TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

TABLE OF CONTENTS

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 This section describes requirements applicable to all Sections of this Bid Opportunity.

1.2 COMPLEMENTARY DOCUMENTS

.1 Drawings, specifications, and schedules are complementary each to the other and what is called for by one to be binding as if called for by all. Should any discrepancy appear between documents leaves doubt as to the intent or meaning, abide by Precedence of Documents article below or obtain direction from the Contract Administrator.

.2 Examine all discipline drawings, specifications, and schedules and related documents to ensure that Work can be satisfactorily executed. Conflicts or additional work beyond Work described to be brought to attention of Contract Administrator.

1.3 PRECEDENCE OF DOCUMENTS

.1 In the event of conflict within and between the Contract documents, the order of priority within specifications and drawings are - from highest to lowest:

- .1 Agreement - Between the City of Winnipeg and Contractor,
- .2 Supplementary Conditions (if any),
- .3 General Conditions of the Contract,
- .4 Specifications:
  - .1 Sections of Divisions 01 to 33 of the specifications, and
  - .2 Specifications specifically indicated on drawings.
- .5 Schedules and keynotes:
  - .1 Schedules within the specifications, then
  - .2 Schedules on drawings.
- .6 Drawings:
  - .1 P&ID drawings, then
  - .2 Drawings of larger scale shall govern over those of smaller scale of the same date, then
  - .3 Dimensions shown on drawings shall govern over dimensions scaled from drawings, then
  - .4 Location of utility outlets indicated on architectural detail drawings takes precedence over positions or mounting heights located on mechanical or electrical drawings.
- .7 Later dated documents shall govern over earlier documents of the same type.

.2 In the event of conflict between documents, the decision of the Contract Administrator shall be final.

1.4 DESCRIPTION OF THE WORK

.1 The Work to be constructed under this Contract consists of the installation of a landfill gas collection system expansion at the Brady Road Resource Management Facility in Winnipeg, Manitoba. The Work generally includes but is not limited to: the drilling, installation and connection of fifteen (15) new dual-purpose vertical landfill gas extraction wells to the existing landfill gas flare system via a network of newly constructed and existing buried HDPE gas collection piping. The Work also includes the conversion of all existing single purpose wells to dual purpose, gravity drain traps, buried valve assemblies, retrofits to existing leachate manholes, as well as the supply and installation of a 60 HP compressed air system at the existing flaring compound.

.2 The successful Contractor will be the constructor for this project and shall be responsible for filing all required permits prior to initiating the Work.

.3 Division of the Work among subcontractors, suppliers or vendors is solely the Contractor's responsibility. The Contract Administrator assumes no responsibility to act as an arbiter to establish subcontract terms between sectors or disciplines of Work.

1.5 SUMMARY OF WORK INCLUDED

.1 In summary, the project comprises the following major Work activities. For detailed description of the Work, refer to the applicable specification section.

.1 Mobilization and startup.

.2 Development, implementation, and maintenance of a Site- Specific Health and Safety Plan.

.3 Provide construction layout as required.

.4 Provision and maintenance of construction facilities and temporary controls.

.5 The drilling and installation of fifteen (15) dual-purpose vertical landfill gas extraction wells, and connection to the existing collection system via a network of newly constructed header, lateral and sub-lateral piping.

.6 Installation and connection of five (5) monitoring wellheads for gas collection at manholes and future horizontals.

.7 Conversion of fifty-seven (57) existing single-purpose wells to dual-purpose.

.8 Supply and install compressed air and forcemain piping.

.9 Supply and installation of gravity drain traps.

.10 Supply and install flow control assemblies.

.11 Retrofits to existing manholes, including coring, sealing lids and leachate pump retrofits.

.12 Supply and installation of a 60 HP compressed air system within a weatherized enclosure at the flaring compound.

.13 Supply and installation of a reinforced concrete slab for the compressed air system.

.14 Supply and installation of disconnect switches, power and control wiring from the existing electrical container to the compressed air system.

.15 Pressure testing of all installed piping.

.16 Final cover repair at all locations affected by the Work of this Contract.

.17 Landscaping including topsoil, final grading, erosion control blankets and seeding to restore all locations to existing conditions.

.18 Demobilization and closeout.

.2 The Work provided under this Contract shall provide a fully operational, functioning landfill gas collection system and compressed air system, and be in full compliance with all applicable code and regulatory requirements.

1.6 DRAWINGS

.1 Drawing issued with and forming part of Contract documents are listed below:

City Drawing No.	*Comcor Drawing No.*	*Rev. No.*	*Date of Drawing or Latest Revision*	*Title*
1-0400A-G0005-001	W1001	3	March 17, 2020	Pre-Construction Site Conditions
1-0400A-G0006-001	W1002	3	March 17, 2020	Proposed System Layout
1-0400A-C0078-001	W1101	3	March 17, 2020	Plan & Profile – 450ø West Header
1-0400A-C0079-001	W1201	3	March 17, 2020	Plan & Profile – 250ø Lateral 8
1-0400A-C0080-001	W1202	3	March 17, 2020	Plan & Profiles – Horizontals
1-0400A-C0081-001	W1203	3	March 17, 2020	Plan & Profiles – Manholes
1-0400A-C0082-001	W1301	3	March 17, 2020	Trench & System Details
1-0400A-C0083-001	W1302	3	March 17, 2020	Manhole Retrofit Details
1-0400A-C0084-001	W1303	3	March 17, 2020	Gravity Drain Trap Details
1-0400A-C0085-001	W1304	3	March 17, 2020	New-Dual Purpose Wellhead Details
1-0400A-C0086-001	W1305	3	March 17, 2020	Existing Wellhead Dual-Purpose Retrofit Details
1-0400A-S0017-001	S6001	0	March 17, 2020	Structural Foundation Plan, Section & Detail
1-0400A-E0008-001	E8001	2	March 17, 2020	Compound Plan, Underground Power & Grounding
1-0400A-E0009-001	E8002	2	March 17, 2020	Power & Controls Connections – Electrical Container, Compressed Air Container

1.7 SITE LOCATION

.1 The construction is to be performed at the Brady Road Resource Management Facility located at 1901 Brady Road in Winnipeg, Manitoba.

1.8 CONTRACTOR USE OF SITE

.1 Access to the Site is available through the main entrance of the address provided in Article 1.7.1.

.2 Limit use of Site to allow:

.1 City of Winnipeg occupancy.

.2 Work by the City of Winnipeg.

.3 Work by other Contractors.

.4 Use of Site by the public.

.3 Construction Operations: Limited to area noted on the Contract drawings. Do not unreasonably encumber Site with plant, equipment, or materials. Do not obstruct vehicle passage, use or otherwise interfere with properties outside of Site unless otherwise specified.

.4 The landfill is open Monday to Friday from 6:00 AM to 6:00 PM and Saturday and Sunday from 9:00 AM to 5:00 PM. After hours, weekend and holiday work will require a minimum 72 hours advance written request. Requests for after hours, weekend and holiday work will be assessed by the Contract Administrator on an as-required basis.

.5 Co-ordination with Landfill Operations: Landfill operation must be maintained at all times throughout the execution of Work. The City of Winnipeg and its other Contractors will be using existing access roads common with Contractor. Arrange and perform all Work in such a manner as to minimize interference with Site operations.

.6 Co-ordination with the City of Winnipeg's Landfill Gas Extraction System: Arrange and perform all Work in such a manner as to minimize interference with the Site's landfill gas operations.

.7 Where necessary to interrupt existing services for connecting work, rerouting systems, or changing over to new arrangements, all related and preliminary work will be scheduled and completed in advance, except for necessary final connecting to ensure minimum shut down time.

