DEPARTMENT OF NATIONAL DEFENCE

STANDING OFFER

SPECIFICATION

FOR

ASBESTOS ABATEMENT

AT

CANADIAN FORCES BASE SHILO

SHILO, MANITOBA

_____

Design Officer

SO-55 **2013-02-12**

1 GENERAL

.1 A person to be named at the startup meeting will be the Technical Authority for all work done on this Standing Offer and will be the direct point of contact for the Contractor.

.2 All on site matters will be handled by CE Contracts.

2 REFERENCES

.1 National Building Code of Canada (NBC) 2010 including all amendments up to tender closing date.

.2 “Guidelines for Working with Asbestos, March 2008”

.3 Workplace, Safety and Heath (Manitoba Regulation 217/2006).

.4 .1 Canadian Environmental Protection Act, 1999 (CEPA).
.2 Transport Canada (TC).
.3 Transportation of Dangerous Goods Act, 1992 (TDGA).

3 DESCRIPTION OF WORK

.1 Work under this Standing Offer covers the all material, labour, equipment and supervision required for the inspection, testing, sampling, air monitoring or removal of asbestos materials from various buildings at Canadian Forces Base Shilo, Shilo, Manitoba and the Brandon Armories on an as required basis.

.2 Work included in this Standing Offer must cover, but is not necessarily restricted to the following:
.1 Asbestos removals for Type 1,2 and 3 abatement procedures.
.2 Asbestos removal of pipe insulation using glove-bag method from water, steam and condensate lines.
.3 Removal of asbestos materials that may be found in the form of vinyl floor tiles; cement sheets/panels/siding including exterior shingles and rigid siding boards; boiler room wallboards; vinyl sheet flooring; contaminated ceiling tiles and associated suspension systems; attic space asbestos insulation; boiler, breeching and hot water tank insulations including parging cement; and sprayed/trowelled-on asbestos insulation.
.4 Preparation and encapsulation of exposed

asbestos products.
.5 Taping/sealing exposed asbestos products.
.6 Disposal and clean-up.
.7 Building asbestos survey and reports, on-site bulk analysis material sampling and/or testing from DND provided samples, and analysis of asbestos materials.
.8 Air monitoring.
.9 Insulation of pipe and ducts.
.10 Restoration of various surfaces related.

4 "ENVIRONMENTAL" POLICY

.1 In accordance with Canadian Forces Base Shilo's "Shilo Environmental" policy, the Contractor must propose "environmentally safe" products for those materials listed. The Contractor must submit product data and WHMIS for all "environmentally safe" products as requested by Engineer. All materials listed and "environmentally safe" material must be approved by the Engineer prior to use.

5 DISPOSAL

.1 All removed asbestos must be taken off Base.

.2 Disposal location must be an approved and licensed facility by the municipality to where it is taken.

.3 Disposal location must also be approved by the Province.

.4 Contractor must complete all necessary forms to facilitate the disposal process and for each callout, Contractor must provide a signed copy of the Transit Document issued by the disposal facility to the Contractor back to the Engineer.

7 ON-SITE SUPERVISION

.1 Contractor will designate a competent and qualified supervisor to be on site at all times during work, and act upon Engineer's instructions. Supervisor must not be changed without Engineer's permission or alternatively at this request and must be capable of and having authority to speak on his behalf on day-to-day matters.

9 QUALIFICATIONS

.1 Have only qualified and trained personnel in the hazards of and removal of asbestos when performing work.

10 COMMENCING WORK

.1 The Contractor must not commence work without first obtaining the approval of the Engineer.

.2 The Contractor must be responsible for giving ample notification to the occupant of his intent to begin work.

.3 Movement around the site and the immediate area of work must be subject to restrictions as laid down by the location and as specified by the Engineer.

11 HOURS OF WORK

.1 The Contractor must comply with the normal hours of work in effect at the site during the period of this Contract.

12 REGULATIONS

.1 The Contractor undertakes and agrees to comply with all Base Standing Order's and other regulations in force on site where the work is to be performed.

13 REMOVAL OF MATERIAL AND EQUIPMENT

.1 The Contractor must not remove any salvageable materials or hardware from the job site without written permission from the Engineer.

14 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of apparatus, equipment, fixtures and outlets indicated or specified are to be considered as approximate. Actual locations must be as directed and required to suit conditions at time of installation and as is reasonable.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform Engineer of impending installation and obtain his approval for actual location.

.4 Submit field drawings to indicate relative position of various services and equipment when required by Engineer.

15 EXISTING SERVICES

.1 Any work which will directly or indirectly affect Building L158, must be notified to the Base Hospital Administrator at local 4131 or the Hospital Cheif Clerk at local 3190 at least 48 hours prior to any work being done.

16 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

.1 Execute work with least possible interference or disturbance to occupants, public and normal use of premises. Arrange with Engineer to facilitate execution of work.

.2 Where security has been reduced by work of Standing Offer, provide temporary means to maintain security acceptable to Engineer and Military Police.

.3 Provide temporary dust screens, barriers, warning signs in locations where renovation and alteration work is adjacent to areas used by Building Occupants

17 BUILDING SMOKING ENVIRONMENT

.1 There must be **NO SMOKING** within any Base Building or MQ at any time.

.2 Contractor is to abide by all regulations on the control of smoking materials within the Ammunition Compound as directed by the Ammunition Compound Supervisor.

18 ADDITIONAL DRAWINGS

.1 Engineer may furnish additional drawings for clarification. These additional drawings have same meaning and intent as if they were included with plans referred to in Contract documents.

19 INSPECTION

.1 The Engineer must be given ample notice and opportunity to inspect each completed phase of work. Work must not proceed until the proceeding phase has been approved.

20 WORKMANSHIP AND MATERIALS

.1 All workmanship and materials must be of a high standard and in accordance with standard asbestos removal and handling practice.

.2 It is the Contractor's responsibility to produce an acceptable end result regardless of labour or quantity of material required.

.4 It must be the responsibility of the Contractor to make good any damage to DND, private property or City of Brandon property resulting from Contractor’s work at own expense.

21 GUARANTEE

.1 The Contractor must guarantee work for a minimum of 1 (one) year. Materials must be guaranteed as specified by the manufacturer.

22 SHOP DRAWINGS, PRODUCT DATA, SAMPLES.

.1 This paragraph specifies general requirements and procedures for Contractors submissions of shop drawings, product data, samples and mock-ups to Engineer for review. Additional specific requirements for submission are specified in the specification sections or scopes of work.

.2 Shop drawings: provide original drawings or modified standard drawings to illustrate details of portions of work which are specific to project requirements:
.1 Maximum sheet size: 707 x 1000 mm.
.2 Cross-reference shop drawing information to applicable portions of specification sections.

.3 Product data: manufacturer's catalogue sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products:
.1 Submit 3 copies of product data.
.2 Sheet size: 215 x 280 mm.
.3 Delete information not applicable to project.
.4 Supplement standard information to provide details applicable to project.
.5 Cross-reference product data information to applicable portions of specification sections.

.4 Samples: examples of materials, equipment, quality, finishes, workmanship:
.1 Where colour, pattern or texture is criterion, submit full range of samples.
.2 Reviewed and accepted samples will become standard of workmanship and material against which installed work will be verified.

23 TESTING LABORATORY SERVICES

.1 Particular requirements for inspection and testing to be carried out by testing laboratory designated by Engineer are specified under various sections of specification sections.

.2 Engineer will appoint and pay for services of testing laboratory except for the following:
.1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
.2 Inspection and testing performed exclusively for Contractor's convenience.

.3 Non-specified testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.
.4 Mill tests and certificates of compliance.
.5 Tests specified to be carried out by Contractor under the supervision of Engineer.
.6 Additional tests specified in paragraph 2.2.

.3 Where tests or inspections by designated testing laboratory reveal work not in accordance with Contract requirements. Contractor must pay costs for additional tests or inspections as Engineer may require to verify acceptability of corrected work.

.4 Where tests or inspections by designated testing laboratory reveal work not in accordance with specification sections, Contractor must pay costs for additional tests or inspections as Engineer may require to verify acceptability of corrected work.

.5 Furnish labour and facilities to:
.1 Provide access to work to be inspected and tested.
.2 Facilitate inspections and tests.
.3 Make good work distributed by inspection and test.
.4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.

.6 Notify Engineer sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.

.7 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.

.8 Pay costs for uncovering and making good work that is covered before required inspection or testing is completed and approved by Engineer.

