

Part 1 General

1.1 SECTION INCLUDES

This Section specifies the requirements for the loading, handling and disposal of contaminated soils, including Petroleum Hydrocarbon (PHC) contaminated soils.

1.2 RELATED SECTIONS

- .1 Section 31 23 10 - Excavating, Trenching and Backfilling.
- .2 Section 02 65 00 – Underground Storage Tank Removal.

1.3 DEFINITIONS

- .1 Petroleum Hydrocarbons: Hydrocarbon products described by laboratory analyses as lubricating oil and grease, fuel oil, diesel and/or gasoline.
- .2 Hydrocarbon Contaminated Soil: Soil containing concentrations of Petroleum Hydrocarbons (PHCs) in excess of CCME Commercial/Industrial Guidelines.
- .3 Free Product: The presence of a layer of undiluted or non-aqueous petroleum hydrocarbon in the subsurface.

1.4 QUALIFICATIONS

- .1 The Contractor shall be thoroughly familiar with and knowledgeable about existing site conditions, scope of work and requirements of the Specification.
- .2 Only Contractor's personnel capable of demonstrating a history of satisfactory experience in the area of hazardous waste management and who can satisfy Federal and Territorial requirements will be permitted to carry out the work of this Section. The Contractor's Superintendent responsible for the work of this Section shall have a minimum of five years of experience in the area of hazardous waste management.
- .3 Follow at all times, guidelines such as those established in Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities: NIOSH Publication No. 85-115, or Hazardous Waste Worker Training Manual: Canadian LIUNA - Contractors Training Council, 1992.
- .4 All activities involving the handling of contaminated soils, shall be directly supervised by the Contractor's personnel who have successfully completed a 40 hour training course for Hazardous Waste Activities in compliance with OSHA 29 CFR 1910.120 or other approved equivalent training courses such as the Canadian Hazardous Waste Workers Program.
- .5 Contractor's personnel trained as described in Clause 1.4.4 of this Section shall instruct and direct all workers with respect to the waste management procedures and labour and safety practices to be followed in carrying out the work.

- .6 Provide workers, the Contract Administrator and the Contract Administrator's staff with protection appropriate to the potential type and level of exposure. Establish specific safety protocols prior to commencing clean up activities.
- .7 Provide suitable safety clothing and equipment as required during the course of the work.
- .8 Trained and certified personnel are required to complete all Transportation of Dangerous Goods Act (TDGA) documentation and recording requirements.

1.5 SITE CONDITIONS

- .1 The Contractor shall ensure that services, not designated for demolition, are not damaged as a result of excavation work. The Contractor shall repair any services, utilities, or objects damaged by his actions at no cost to the City.
- .2 Suspend operations whenever climatic conditions are unsatisfactory for excavating or regrading to conform with this Specification.
- .3 After occurrence of heavy rains, do not operate equipment in designated areas until the material has dried sufficiently to prevent excessive rutting.
- .4 The Contractor is advised that the ground in low-lying areas may often be saturated. Dewater saturated ground and ponded areas as required.

1.6 PROTECTION

- .1 Prevent damage to benchmarks, existing buildings, surface and underground service and utility lines not designated for demolition. Immediately repair or replace any damage to the above, at no cost to the City.

1.7 PERSONNEL PROTECTION

- .1 Some areas designated for cleanup under this contract may involve soils and hazardous materials which contain PCBs, inorganic elements, hydrocarbons, and other contaminants which are considered hazardous to human health.
- .2 Supply sufficient quantities of designated protection equipment to fit all site personnel including the Contract Administrator and authorized visitors. Educate workers as to risks, and train in safe work practices.
- .3 No separate pay item shall apply to the work practice requirements, including personnel protection, of this Section. Costs shall be included in the applicable payment items to which this Section applies.

Part 2 Execution

2.1 REMOVAL AND DISPOSAL OF CONTAMINATED SOIL

- .1 Remove all surface debris prior to excavation. Remove all debris from excavated soil, sort, and dispose of appropriately.

- .2 Suppress dust generated during excavation operations with a water spray. Prevent surface water from entering the excavated area.
- .3 Dewater ponded contaminated soil areas, as required.
- .4 Transport PHC contaminated soil to the MidCanada Waste Management Ltd. facility in Ile Des Chenes, Manitoba such that no soil (or liquid) will be spilled during transport.
- .5 Clean the excavating equipment including the bucket, tracks, etc., of soil lumps and particles prior to demobilizing from the site. Take special precautions to mitigate the tracking of contaminated soil over the site area.

2.2 EQUIPMENT DECONTAMINATION

- .1 Decontaminate equipment which comes into direct contact with the contaminated soils by steam cleaning or other means acceptable to the Contract Administrator in a secure area capable of containing the waste generated by the washing operation.
- .2 Collect and dispose of any contaminated soil that leaks, spills or otherwise leaves the piece of equipment during transport from the area of work to the decontamination area.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

- .1 This Section specifies requirements for:
 - .1 The supply and placement of fill materials.
 - .2 The excavation, backfilling, and grading of designated areas including site debris areas, depressions created by the removal of debris and contaminated soil, and general site areas requiring regarding and reshaping.