.8 Advise Contract Administrator a minimum of seventy-two (72) hours in advance of a proposed shut down or interruption of services, utilities or access to any plant facility and do not proceed with such shutdown or interruption until authorization to proceed has been issued by the Contract Administrator in the form of a Work Permit in writing. No additional payment will be made for delays resulting from failure to issue the Work Permit within seventy-two (72) hours or modifications required to the proposed sequence of Work to accommodate plant operations.

.9 Co-ordinate all Work to ensure alternate access routes, points of entry, or service connections are not interrupted at a facility where more than one access route, point of entry or service connection exists.

.10 Construct all access roads, detour roads, or other temporary work as required to maintain operations. Obtain approval from Contract Administrator prior to use of such areas.

.11 When unfavorable weather, soil, drainage, or other unsuitable construction conditions exist, continue operations which will not be adversely affected by such conditions. Do not construct or cause to be constructed any portion of the Work under conditions which would adversely affect the quality of the Work, unless special means or precautions are taken to perform the Work in a proper manner, satisfactory to the Contract Administrator.

1.9 DOCUMENTS PROVIDED

.1 The Contract Administrator will supply the Contractor with:

.1 Two (2) paper sets of Contract documents for construction purposes.

.2 One (1) paper set for as-built purposes.

.3 One (1) digital copy of the Contract documents.

.2 The Contractor may print additional sets of Contract documents at their own cost.

.3 Onus is on Contractor to request any additional documents/information from the City that are deemed necessary by the Contractor to complete the Works, such a benchmarks and survey information.

1.10 SPECIFICATION GRAMMAR

.1 Specifications are written in the imperative mood, in an abbreviated form.

.2 The imperative language of all technical sections is directed to the Contractor:

.1 This form of statement requires the Contractor to perform such action or work or by one of their engaged subcontractors.

.2 Perform all requirements whether stated imperatively or otherwise.

1.11 WORK SEQUENCE

.1 Construct Work in phases to accommodate the City of Winnipeg's construction schedule requirements during the construction period.

.2 Coordinate progress schedule and operations with the Contract Administrator.

1.12 OWNER OCCUPANCY

.1 The City of Winnipeg will occupy premises during entire construction period for execution of normal operations.

.2 Cooperate with the City of Winnipeg in scheduling operations to minimize conflict and to facilitate City of Winnipeg's usage of Site.

.3 Maintain fire and life safety systems and public access to exits during all stages of the Work.

1.13 EXISTING SERVICES

.1 Notify the Contract Administrator and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, give the Contract Administrator, seventy-two (72) hours of notice for necessary interruption of mechanical or electrical service throughout course of the Work.

.1 Keep duration of interruptions minimal.

.2 Perform interruptions after normal working hours of occupants, preferably on weekends.

.3 Provide for personnel and vehicular traffic. Construct barriers as required.

END OF SECTION 01 11 00

TABLE OF CONTENTS

PART 1 GENERAL

1.1 GENERAL

.1 The Contractor shall be responsible for the complete Work and for co-ordination of all its Subcontractors and shall make certain all the Work is satisfactorily executed in accordance with the design and shall include Work of all subcontractors as follows:

.1 Scheduling of material and Work.

.2 Expediting of all materials including subcontractors.

.3 Correctness of all Work and workmanship.

.4 Inspection of all Work and deficiencies of all trades which shall be corrected before Contract Administrator's final inspection.

.5 Co-ordination of Work and of trades and arbitrating of disputes of subcontractors.

.2 Contractor shall provide all supervision, labour, materials, equipment and services necessary to complete the Work as specified in the Contract documents and shown on the drawings.

.3 Work includes accessories and/or apparatus which may not have been specifically mentioned in the Contract documents, but which are usual or necessary for the installation, operation or maintenance of the Work.

.4 Unless otherwise specified, the Contract documents are intended to include everything obviously requisite and necessary for the appropriate and entire finishing by each trade of every component part of the Work (whether each necessary item is mentioned herein or not) except such items as may be specifically designated to be supplied by others or by the City of Winnipeg.

.5 Attempts made to specify quantities and amount of material, equipment, etc. are summarized in Form B: Prices. Any item not so specified shall be supplied by the Contractor for the satisfactory completion of the Work.

.6 The responsibility as to which trade provides the required materials or articles and/or built-in articles, or executes cutting and patching rests solely with the Contractor.

.7 Ensure that materials and workmanship are new, and either meet or exceed the requirements of the Contract documents.

1.2 MOBILIZATION AND PROJECT STARTUP

.1 Do not mobilize to Site without the Contract Administrator's prior authorization.

.2 Perform planning and scheduling activities as required for the performance of the Work.

.3 Purchase materials and mobilize equipment, supplies, and incidentals to Site.

.4 Use the existing Site access roads to designated work areas during mobilization. Complete improvements to roads as required.

.5 Temporary construction facilities shall be located as directed by the Contract Administrator. No other areas shall be used by Contractor without Contract Administrator's prior approval. Provide additional land and access thereto not shown or described that may be required by Contractor for temporary construction facilities or storage of materials with no liability to the City of Winnipeg or Contract Administrator. Relocate construction equipment or other materials or equipment as required for the performance of the Work.

.6 Furnish submittals as required and described in these Specifications.

.7 Obtain permits required specifically for this Work.

.8 No separate payment will be made for mobilization and project startup.

1.3 SUPERINTENDENCE

.1 Provide all necessary superintendence during execution of Works. Employ and assign to the Work a competent and authorized representative satisfactory to the Contract Administrator herein referred to as the Superintendent and who shall be responsible for supervision, inspection, and direction of the Work and who shall be empowered to act on behalf of Contractor in all matters pertaining to the Contract. All instructions given to such representative by the Contract Administrator shall be binding as if given to Contractor. Instructions will be confirmed by Contract Administrator in writing upon request. The Superintendent shall be constantly on Works at Site and give his whole time to the superintendence of the same. Do not remove Superintendent for Works unless (a) the Contract Administrator requests removal, (b) the Superintendent ceases to be employed by Contractor, or (c) otherwise agreed by the Contract Administrator and Contractor. If double shift work is necessary at Site, provide an assistant Superintendent to take charge of the second shift.

.2 Within 5 days after receipt of letter of intent from the City of Winnipeg, furnish name of Superintendent, in writing, to Contract Administrator.

1.4 RELATED SECTIONS

.1 When related Sections are listed in individual Technical Specification Sections, other Sections of the Technical Specifications not referenced in the list of related Sections shall apply to the extent required for the proper performance of Works.

1.5 SPECIFICATION LANGUAGE

.1 The Technical Specifications are written in imperative mood and are in the abbreviated or streamlined form and include incomplete sentences. This imperative language is directed to "Contractor shall", "shall be", "a", "the", and "all" are

intentional. Omitted words or phrases shall be supplied by inference in the same manner as they are when a "Note" occurs on the Contract drawings.

1.6 COORDINATION

.1 Coordinate scheduling, submittals, and Work of the various sections of the Technical Specifications and other requirements of the Contract to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

.2 Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate Work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

.3 Coordinate space requirements and installation of mechanical and electrical Work, which are indicated diagrammatically on drawings. Follow routing shown for pipes, ducts, and conduits, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

.4 In finished areas conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

.5 Coordinate completion and cleanup of the Work of separate Sections in preparation for Substantial Performance.

.6 After Substantial Performance, coordinate access to Site with Contract Administrator for correction of defective Work and Work not in accordance with the Contract, to minimize disruption of the City of Winnipeg's Site activities.

.7 Coordinate delivery of material and equipment to Site with Work sequence; schedule deliveries to limit requirement for storage at Site to the practical minimum; limit on-Site storage of materials to areas approved by Contract Administrator.

.8 Coordinate interruptions of the existing landfill gas extraction and flaring system with the Contract Administrator in order to minimize duration of interruptions. Provide seventy-two (72) hours of notice to the Contract Administrator when interruptions to the extraction and flaring system will be required.

.9 Coordinate delivery of excess waste to tipping face with the Contract Administrator.