24 SAFETY REQUIREMENTS

.1 Observe construction safety measures of National Building Code 2010 Part 8, Workplace Safety and Health (Manitoba Regulation 217/2006), Workers Compensation Board and municipal authority provided that in any case of conflict or discrepancy more stringent requirements must apply.
.2 Contractor is aware of, and accepts, the appropriate safety and health jurisdiction to which they are working in. Contractor accepts the responsibility to comply with the specified provincial and federal regulatory instruments, as

appropriate, and to ensure that all subcontractors do likewise.

.3 Contractor is responsible for all subcontractors with respect to safety and health issues and must be deemed as "site coordinator" to facilitate employer/contractor coordination.

.4 Contractor (and his subcontractors) must submit proof of WCB coverage for all their personnel to Engineer prior to commencing work.

.5 DND owned equipment, devises, tools, machinery and personal protective equipment (PPE) is not to be used.

.6 Safety personnel and responsibility:
.1 The Contractor must supply competent personnel to implement a safety orientation program and ensure that DND, Federal and Provincial safety and health standards, guidelines,policies and regulations are being complied with.
.2 The safety orientation program must include a contractor's checklist to confirm that the contractor, subcontractors and all on-site tradespeople are aware and concur with all safety practices that need to be complied with while performing the project scope and if unforeseen issues arise on the job site,the Contractor must notify the Engineer in writing of such instances and appropriate action be taken.
.3 DND must monitor daily to ensure safety requirements are met and that safety records are properly kept and maintained.
.4 The Contractor will report to the Engineer and jurisdictional authorities any accident or incident involving Contractor, DND or public personnel and/or property arising from the Contractor's execution of work.

.7 Overloading:
.1 Ensure no part of work is to be subjected to loading that will endanger its safety or cause permanent deformation.

.8 WHMIS:
.1 Comply with requirements of Workplace Hazardous Materials information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Labour Canada and Health and Welfare Canada.
.2 Deliver copies of MSDS data sheets to

Engineer on delivery of materials.

.9 Barricades:
.1 Barricade dangerous work sites.

.10 Work procedures and equipment:
.1 All work procedures and equipment will be in accordance with legislated standards.
.2 Position cranes, hoists and scaffolding and operate them in a manner that will not result in damage to nearby equipment or personnel even if slung loads or small objects fall or the equipment collapses.

.11 Undergoing work sites:
.1 When work sites are left unguarded, especially overnight, powered equipment must be left at zero energy potential, material must be safely positioned and stacked, and portable ladders leading to elevated work platforms removed and secured.

.12 Safety personnel and responsibility:
.1 The Contractor must supply competent personnel to implement their safety program and ensure that DND, Federal and Provincial safety and health standards are being complied with.
.2 DND must monitor daily to ensure safety requirements are met and safety records are properly kept and maintained.
.3 The Contractor will report to the Engineer and jurisdictional authorities any accident or incident involving Contractor, DND or public personnel and/or property arising from the Contractor's execution of work.

.13 Delay due to Health and Safety Regulations infractions:
.1 The Contractor must include all provisions of the Standing Offer in any agreement with Sub-Contractors equally responsible for safe work performance.
.2 If the Contractor is responsible for a delay in the progress of work due to an infraction of legislated Health and Safety requirements, the Contractor must, without additional cost to DND, work such overtime, acquire and use equipment or material for the execution as deemed necessary in the opinion of the Engineer to avoid daily in the final completion of the work or any operation thereof.

25 FIRE SAFETY

.1 Engineer will co-ordinate arrangements for the

REQUIREMENTS

contractor to be briefed on Fire Safety and Base Fire Orders at their pre-work conference by Fire Chief before any work is commenced.

.2 Prior to the commencement of construction or demolition, an acceptable Fire Safety Plan must be prepared for the site.

.3 The Fire Safety Plan must include:
.1 the designation and organization of site personnel to carry out fire safety duties including watchman service if applicable.
.2 the emergency procedures to be used in case of fire including:
.1 sounding the alarm;
.2 notifying the fire department;
.3 instructing site personnel on procedures to be followed when the fire alarm sounds; and
.4 fire fighting procedures.
.3 the control of fire hazards in and around the building.
.4 maintenance of fire fighting activities.

.4 The Contractor is to be informed at the briefing that the Fire Chief will conduct periodic inspections of the work site to ensure fire safety guidelines are met and that Fire Department emergency planning is completed.

.5 The Contractor must designate an on-site representative who must be responsible for correcting all violations immediately.

.6 Know the location of nearest fire alarm box and telephone, including the emergency phone number.

.7 Report immediately all fire incidents to the Fire Department as follows:
.1 Activate nearest fire alarm box; or
.2 Telephone:
.1 PMQ Area 911.
.2 Base Area 911.

.8 Person activating fire alarm box is to remain at the box to help direct Fire Department to scene of fire.

.9 When reporting a fire by telephone, give location of fire, name or number of building and be prepared to verify the location.

.10 Allow Fire Chief unrestricted access to work site including routine fire safety inspections of the work site.

26 ENVIRONMENTAL PROTECTION

.1 Fires:
.1 Fires and burning of rubbish on site is not permitted.

.2 Disposal of waste:
.1 Do not bury rubbish and waste materials on site.
.2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into storm or sanitary sewers.

.3 Pollution control:
.1 Control emissions from equipment and plant to local authorities emission requirements.
.2 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

.4 Equipment:
.1 Equipment which is to be used in the execution of the work must be maintained in a manner that will not be detrimental to the environment and in compliance with the Canada Environmental Protection (CEPA). Equipment which is in violation must be removed from site until such time it does comply with the above mentioned requirements.

.5 Storage and handling:
.1 All hazardous substances (any substance that is poisonous, exhibits flammability, corrosive, reactive or toxic) must be stored and handled in a manner which is not harmful to human life and will not pollute the environment.
.2 All hazardous substances stored outdoors must be situated in or on a secondary containment device capable of fully containing 1.5 times the quantity of the total volume stored in or on it. Storage sites must be consolidated to the greatest extent possible to reduce the number of hazardous sites.
.3 Where hazardous sites are stored indoors in quantities which cannot be contained safely by the building structure in the event of a leak, the Engineer may direct that such substances be stored in or on proper secondary containment devices capable of fully containing 1.5 times the quantity of the total volume stored in or on it.

.6 Clean-ups:
.1 Leaks or spills or hazardous substances, regardless of the quantity or whether indoors or outdoors, must be stopped and cleaned-up immediately and be prevented from entering storm or sanitary sewer systems or contaminating soil or

water.
.2 All spilled substances and materials contaminated by the spill must be collected in leak proof containers or double bagged for disposal off DND property. (CFB Shilo's Landfill site may be used on written approval from Engineer.) Disposal must be in a manner which is acceptable to the local authority having jurisdiction over disposal of such substances.

.7 Reporting:
.1 **ALL releases of hazardous substances into the environment (ground, water, drains, sewer systems, ditches, road, parking areas, air, etc.) must be reported to the Engineer immediately.**

.8 Inspection:
.1 From time to time, the project site must be inspected to ensure compliance with federal, provincial and local environment requirements.
.2 All spills reported are subject to inspection by the Base Environmental Officer and the Engineer to confirm clean-up and disposal have been carried out satisfactorily.

28 CLEANING

.1 General cleaning during construction:
.1 Provide on-site metal containers for collection of waste materials and debris.
.2 Dispose of waste materials and debris at designated dumping areas on Crown property as directed by Engineer.
.3 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.
.4 Remove grease, dust dirt, stains, labels, fingerprints, and other foreign materials, from interior and exterior finished surfaces including glass and other polished surfaces affected by work.
.5 Clean lighting reflectors, lenses, and other lighting surfaces affected by work.
.6 Broom clean paved surfaces; rake clean other surfaces of grounds; use heavy duty magnet to pick-up nails, screws and metal pieces.
.7 All cleaning must be done to the complete satisfaction of the Engineer.

PART 1 - GENERAL

1.1 OUTLINE OF WORK

.1 Comply with the requirements of this Section when performing the following work:
.1 Removal of asbestos cement panels and sheets, vinyl floor tiles, exterior cement tiles and shingles, hard plasters, and boiler room wall boards containing asbestos.
.2 Cutting, shaping, grinding, drilling or abrading materials mentioned in 1.1.1.1 above using hand powered tools, or using power tools equipped with a HEPA filter.

1.2 DEFINITIONS

.1 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with a filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.

.2 Amended water: water with a non-ionic surfactant wetting agent added to reduce water tension to allow thorough wetting of fibres.

1.3 REGULATORY AGENCIES

.1 Comply with Federal, Provincial, and local requirements pertaining to asbestos, provided that in any case of conflict among these requirements or with these specifications the more stringent requirement shall apply.