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C117-04, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D422-632002, Standard Test Method for Particle-Size Analysis of Soils.
 - .4 ASTM D698-00ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ;) (600 kN-m/m ;).
 - .5 ASTM D1557-02e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ;) (2,700 kN-m/m ;).
 - .6 ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .3 Canadian Green Building Council (CaGBC)LEED Canada-NC Version 1.0-December 2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System For New Construction and Major Renovations.
- .4 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-A3000-03, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
 - .1 CSA-A3001-03, Cementitious Materials for Use in Concrete.
 - .2 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .5 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 DEFINITIONS

- .1 Common excavation: excavation of materials of any nature, including soils, dense tills, hardpan, frozen materials, and partially cemented materials which can be ripped and excavated with heavy construction equipment.
- .2 Regrading: the supply and placement of granular fill in designated areas to blend in with the natural terrain and provide positive drainage.
- .3 Waste Material: excavated material unsuitable for use in work or surplus to requirements.
- .4 Maximum Dry Density: determined by the Standard Proctor Method in accordance with ASTM D698. It is applicable if less than 30% of the material is retained on the ASTM 19 mm sieve.
- .5 Corrected maximum dry density is applicable if more than 30% of the material is retained on the ASTM 19 mm sieve. It is defined as:

$$D = \frac{D1 * D2}{(F1)(D2) + (F2)(D1)}$$

Where:

D = corrected maximum dry density (kg/m³).

F1 = fraction (decimal) of total field sample passing ASTM 19.0 mm sieve.

F2 = fraction (decimal) of total field sample retained on ASTM 19.0 mm sieve (equal to 1.0-F1)

D1 = maximum dry density (kg/m³) of material passing ASTM 19.0 mm sieve determined in accordance with Method C of ASTM D698 or latest edition thereof.

D2 – bulk density (kg/m³) of material retained on ASTM 19.0 mm sieve, equal to 1000G where G is bulk specific gravity (dry basis) of material when tested to ASTM C127-84, or latest edition thereof.

- .6 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- .7 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.
- .8 Unsuitable materials:
 - .1 Weak, chemically unstable, and compressible materials.
 - .2 Frost susceptible materials:
 - .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422 and ASTM C136 : Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.

.2 Table:

| | |
|-------------------|-----------|
| Sieve Designation | % Passing |
| 2.00 mm | 100 |

| Sieve Designation | % Passing |
|-------------------|-----------|
| 0.10 mm | 45 - 100 |
| 0.02 mm | 10 - 80 |
| 0.005 mm | 0 - 45 |

- .9 Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

1.4 SITE CONDITIONS

- .1 Suspend operations whenever climatic conditions are unsatisfactory for grading to conform with this Specification.
- .2 Do not operate equipment in work areas until the material has dried sufficiently to prevent excess rutting.
- .3 Areas to be graded are to be free from debris and excessive snow, ice, or standing water.

1.5 PROTECTION

- .1 Prior to commencing any excavation work, notify Contract Administrator, establish location and state of use of buried utilities and structures. Clearly mark such locations to prevent disturbance during work.
- .2 Prevent damage to benchmarks, existing buildings, surface or underground service or utility lines which are to remain. Immediately repair any damage to the above or replace the above in the event of damage, at no cost to the Owner.

1.6 TESTING

- .1 Contractor will appoint the services of a testing laboratory and pay for the services under his contract unless otherwise stipulated.

Part 2 Products

2.1 MATERIALS

- .1 Type 1 and Type 2 fill: properties to the following requirements:
 - .1 Crushed, pit run or screened stone, gravel or sand.
 - .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1 and/or CAN/CGSB-8.2.
 - .3 Table:

| Sieve Designation | % Passing | |
|-------------------|-----------|--------|
| | Type 1 | Type 2 |
| 75 mm | - | 100 |
| 50 mm | - | - |
| 37.5 mm | - | - |
| 25 mm | 100 | - |
| 19 mm | 75-100 | - |
| 12.5 mm | - | - |

| Sieve Designation | % Passing | |
|-------------------|-----------|--------|
| | Type 1 | Type 2 |
| 9.5 mm | 50-100 | - |
| 4.75 mm | 30-70 | 22-85 |
| 2.00 mm | 20-45 | - |
| 0.425 mm | 10-25 | 5-30 |
| 0.180 mm | - | - |
| 0.075 mm | 3-8 | 0-10 |

- .2 Type 3 fill: selected material from excavation or other sources, approved by the Contract Administrator for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.

Part 3 Execution

3.1 SITE PREPARATION

- .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated, if applicable.

3.2 PREPARATION/PROTECTION

- .1 Keep excavations clean, free of standing water, and loose soil.
- .2 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Engineer's approval.
- .3 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage. Protect buried services that are required to remain undisturbed.

3.3 STOCKPILING

- .1 Stockpile fill materials in areas designated by the Engineer.
- .1 Stockpile granular materials in manner to prevent segregation.
- .2 Protect fill materials from contamination.

3.4 EXCAVATION

- .1 Excavate to lines, grades, elevations and dimensions as directed by the Contract Administrator.
- .2 Remove concrete, masonry, rubble, and other obstructions encountered during excavation in accordance with Section X – Debris Removal.
- .3 Excavation must not interfere with bearing capacity of adjacent foundations.
- .4 Do not disturb soil within branch spread of trees or shrubs that are to remain.
- .1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.

- .5 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by the Contract Administrator.
- .6 Restrict vehicle operations directly adjacent to open trenches.
- .7 Dispose of contaminated soil in accordance with Section 02066 – Contaminated Soils.
- .8 Do not obstruct flow of surface drainage or natural watercourses.
- .9 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .10 Notify Contract Administrator when bottom of excavation is reached.
- .11 Obtain Contract Administrator approval of completed excavation.