1.7 FIELD SURVEYING

.1 The Contractor will be responsible for establishing and maintaining reference benchmarks and base lines adjacent to Works.

.2 Verify location of survey control points prior to starting Work. Promptly notify Contract Administrator of any discrepancies discovered before starting Work.

.3 Locate, preserve, and protect survey control and reference points.

.4 Develop and make such additional detailed surveys as are needed for construction, such as slope stakes, batterboards, stakes for establishing the design elevations of excavation and final grades and other working points, lines, and elevations. Maintain benchmarks and base lines established or other existing property boundaries, line and grade hubs, and other references and construction or survey points.

.5 Contract Administrator may, at any time, check Contractor's survey and layout work but this shall not relieve Contractor of any of his responsibilities to carry out Works to the lines and grades as set out in accordance with drawings and Technical Specifications.

.6 Provide reasonable and necessary opportunities and facilities for setting points and making measurements during construction.

.7 Employ a competent surveyor to assist Contract Administrator, when required, in checking lines and elevation in Contractor's layout.

.8 Locate and protect survey control and reference points.

.9 Control datum for survey is that established by the City of Winnipeg's provided survey.

.10 Verify set-backs and easements, confirm drawing dimensions and elevations. Maintain a complete and accurate log of control and survey work as it progresses.

.11 Establish elevations, lines, and levels, utilizing recognized engineering survey practices.

.12 Prepare and maintain as-built drawings for the Work at all times for reference by the Contract Administrator. On a daily basis, transfer as-constructed information to the as-built drawings.

.13 Contract Administrator may request survey information (coordinates and elevations) from the Contractor, at the Contractor's expense, of any item installed under this Contract.

.14 Final as-built survey information to be provided to Contract Administrator shall include: coordinates of gas wells, flow control assemblies, gravity drain traps and any other appurtenances, as well as co-ordinates and elevations of landfill gas, compressed air and forcemain piping.

1.8 CODES AND REGULATIONS

.1 All Work shall conform to the latest editions of the following codes, acts, regulations and licenses:

.1 Manitoba Workplace Safety and Health Act and Regulations

.2 Manitoba Environment Act and Regulations
.3 Manitoba Environment Act License 3081R
.4 Manitoba Heritage Resource Act
.5 Manitoba Building code
.6 City Building Regulations and By-Laws
.7 The City of Winnipeg's Safety and Security Regulation
.8 Manitoba Electrical Code
.9 CAN/CGA B149.6 Code for Digester Gas and Landfill Gas Installations
.10 CAN/CSA B149.3 Code for the Filed Approval of Fuel-Related Components and Appliances and Equipment
.11 CAN/CSA B149.1 Natural Gas and Propane Installation Code
.12 Any other applicable codes, acts, regulations or licenses

.2 Equipment supplied shall be designed and supplied in accordance with latest versions of CAN/CGA-B149.6 and CAN/CSA-B149.3.

.3 Where there is a conflict between the Technical Specifications and/or Contract drawings and the above-noted codes; the codes, laws, rules and ordinances shall govern. In no instances, however, shall the standard established by the Technical Specification and Contract drawing be reduced by any of the codes referred to above.

1.9 PERMITS

.1 The Contractor will obtain and pay for the cost of a building permit for the air compressor container, if required.

.2 The Contractor shall obtain all other necessary permits as required, pay all fees for such permits, and shall include such charges in his Bid Submission.

1.10 PRECONSTRUCTION AND PROGRESS MEETINGS

.1 Contract Administrator may schedule and administer meetings prior to commencement of and throughout progress of Works at maximum bi- monthly intervals.

.2 Contract Administrator will make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.

.3 Attendance Required: Contractor's Superintendent, major Subcontractors and Suppliers, the City of Winnipeg and the Contract Administrator.

.4 Agenda:

.1 Review minutes of previous meetings.
.2 Review of work progress.
.3 Field observations, problems, and decisions.
.4 Identification of problems which impede planned progress.
.5 Review of submittals schedule and status of submittals.

.6 Review of off-site fabrication and delivery schedules.

.7 Review of health and safety concerns.

.8 Maintenance of progress schedule.

.9 Corrective measure to regain projected schedules.

.10 Planned progress during succeeding Work period.

.11 Coordination of projected progress.

.12 Maintenance of quality and Work standards.

.13 Effect of proposed changes on progress schedule and coordination.

.14 Other business relating to Works.

.5 Contract Administrator will record and distribute copies to participants and those affected by decisions made.

1.11 EXAMINATION

.1 Prior to commencement of Work at Site, inspect Site and Contract drawings with Contract Administrator to review and establish the condition of surface features including existing buildings, wells, trees and other plants, grassed areas, fencing, service poles, wires, paving and survey bench marks or monuments on or adjacent to Site which may be affected by Works. This inventory shall be mutually agreed between Contract Administrator and Contractor and shall not thereafter be subject to dispute. Such inventory as may be amended, from time to time, will be used by Contract Administrator to check compliance by Contractor with the requirements of Contract documents.

.2 Provide ongoing review, inspection, and attendance during performance of Works to properly document conditions. Promptly inform Contract Administrator of any existing condition at Site affected by Works, which may require restoration, repair, or replacement. Do not cover up any of Works without prior approval from Contract Administrator.

.3 Protect existing Site structures and facilities from damage, which may be affected by Works while work is in progress, and repair any damage resulting from Works to Contract Administrator's approval.

.4 Verify that existing Site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance by Contractor of existing conditions.

.5 Verify that existing substrate is capable of structural attachment of new Work being applied or attached.

.6 Examine and verify specific conditions described in individual specification Sections.

.7 Verify that utility services are available, of the correct characteristics, and in the correct location.

1.12 PREPARATION

.1 Clean substrate surfaces prior to applying next material or substance.

.2 Seal cracks or openings of substrate prior to applying next material or substance.

.3 Apply any manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contract or bond.

1.13 CUTTING AND PATCHING

.1 Prior to starting cutting and patching work, except as specified hereinafter, Contractor will obtain Contract Administrator approval as to the proposed cutting and patching techniques and mixes.

.2 All cutting of openings that are required for performance of Works will be the responsibility of Contractor.

.3 Remove all defective concrete out to sound concrete during cutting operations. If chipping is required, the edges will be perpendicular to the surface. Featured edges will not be permitted. Areas requiring patchings are to be filled with a non-shrink, non-metallic grout.

.4 All patching of openings will be the responsibility of Contractor and will be performed by a qualified tradesman to a condition as good as or better than the condition prior to commencement of the Works.

.5 All materials and equipment (including emergency equipment) necessary to expedite the tie-in will be on hand prior to the shutdown of existing services or utilities.

1.14 ENVIRONMENTAL PROTECTION

.1 Give prime consideration to protecting the environment during all stages of construction. Cooperate fully with the Contract Administrator, Site operating personnel, and local authorities to protect the natural environment.

.2 Inspectors from Manitoba Conservation and Climate (formerly Manitoba Sustainable Development) and other authorities having jurisdiction may take periodic visits to Site during construction. They have authority to order Contractor to stop work if in their opinion the Work is not being completed so as to ensure compliance with the environmental objectives.

.3 Limits of Site working area are shown on drawings. Confine operations within these limits unless written approval to conduct Work outside these limits is obtained from the Contract Administrator.

.4 Protect all existing trees and shrubs from damage. Protect foliage, branches, trunks and roofs from damage by equipment, workers or construction materials. Do not

permit encroachment of machinery within the drip line to prevent damage to roots, trunks, and foliage.

.5 Remove trees and shrubs only as directed by Contract Administrator or as specifically shown on the Contract drawings.

.6 Where damage does occur have damage repaired or replace tree damaged during construction by a qualified person approved by Contract Administrator.

.7 During performance of the Work meet all requirements of the Manitoba Heritage Resource Act.

