periods.
 3. If fiber levels are above safety factor of respirators in use, stop abatement, apply means of dust suppression, and use higher safety factor in respiratory protection for persons inside enclosure.
 4. If air monitoring shows that areas outside work area enclosures are contaminated, enclose, maintain and clean these areas, in same manner as that applicable to work areas.
 5. Final air monitoring to be conducted by the Contractor using aggressive sampling techniques in accordance with WSCC Northwest Territories & Nunavut Code of Practice on Asbestos Abatement (2012) practices for **High Risk** Abatement Activities.

3.7 INSPECTION

1. Perform inspection of Asbestos Work Area to confirm compliance with specification and governing authority requirements. Deviation(s) from these requirements that have not been approved in writing by Engineer may result in Work stoppage, at no cost to Owner.
2. Allow full access for WSCC personnel to inspect work areas.
3. Engineer and/or WSCC personnel may inspect Work for:
 1. Adherence to specific procedures and materials.
 2. Final cleanliness and completion.
 3. No additional costs will be allowed by Contractor for additional labor or materials required to provide specified performance level.
4. When asbestos leakage from Asbestos Work Area has occurred or is likely to occur Engineer may order Work shutdown.

1. No additional costs will be allowed by Contractor for additional labor or materials required to provide specified performance level.

END OF SECTION



ANALYSIS REPORT

Analysis Requested: ASBESTOS IDENTIFICATION

Requested by: Williams Engineering Canada Inc. PO Box 1529, 4902 49St. Yellowknife, NT Attn: Shannon Connors	Date received: April 28, 2012 Sample Type: Bulk No. of samples: 5 Project Number #: Date completed: May 2, 2012
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ANALYSIS RESULTS

Our File #	Ref #	Description	Asbestos type and percent	Other fibres detected
12AI1905	A1	Pipe elbow	CHRYSOTILE 50 – 75%	Cellulose
12AI1906	A2	Pipe elbow	CHRYSOTILE 50 – 75%	Cellulose
12AI1907	A3	Pipe elbow (flue)	CHRYSOTILE 25 – 50%	Glass fibers ,cellulose
12AI1908	A4	Boiler flue	CHRYSOTILE 50 – 75%	Glass fibers ,cellulose
12AI1909	A5	Pipe elbow	CHRYSOTILE 5 – 10%	Glass fibers ,cellulose

COMMENTS:

ANALYTICAL PARAMETERS:

Method used: NIOSH Method 9002 (4th Edition),

Methodology: Polarized Light Microscope (PLM)

Analysis Performed by: Irene Z. Walewski, B. Sc. Chem.