1.4 SUBMITTALS

.1 Submit proof satisfactory to the Engineer that suitable arrangements have been made to dispose of asbestos-containing waste in accordance with requirements of authority having jurisdiction.

1.5 EXISTING CONDITIONS

.1 Reports and information pertaining to material containing asbestos to be handled, removed, or otherwise disturbed during this project are available for inspection at bound into this specification immediately after this Section.

.2 Notify the Engineer of friable material discovered during the work and not apparent from the drawings, specifications, or report, pertaining to the work.

Do not disturb such material pending instructions from the Engineer.

1.6 INSTRUCTION AND TRAINING

.1 Before commencing work provide to the Engineer satisfactory proof that every worker has had instruction and training in the hazards of asbestos exposure, in personal hygiene and work practices, and in the use, cleaning, and disposal, of respirators and protective clothing.

.2 Instruction and training related to respirators shall include instruction and training related to:
.1 The limitations of the equipment.
.2 The inspection and maintenance of the equipment.
.3 The fitting of the equipment.
.4 The disinfecting of the equipment.

1.7 WORKER PROTECTION

.1 Respirators: Provide workers with personally issued and marked as to efficiency and purpose non-powered reusable or replaceable filter type air purifying respirators suitable for protection against asbestos and acceptable to the Provincial Authority having jurisdiction.

.2 Protective Clothing: Provide workers with full body disposable type coveralls.

.3 Eating, drinking, chewing, and smoking, are not permitted in the work area.

.4 Before leaving the work area workers shall decontaminate their protective clothing using a HEPA vacuum or by damp wiping. Store protective clothing in clean plastic bag for reuse, or if protective clothing is not to be reused, dispose of as contaminated waste as specified under paragraph 3.1.4.

.5 Workers shall wash hands and face when leaving the work area.

1.8 HOURS OF WORK

.1 Work shall be performed outside of normal working hours.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Drop Sheets: 0.15 mm thick polyethylene.
.1 Polyethylene: 0.15 mm thick.
.2 FR polyethylene: 0.15 mm thick woven fibre reinforced fabric bonded both sides with polyethylene.

.2 Wetting Agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with water in a concentration to provide thorough wetting of asbestos-containing material.

.3 Waste Containers: waste shall be contained in two separate containers. The inner container shall be a 0.15 mm thick sealable polyethylene waste bag. The outer container shall be a sealable metal or fibre type where there are sharp objects included in the waste material; otherwise the outer container may be a sealable metal or fibre type or a second 0.15 mm thick sealable polyethylene bag. Waste containers shall have a preprinted cautionary asbestos warning in both official languages clearly visible when ready for removal to disposal site.

PART 3 - EXECUTION

3.1 PROCEDURES

.1 Before beginning work remove visible dust from surfaces in the work area where dust is likely to be disturbed during the course of the work. Use HEPA vacuum, or damp cloths where damp cleaning does not create a hazard and is otherwise appropriate. Do not use compressed air to clean up or remove dust from any surface.

.2 Prevent the spread of dust from the work area using measures appropriate to the work to be done. Use FR polyethylene drop sheets over flooring such as carpeting that absorbs dust and over all flooring in work areas where dust and contamination cannot otherwise be safely contained.

.3 Wet materials containing asbestos to be cut, ground, abraded, drilled, or otherwise disturbed unless wetting creates a hazard or causes damage. Use garden reservoir type low velocity fine mist sprayer. Perform work in a manner to reduce dust creation to lowest levels practicable. All work

will be subject to visual inspection and air monitoring. Any contamination of surrounding areas indicated by visual inspection or air monitoring will require the complete enclosure and clean-up of the affected areas.

.4 Cleanup:

.1 Frequently during the work and immediately after completion of the work clean up dust and waste containing asbestos using a HEPA vacuum or by damp mopping.

.2 Place dust and waste containing asbestos in sealed dust-tight waste bags. Drop sheets and disposable protective clothing shall be treated as asbestos waste and shall be wetted and folded to contain dust and then placed in waste bags.

.3 Immediately before their removal from the work area, and disposal, clean each filled waste bag using damp cloths or HEPA vacuum and place in second clean waste bag.

.4 Seal and remove from site. Dispose of in accordance with requirements of Provincial and Federal authority having jurisdiction. Supervise dumping and ensure that dump operator is fully aware of hazardous nature of material to be dumped and that guidelines and regulations for asbestos disposal are followed.

.5 Perform final thorough cleanup of work areas and adjacent areas affected by the work using HEPA vacuum.

PART 1 - GENERAL

1.1 OUTLINE OF WORK

.1 Comply with the requirements of this Section when performing the following work:

.1 Removing whole or in part suspended ceiling tiles and suspension systems, and vinyl sheet flooring.

.2 Removal of asbestos-containing material from piping insulation.

.3 Enclosure of friable asbestos-containing material.

.4 The application of tape or sealant or other covering to pipe and boiler insulation containing asbestos.

1.2 DEFINITIONS

.1 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with a filter system capable of collecting and retaining fibres greater than 0.3 microns in any dimension at 99.97% efficiency.

.2 Amended water: Water with a non-ionic surfactant wetting agent added to reduce water tension to allow wetting of fibres.

.3 Authorized visitor: the Engineer, or his representative, and persons representing regulatory agencies.

1.3 REGULATORY AGENCIES

.1 Comply with Federal, Provincial, and local requirements pertaining to asbestos, provided that in any case of conflict among these requirements or with these specifications the more stringent requirement shall apply.

1.4 SUBMITTALS

.1 Submit proof satisfactory to the Engineer that suitable arrangements have been made to dispose of

asbestos-containing waste in accordance with requirements of authority having jurisdiction.

1.5 EXISTING CONDITIONS

.1 Reports and information pertaining to material containing asbestos to be handled, removed, or otherwise disturbed during work may be available at Base Construction Engineering by contacting the Engineering Officer at 765-3000, ext. 3122.

.2 Notify the Engineer of friable material discovered during the work and not apparent from the drawings, specifications, or report, pertaining to the work. Do not disturb such material pending instructions from the Engineer.

1.6 INSTRUCTION AND TRAINING

.1 Before commencing work provide to the Engineer satisfactory proof that every worker has had instruction and training in the hazards of asbestos exposure, in personal hygiene and work practices, and in the use, cleaning, and disposal, of respirators and protective clothing.

.2 Instruction and training related to respirators shall include instruction and training related to:
.1 The limitations of the equipment.
.2 The inspection and maintenance of the equipment.
.3 The fitting of the equipment.
.4 The disinfecting of the equipment.

1.7 WORKER PROTECTION

.1 Respirators: Provide workers with personally issued and marked as to efficiency and purpose non-powered reusable or replaceable filter type air purifying respirators suitable for protection against asbestos and acceptable to the Provincial Authority having jurisdiction. Workers shall wear and use the equipment while in the work area.

.2 Protective Clothing: Provide workers with protective clothing that does not readily retain or permit penetration of asbestos fibres, and consists of full-body covering including head covering with snug fitting cuffs at wrists, ankles, and neck. Every worker who enters the work area shall wear protective clothing.

.3 Eating, drinking, chewing, and smoking, are not permitted in the work area.

.4 Before leaving the work area workers shall decontaminate their protective clothing using a HEPA vacuum or by damp wiping. Store clean protective clothing in clean plastic bag for reuse, or, if protective clothing is not to be reused, dispose of as contaminated waste as specified under paragraph 3.1.8.

.5 Workers shall wash hands and face when leaving the work area.

1.8 VISITOR PROTECTION

.1 Provide protective clothing and approved respirators to authorized visitors to the work areas.

.2 Instruct authorized visitors in the use of protective clothing, respirators, and procedures.

1.9 HOURS OF WORK

.1 Work shall be performed outside of normal working hours.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Drop & Enclosure Sheets:
.1 Polyethylene: 0.15 mm thick.
.2 FR polyethylene: 0.15 mm thick woven fibre reinforced fabric bonded both sides with polyethylene.

.2 Wetting Agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with water in a concentration to provide thorough wetting of asbestos-containing material.

.3 Waste Containers: Waste shall be contained in two separate containers. The inner container shall be a 0.15 mm thick sealable polyethylene bag or where the glove bag method is used, the glove bag itself. The outer container shall be a sealable metal or fibre type where there are sharp objects included in the waste material; otherwise the outer container may be sealable metal or fibre type or a second 0.15 mm thick sealable polyethylene bag.

Waste containers shall have a preprinted cautionary asbestos warning, in both official languages, clearly visible when ready for removal to disposal site.