3.5 BACKFILLING

- .1 For backfilling operations, use compaction equipment capable of obtaining required densities in materials on project.
- .2 Do not proceed with backfilling operations until Engineer has inspected and approved excavation.
- .3 Areas to be backfilled are to be free from debris, snow, ice and water.
- .4 Commence backfilling of excavated soil areas within 3 days of receipt of confirmatory sampling results indicating no further excavation in the area is required. Costs for any extra work caused as a result of leaving excavations open longer will be the responsibility of the Contractor.
- .5 Place specified backfill material in uniform horizontal layers in depths as indicated in this Section up to grades indicated. Layers should be laid in 0.6 m lifts and compacted to 95% Standard Proctor Density. The top layer is to be compacted to 98%.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 An abridged version of methods and procedures for demolition of structures, parts of structures, basements and foundation walls, including abandonment and removal of septic tanks and tanks containing petroleum products.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.

1.3 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA S350-M1980(R1998), Code of Practice for Safety in Demolition of Structures.

1.4 SUBMITTALS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Before proceeding with demolition of load bearing walls or of other walls and where required by authority having jurisdiction submit for review by Contract Administrator shoring and underpinning drawings prepared by qualified professional engineer registered or licensed in the Province of Manitoba in Canada showing proposed method.

1.5 SITE CONDITIONS

- .1 Review designated substance report and take precautions to protect environment.
- .2 Should material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous be encountered, stop work, take preventative measures, and notify Contract Administrator immediately.
 - .1 Do not proceed until written instructions have been received from Contract Administrator.
- .3 Notify Contract Administrator before disrupting building access or services.

Part 2 Products

2.1 NOT USED

- .1 Not used.

Part 3 Execution

3.1 PROTECTION

- .1 Prevent movement, settlement, or damage to adjacent structures, utilities, and parts of building to remain in place. Provide bracing and shoring required.
- .2 Keep noise, dust, and inconvenience to occupants to minimum.
- .3 Protect building systems, services and equipment.
- .4 Provide temporary dust screens, covers, railings, supports and other protection as required.

3.2 DEMOLITION SALVAGE AND DISPOSAL

- .1 Remove parts of existing building to permit new construction. Sort materials into appropriate piles for reuse and recycling .
- .2 Refer to drawings and specifications for items to be salvaged for reuse.
- .3 Remove items to be reused, store as directed by Contract Administrator and re-install under appropriate section of specification.
- .4 Trim edges of partially demolished building elements to tolerances as defined by Contract Administrator.
- .5 Dispose of removed materials, to appropriate recycling facilities reuse facilities except where specified otherwise, in accordance with authority having jurisdiction.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Export and Import of Hazardous Waste Regulations SOR/2002-300.
- .2 National Fire Code of Canada 2005.
- .3 Transportation of Dangerous Goods Act (TDG Act) 1999, (c. 34).
- .4 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2003-400).

1.2 DEFINITIONS

- .1 Dangerous Goods: product, substance, or organism that is specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.
- .2 Hazardous Material: product, substance, or organism that is used for its original purpose; and that is either dangerous goods or a material that may cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into the environment.
- .3 Hazardous Waste: any hazardous material that is no longer used for its original purpose and that is intended for recycling, treatment or disposal.
- .4 Workplace Hazardous Materials Information System (WHMIS): a Canada-wide system designed to give employers and workers information about hazardous materials used in workplace. Under WHMIS, information on hazardous materials is provided on container labels, material safety data sheets (MSDS), and worker education programs. WHMIS is put into effect by combination of federal and provincial laws.

1.3 SUBMITTALS

- .1 Submit product data in accordance with Section 013300 - Submittal Procedures.
- .2 Submit to Contract Administrator current Material Safety Data Sheet (MSDS) for each hazardous material required prior to bringing hazardous material on site.
- .3 Submit hazardous materials management plan to Contract Administrator that identifies hazardous materials, their use, their location, personal protective equipment requirements, and disposal arrangements.

1.4 STORAGE AND HANDLING

- .1 Co-ordinate storage of hazardous materials with Contract Administrator and abide by internal requirements for labelling and storage of materials and wastes.
- .2 Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.

- .3 Store and handle flammable and combustible materials in accordance with current National Fire Code of Canada requirements.
- .4 Keep no more than 45 litres of flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use.
 - .1 Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval.
 - .2 Storage of quantities of flammable and combustible liquids exceeding 45litres for work purposes requires the written approval of the Contract Administrator.
- .5 Transfer of flammable and combustible liquids is prohibited within buildings.
- .6 Do not transfer of flammable and combustible liquids in vicinity of open flames or heat-producing devices.
- .7 Do not use flammable liquids having flash point below 38 degrees C, such as naphtha or gasoline as solvents or cleaning agents.
- .8 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to minimum.
- .9 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.
- .10 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:
 - .1 Store hazardous materials and wastes in closed and sealed containers.
 - .2 Label containers of hazardous materials and wastes in accordance with WHMIS.
 - .3 Store hazardous materials and wastes in containers compatible with that material or waste.
 - .4 Segregate incompatible materials and wastes.
 - .5 Ensure that different hazardous materials or hazardous wastes are not mixed.
 - .6 Store hazardous materials and wastes in secure storage area with controlled access.
 - .7 Maintain clear egress from storage area.
 - .8 Store hazardous materials and wastes in location that will prevent them from spilling into environment.
 - .9 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.
 - .10 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.
- .11 Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements. Report spills or accidents immediately to Contract Administrator. Submit a written spill report to Contract Administrator within 24 hours of incident.