.8 Halt Work immediately in area if any archaeological or historical resources found during performance of Works. Notify Ministry of Sport, Culture and Heritage for an assessment of discovery and do not resume Work in area until clearance is received form an archaeologist.

1.15 EXISTING UTILITIES/UNDERGROUND FACILITIES

.1 Locations of existing utilities and underground facilities are not indicated on the Contract drawings. Contract Administrator does not guarantee accuracy of completeness of this information. Other aboveground or underground facilities/utilities not shown on the Contract drawings may be encountered during the course of Works. The Contractor shall be fully responsible for:

.1 Reviewing, checking and independently verifying all such information and data;

.2 Locating all underground facilities and utilities that are shown or indicated in the Contract or that otherwise may interfere with or be affected by the Works;

.3 Coordination of the Works with the owners of such underground facilities, including the City of Winnipeg, during performance of the Works; and

.4 The safety and protection of all such utilities / underground facilities repairing any damage thereto resulting or arising, directly or indirectly, from the Works.

.2 Contractor shall comply with the requirements of occupancy permits and other requirements of the utilities involved.

.3 Owners of public utilities and franchises have the right to enter upon any street, road, right-of-way, or easement for the purpose of maintaining their property and for making necessary repairs or changes caused by the Works.

1.16 LANDFILL INFRASTRUCTURE/WELLS

.1 Existing landfill infrastructure, monitoring wells, observation wells, gas extraction wells and perimeter gas probes are located throughout Site in the approximate locations shown on Drawings. The Contractor is to check location of the wells in the field, and not hold the Contract Administrator or the City of Winnipeg responsible

for discrepancy in location or deletions from the Contract drawings. Maintain the wells in an undisturbed and undamaged condition at all times during performance of Works. Any well damaged by Contractor's activities will be repaired or replaced to the satisfaction of Contract Administrator at Contractor's cost.

1.17 RESTORATION

.1 As a minimum, restoration shall mean replacement, repairs, or reconstruction to a condition at least as good as or better than the condition prior to commencement of Works. Acceptance of the restoration of the damage to landfill infrastructure shall be conditional on the acceptance by the Contract Administrator.

.2 Except where specifically required otherwise by other Technical Specification Sections, restore areas of Works and areas affected by the performance of Works to conditions that existed prior to commencement of Works and to match condition of similar adjacent, undisturbed areas.

.3 Ensure that restored areas match existing grade and surface drainage characteristics, except as otherwise specified, and ensure a smooth transition from restored surfaces to existing surfaces.

.4 Do not alter original conditions without prior written approval from Contract Administrator.

.5 Without limiting the generality of the foregoing or other requirements of the Contract, preserve and protect any existing feature encountered at Site during the performance of Works including, but not limited to access, layout or landscaping, buildings, wells, structures, curbs and gutters, fences, pavement, manholes and catch basins, utilities, roads, grassed areas, and other graded or improved areas.

.6 Utilize construction methods and procedures during the performance of Works, which keeps disturbance, and damage of whatever nature to existing conditions to the minimum. Where Work necessitates root or branch cutting, do not proceed without Contract Administrator's prior approval.

.7 Ensure that quality, grades, elevations, and extent of bedding, cover, and other backfill materials including sub grades, finish grades, thickness of pavements for roadways, and parking areas are properly documented during their removal to ensure reconstruction to at least their original and functional condition.

.8 Restoration Material: New, except as otherwise specified, not damaged or defective and of the best quality for the purpose intended. Furnish evidence as to type, source, and quality of materials or products provided when requested by Contract Administrator or specified in other Technical Specification Sections.

.9 Should any dispute arise as to the quality or fitness of materials, whether obtained onsite or offsite, whether previously inspected by Contract Administrator prior to use

or not, the decision to use any material or product in the finished Works will rest solely with the Contract Administrator.

.10 Stockpile clean material not approved for reuse in an onsite area directed by Contract Administrator.

.11 Handle and store products and materials in a manner to prevent damage, adulteration, deterioration, and soiling and in accordance with manufacturer's instructions when applicable.

.12 Prior to commencement of restoration work, inform Contract Administrator of proposed material, methods, and procedures to repair, replace, or reconstruct any disturbed, damaged, or suspected damage to Works.

.13 Perform cutting, fitting, remedial, and coordination work to make the several parts of Works fit together.

.14 Except as specified otherwise, dismantle and salvage materials to reuse where practicable. Exercise due care when removing material for salvage. Repair or replace materials damaged through improper handling or through loss after removal.

.15 Store and protect removed material approved for reuse in approved locations.

END OF SECTION 01 15 00

TABLE OF CONTENTS

PART 1 GENERAL

1.1 MEASUREMENT AND PAYMENT

.1 Authority: Measurement methods delineated in the individual Technical Specification Sections complement the criteria of this Section. In the event of conflict, the requirements of the individual Section will govern.

.2 Contract Administrator will take measurements and compute quantities accordingly. Notify Contract Administrator sufficiently in advance of operations to permit required measurements for payment. Assist by providing necessary equipment, workers, and survey personnel as required. Provide reasonable and necessary opportunities and facilities in making measurements.

.3 Quantities: Quantities indicated in the Form B: Prices are for bidding and Contract purposes only and are approximate. Quantities and measurements supplied or placed in Works and verified by Contract Administrator determine payment.

.4 Measurement of quantities: As specified in individual Sections. Items stipulated to be paid on a lump sum price basis will not be measured for payment purposes.

.5 Payment for each item includes: Full compensation for all required labour, supervision, material, tools, equipment, plant, transportation, services, and incidentals; for completion of Works in complete accordance with Contract documents; erection, application, installation, or construction of an item of Works; overhead and profit; and all other miscellaneous items for which separate payment is not provided under other Items in Form B: Prices. All Works not specifically set forth as a separate Item in Form B: Prices shall be considered a subsidiary obligation of Contractor and all costs in connection therewith shall be included in the amounts and process stipulated in Form B: Prices. Contractor shall properly and fairly distribute indirect costs to each Item. Final payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities approved by Contract Administrator multiplied by the unit price stipulated in Form B: Prices.

.6 Defect assessment: Replace Works, or portions of Works, not conforming to specified requirements. If, in the opinion of Contract Administrator, it is not practical to remove and replace the defective Work, Contract Administrator will direct one of the following remedies:

.1 The defective Work may remain, but the price will be adjusted to a new price at the discretion of Contract Administrator.

.2 The defective Work will be partially repaired to the instructions of Contract Administrator, and the price will be adjusted to a new price at the discretion of Contract Administrator.

.7 Non-payment for rejected products: Payment will not be made for any of the following:

.1 Products wasted or disposed of in a manner that is not acceptable.

.2 Products determined as unacceptable before or after placement.

.3 Product not completely unloaded from the transporting vehicle.

.4 Products placed beyond the lines and levels of the required Works.

.5 Products remaining on hand after completion of Works.

.6 Loading, hauling and disposing of rejected products.

1.2 CHANGE PROCEDURES

.1 Field order: Contract Administrator will advise of minor changes in Works and issue supplemental instructions not involving an adjustment to Contract price or schedule as authorized by the Contract by issuing a Field Order. Promptly execute such minor changes and supplemental instructions.

.2 Revision notice: Contract Administrator may issue a request for quotation, which includes a detailed description of a proposed change with supplementary or revised drawings and Technical Specifications and schedule for executing the change in Works. Contractor shall prepare and submit a quotation within the due date stipulated in the request for quotation with sufficient data to allow evaluation by Contract Administrator. When requested by Contract Administrator, provide additional data to support computations:

.1 Quantities of products, labour, and equipment.

.2 Taxes, insurance, and bonds.

.3 Overhead and profit.

.4 Justification for any change in contract schedule.

.5 Credit for deletions from Contract, similarly documented.