.4 Glove-bag:
.1 Acceptable materials: Safe-T-Strip products in configuration suitable for work, or alternative material approved by Engineer. Bags intended for use at more than one location shall have internal zipper fasteners.

.5 Tape: Tape suitable for sealing polyethylene to surfaces under both wet conditions using amended water, and dry conditions.

.6 Slow drying sealer: non-staining, clear, water dispersible type that remains tacky on surface for at least 8 hours and designed for the purpose of trapping residual asbestos fibres. Sealer shall have flame spread and smoke developed rating less than 50 and be compatible with any new fireproofing.

PART 3 - EXECUTION

3.1 PROCEDURES

.1 Before beginning work, at each access to work areas, install warning signs in upper case 'Helvetica Medium' letters reading as follows: 'Caution Asbestos Hazard Area (25 mm) No Unauthorized Entry (19 mm) Wear Assigned Protective Equipment (19 mm) Breathing Asbestos Dust May Cause Serious Bodily Harm (7 mm)'.

.2 Before beginning work remove visible dust from surfaces in the work area where dust is likely to be disturbed during the course of the work. Use HEPA vacuum, or damp cloths where damp cleaning does not create a hazard and is otherwise appropriate. Do not use compressed air to clean up or remove dust from any surface.

.3 Prevent the spread of dust from the work area using measures appropriate to the work to be done. Use FR polyethylene drop sheets over flooring such as carpeting that absorbs dust and over all flooring in work areas where dust or contamination cannot otherwise be safely contained. When removing suspended ceilings and the walls themselves do not enclose the work area and when removing asbestos

containing material from piping or equipment and the "glove-bag" method is not used erect an enclosure of polyethylene sheeting around the work area, shut off the mechanical ventilation system serving the work area and seal ventilation ducts to and from the work area.

.4 When removing suspended ceilings, after gaining access to ceiling space, remove friable material on upper surfaces, as removal of ceiling panels progresses, using HEPA vacuum equipment.

.1 Clean ceiling panels using HEPA vacuum, wrap clean panels in 0.10 mm thick polyethylene, and store in building as directed by Engineer.

.2 Clean "T" grid suspension system, disconnect, wrap in 0.10 mm thick polyethylene, and store in building as directed by Engineer.

.5 Other than loose material which shall be removed by HEPA vacuum, friable material containing asbestos to be removed or disturbed shall be thoroughly wetted before and during work unless wetting creates a hazard or causes damage. Use garden reservoir type low velocity fine mist sprayer. Perform work in a manner to reduce dust creation to lowest levels practicable.

.6 Pipe Insulation Removal Using Glove-Bag:

.1 Place tools necessary to remove insulation, in tool pouch. Wrap the bag around pipe and close zippers. Seal bag to pipe with cloth straps.

.2 Place hands in gloves and use necessary tools to remove insulation. Arrange insulation in bag to obtain full capacity of bag.

.3 Insert nozzle of spray pump into bag through valve and wash down pipe and interior of bag thoroughly. Wet surface of insulation in lower section of bag.

.4 Waste material in bags intended for use at more than one location and which are equipped with internal zippers to seal off waste, shall be sealed off in lower sections of bag before bag is removed from pipe. Reinstall bag in new location before opening zip-lock.

.5 If bag is to be moved along pipe, loosen straps, move bag, re-seal to pipe using double-pull zipper to pass hangers. Repeat stripping operation.

.6 To remove bag after completion of stripping wash top section and tools thoroughly. Pull polyethylene waste container over glove-bag before removing from pipe. Release one strap and remove freshly washed tools. Place tools in water. Remove second strap and zipper. Fold over into waste container and seal.

.7 After removal of bag ensure that pipe is free

of all residue. Remove all residue using HEPA vacuum or wet cloths. Ensure that surfaces are free of sludge which after drying could release asbestos dust into atmosphere. Seal exposed surfaces of pipe and ends of insulation with slow-drying sealer to seal in any residual fibres.

.8 Upon completion of work shift, cover exposed ends of remaining pipe insulation with polyethelene taped in place.

.7 All work will be subject to visual inspection and air monitoring. Any contamination of surrounding areas indicated by visual inspection or air monitoring will require the complete enclosure and clean-up of affected areas.

.8 Cleanup:

.1 Frequently during the work and immediately after completion of the work clean up dust and waste containing asbestos using a HEPA vacuum or by damp mopping.

.2 Place dust and waste containing asbestos in sealed dust-tight waste bags. Drop sheets and disposable protective clothing shall be treated as asbestos waste and shall be wetted and folded to contain dust and then placed in waste bags.

.3 Immediately before their removal from the work area, and disposal, clean each filled waste bag using damp cloths or HEPA vacuum and place in second clean waste bag.

.4 Seal and remove double-bagged waste from site. Dispose of in accordance with requirements of Provincial and Federal authority having jurisdiction. Supervise dumping and ensure that dump operator is fully aware of hazardous nature of material to be dumped and that guidelines and regulations for asbestos disposal are followed.

.5 Perform final thorough cleanup of work areas and adjacent areas affected by the work using HEPA vacuum.

3.2 AIR MONITORING

.1 From commencement of work until completion of cleaning operations air samples will be taken outside of work area enclosures in accordance with Health and Welfare Canada recommendations and Manitoba Labour.

.2 If air monitoring shows that areas outside work area enclosures are contaminated, these areas shall be enclosed, maintained and cleaned, in the same manner as that applicable to work areas.

PART 1 - GENERAL

1.1 OUTLINE OF WORK

.1 Removal of any spray or trowel-applied asbestos-containing material where specified by Engineer except where removal is considered impracticable by Engineer.

.2 Seal as specified all spray or trowel- applied asbestos-containing material located where specified by Engineer except where removal is considered by Engineer to be impracticable.

.3 Seal areas where asphaltic adhesive coating under spray or trowel-applied asbestos- containing material prevents complete removal of spray or trowel-applied asbestos-containing material.

.4 Enclosure as specified all spray or trowel- applied asbestos-containing material.

1.2 DEFINITIONS

.1 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with a filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.

.2 Polyethylene sheeting sealed with tape: polyethylene sheeting of type and thickness specified sealed with tape along all edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide a continuous polyethylene membrane to protect underlying surfaces from water damage or damage by sealants, and to prevent escape of asbestos fibres through the sheeting into a clean area.

.3 Authorized visitor: the Engineer or his representative, and persons representing regulatory agencies.

.4 Work Areas: where actual removal,sealing and enclosure of spray or trowel- applied asbestos-containing materials takes place.

.5 Negative pressure: a system which extracts air directly from work area, filters such extracted air through a High Efficiency Particulate Air filtering system, and discharges this air directly outside work area to exterior of building. This system shall maintain a minimum pressure differential of 5

Pa relative to adjacent areas outside of work areas, be equipped with an alarm to warn of system breakdown, and be equipped with an instrument to continuously monitor and automatically record pressure differences.

.6 Amended water: water with a non-ionic surfactant wetting agent added to reduce water tension to allow thorough wetting of asbestos fibres.

.7 Airlock: a system for permitting ingress or egress without permitting air movement between a contaminated area and an uncontaminated area, typically consisting of two curtained doorways at least 2 m apart.

.8 Curtained doorway: an arrangement of closures to allow ingress and egress from one room to another while permitting minimal air movement between rooms, typically constructed by placing two overlapping sheets of polyethylene over an existing or temporarily framed doorway, securing each along the top of the doorway, securing the vertical edge of one sheet along one vertical side of the doorway, and securing the vertical edge of the other sheet along the opposite vertical side of the doorway. All free edges of polyethylene shall be reinforced with duct tape and the bottom edge shall be weighted to ensure proper closing. Each polyethylene sheet shall overlap openings not less than 1.5 m on each side.

1.3 REGULATORY AGENCIES

.1 Comply with Federal, Provincial, and local requirements pertaining to asbestos, provided that in any case of conflict among those requirements or with these specifications the more stringent requirement shall apply.

1.4 SUBMITTALS

.1 Before commencing work:
.1 Obtain from the appropriate agency and submit to Engineer all necessary permits for transporting 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 employees have had instruction on the hazards of asbestos exposure, respirator use, dress, use of showers, entry and exit from work areas, and all aspects of work procedures and protective measures.

The Contractor's Superintendent shall have attended an asbestos abatement course, of not less than two days duration, approved by the Engineer. The Association of the Wall and Ceiling Industry (AWCI), D.J. Pinchin Technical Consulting Ltd., and Ontario Research Foundation, mount acceptable courses. Submit proof of attendance in the form of a certificate.