1.5 TRANSPORTATION

- .1 Transport hazardous materials and wastes in accordance with federal Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.
- .2 If exporting hazardous waste to another country, ensure compliance with federal Export and Import of Hazardous Waste Regulations.
- .3 If hazardous waste is generated on site:
 - .1 Co-ordinate transportation and disposal with Contract Administrator.
 - .2 Ensure compliance with applicable federal, provincial and municipal laws and regulations for generators of hazardous waste.
 - .3 Use licensed carrier authorized by provincial authorities to accept subject material.
 - .4 Prior to shipping material obtain written notice from intended hazardous waste treatment or disposal facility that it will accept material and that it is licensed to accept this material.
 - .5 Label containers with legible, visible safety marks as prescribed by federal and provincial regulations.
 - .6 Ensure that trained personnel handle, offer for transport, or transport dangerous goods.
 - .7 Provide photocopy of shipping documents and waste manifests to Contract Administrator.
 - .8 Track receipt of completed manifest from consignee after shipping dangerous goods. Provide a photocopy of completed manifest to Contract Administrator.
 - .9 Report discharge, emission, or escape of hazardous materials immediately to Contract Administrator and appropriate provincial authority. Take reasonable measures to control release.

Part 2 Products

2.1 MATERIALS

- .1 Only bring on site quantity of hazardous materials required to perform work.
- .2 Maintain MSDSs in proximity to where materials are being used. Communicate this location to personnel who may have contact with hazardous materials.

Part 3 Execution

3.1 DISPOSAL

- .1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.

- .2 Recycle hazardous wastes for which there is approved, cost effective recycling process available.
- .3 Send hazardous wastes to authorized hazardous waste disposal or treatment facilities.
- .4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.
- .5 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.
- .6 Dispose of hazardous wastes in timely fashion in accordance with applicable provincial regulations.
- .7 Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.
- .8 Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:
 - .1 Hazardous wastes recycled in manner constituting disposal.
 - .2 Hazardous waste burned for energy recovery.
 - .3 Lead-acid battery recycling.
 - .4 Hazardous wastes with economically recoverable precious metals.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Materials and procedures for the removal of underground storage tanks.

1.2 RELATED SECTIONS

- .1 Section 02066 – Contaminated Soils.
- .2 Section 02209 - Excavating, Trenching and Backfilling.

1.3 REFERENCES

- .1 Canadian Council of Ministers of the Environment (CCME).
 - .1 CCME PN1326-2003, Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum Products and Allied Petroleum Products.
 - .2 CCME PN1299-1999, Canadian Environmental Quality Guidelines.
 - .1 Chapter 7-Updated 2007, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health.
- .2 Canadian Federal Legislation
 - .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
 - .1 Section 53 Technical CEPA Guidelines for Underground Storage Tank Systems Containing Petroleum Products and Allied Petroleum Products 1995.
 - .2 Canadian Environmental Assessment Act (CEAA), 1992, c. 37.
 - .3 Canada Labour Code (R.S. 1985, c. L-2).
 - .1 Part II (Updated June 2006) - Occupational Health and Safety.
 - .4 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.
- .3 Underwriters' Laboratories of Canada (ULC).
 - .1 ULC-S603-2000, Underground Steel Tanks.
 - .2 ULC-S615-1998, Underground Reinforced Plastic Tanks.

1.4 SUBMITTALS

- .1 Submit written tank description in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide written description of tank, its former contents, location and reason for removal.
- .3 Provide the Contract Administrator and Regulator (Manitoba Conservation) with copy of vapour removal test results.

- .4 Forward affidavit of destruction of underground storage tanks to the Contract Administrator and Regulator.

1.5 QUALITY ASSURANCE

- .1 Contractor must be licensed/certified by Manitoba Conservation for removal of underground storage tanks.
 - .1 License/certificate, title and number must accompany the bid submission.
 - .2 Regulatory Requirements: Ensure Work is performed in compliance with CEPA, CEAA, TDGA and applicable Provincial regulations.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Segregate and deliver non-salvageable or non-recyclable materials, including waste liquids and sludges to a Provincially licensed waste facility.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 PREPARATION SAFETY AND SECURITY

- .1 Conform to or exceed Federal, Provincial and Territorial codes, local municipal by-laws, by-laws, and codes and regulations of utility authorities having jurisdiction.
- .2 Comply with occupational health and safety in accordance with Section 01 35 30 - Health and Safety Requirements.
- .3 Protection.
 - .1 Meet safety requirements of Occupational Safety and Health, Canada Labour Code Part II and Regulations for Construction Projects.
 - .2 Disconnect or remove source of ignition from vicinity of tank.
 - .3 Provide temporary protection for safe movement of personnel and vehicle traffic.
 - .4 Cut, braze or weld metal only in monitored areas established to be free of ignitable vapour concentrations.
 - .5 Ground and bond metal equipment, including tanks and transfer pipes, before operating equipment or transferring flammable materials.
 - .6 Use non-sparking tools and intrinsically safe electrical equipment.
 - .7 On-site smoking is not permitted at any time.

3.2 DRAINING

- .1 Drain and flush piping into tank.

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- .2 Pump out liquid from tank
 - .1 Use explosion proof, air driven or hand pump.
- .3 Remove sludge from tank bottom.
 - .1 Dispose of product and sludge in accordance with local, and Provincial regulations using waste disposal carrier licensed by Manitoba Conservation.

3.3 EXCAVATION TRENCHING AND BACKFILL

- .1 Do work in accordance with Section 31 23 10 - Excavation, Trenching and Backfilling.
- .2 Provide protective material around excavation.
- .3 Provide constant supervision during excavation and backfilling.
- .4 Excavation.
 - .1 Excavate until top of tank and connections and openings are exposed. The Contractor shall contact the Contract Administrator for an inspection immediately after the tank is exposed.
 - .2 Disconnect piping.
 - .1 Remove fill tube.
 - .2 Disconnect fill gauge, product and vent lines.
 - .3 Cap or plug open ends of lines that are not to be used further.
 - .4 Remove piping from ground.
 - .3 Temporarily plug tank openings.
 - .4 Continue excavation until tank is completely exposed.
 - .5 Temporarily stockpile on site soil in vicinity of tank, until waste classification can be established by the Contract Administrator prior to final disposal.