.3 Work change directive: Contract Administrator may issue a directive on behalf of the City of Winnipeg instructing Contractor to proceed with a change in Works, for subsequent inclusion in a change order. Document will describe change in Works, and designate method of determining any change in Contract price or schedule. Promptly execute the change in Works.

.4 Change order: Based on the requirements of the request for quotation or the Work change directive and prepared as follows:

.1 Lump sum price change order will be executed on Contractor's fixed lump sum price quotation as approved by Contract Administrator.

.2 A unit price change order will be executed on a fixed unit price basis for pre-determined unit prices and quantities. For unit costs or quantities of units of Work which are not pre-determined, execute Works under a Work change directive.

.3 A time and material change order will be executed on time and material rates approved by Contract Administrator. Submit an itemized account and supporting data after completion of change, within time limits indicated in

the Contract. Contract Administrator will determine the change allowable in Contract price and schedule as provided in the Contract. Maintain detailed records of Work done on time and material basis in accordance with Contract documents. Provide full information required to substantiate costs for changes in Works.

.5 Contract Administrator will prepare and issue field orders, request for quotations, work change directives, and change orders, as required, for signatures of parties.

.6 When requested by Contract Administrator, support each claim for Work done on a time and material basis, with additional information:

.1 Origin and date of claim.

.2 Dates and times Work was performed, and by whom.

.3 Time records and wage rates paid.

.4 Invoices and receipts for products, equipment, and subcontracts, similarly documented.

.7 Promptly revise progress schedule to reflect any approved change in Contract schedule, revise sub-schedules to adjust times for other items of Work affected by the change, and resubmit.

.8 Promptly enter changes in as-built drawings.

END OF SECTION 01 20 00

TABLE OF CONTENTS

PART 1 GENERAL

1.1 GENERAL

.1 Requirements in this section are in addition to any specific requirements for submittals specified in other sections of these Contract Documents.

.2 Submittals to The City will be clearly marked with the project name and addressed to the Contract Administrator listed in D4.1.

.3 Submitted data will be fully sufficient in detail for determination of compliance with the Contract Documents.

.4 Review, acceptance, or approval of substitution, schedules, shop drawings, lists of materials, and procedures submitted or requested by the Contractor will not add to the Contract amount, and all additional costs which may result therefrom will be solely the obligation of the Contractor.

.5 No equipment or material for which listings, drawings, or descriptive material is required will be installed until The City has on hand copies of such approved lists and the appropriately stamped final shop drawings.

.6 The review of drawings by The City will be limited to general design requirements only, and will in no way relieve the Contractor from responsibility for errors or omissions contained therein.

.7 Submittals will be acted upon by The City as promptly as possible, and returned to the Contractor not later than the time allowed for review in Shop Drawing Submittal Procedure. Delays caused by the need for resubmittals will not constitute reason for an extension of Contract time.

1.2 SUBMITTAL SCHEDULE

.1 Submittals for the Works will be required prior to construction, during construction and on completion of construction.

.2 The Contractor will be required to provide the following submittals prior to or at the preconstruction meeting:

.1 Construction Schedule

.2 Site-Specific Health and Safety Plan

.3 The City will provide to the Contractor a detailed listing of submittals required during construction and on completion of construction.

1.3 CONSTRUCTION PROGRESS SCHEDULES

.1 Submit initial detailed construction schedule in duplicate within 5 days after receipt of the letter of intent and prior to commencing work at Site.

.2 Revise and resubmit as required.

.3 Submit revised schedules with each Payment Certificate, identifying changes since previous version.

.4 If Contractor believes it necessary or advantageous to change sequence of activities shown on Contractor's construction schedule, submit proposed revisions to Contract Administrator for approval. No change shall be made in the order in which work activities are being performed until Contract Administrator's written approval for the revised schedule has been obtained. The schedule will be acceptable to the Contract Administrator as providing an orderly progression of Works to completion within any specified dates in the Supplemental Conditions Schedule of Work, but such acceptance will neither impose on the Contract Administrator's responsibility for the sequencing, scheduling or progress of Works nor interfere with or relieve Contractor from Contractor's full responsibility thereof.

.5 Submit a chart with separate line for each item of work identified in Form B: Prices item of work identified in the individual specification Sections identifying first workday of each week.

.6 Show complete sequence of construction by activity, identifying work of separate stages and other logically grouped activities in accordance with the construction schedule issued by Contract Administrator and identified in the Supplemental Conditions Schedule of Work. Show coordination of interrelated work activities and items. Indicate the early and late start, early and late finish, float dates, and durations.

.7 Indicate estimated percentage of completion for each item of Works at each submission.

.8 Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by The City.

1.4 PROPOSED PRODUCTS LIST

.1 Within 15 days after receipt of the letter of intent and prior to products arrival on Site, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

.2 For products specified only by reference standards or description, give manufacturer, trade name, model or catalogue designation, and reference standards.

.3 For products requiring special handling procedures, submit Material Safety Data Sheet prior to products arrival on Site.

1.5 SHOP DRAWING SUBMITTAL PROCEDURE

.1 The Contractor will submit to shop drawings for review to The City in electronic PDF format, or another format accepted by the Contract Administrator. Shop drawings will be submitted in sufficient time to allow The City not less than 15 regular working days for examining the shop drawings.

.2 Shop drawing submittals for interdependent equipment will be coordinated by the Contractor such that The City will receive all of the Drawings in time to review the interconnection of the equipment as well as the individual elements.

.3 Shop Drawings will be accurate, distinct, and complete, and will contain all required information, including satisfactory identification of items, units, and assemblies in relation to the Contract Drawings and Specifications. Include with each submittal a transmittal letter containing the following information:

.1 Project name:

.2 Quantity of each document submitted

.3 Document title

.4 Document number

.5 Document revision: "A" for initial submittal
"B" for first revision
"C" for second revision

.6 Specification section and article number where equipment, material or installation is covered

.7 Date of transmittal

.4 Unless otherwise approved by The City, shop drawings will be submitted only by the Contractor, who will indicate by a signed stamp on the shop drawings, or other approved means, that the Contractor has checked and approved the shop drawings, and that the work shown is in accordance with Contract requirements and has been checked for dimensions and relationship with work of all other trades involved.

1.6 RECORD DRAWINGS

.1 The Contractor will be responsible for maintaining a record of all changes in materials, equipment, location and dimensions of the work. Upon completion of the work, submit to The City, one set of drawings, specifications, and schedules marked up to show deviations from the Contract Documents.

.2 Information on record drawings shall include location of "field run" equipment such as piping, conduit, wiring, cables, raceways, cable trays.

.3 Dimension location of field run equipment from items such as building walls or mark levels relative to elevation of finished floor below which equipment is buried.

.4 Certify each piece of record information. This must include the name and signature of the Contractor's certifier.

1.7 WARRANTIES

.1 See D24 for warranty requirements.

1.8 MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION

.1 Where required in the Specifications, the Contractor will submit manufacturer's certification of proper installation of equipment prior to start-up or performance testing. Such certificate will state that the equipment or system has been installed in accordance with the manufacturer's recommendation and has been inspected by a manufacturer's authorized representative, that it has been serviced with the proper initial lubricants, and that the proper electrical and mechanical connections have been made.

1.9 SAMPLES AND TEST SPECIMENS

.1 When required in the Specifications, and as determined necessary by The City, test specimens or samples of materials, appliances and fittings to be used or offered for use in connection with the work will be submitted to The City at the Contractor's expense, with information as to their sources, with all cartage charges prepaid, and in such quantities and sizes as may be required for proper examination and tests to establish the quality or equality thereof, as applicable.

.2 All samples and test specimens will be submitted in ample time to enable The City to make any tests or examinations necessary, without delay to the work. The Contractor will be held responsible for any loss of time due to his neglect or failure to deliver the required samples to The City, as specified.