.3 Submit layout of proposed enclosures and decontamination facilities to Engineer for review.

.4 Submit documentation including test results for sealer proposed for use.

1.5 EXISTING CONDITIONS

.1 Results of tests of asbestos-containing materials taken from surfaces within the scope may be available for inspection at Base Construction Engineering by contacting the Engineering Officer at 765-3000, ext. 3122. When existing reports are available, they are for general information only and are not necessarily representative of all asbestos- containing materials contained within the scope of the project.

1.6 WORKER PROTECTION

.1 Instructions: before commencing work instruct workers in use of respirators, dress, showers, entry and exit from work areas, and all aspects of work procedures and protective measures.

.2 Respirators: provide workers with personally issued and marked as to efficiency and purpose respiratory equipment acceptable to Labour Canada or provincial labour department as suitable for the asbestos exposure in the work area. If disposable type filters are used, provide sufficient filters so that workers can install new filters following disposal of used filters and before re-entering contaminated areas.

.3 Protective Clothing: provide workers with full body disposable type coveralls. Alternatively, reusable protective clothing may be used if it is left in Equipment and Access Room until the end of asbestos abatement work, at which time such items shall be disposed of as asbestos waste. Provide other body protection required under applicable safety regulations.

.4 Each worker shall:

.1 Remove street clothes in clean change room

and put on respirator with new filters or reusable filters that have been tested as satisfactory, clean coveralls and head covers before entering Equipment and Access Rooms or work area. If reusable protective clothing is used each worker shall don respirator only before entering Equipment and Access Rooms where clothing is stored. All street clothes, uncontaminated footwear, towels, and similar uncontaminated articles shall be stored in clean change room.

.2 Remove gross contamination from clothing before leaving work area then proceed to Equipment and Access Room and remove all clothing except respirators. Place contaminated worksuits in receptacles for disposal with other asbestos contaminated materials. Leave reusable items except respirator in Equipment and Access Room. Still wearing the respirator proceed naked to the showers. Clean outside of respirator with soap and water while showering; remove respirator; remove filters and wet them and dispose of filters in the container provided for the purpose; and wash and rinse the inside of the respirator. When not in use in the work area, store work footwear in Equipment and Access Room. Upon completion of asbestos abatement, dispose of footwear as contaminated waste or clean thoroughly inside and out using soap and water before removing from work area or from Equipment and Access Room.

.3 Following showering and drying off, proceed to clean change room and dress in street clothes at the end of each day's work, or in clean coveralls before eating, smoking, or drinking. If re-entering work area, follow procedures outlined in 1.6.4.1 above.

.4 Enter the unloading room from outside dressed in clean coveralls to remove waste containers and equipment from the Holding Room of the Container and Equipment Decontamination Enclosure system. No worker shall use this system as a means to leave or enter the work area.

.5 Workers shall not eat, drink, smoke or chew gum or tobacco at the work site except in established clean room.

.6 Workers shall be fully protected with respirators and protective clothing during preparation of system of enclosures prior to commencing actual asbestos abatement.

.7 Provide and post in Clean Change Room and in Equipment and Access Room the procedures described in 1.6 of this section, in both official languages.

1.7 VISITOR PROTECTION

.1 Provide protection clothing and approved respirators to authorized visitors to work areas.

.2 Instruct authorized visitors in the use of protective clothing and respirators.

.3 Instruct authorized visitors in proper procedures to be followed in entering into and exiting from work areas.

1.8 NOTIFICATION

.1 Not later than ten (10) days before commencing work on this project notify the following in writing:
.1 The appropriate Regional or Zone Director of Medical Services Branch, Health and Welfare Canada.
.2 Manitoba Labour.

.2 When 10 days notice is not possible before job start, verbal notification followed by written letter and copy to Engineer will be accepted.

PART 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 wet conditions using amended water, and dry conditions.

.4 Wetting agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether, or other material approved by Engineer, mixed with water in a concentration to provide adequate penetration and wetting of asbestos-containing material.

.5 Asbestos waste containers: metal or fibre type acceptable to dump operator with tightly fitting covers and 0.15 mm minimum thickness sealable polyethylene liners. Containers shall be labelled in accordance with Occupational Safety and Health Administration, United States Department of Labour (OSHA) Asbestos Regulations (29 CFR 1910.1001).

Labelling shall be in both official languages.

.6 Sealers: Type Class A water based conforming to CGSB 1-GP-205M and approved by the Engineer and the Canadian Forces Fire Marshall (CFFM) of Canada or his representative.

.7 Sprayed fireproofing: ULC labelled and listed asbestos-free to provide the degree of fire or thermal protection required by current NBC standards.

.8 Slow drying sealer: non-staining, clear, water dispersible type that remains tacky on surface for at least 8 hours and designed for the purpose of trapping residual asbestos fibres. Sealer shall have flame spread and smoke developed rating less than 50 and be compatible with new fireproofing.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Work Areas:

.1 Shut off air handling and ventilation systems to prevent contamination and fibre dispersal to other areas of the building during work phase.

.2 Preclean moveable objects and carpeting within proposed work areas using HEPA vacuum and remove such objects from work areas to a temporary location for reinstallation at a later date.

.3 Preclean fixed casework, plant, and equipment within proposed work areas, using HEPA vacuum and cover with polyethylene sheeting sealed with tape.

.4 Clean proposed work areas using, where practicable, HEPA vacuum cleaning equipment. If not practicable, use a wet cleaning method. Do not use methods that raise dust, such as dry sweeping, or vacuuming using other than HEPA vacuum equipment.

.5 Put negative pressure system in operation and operate continuously from the time the first polyethylene is installed to seal openings until final completion of the work including final cleanup. Provide continuous monitoring of pressure difference using an automatic recording instrument.

.6 Seal off all openings such as corridors, doorways, windows, skylights, ducts, grilles, and diffusers, with polyethylene sheeting sealed with tape.

.7 Cover floor and wall surfaces with polyethylene sheeting sealed with tape. Use two layers of FR polyethylene on floors. Cover floors

first so that polyethylene extends at least 300 mm up walls then cover walls to overlap floor sheeting.

.8 Build airlocks at all entrances to and exits from work areas so that work areas are always closed off by one curtained doorway when workers enter or exit.

.9 At each access to work areas install warning signs in upper case "Helvetica Medium" letters reading as follows: "CAUTION ASBESTOS HAZARD AREA (25 mm) NO UNAUTHORIZED ENTRY (19 mm) WEAR ASSIGNED PROTECTIVE EQUIPMENT (19 mm) BREATHING ASBESTOS DUST MAY CAUSE SERIOUS BODILY HARM (7 mm)"

.10 After work area isolation remove heating, ventilating, and air conditioning filters, pack in sealed plastic bags 0.15 mm minimum thick and treat as contaminated asbestos waste. Remove ceiling mounted objects such as lights, partitions, other fixtures not previously sealed off, and other objects that interfere with asbestos removal, as directed by Engineer. Use localized water spraying during fixture removal to reduce fibre dispersal.

.11 Maintain emergency and fire exits from work areas, or establish alternative exits satisfactory to Fire Commissioner of Canada and Provincial Fire Marshall.

.12 Where application of water is required for wetting asbestos-containing materials, shut off electrical power, provide 24 volt safety lighting and ground fault interrupter circuits on power source for electrical tools, in accordance with applicable CSA Standard. Ensure safe installation of electrical lines and equipment.

.13 After preparation of work areas and Decontamination Enclosure Systems remove ceiling panels and tiles within work areas progressively and carefully, clean using HEPA vacuum and damp sponge, wrap clean panels in 0.10 mm minimum thick polyethylene, and store in building as directed by Engineer. Clean "T" grid suspension system within work areas using wet sponge, disconnect grid from hangers, wrap grid members in 0.10 mm minimum thick polyethylene and store in building as directed by Engineer.

.14 After preparation of work areas and Decontamination Enclosure Systems remove plaster ceilings, including lath, furring, channels, hangers, wires, clips, and dispose of as contaminated waste in specified containers. Spray ceiling debris and immediate work area with amended water to reduce dust, as work progresses.

.2 Worker Decontamination Enclosure System:

.1 Worker Decontamination Enclosure System shall comprise an Equipment and Access Room, a Shower Room, and a Clean Room, as follows:

.1 Equipment and Access Room: build an Equipment and Access Room between Shower Room and work areas, with two curtained doorways, one to the Shower Room and one to work areas. Install portable toilet, waste receptor, and storage facilities for workers' shoes and any protective clothing to be reworn in work areas. The Equipment and Access Room shall be large enough to accommodate specified facilities, any other equipment needed, and at least one worker allowing him sufficient space to undress comfortably.