3.4 TANK REMOVAL

- .1 Remove tank in accordance with CCME Code of Practice PN1326 and place in secure location.
- .2 Block tank to prevent movement.
- .3 Contact Contract Administrator immediately if there is evidence of contamination in tank excavation, stop Work until further notice.
- .4 Remove and replace contaminated soil and accumulated flammable or combustible liquid with clean fill common to local area in accordance with Section 31 23 10 - Excavating, Trenching and Backfilling and Section 02066 – Contaminated Soils.

3.5 VAPOUR REMOVAL

- .1 Purging:
 - .1 Purge vapours to less than 10% of lower explosive limit (LEL).
 - .2 Verify with combustible gas metre.

- .2 Inverting:
 - .1 Displace oxygen to levels below necessary to sustain combustion.
 - .2 Verify with combustible gas metre.
- .3 Water Method:
 - .1 Fill tank with water to expel vapours.
 - .2 Remove and dispose of contaminated water in accordance with regulations after tank is removed from site.
 - .3 Verify with combustible gas metre.
- .4 Dry Ice Method:
 - .1 Add 1.85 gm of solid carbon dioxide (dry ice) for each 100 litre capacity.
 - .2 Crush and distribute ice evenly over greatest area to secure rapid evaporation. Avoid skin contact.
 - .3 Verify dry ice has vapourized.
- .5 Air Method:
 - .1 Ventilate tank with air using small gas exhauster operated with compressed air.
 - .2 Air to enter opening at one end and to exit opening at other end to quickly remove vapour.
 - .3 Test interior of tank to determine when tank is free of vapour.

3.6 CAPPING

- .1 Plug or cap holes after tank has been freed of vapours and before tank is moved from site.
 - .1 Leave vents open.
- .2 Plug corrosion leak holes using screwed (boiler) plugs.
- .3 Leave a 3 mm vent hole in one plug to prevent tank from being subjected to excessive pressure differential caused by extreme temperature change.

3.7 SECURING AND REMOVAL FROM SITE

- .1 Check vapour levels prior to transport.
 - .1 Remove vapour if required.
- .2 Dispose of tank in accordance with local, Provincial, and Federal regulations.
- .3 Truck removal.
 - .1 Secure tank on truck for transport to disposal site.
 - .2 Cut suitable openings in tank sides to render tank unusable.
 - .3 Ensure 3 mm vent hole located at uppermost point on tank.

3.8 SITE REMEDIATION

- .1 To CCME-PN 1299 and according to Section 02066 – Contaminated Soils.

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- .2 Repair/replace finish grade to match surrounding area.

3.9 WORKMANSHIP AND DISPOSAL

- .1 Tanks destined for disposal.
 - .1 Dismantle, cut sufficient openings or otherwise render unusable.
 - .2 Tanks for reuse.
 - .1 Refurbish to: ULC-S603 and ULC-S615.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Removal as specified of spray or trowel-applied asbestos-containing material located as indicated except where removal is considered impracticable by Contract Administrator.
- .2 Removal (other than defined minor amounts) of friable materials containing asbestos.
- .3 Removal of amosite or crocidolite asbestos-containing materials.
- .4 Use of power tools that are fitted with dust collectors equipped with HEPA filter to cut, shape, grind, drill, scrape, or abrade manufactured products containing asbestos.

1.2 RELATED SECTIONS

- .1 City of Winnipeg CW 1110 – General Instructions.

1.3 REFERENCES

- .1 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-1.205-94, Sealer for Application to Asbestos-Fibre-Releasing Materials.
- .2 Canadian Standards Association (CSA International).
- .3 Department of Justice Canada.
 - .1 Canadian Environmental Protection Act (CEPA), 1999.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .1 Material Safety Data Sheets (MSDS).
- .5 Transport Canada (TC).
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).
- .6 Underwriters' Laboratories of Canada (ULC).
- .7 U.S. Department of Health and Human Services/Centers for Disease Control and Prevention (CDC)/National Institute for Occupational Safety and Health (NIOSH).
 - .1 NIOSH 94-113-August 1994, NIOSH Manual of Analytical Methods (NMAM), 4th Edition.
- .8 U.S. Department of Labour - Occupational Safety and Health Administration - Toxic and Hazardous Substances.
 - .1 29 CFR 1910.1001-2001, Asbestos Regulations.