1.10 UTILITY LOCATES AND PROTECTION

.1 Provide record copy of utility locates sheets.

.2 Provide copy of utility protection requirements.

1.11 TAX REBATES

.1 Assist The City to submit for refunds of Federal and Provincial Sales Taxes for materials supplied by the Contractor which are eligible for sales tax rebate, and furnish upon the request of The City copies of invoices for the purchase of such materials.

1.12 SUBSTITUTIONS

.1 B7: Substitutes specifies requirements and procedures for submitting request for substitutions during the bidding period.

.2 If Contractor wishes to substitute material or equipment as being “equal to” or “equivalent” of the item specified, the onus is on the Contractor to demonstrate equivalency.

.3 Submittals supporting a written request to substitute an equivalent shall be in a format which directly compares all relevant characteristics in a tabular format.

.4 Submittal of a data sheet of the proposed “equivalent” and a data sheet of the original without formatting both sheets into a comparative table will be rejected.

.5 Owner may reject proposed equivalents without reason.

END OF SECTION 01 33 00

TABLE OF CONTENTS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

.1 Develop a written Site-specific health and safety plan prior to commencing any on-Site work and continue to implement, maintain, and enforce the plan until final demobilization from Site. The development, implementation, and maintenance of the Site-specific health and safety plan is Contractor's sole responsibility. Contractor's Site-specific health and safety plan, as a minimum, shall address the specifications contained herein.

.2 The Contractor will be provided a copy of the *Contractor Safety Guidelines Booklet* as prepared by the Contract Administrator. The information contained within this *Booklet* is to be followed while performing works onsite. It is the Contractor's responsibility to review the *Booklet* before commencing work. The Contractor is to provide this information to all employees including subcontractors and trades personnel. The Contractor's employees and subcontractors are also expected to follow the site specific Health and Safety Plan, the Contractors' Company Health and Safety Program and Procedures and all rules, standards, regulations, acts and codes that apply to the Work being performed.

.3 Should Contractor seek relief from or substitution for any portion or provision of the minimum health and safety guidelines specified herein or the reviewed Site-specific health and safety plan, such relief or substitution shall be requested of Contract Administrator in writing, and if accepted by Contract Administrator, will be authorized in writing.

.4 Responsibility: Contractor will be responsible for the safety of persons and property on Site and for the protection of persons off Site and the environment to the extent that they may be affected by the conduct of Works. Comply with and enforce compliance by Contractor employees and the employees of subcontractors, agents, and invitees, with safety requirements of Contract documents, applicable federal, provincial, and local statutes, regulations, and ordinances, and with Contractor's Site-specific health and safety plan. Contractor acknowledges that safety and environment protection obligations are of paramount importance regarding all of the Work to be performed under Contract documents. Any fines resulting from Contractor employees and the employees of subcontractors, agents, and invitees non-compliance to Workplace Safety and Health Acts (WSHA) and Regulations are the responsibility of the Contractor.

.5 Hazard communication requirements: Comply with the Workplace Safety and Health Act and WHMIS 2015. Before the Work starts, the Contractor shall provide a list of those products controlled under WHMIS which are expected to be used during the Contract. Related material safety data sheets (MSDS) shall accompany the submittal. Notify the Contract Administrator in writing of changes to the list and provide the relevant MSDS.

.6 Work stoppage: Contractor shall give precedence to the safety and health of the public and on-Site personnel and the protection of the environment over cost and schedule considerations for all project Work. The Health and Safety Officer shall be responsible for decisions regarding when Work will be stopped or started for health or safety consideration and shall have the authority to stop or start the Work for health or safety considerations. Contractor shall assign the responsibility and obligation to the Health and Safety Officer to stop or start the Work when, in the Health and Safety Officer's discretion, it is necessary or advisable for reasons of health or safety. Contract Administrator shall have the right to stop Work for health and safety considerations.

.7 Unforeseen hazards: Should any unforeseen or Site-specific safety-related factor, hazard, or condition become evident during the performance of Works at Site, bring such to the attention of Contract Administrator verbally and in writing as quickly as possible, for resolution. In the interim, take prudent action to establish and maintain safe working conditions and to safeguard Contractor employees and employees of subcontractors, agents and invitees, the public, the City of Winnipeg, Contract Administrator, and the environment.

1.2 WORKPLACE SAFETY AND HEALTH ACT

.1 It is the Contractor's responsibility under the provisions the Workplace Safety and Health Act (WSHA), Standards and Regulations to coordinate the activities of all employees and workers under the Contractor's control operating within the Contract limits to ensure that the requirements of the WSHA are satisfied.

.2 Submit proof that:

.1 All employees of Contractor and subcontractors have received training in occupational safety in accordance with the requirements of the WSHA.

.2 Contractor shall name a representative whom he/she shall designate as having responsibility for supervising the implementation of the Contract, and who is qualified as a "competent" person as defined in the WSHA.

1.3 SITE CHARACTERIZATION

.1 Work at Site will involve contact with municipal solid waste and associated contaminants including but not limited to landfill leachate, landfill gas, and landfill gas condensate.

.2 Landfill gas:

.1 Landfill gas will be present during excavations and on the surface of the landfill, in the soil adjacent to the landfill, in the piping and leachate collection system and in confined spaces.

.2 Landfill gas results from the decomposition of refuse and is primarily composed of 40 to 65 percent methane, and 30 to 50 percent carbon dioxide, less than 2 percent nitrogen, less than 1 percent oxygen, and trace gases

including mercaptans, hydrocarbons, solvents, water vapour, and hydrogen sulfide.

.3 Methane is explosive in concentrations between 5 and 15 percent by volume in air. Methane, carbon dioxide, and nitrogen are simple asphyxiants.

.4 Trace gases in landfill gas may be toxic and odorous. Odorous gases cause nausea in some persons. Toxic gases may also be present at concentrations above or below the levels deemed safe for human exposure; there is always a potential for levels to be sufficient to cause permanent and irreversible damage and even death.

.5 All contractor employees performing Work at site must have hydrogen sulfide training.

.3 Asbestos:

.1 Asbestos filled bags can typically be identified by a bright yellow colouring and a written warning that describes the contents of the bag to be asbestos. However, colour and text may vary and caution should be used when handling any material that is brightly coloured or marked with text.

.2 The Contractor should ensure that all employees have an understanding of the health risks associated with breathing in asbestos fibres. As with any construction project, employees should be competent, have required training and use general common sense to ensure the protection of workers and the environment.

.3 In addition to all other applicable regulations or documents related to construction, all workers onsite should review the most recent publications of:

.1 Workplace Safety and Health Regulation, Part 37 – Asbestos.

.2 Workplace Safety and Health Division's Guidelines for Working With Asbestos.

Where applicable, these regulations must be followed to ensure the safety of workers and the environment.

.4 Refuse stability: Refuse must be considered prone to instability that may cause slope or sidewall failure due to the high void ratio, irregularity of material composing the refuse, and a typically lesser degree of compaction than soil.

1.4 SUBMITTALS FOR REVIEW

.1 Section 01 33 00 – Submittal Procedures: Requirements for submittals.

.2 Safe Work Plan as specified in D9.

.3 Contractor's Site-specific health and safety plan:

.1 Within 5 days after receipt of the letter of intent and prior to mobilization to Site, submit a Site-specific health and safety plan. As a minimum, address aspects of worker protection and measures designed to prevent migration of

hazardous or contaminated material to the environment, including but not limited to the provisions and guidelines contained herein, and the following specific topics:

.1 Worker training including Site-specific training and refresher sessions.

.2 A detailed description of the wash down area for decontamination of vehicles and equipment and the methods to be used to collect, store, treat, and ultimately dispose of wash down decontamination waters and sediments.