.2 Shower Room: build a Shower Room between the Clean Room and Equipment and Access Room, with two curtained doorways, one to the Clean Room and one to Equipment and Access Room. Provide one shower for every five workers. Provide a constant supply of hot and cold or warm water. Provide piping and connect to water sources and drains. Pump waste water through a 5 micrometre filter system acceptable to Engineer before directing into drains. Provide soap, clean towels and appropriate containers for disposal of used respirator filters.

.3 Clean Room: build a Clean Room between the Shower Room and clean areas outside of enclosures, with two curtained doorways, one to outside of enclosures and one to Shower Room. Provide lockers or hangers for workers street clothes and personal belongings. Provide storage for clean protective clothing and respiratory equipment. Install a mirror to permit workers to fit respiratory equipment properly, and sufficient hangers and hooks.

.3 Container and Equipment Decontamination Enclosure System:

.1 Container and Equipment Decontamination Enclosure System shall comprise a Staging Area within the work area, a Washroom, a Holding Room, and an Unloading Room. The purpose of this system is to provide a means to decontaminate waste containers, scaffolding, waste and material containers, vacuum and spray equipment, and other tools and equipment for which the Worker Decontamination Enclosure System is not suitable.

.1 Staging Area: designate a Staging Area in the work area for gross removal of dust and debris from waste containers and equipment, labelling and sealing of waste containers, and temporary storage pending removal to Washroom. Staging Area shall have a curtained doorway to the Washroom.

.2 Washroom: build a Washroom between the

Staging Area and Holding Room with two curtained doorways, one to the Staging Area and one to the Holding Room. Provide high pressure low volume sprays for washing of waste containers and equipment. Pump waste water through 5 micrometre filter system before directing into drains. Provide piping and connect to water sources and drains.

.3 Holding Room: build a Holding Room between the Washroom and Unloading Room, with two curtained doorways, one to the Washroom and one to the Unloading Room. The Holding Room shall be of sufficient size to accommodate at least two waste containers and the largest item of equipment used.

.4 Unloading Room: build an Unloading Room between the Holding Room and outside, with two curtained doorways, one to the Holding Room and one to outside.

.4 Construction of Decontamination Enclosures:

.1 Build suitable framing for enclosures or use existing rooms where convenient (as approved by Engineer), and line with polyethylene sheeting sealed with tape. Use two layers of FR polyethylene on floors.

.2 Build curtained doorways between enclosures so that when people move through or when waste containers and equipment are moved through a doorway, one of the two closures comprising the doorway always remains closed.

.5 Separation of Work Areas from Occupied Areas:

.1 Separate parts of the building required to remain in use from parts of the building used for asbestos abatement by means of an airtight barrier system constructed as follows:

.1 Build suitable floor to ceiling lumber or metal stud framing, cover with polyethylene sheeting sealed with tape, and apply 9 mm minimum thick plywood. Seal all joints between plywood sheets and between plywood and adjacent materials with surface film forming type sealer, to create an airtight barrier.

.2 Cover plywood barrier with polyethylene sealed with tape, as specified for work areas.

.6 Maintenance of Enclosures:

.1 Maintain enclosures in tidy condition.

.2 Ensure that barriers and polyethyene linings are effectively sealed and taped. Repair damaged barriers and remedy defects immediately upon discovery.

.3 Visually inspect enclosures at the beginning of each working period.
.4 Use smoke methods to test effectiveness of barriers when directed by Engineer.

.7 Asbestos Abatement work shall not commence until:
.1 Arrangements have been made for disposal of waste.
.2 For wet stripping techniques, arrangements have been made for containing, filtering, and disposal of waste water.
.3 Work areas, decontamination enclosures and parts of the building required to remain in use are effectively segregated.
.4 Tools, equipment and materials waste containers are on hand.
.5 Arrangements have been made for building security.
.6 Warning signs specified in 3.1.1.9 are displayed where access to contaminated areas is possible.
.7 All notifications have been completed and other preparatory steps have been taken.

3.2 ASBESTOS REMOVAL

.1 Before removing asbestos:
.1 Prepare site.
.2 Spray asbestos material with water containing the specified wetting agent, using airless spray equipment capable of providing a "mist" application to prevent release of fibres. Saturate the asbestos material sufficiently to wet it to the substrate without causing excess dripping. Spray the asbestos material repeatedly during work process to maintain saturation and to minimize asbestos fibre dispersion.

.2 Remove the saturated asbestos material in small sections. Do not allow saturated asbestos to dry out. As it is being removed pack the material in sealable plastic bags 0.15 mm minimum thick and place in labelled containers for transport.

.3 Seal filled containers. Clean external surfaces thoroughly by wet sponging. Remove from immediate working area to Staging Area. Clean external surfaces thoroughly again by wet sponging before moving containers to decontamination Washroom. Wash containers thoroughly in decontamination Washroom, and store in Holding Room pending removal to Unloading Room and outside. Ensure that containers are removed from the Holding Room by workers who have entered from uncontaminated areas dressed in clean coveralls.

.4 After completion of stripping work, all surfaces from which asbestos has been removed shall be wire brushed and wet-sponged to remove all visible material. During this work the surfaces shall be kept wet.

.5 Where Engineer decides complete removal of asbestos- containing material is impossible due to obstructions such as structural members or major service elements, or because asbestos- containing material was originally applied to an asphaltic coating and provides a written direction, seal the material as follows:
.1 Apply surface film forming type sealer to provide 0.635 mm minimum dry film thickness over sprayed asbestos surfaces. Apply using airless spray equipment to avoid blowing off fibres. Apply penetrating type sealer to penetrate existing sprayed asbestos surfaces to uniform depth of 25 mm minimum.

.6 After wire brushing and wet sponging to remove visible asbestos, and after sealing asbestos-containing material impossible to remove, wet clean the entire work area including the Equipment and Access Room, and equipment used in the process. After a 24 hour period to allow for dust settling, wet clean these areas and objects again. During this settling period no entry, activity, or ventilation will be permitted. After a second 24 hour period under the same conditions, clean these areas and objects again using HEPA vacuum followed by wet cleaning. After inspection by Engineer apply continuous coat of slow-drying sealer to all surfaces of work space. Allow at least 16 hours with no entry, activity, ventilation or disturbance other than operation of negative pressure units during this period.

3.3 ASBESTOS SEALING

.1 Before sealing asbestos:
.1 Prepare site.
.2 Vacuum surfaces in work areas except those to be sealed, using HEPA vacuum to remove all loose debris and dust particles.
.3 Repair damaged and missing areas of existing sprayed asbestos to obtain a suitable base for sealing and to restore continuity of fireproofing. Use the specified asbestos-free fireproofing material. Prepare surfaces and apply fireproofing in accordance with manufacturer's printed instructions.
.4 Remove loose asbestos and pack in sealable plastic bags 0.15 mm minimum thick and place in

labelled waste containers for transport.

.5 Seal filled waste containers. Remove from immediate working area to Staging Area. Clean external surfaces thoroughly again by wet sponging before moving containers to decontamination washroom. Wash waste containers thoroughly in decontamination Washroom, and store in Holding Room pending removal to Unloading Room and outside. Ensure that waste containers are removed from holding areas by workers who have entered from uncontaminated areas dressed in clean coveralls.

.2 Apply surface film forming type sealer to provide 0.635 mm minimum dry film thickness over sprayed asbestos surfaces. Apply using airless spray equipment to avoid blowing off fibres. Apply penetrating type sealer to penetrate existing sprayed asbestos surfaces to uniform depth of 25 mm minimum.

.3 After sealing asbestos surfaces wet clean the entire work area including Equipment and Access Room, and equipment used in the process. After a 24 hour period to allow for dust settling, wet clean these areas and objects again. During this settling period no entry, activity, or ventilation will be permitted. After a second 24 hour period under the same conditions, clean these areas and objects again using HEPA vacuum followed by wet cleaning.

.4 Install warning signs in both official languages in 25 mm sans serif letters worded as follows: WARNING - SEALED ASBESTOS/ATTENTION AMIANTE SCELLE. Install signs at locations specified by Engineer.

3.4 ASBESTOS ENCLOSURE

.1 Before enclosing asbestos:

.1 Prepare site.

.2 Vacuum all surfaces in work areas, except asbestos surfaces, using HEPA vacuum equipment to remove all loose debris and dust particles.

.3 Spray areas to be disturbed while securing hangers and other fixing devices. Use water containing the specified wetting agent. Keep asbestos material damp to prevent release of airborne fibres.