1.4 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 wetting of fibres.
- .3 Asbestos-Containing Materials (ACMs): materials identified under Existing Conditions Article, including fallen materials and settled dust.
- .4 Asbestos Work Area: Area where actual removal and sealing and enclosure of spray or trowel-applied asbestos-containing materials takes place.
- .5 Authorized Visitors: Contract Administrator, or designated representatives, and representatives of regulatory agencies.
- .6 Friable Material: material that when dry can be crumbled, pulverized or powdered by hand pressure and includes such material that is crumbled, pulverized or powdered.
- .7 Occupied Area: any area of building or work site that is outside Asbestos Work Area.
- .8 Polyethylene sheeting sealed with tape: Polyethylene sheeting of type and thickness specified sealed with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide continuous polyethylene membrane to protect underlying surfaces from water damage or damage by sealants, and to prevent escape of asbestos fibres through sheeting into clean area.
- .9 Glove Bag: prefabricated glove bag as follows:
 - .1 Minimum thickness 0.25 mm polyvinyl-chloride bag.
 - .2 Integral 0.25 mm thick polyvinyl-chloride gloves and elastic ports.
 - .3 Equipped with reversible double-pull double throw zipper on top.
 - .4 Straps for sealing ends around pipe.
 - .5 Must incorporate internal closure strip if it is to be moved or used in more than one specific location.
- .10 DOP Test: testing method used to determine integrity of Negative Pressure unit using dioctyl phthalate (DOP) HEPA-filter leak test.
- .11 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must be appropriate capacity for scope of work.
- .12 Negative pressure: system that extracts air directly from work area, filters such extracted air through High Efficiency Particulate Air filtering system, and discharges this air directly outside work area to exterior of building.
 - .1 System to maintain minimum pressure differential of 5 Pa relative to adjacent areas outside of work areas, be equipped with alarm to warn of system breakdown, and be equipped with instrument to continuously monitor and automatically record pressure differences.

- .13 Airlock: system for permitting ingress or egress without permitting air movement between contaminated area and uncontaminated area, typically consisting of two curtained doorways at least 2 m apart.
- .14 Curtained doorway: arrangement of closures to allow ingress and egress from one room to another while permitting minimal air movement between rooms, typically constructed as follows:
 - .1 Place two overlapping sheets of polyethylene over existing or temporarily framed doorway, secure each along top of doorway, secure vertical edge of one sheet along one vertical side of doorway, and secure vertical edge of other sheet along opposite vertical side of doorway.
 - .2 Reinforce free edges of polyethylene with duct tape and weight bottom edge to ensure proper closing.
 - .3 Overlap each polyethylene sheet at openings not less than 1.5 m on each side.

1.5 SUBMITTALS

- .1 Before beginning work:
 - .1 Obtain from appropriate agency and submit to Contract Administrator 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 Contract Administrator that suitable arrangements have been made to receive and properly dispose of asbestos waste.
 - .2 Submit proof satisfactory to Contract Administrator that employees have had instruction on hazards of asbestos exposure, respirator use, dress, use of showers, entry and exit from work areas, and aspects of work procedures and protective measures. Ensure supervisory personnel have attended asbestos abatement course, of not less than two days duration, approved by Contract Administrator. Submit proof of attendance in form of certificate. Minimum of one Supervisor for every ten workers.
 - .3 Submit layout of proposed enclosures and decontamination facilities to Contract Administrator for review.
 - .4 Submit documentation including test results for sealer proposed for use.
 - .5 Submit Provincial/Territorial and/or local requirements for Notice of Project Form.
 - .6 Submit proof of Contractor's Asbestos Liability Insurance.
 - .7 Submit proof satisfactory to Contract Administrator 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.

1.6 QUALITY ASSURANCE

- .1 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.
- .2 Health and Safety:
 - .1 Safety Requirements: worker and visitor protection.
 - .1 Protective equipment and clothing to be worn by workers while in Asbestos Work Area includes:
 - .1 Respirator equipped with HEPA filter cartridges or supplied-air type, personally issued to worker and marked as to efficiency and purpose, and acceptable to Authority having jurisdiction as suitable for type of asbestos and level of asbestos exposure in Asbestos 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.
 - .2 Disposable-type protective clothing that does not readily retain or permit penetration of asbestos fibres, consisting of full-body covering including head covering with snug-fitting cuffs at wrists, ankles, and neck.
 - .2 Requirements for each worker:
 - .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 Asbestos Work Area. Store street clothes, uncontaminated footwear, towels, and similar uncontaminated articles in clean change room.
 - .2 Remove gross contamination from clothing before leaving work area then proceed to Equipment and Access Room and remove 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 showers. Using soap and water wash body and hair thoroughly. Clean outside of respirator with soap and water while showering; remove respirator; remove filters and wet them and dispose of filters in container provided for purpose; and wash and rinse inside of respirator. When not in use in 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 After showering and drying off, proceed to clean change room and dress in street clothes at end of each day's work, or in clean coveralls before eating, smoking, or drinking. If re-entering work area, follow procedures outlined in paragraphs above.

- .4 Enter unloading room from outside dressed in clean coveralls to remove waste containers and equipment from Holding Room of Container and Equipment Decontamination Enclosure system. Workers must not use this system as means to leave or enter work area.
- .3 Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Area.
- .4 Ensure workers are fully protected with respirators and protective clothing during preparation of system of enclosures prior to commencing actual asbestos abatement.
- .5 Provide and post in Clean Change Room and in Equipment and Access Room the procedures described in this Section, in both official languages.
- .6 Ensure that no person required to enter an Asbestos Work Area has facial hair that affects seal between respirator and face.
- .7 Visitor Protection:
 - .1 Provide protective clothing and approved respirators to Authorized Visitors to work areas.
 - .2 Instruct Authorized Visitors in the use of protective clothing, respirators and procedures.
 - .3 Instruct Authorized Visitors in proper procedures to be followed in entering into and exiting from Asbestos Work Area.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Place materials defined as hazardous or toxic in designated containers.
- .2 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- .3 Disposal of asbestos waste generated by removal activities must comply with Federal, Provincial, Territorial and Municipal regulations. Dispose of asbestos waste in sealed double thickness 6 ml bags or leak proof drums. Label containers with appropriate warning labels.
- .4 Provide manifests describing and listing waste created. Transport containers by approved means to licenced landfill for burial.