.3 Confined space entry program and procedures if Contractor expects confined space work to be performed. The confined space entry program and procedures shall contain:

.1 Duties of workers

.2 Coordination documents (as required)

.3 Onsite rescue procedures, rescue equipment and methods of communication

.4 Personal protective equipment, clothing and devices

.5 Isolation of energy (lockout tagout) and control of materials movement

.6 Attendant, entrant and entry supervisor responsibilities

.7 Ingress and egress: Maintain a safe means of ingress and egress in place at all times when personnel are occupying a confined space.

.8 Atmospheric testing/air monitoring: Continuous air monitoring with an Oxygen/Combustible Gas/H_2S meter. Oxygen content must be above 19.5 percent and below 23 percent before entry will be allowed. Personnel must leave the confined space if the concentration of explosive gases exceeds 10 percent of the lower explosive limit (LEL). If hot work is to be conducted in the space, then explosive gasses cannot exceed 0 percent (LEL). Personnel must leave the confined space if the concentration of hydrogen sulphide approaches 10 ppm.

.9 Procedures for working in the presence of explosive or flammable substances

.10 Ventilation and purging

.11 Entry permit: Do not allow Site personnel to enter confined space without a written confined space work permit. Maintain properly completed permits readily available at Site.

.12 Worker training.

.4 Hot work program and procedures if Contractor expects hot work to be performed. Works including, but not limited to electrofusing, welding, and metal grinding will only be permitted under well-

ventilated conditions and only with written approval of Contract Administrator.

.5 Personal hygiene and personnel decontamination procedures.

.6 Personal protective equipment types to be used including, but not limited to: gloves, hardhat, safety vest, safety boots, safety glasses, respirators. The following are the minimum PPE required for each level of protection as applicable:

.1 Level C:

.1 Individually assigned half- or full- face piece air-purifying respirations (NIOSH approved), with appropriate cartridges for organic vapours and particulates. Respirators shall be available at all times and donned when required as indicated by air monitoring.

.2 Chemical- resistant disposable coveralls (tyvek).

.3 Latex and/ or cotton inner gloves.

.4 Nitrile outer gloves.

.5 Work boots with steel toe and shank.

.6 Chemical- resistant over boots or booties.

.7 Hard hat.

.8 Safety glasses with side shields and/ or chemical-resistant goggles.

.2 Modified Level C:

.1 Chemical- Resistant disposable coveralls (tyvek).

.2 Latex and/ or cotton inner gloves.

.3 Nitrile outer gloves.

.4 Work boots with steel toe and shank.

.5 Chemical- resistant over boots or booties.

.6 Hard hat.

.7 Safety glasses with side shields and/ or chemical-resistant goggles.

.3 Level D:

.1 Hard hats.

.2 Safety glasses with side shields or goggles.

.3 Long pants and long-sleeve shirt.

.4 Safety boots.

.5 Safety vest.

.6 Any personal protective equipment necessary for specialized tasks (for example, welding goggles).

.7 Respirator protection program and procedures. Provide on-Site personnel engaged in activities on or directly adjacent to the landfill,

with extensive training in the usage and limitations of, and qualitative fit test for, half- and full- face piece respirators as required.

.8 Air monitoring program and procedures. Establish action levels and levels of protection for each work area based on planned activity, location of activity, and air monitoring results. Monitor potential exposures to landfill gas with an intrinsically safe, multi-gas (O_2, CH_4/LEL, CO, and H_2S) continuous sampling air monitor and record results. Additionally, personal air monitors may be required if Site conditions warrant. Provide sufficient number of each instrument to monitor the active work location and to provide back-up equipment in cases of equipment malfunctions.

Action Levels:

NON-CONFINED SPACE READING, GENERAL AREA

.1 Combustible Gases - The readings are generally given as a percentage of the lower explosion limit (percent LEL) and are collected in the general work area. An atmospheric oxygen level of less than 19.5 percent may affect the reading from a combustible gas meter and give lower than actual levels. Test oxygen content first.

Instrument Reading	Action to be Taken
1-10% LEL	Continue working and monitoring atmosphere for combustible gases. Inform personnel working in the area whenever reading >5% LEL.
11-20%	Continue working with caution. Inform personnel working in area of readings. Be prepared to cease operations.
>20% LEL	Cease operation and move to a safe place. Re-evaluate work plan. Engineering controls such as forced ventilation and use of non- sparking tools are to be implemented if operations are to continue. DO NOT CONTINUE WORKING UNTIL CONDITIONS ARE CONSISTENTLY BELOW 20% LEL.

.2 Oxygen

Instrument Reading	Action to be Taken
<19.5% or >23%	Cease operations and move to safe area. Re-evaluate work plan. Engineering controls such as forced ventilation are to be implemented if

operations continue. DO NOT CONTINUE WORKING UNTIL OXYGEN LEVELS ARE BETWEEN 19.5 AND 23%. When oxygen levels are outside this range, combustible gas meter readings are not reliable. Supplied air or SCBA respiratory protection may be necessary.

.3 Hydrogen Sulfide (H_2S) - Whenever readings approach 10 ppm on a direct reading H_2S meter, cease work immediately, move to a safe area and contact the Health and Safety Officer. H_2S has a TWAEV level of 10 ppm. Supplied air or SCBA respiratory protection may be necessary.

Record daily air monitoring activities in a log book and maintain the log book onsite at all times. The following are to be recorded: site location/date, description of operation, temperature, wind speed/direction, chemicals/materials/equipment in use, engineering/ administrative controls in effect, PPE in use, sampling observations/comments and complaints.

.9 Lockout / Tagout.

.10 Emergency and first-aid equipment and supply. Provide person trained in first aid on Site at all times that work activities are in progress.

.11 Dust and particulate emission control.

.12 Monitoring and mitigation of worker heat and cold stress.

.13 On-Site and off-Site Contingency and Emergency Response Plans including procedures for injuries or illnesses, hazardous exposures, spills/accidental release, fire, and evacuations. The Contract Administrator and the Health and Safety Officer must be notified in all cases immediately.

.14 Illness/injury reporting and investigation procedures.

.15 Site Communication procedures.

.2 Contract Administrator will review Contractor's Site-specific health and safety plan and provide comments to Contractor within 7 days after receipt of the plan. Revise the plan as appropriate and resubmit the plan to Contract Administrator within 3 days after receipt of comments from Contract Administrator.

.4 Within 7 days after receipt of letter of intent and prior to mobilization to Site, Contractor will be required to submit the following to Contract Administrator:

.1 A signed *Contractor Worksite Permission Form.*

.2 A signed *Contractor's Agreement Respecting Indemnification, Insurance and Other Matters Related to Work on the Premises.*

.3 A copy of the Worker's Compensation Board (WCB) clearance documents (or equivalent) must be submitted as required.

.4 A copy of the Contractor's Health and Safety Program for review.

.5 A copy of the Contractor's General Liability Proof of Insurance.

.6 Proof of trade qualifications and training of Contractor's employees (i.e. crane, confined space, lockout/tagout, WHMIS, forklift, etc) as appropriate.

.7 WHMIS material safety data sheets (MSDS).

1.5 HEALTH AND SAFETY OFFICER

.1 Employ and assign to Works a representative whom shall be designated as having responsibility for supervising the implementation of the Contract and who is qualified as a "competent" person as defined in the Workplace Safety and Health Act and Regulations. This competent and authorized representative herein will be referred to as Health and Safety Officer. Health and Safety Officer shall be on Site during the execution of Work and report directly to Superintendent.

.2 Health and safety officer responsibilities:

.1 Have a working knowledge of the Workplace Safety and Health Act and Regulations.

.2 Have working experience specific to the activities associated with municipal solid waste landfills including landfill gas.

.3 Have formal education and/ or training in occupational safety and health.

.4 Be responsible for completing health and safety training sessions and ensuring that personnel not successfully completing the required training are not permitted to enter the Site.