.4 Remove loose asbestos and pack in sealable plastic bags 0.15 mm minimum thickness and place in labelled containers for transport.

.5 Seal filled waste containers. Remove from immediate working area to Staging Area. Clean external surfaces thoroughly again by wet sponging before moving containers to decontamination washroom. Wash waste containers thoroughly in

decontamination Washroom, and store in Holding Room pending removal to Unloading Room and outside. Ensure that waste containers are removed from holding areas by workers who have entered from uncontaminated areas dressed in clean coveralls.

.2 After installation of hangers and other fixing devices and before enclosing asbestos, repair damaged and missing areas of existing sprayed- on material using the specified asbestos-free fireproofing material. Prepare surfaces and apply fireproofing or thermal insulation in accordance with manufacturer's printed instructions.

.3 Enclose asbestos surfaces.

.4 After enclosing asbestos surfaces, wet clean the entire work area including Equipment and Access Room, and equipment used in the process. After a 24 hour period to allow for dust settling, wet clean these areas and objects again. During this settling period no entry, activity, or ventilation will be permitted. After a second 24 hour period under the same conditions, clean these areas and objects again using HEPA vacuum followed by wet cleaning.

.5 Install warning signs at locations directed by Engineer in both official languages in 25 mm san serif letters worded as follows: WARNING: ENCLOSED ASBESTOS/ATTENTION: AMIANTE CONFINE.

3.5 FINAL CLEANUP

.1 Following cleaning specified as above, and when air sampling shows that asbestos levels on both sides of seals do not exceed 0.10 fibres/cc as determined by the membrane filter method at 400-500X magnification phase contrast illumination, as described in NIOSH technical report PS CAM 239 or 7500 or equivalent, proceed with final cleanup.

.2 Remove polyethylene sheet by rolling it away from walls to centre of work area. Vacuum all visible asbestos-containing particles observed during cleanup, immediately, using HEPA vacuum equipment.

.3 Place polyethylene seals, tape, cleaning material, clothing, and other contaminated waste in plastic bags and sealed labelled waste containers for transport.

.4 Work areas, Equipment and Access Room, Washroom, Shower Room, and other enclosures that may be contaminated shall be included in the clean-up.

.5 Sealed waste containers and all equipment used in the work shall be included in the cleanup and shall be removed from work areas, via the Container and Equipment Decontamination Enclosure System, at an appropriate time in the cleaning sequence.

.6 A final check shall be carried out to ensure that no dust or debris remains on surfaces as a result of dismantling operations and air- monitoring shall be carried out again to ensure that asbestos levels in the building do not exceed 0.10 fibres/cc. Repeat cleaning using HEPA vacuum equipment, or wet cleaning methods where feasible, in conjunction with sampling until levels meet this criteria.

.7 As work progresses, and to prevent exceeding available storage capacity on site, remove sealed and labelled containers containing asbestos waste and dispose of to authorized disposal area in accordance with requirements of disposal authority. Ensure that each shipment of containers transported to dump is accompanied by Contractor's representative who shall ensure that dumping is done in accordance with governing regulations.

3.6 RE-ESTABLISHMENT OF OBJECTS AND SYSTEMS

.1 When cleanup is complete:
.1 Re-establish objects moved to temporary locations in the course of the work, in their proper positions.
.2 Re-secure mounted objects removed in the course of the work in their former positions.

.2 Re-establish mechanical and electrical systems in proper working order. Install new filters.

.3 Repair or replace objects damaged in the course of the work, as directed by Engineer.

3.7 AIR MONITORING

.1 From commencement of work until completion of cleaning operations air samples will be taken outside of work area enclosures in accordance with Health and Welfare Canada recommendations.

.2 If air monitoring shows that areas outside work area enclosures are contaminated, these areas shall be enclosed, maintained and cleaned, in the same manner as that applicable to work areas.

PART 1 - GENERAL

1.1 References

.1 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-51.9-92, Mineral Fibre Thermal Insulation for Piping and Round Ducting.
.2 CAN/CGSB-51.12-95, Cement, Thermal Insulating and Finishing.
.3 CGSB 51-GP-52Ma, Vapour Barrier Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.2 Underwriters Laboratories of Canada (ULC)
.1 CAN/ULC-S102-M88, Surface Burning Characteristics of Building Materials and Assemblies.

.3 American Society for Testing and Materials (ASTM)
.1 ASTM C 335-95, Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
.2 ASTM C 449/C 449M-88, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
.3 ASTM C 921-89, Practice for Determining the Properties Jacketing Materials for Thermal Insulation.

.4 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
.1 ASHRAE Standard 90.1-1989

.5 Manufacturer's Trade Associations
.1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards.

1.2 Shop Drawings

.1 Submit shop drawings in accordance with Section 01002 paragraph 21- Shop Drawings, Product Data and Samples.

.2 Submit for approval manufacturer's catalogue literature related to installation, fabrication for pipe, fittings, valves and jointing recommendations.

1.3 Qualifications

.1 Installer to be specialist in performing work of this section, and have at least 3 years successful experience in this size and type of project,

qualified to standards of TIAC.

1.4 Definitions

.1 For purposes of this section:
.1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.
.2 "EXPOSED" - will mean "not concealed" as defined herein.

PART 2 - PRODUCTS

2.1 Fire and Smoke Rating

.1 In accordance with CAN/ULC-S102-M88:
.1 Maximum flame spread rating: 25.
.2 Maximum smoke developed rating: 50.

2.2 Insulation

.1 Mineral fibre as specified herein includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24 C mean temperature when n tested in accordance with ASTM C 335-95.

.3 TIAC Code A-1: Rigid moulded mineral fibre without factory applied vapour retarder jacket.
.1 Mineral fibre: to CAN/CGSB-51.9-92.
.2 Maximum "k" factor: to CAN/CGSB-51.9-92.

.4 TIAC Code A-3: Rigid moulded mineral fibre with factory applied vapour retarder jacket.
.1 Mineral fibre: to CAN/CGSB-51.9-92.
.2 Jacket: to CGSB 51-GP-52Ma Ma.
.3 Maximum "k" factor: to CAN/CGSB-51.9-92.

2.3 Insulation Securement

.1 Tape: Self-adhesive, aluminum, reinforced, 50 mm wide minimum.

.2 Contact adhesive: Quick setting.

.3 Canvas adhesive: Washable.

2.4 Cement

.1 Thermal insulating and finishing cement:
.1 To CAN/CGSB-51.12-95.
.2 Hydraulic setting or Air drying on mineral wool, to ASTM C 449/C 449M-88.

2.5 Vapour Retarder Lap Adhesive

.1 Water based, fire retardant type, compatible with insulation.

2.6 Indoor Vapour Retarder Finish

.1 Vinyl emulsion type acrylic, compatible with insulation.

2.7 Jackets

.1 Polyvinyl Chloride (PVC):
.1 One-piece moulded type and sheet to CAN/CGSB-51.53-95 with pre-formed shapes as required.
.2 Colours: to match adjacent finish paint by Engineer.
.3 Minimum service temperatures: -20 C.
.4 Maximum service temperature: 65 C.
.5 Moisture vapour transmission: 0.02 perm.
.6 Fastenings:
.1 Use solvent weld adhesive compatible with insulation to seal laps and joints.
.2 Tacks.
.3 Pressure sensitive vinyl tape of matching colour.

.2 Canvas:
.1 220 gm/m² cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C 921-89.
.2 Lagging adhesive: Compatible with insulation.

2.8 Fastenings

.1 For insulation system A-1, A-3:
.1 Tape: self adhesive, aluminum ULC labelled for less than 25 flame spread and less than 50 smoke developed.
.1 Standard of Acceptance: Fattal Insultape by S. Fattal Canvas Inc.
.2 Lap Seal Adhesive: quick setting for joints and lap sealing of vapour barriers.
.1 Standard of Acceptance: Childers CP 80, Foster 87-75 asbestos free at 6 m²/L.

.3 Lagging Adhesive: Fire retardant coating.
.1 Standard of Acceptance:Childers CP 50A-hv2, Foster 30-36 asbestos free 1.25 m²/L

PART 3 - EXECUTION

3.1 Pre-Installation Requirement

.1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.

.2 Surfaces to be clean, dry, free from foreign material.

3.2 Installation

.1 Install in accordance with TIAC National Standards.

.2 Apply materials in accordance with manufacturers instructions and this specification.

.3 Use two layers with staggered joints when required nominal wall thickness exceeds 75 mm.

.4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
.1 Hangers, supports to be outside vapour retarder jacket.