1.8 SCHEDULING

- .1 Not later than ten (10) days before beginning Work on this Project notify following in writing:
 - .1 Provincial/Territorial, Department of Labour.
 - .2 Disposal Authority.
- .2 Inform sub-trades of presence of friable asbestos-containing materials identified in Existing Conditions.
- .3 Submit to Contract Administrator copy of notifications prior to start of Work.

1.9 OWNER'S INSTRUCTIONS

- .1 Before beginning Work, provide to Contract Administrator 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.
- .2 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.
- .3 Instruction and training must be provided by competent, qualified person.
- .4 Supervisory personnel to complete required training.

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: fibreglass - 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 Contract Administrator, mixed with water in 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.
 - .1 Label containers in accordance with Asbestos Regulations 29 CFR 1910.1001. Label in both official languages.
- .6 Encapsulants : Type 2 surface film forming, Type 1 penetrating, type Class A water based conforming to CAN/CGSB-1.205 and approved by the Fire Commissioner of Canada having following characteristics:
- .7 Glove bag: acceptable materials include safe-T-strip products in configuration suitable for Work, or alternative material approved in accordance with B6.
 - .1 Equip glove bags intended for use in more than one location with reversible, double-pull, double-throw zipper on top and at approximately mid-section of bag.

- .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 fibres.
 - .1 Sealer: 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 and isolate air handling and ventilation systems to prevent fibre dispersal to other building areas during work phase. Conduct smoke tests to ensure that duct work is airtight. Seal and caulk joints and seams of active return air ducts within Asbestos Work Area.
 - .2 Clean proposed work areas using, where practicable, HEPA vacuum cleaning equipment. If not practicable, use wet cleaning method. Do not use methods that raise dust, such as dry sweeping, or vacuuming using other than HEPA vacuum equipment.
 - .3 Put negative pressure system in operation and operate continuously from time first polyethylene is installed to seal openings until final completion of work including final cleanup. Provide continuous monitoring of pressure difference using automatic recording instrument.
 - .4 Seal off openings such as corridors, doorways, windows, skylights, ducts, grilles, and diffusers, with polyethylene sheeting sealed with tape.
 - .5 Cover floor and wall surfaces with polyethylene sheeting sealed with tape. Use one 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.
 - .6 Build airlocks at entrances to and exits from work areas so that work areas are always closed off by one curtained doorway when workers enter or exit.
 - .7 At each access to work areas install warning signs in both official languages in upper case "Helvetica Medium" letters reading as follows where number in parentheses indicates font size to be used : "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)".
 - .8 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 Contract Administrator. Use localized water spraying during fixture removal to reduce fibre dispersal.
 - .9 Maintain emergency and fire exits from work areas, or establish alternative exits satisfactory to Authority having jurisdiction.
 - .10 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.

- .2 Worker Decontamination Enclosure System:
 - .1 Worker Decontamination Enclosure System includes Equipment and Access Room, Shower Room, and Clean Room, as follows:
 - .1 Equipment and Access Room: build Equipment and Access Room between Shower Room and work areas, with two curtained doorways, one to Shower Room and one to work areas. Install portable toilet, waste receptor, and storage facilities for workers' shoes and protective clothing to be reworn in work areas. Build Equipment and Access Room large enough to accommodate specified facilities, other equipment needed, and at least one worker allowing him /her sufficient space to undress comfortably.
 - .2 Shower Room: build Shower Room between Clean Room and Equipment and Access Room, with two curtained doorways, one to Clean Room and one to Equipment and Access Room. Provide one shower for every five workers. Provide constant supply of hot and cold or warm water. Cold water source is available from internal storage tank (capacity to be confirmed as adequate by Contractor). Provide piping and connect to water sources and drains. Pump waste water through 5 micrometre filter system acceptable to Contract Administrator before directing into drains. Provide soap, clean towels, and appropriate containers for disposal of used respirator filters.
 - .3 Clean Room: build Clean Room between 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 and hooks for workers' street clothes and personal belongings. Provide storage for clean protective clothing and respiratory equipment. Install mirror to permit workers to fit respiratory equipment properly.
- .3 Container and Equipment Decontamination Enclosure System:
 - .1 Container and Equipment Decontamination Enclosure System consists of Staging Area within work area, Washroom, Holding Room, and Unloading Room. Purpose of system is to provide means to decontaminate waste containers, scaffolding, waste and material containers, vacuum and spray equipment, and other tools and equipment for which Worker Decontamination Enclosure System is not suitable.
 - .1 Staging Area: designate Staging Area in 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. Equip Staging Area with curtained doorway to Washroom.
 - .2 Washroom: build Washroom between Staging Area and Holding Room with two curtained doorways, one to Staging Area and one to 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 Holding Room between Washroom and Unloading Room, with two curtained doorways, one to Washroom and one to Unloading Room. Build Holding Room sized to accommodate at least two waste containers and largest item of equipment used.
- .4 Unloading Room: build Unloading Room between Holding Room and outside, with two curtained doorways, one to Holding Room and one to outside.
- .4 Construction of Decontamination Enclosures:
 - .1 Build suitable framing for enclosures or use existing rooms where convenient, and line with polyethylene sheeting sealed with tape. Use one 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 doorway, one of two closures comprising doorway always remains closed.
- .5 Separation of Work Areas from Occupied Areas:
 - .1 Separate parts of building required to remain in use from parts of building used for asbestos abatement by means of 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 joints between plywood sheets and between plywood and adjacent materials with surface film forming type sealer, to create 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 polyethylene linings are effectively sealed and taped. Repair damaged barriers and remedy defects immediately upon discovery.
 - .3 Visually inspect enclosures at beginning of each working period.
 - .4 Use smoke methods to test effectiveness of barriers when directed by Contract Administrator.
- .7 Do not begin Asbestos Abatement work 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 and decontamination enclosures and parts of 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 are displayed where access to contaminated areas is possible.
 - .7 Notifications have been completed and other preparatory steps have been taken.