.5 Supports, Hangers:
.1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

3.3 Removable, Pre-fabricated, Insulation and Enclosures

.1 Application: At expansion joints, valves, primary flow measuring elements flanges and unions at equipment.

.2 Design: To permit movement of expansion joint and to permit periodic removal and replacement without damage to adjacent insulation.

.3 Insulation:
.1 Insulation, fastenings and finishes: same as system.
.2 Jacket: Aluminum PVC high temperature fabric.

3.4 Piping

.1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.

Insulation Schedules

.2 TIAC Code: A-1.
.1 Securements: Tape @ 300 mm oc.
.2 Seals: lap seal adhesive, lagging adhesive.
.3 Installation: TIAC Code 1501-H.

.3 TIAC Code: A-3.
.1 Securements: Tape @ 300 mm oc.
.2 Seals: VR lap seal adhesive, VR lagging adhesive.
.3 Installation: TIAC Code: 1501-C.

.4 Thickness of insulation to be as listed in following table.
.1 ** Run-outs to individual units and equipment not exceeding 4000 mm long.
.2 ** Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

Application	Temp °C	TIAC code	Pipe sizes (NPS) and insulation thickness (mm) Run out	to 1	1 1/4 2	2 1/2 4	5 6	8 & over
Steam	up to 175	A- 1	38	50	65	75	90	90
Steam, Saturated and Superheated	over 175	A- 1	38	65	65	75	90	90
Condensate Return	60 - 94	A- 1	25	38	38	38	38	38
Pumped Condensate return	up to 94	A- 1	25	38	38	38	38	38
Boiler Feed Water		A- 1	25	25	25	25	25	25
Hot Water Heating	60 - 94	A- 1	25	38	38	38	38	38
Hot Water Heating	up to 59	A- 1	25	25	25	25	38	38
Glycol Heating	60 - 94	A- 1	25	38	38	38	38	38
Glycol Heating	up to 59	A- 1	25	25	25	25	38	38
Domestic HWS		A- 1	25	25	25	38	38	38
Chilled Water	4 - 13	A- 3	25	25	25	25	25	25
Chilled Cooling	below	A- 3	25	25	38	38	38	38
Chilled Water Indoors		A- 3	25	25	25	25	25	25

Refrigerated Drinking Water	A- 3	25	25	25	25	25	25
Domestic CWS retarder	A- 3	25	25	25	25	25	25

.5 Finishes:

.1 Exposed indoors: Canvas PVC jacket.
.2 Exposed in mechanical rooms: Canvas.
.3 Concealed, indoors: canvas on valves, fittings. No further finish.
.4 Use vapour retarder jacket on TIAC code A-3 insulation compatible with insulation.
.5 Finish attachments: SS bands, @ 150 mm oc. Seals: closed.
.6 Installation: To appropriate TIAC code CRF/1 through CPF/5.

PART 1 - GENERAL

1.1 References

.1 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-51.9-92, Mineral Fibre Thermal Insulation for Piping and Round Ducting.
.2 CAN/CGSB-51.11-92, Mineral Fibre Thermal Insulation Blanket.
.3 CAN/CGSB-51.12-95, Cement, Thermal Insulating and Finishing.
.4 CGSB 51-GP-52Ma, Vapour Barrier Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
.5 CAN/CGSB-51.53-95, Jacketing, Polyvinyl, Chloride Sheet, for Insulating Pipes, Vessels and Round Ducts.

.2 Underwriters Laboratories of Canada (ULC)
.1 CAN/ULC-S102-M88, Surface Burning Characteristics of Building Materials and Assemblies.

.3 American Society for Testing and Materials (ASTM)
.1 ASTM C 335-95, Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
.2 ASTM C 449/C 449M-88 449M-88 449M-88, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
.3 ASTM C 921-89, Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

.4 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
.1 ASHRAE Standard 90.1-1989.

.5 Manufacturer's Trade Associations
.1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards.

1.2 Product Data

.1 Submit Product Data in accordance with Section 01002 paragraph 21- Shop Drawings, Product Data and Samples .

1.3 Definition

.1 For purposes of this section:
.1 "Concealed" insulated mechanical services and equipment in suspended ceiling and non accessible chases and furred spaces.
.2 "Exposed" will mean "not concealed" as defined here in.

1.4 Samples Submittals

.1 Submit samples in accordance with Section 01002 paragraph 32- Shop Drawings, Product Data and Samples.

1.5 Installation Instructions

.1 Submit manufacturer's installation instructions in accordance with Section 01002 paragraph 32 - Shop Drawings, Product Data and Samples.

.2 Installation instructions to include procedures to be used, installation standards to be achieved.

1.6 Qualifications

.1 Installer to be specialist in performing work of this section, and have at least 3 years successful experience in this size and type of project, qualified to standards of TIAC.

1.7 Delivery, Storage and Handling

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.2 Protect from weather and construction traffic.

.3 Protect against damage from any source.

.4 Store at temperatures and conditions required by manufacturer.

PART 2 - PRODUCTS

2.1 Fire and Smoke Rating

.1 In accordance with CAN/ULC-S102-M88:
.1 Maximum flame spread rating: 25.
.2 Maximum smoke developed rating: 50.

2.2 Insulation

.1 Mineral fibre as specified herein includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24 C mean temperature when tested in accordance with ASTM C 335-95.

.3 TIAC Code C-2 Mineral Fibre blanket unfaced or faced with factory applied vapour retarder jacket(as scheduled in Part 3 of this section)
.1 Mineral Fibre: to CAN/CGSB-51.11-92.
.2 Jacket: to CGSB 51-GP-52Ma.
.3 Maximum "k" factor: to CAN/CGSB-51.11-92

2.3 Cement

.1 Thermal insulating and finish
.1 To CAN/CGSB-51.12-95.

2.4 Jackets

.1 Polyvinyl Chloride (PVC):
.1 One-piece moulded type and sheet to CAN/CGSB-51.53-95 with pre-formed shapes as required.
.2 Colours: to match adjacent finish paint by Engineer.
.3 Minimum service temperatures: -20 C.
.4 Maximum service temperature: 65 C.
.5 Moisture vapour transmission: 0.02 perm.
.6 Fastenings:
.1 Use solvent weld adhesive compatible with insulation to seal laps and joints.
.2 Tacks.
.3 Pressure sensitive vinyl tape of matching colour.
.7 Covering adhesive: Compatible with insulation.

.2 Canvas:
.1 220 gm/m² cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C 921-89.
.2 Lagging adhesive: Compatible with insulation.

2.5 Insulation Securements

.1 Tape: Self-adhesive, aluminum, reinforced, 100mm wide minimum.

.2 Contact adhesive: Quick setting.
.1 Standard of Acceptance:Armstrong 520 Childers CP.82, Foster 85-20 asbestos free 6m²/L.
.3 Canvas adhesive: Washable.

2.6 Vapour Retarder Lap Adhesive

.1 Water based, fire retardant type, compatible with insulation.

2.7 Indoor vapour Retarder Finish

.1 Vinyl emulsion type acrylic, compatible with insulation.

PART 3 - EXECUTION

3.1 Pre-installation

.1 Pressure testing of equipment and adjacent piping systems to be complete, witnessed and certified.

Requirements

.2 Surfaces to be clean, dry, free from foreign material.

3.2 Installation

.1 Install in accordance with TIAC National Standards
.1 Hot equipment: To TIAC code 1503-H.
.2 Cold equipment: to TIAC code 1503-C.

.2 Elastomeric Insulation:to remain dry at all times. Overlaps to be to manufacturers instructions. Joints to be tight and sealed properly.

.3 Provide vapour retarder as recommended by manufacturer.

.4 Apply materials in accordance with insulation and equipment manufacturers instructions and this specification.

.5 Use two layers with staggered joints when required nominal wall thickness exceeds 75 mm.

.6 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
.1 Hangers, supports to be outside vapour retarder jacket.

.7 Supports, Hangers:
.1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

3.3 Removable, Pre-fabricated, Insulation and Enclosures

.1 Application: At expansion joints, valves, primary flow measuring elements flanges and unions at equipment.

.2 Installation to permit movement of expansion joint and to permit periodic removal and replacement without damage to adjacent insulation.

3.4 Equipment Insulation Schedules

.1 Includes valves, valve bonnets, strainers, flanges & fittings unless otherwise specified.

.2 Hot Equipment:
.1 TIAC code C-2 unfaced with wire or bands. and 13 mm cement precede by one layer of reinforcing mesh.
.2 Thicknesses:

Domestic hot water storage tanks	25 mm
Heat exchangers	50 mm

Steam condensate receivers	50 mm
Deaerator-feedwater heaters	50 mm