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 Before removing asbestos:
 - .1 Prepare site.
 - .2 Spray asbestos material with water containing specified wetting agent, using airless spray equipment capable of providing "mist" application to prevent release of fibres. Saturate asbestos material sufficiently to wet it to substrate without causing excess dripping. Spray asbestos material repeatedly during work process to maintain saturation and to minimize asbestos fibre dispersion.
- .2 Remove saturated asbestos material in small sections. Do not allow saturated asbestos to dry out. As it is being removed pack 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 Holding Room by workers who have entered from uncontaminated areas dressed in clean coveralls.
- .4 After completion of stripping work, wire brushed and wet-sponged surfaces from which asbestos has been removed to remove visible material. During this work keep surfaces wet.
- .5 Where Contract Administrator 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 asphaltic coating, and provides written direction, encapsulate 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. Use different colour for each coat. Use colour for final coat.
- .6 After wire brushing and wet sponging to remove visible asbestos, and after encapsulating asbestos-containing material impossible to remove, wet clean entire work area including Equipment and Access Room, and equipment used in process. After 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.

3.4 ASBESTOS ENCAPSULATION

- .1 Before encapsulating asbestos:

- .1 Prepare site.
- .2 Vacuum surfaces in work areas except those to be sealed, using HEPA vacuum to remove loose debris and dust particles.
- .3 Repair damaged and missing areas of existing sprayed asbestos to obtain suitable base for sealing and to restore continuity of fireproofing. Use 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. Use different colour for each coat.
- .3 After sealing asbestos surfaces wet clean the entire work area including Equipment and Access Room, and equipment used in the process. After 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 second 24 hour period under 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 ENCAPSULÉ.

3.5 PIPE INSULATION REMOVAL USING GLOVE BAG

- .1 Place tools necessary to remove insulation in tool pouch. Wrap 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 garden reservoir type sprayer into bag through valve and wash down pipe and interior of bag thoroughly. Wet surface of insulation in lower section of bag.
- .4 When glove bags are intended for use at more than one location: after wash-down and application of sealer, seal off waste in lower section of bag using zipper at mid-section of bag. Remove air from top section of bag through elasticized valve using HEPA vacuum. Remove bag from pipe, reinstall in new location, and reseal to pipe prior to opening lower section of bag. Repeat stripping operation.

- .5 If bag is to be moved along pipe, first remove air from top section through elasticized valve using HEPA vacuum. Next 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. Remove air from top section through elasticized valve using HEPA vacuum. 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 residue. Remove 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.

3.6 FINAL CLEANUP

- .1 Following cleaning and when air sampling shows that asbestos levels on both sides of seals do not exceed 0.01 fibres/cc as determined by membrane filter method at 400-500X magnification phase contrast illumination, as described in NIOSH 94-113 or equivalent, proceed with final cleanup.
- .2 Remove polyethylene sheet by rolling it away from walls to centre of work area. Vacuum 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 Include in clean-up Work areas, Equipment and Access Room, Washroom, Shower Room, and other contaminated enclosures.
- .5 Include in clean-up sealed waste containers and equipment used in Work and remove from work areas, via Container and Equipment Decontamination Enclosure System, at appropriate time in cleaning sequence.
- .6 Conduct final check to ensure that no dust or debris remains on surfaces as result of dismantling operations and carry out air-monitoring again to ensure that asbestos levels in building do not exceed 0.01 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 to ensure that dumping is done in accordance with governing regulations.

3.7 RE-ESTABLISHMENT OF OBJECTS AND SYSTEMS

- .1 When cleanup is complete:
 - .1 Re-secure mounted objects removed in course of 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 Work, as directed by Contract Administrator.

3.8 AIR MONITORING

- .1 From beginning of Work until completion of cleaning operations, Contract Administrator to take air samples on daily basis outside of work area enclosure in accordance with Health Canada recommendations.
 - .1 Contractor will be responsible for monitoring inside enclosure in accordance with 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.
 - .1 If fibre 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.
 - .2 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.
- .3 During course of Work, Contract Administrator to measure fibre content of air outside work areas by means of fibrous aerosol monitors (FAM).
 - .1 When FAM readings exceed 0.25 f/cc adopt more stringent work procedures immediately and carry out PCM test.
 - .2 Stop Work when PCM measurements exceed 0.01 f/cc and correct procedures.
- .4 Final air monitoring to be conducted as follows: After Asbestos Work Area has passed visual inspection and acceptable coat of lock-down agent has been applied to surfaces within enclosure, and appropriate setting period has passed, Contract Administrator will perform air monitoring within Asbestos Work Area.
 - .1 Final air monitoring results must show fibre levels of less than 0.01 f/cc.
 - .2 If air monitoring results show fibre levels in excess of 0.01 f/cc, re-clean work area and apply another acceptable coat of lock-down agent to surfaces.
 - .3 Repeat as necessary until fibre levels are less than 0.01 f/cc.

3.9 INSPECTION

- .1 Perform inspection of Asbestos Work Area to confirm compliance with specification and governing authority requirements. Deviations from these requirements that have not been approved in writing by Contract Administrator may result in Work stoppage, at no cost to City.
- .2 Contract Administrator will 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 labour or materials required to provide specified performance level.
- .3 When asbestos leakage from Asbestos Work Area has occurred or is likely to occur Contract Administrator may order Work shutdown.
- .1 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

END OF SECTION