.5 Be responsible for the pre-construction indoctrination of onsite personnel with regard to the Site-specific health and safety plan and other safety requirements to be observed during performance of Works, including:

.1 Alerting appropriate onsite and/ or offsite emergency services and Contract Administrator before starting any particularly hazardous work

.2 Personal protective equipment and respiratory protection, including fit testing

.3 Personal hygiene principles

.4 Emergency procedures for dealing with fire and medical situations

.6 Be responsible for implementing and daily enforcing and monitoring the Site-specific health and safety plan.

.7 Have the authority and obligation to stop all, or any part of Works if, in his/her sole discretion, stoppage of Works is necessary or advisable for considerations of health or safety.

.8 Assist Contract Administrator in contacting and advising local authorities of Works to be performed.

1.6 PERSONNEL HEALTH, SAFETY AND HYGIENE

.1 Implement a hazard communication ("Right-to-Know") program in accordance with the WSHA and WHMIS Regulation.

.2 The City of Winnipeg may have a safety orientation program which must be attended by Contractor's personnel before they start Work onsite.

.3 All Contractors and sub-contractors shall ensure that their employees are trained in and familiar with the WSHA and applicable regulations to their trade(s) as applicable to the service to be provided.

.4 All Contractors and sub-contractors are required to participate in weekly Site health and safety meetings as requested by the Contract Administrator.

.5 Issue a written notice of violation to onsite personnel found to be disregarding the provisions of the Site-specific health and safety plan or the Project Specifications. The notice may be issued by the City of Winnipeg, Contract Administrator, the Health and Safety Officer, or any supervisory personnel of Contractor. Give a copy of the notice to the offending worker, to his/her immediate supervisor, to Contractor's Superintendent, and to Contract Administrator. Upon issuance of a second written notice of such violation, terminate the worker from employment at Site. Failure of Contractor's supervisory personnel to implement this warning/ termination provision shall be deemed a material breach of the Contract.

.6 Smoking is prohibited on site.

.7 Eating and drinking are prohibited except in designated lunch/break area.

1.7 SITE HEALTH AND SAFETY

.1 Work areas: Take necessary precautions to avoid hazardous conditions on Site. Open flame, matches, smoking, welding or other activity potentially capable of generating an explosion will not be allowed in any area associated with landfill gases.

.2 Hot work: Permits are required for welding, grinding, fusing and are issued by the Contract Administrator.

.3 Signs and symbols:

.1 Provide signs and symbols informing personnel of the danger of combustible gases. Signs such as:

.1 Danger – Keep Away- Explosive Gases.

.2 Danger – No open Flame or Matches.

.3 Danger – No Smoking.

.4 Temporary fencing: Erect temporary fencing with warning signs to delineate work areas and to control access to excavations in accordance with the Site-specific health and safety plan.

.5 Confined space entry: Do not allow Site personnel to enter confined space without a written confined space work permit and the required training. Maintain properly completed permits readily available at Site.

END OF SECTION 01 35 29

TABLE OF CONTENTS

PART 1 GENERAL

1.1 REFERENCES AND CODES

.1 All work to be performed in accordance with the more stringent of:

.1 City of Winnipeg Standard Construction Specifications (CW), and

.2 Province of Manitoba Standards Construction Specifications (MSCS).

.2 All work to meet or exceed requirements of:

.1 Contract documents,

.2 Specified standards, codes and referenced documents.

END OF SECTION 01 41 00

TABLE OF CONTENTS

PART 1 GENERAL

1.1 QUALITY ASSURANCE – CONTROL OF INSTALLATION

.1 Monitor quality control over suppliers, manufacturers, products, services, Site conditions, and workmanship, to produce Works of specified quality.

.2 Comply with manufacturers' instructions, including each step in sequence.

.3 Should manufacturers' instructions conflict with Contract documents, request clarification from Contract Administrator before proceeding.

.4 Comply with specified standards as minimum quality for Works except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

.5 Perform Work by persons qualified to produce workmanship of specified quality. Use persons licensed to perform Works where required by these Technical Specifications or laws and regulations.

.6 Secure products and Works in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

.7 Materials furnished and finished or intermediate stages of Works shall be sampled, tested and inspected as specified in the individual Sections of these Technical Specifications and as required by reference standards.

.8 Performance of tests or observations by Contract Administrator are for the sole benefit of Contract Administrator and are not intended to replace Contractor's quality control program. Contractor is solely responsible for establishing and implementing a quality control program to ensure that Works are in accordance with the Contract.

.9 It is Contractor's responsibility to notify Contract Administrator when Contractor believes Works (or intermediate stages or parts of Works) are of specified quality and to permit Contract Administrator to perform independent tests or analyses.

1.2 TOLERANCES

.1 Monitor tolerance control of installed products to produce acceptable Works. Do not permit tolerances to accumulate.

.2 Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract documents, request clarification from Contract Administrator before proceeding.

.3 Adjust products to appropriate dimensions; position before securing products in place.

1.3 REFERENCES AND CODES

.1 For products of workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

.2 Conform to reference standard by date of issue current on date of submission deadline stated in B2, except where a specific date is established by code or by individual specification Section.

.3 The contractual relationship, duties, and responsibilities of the parties in Contract or those of Contract Administrator shall not be altered form Contract documents by mentions or inference otherwise in any reference documents.

.4 Publications referred to in these Technical Specifications form part of the Specifications to the extent specified in individual specification Sections.

1.4 INSPECTING AND TESTING LABORATORY SERVICES

.1 The Contract Administrator may engage the services of an independent inspecting and testing firm to perform inspections, tests, or approvals required by Contract documents except as otherwise specifically provided in Contract documents.

.2 Employment of independent inspecting and testing firm and services performed by such firm in no way relieves Contractor of obligation to perform Works in accordance with requirements of Contract documents.

.3 The independent firm engaged by the Contract Administrator may perform inspections, tests, and other services specified in individual specification Sections and required by the Contract Administrator.

.4 Inspecting, testing, and source quality control may occur on or off Site.

.5 Reports will be submitted by the independent firm to Contract Administrator, indicating observations and results of tests and indicating compliance or non-compliance with Contract documents.

.6 Furnish to laboratory at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.

.7 Cooperate with personnel of independent inspecting and testing firm, and provide safe access to Works.

.8 Provide incidental labour and facilities:

.1 To provide access to Works to be tested.

.2 To obtain and handle samples at Site or at source of products to be tested.

.3 To facilitate tests and inspections.

.4 To provide storage and curing of test samples.

.9 Notify Contract Administrator and independent firm 48 hours prior to expected time for operations requiring inspection and testing services.

.10 Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

.11 Retesting required because of non-conformance to specified requirements will be performed by the same independent firm on instructions by Contract Administrator. Costs for retesting and reinspection will be payable by Contractor to the City of Winnipeg on demand or the City may deduct cost of inspecting or testing charges from monies which are due or may become due to Contractor.

.12 If defects or deficiencies are revealed during testing or inspecting, correct such defects and deficiencies.

.13 Comply with requirements of individual specification Sections.

1.5 MANUFACTURERS' FIELD SERVICES AND REPORTS

.1 When specified in individual Technical Specification Sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe Site conditions, conditions of surfaces and installation, quality of workmanship, startup of equipment, test, adjust, and balance of equipment and commissioning of complete system as applicable, and to initiate instructions when necessary.

.2 Submit qualifications of observer to Contract Administrator 30 days in advance of required observations.

.3 Report observations and Site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

.4 Submit report in duplicate within 30 days of observation to Contract Administrator for information.

1.6 SCHEDULE OF INSPECTIONS AND TESTS

.1 Section 31 23 00 – Excavation, Backfilling and Compacting: Requirements for sampling and testing backfilled materials.

.2 Section 33 52 16 – HDPE Wellfield Piping: Pressure testing.

END OF SECTION 01 45 00

TABLE OF CONTENTS

PART 1 GENERAL

1.1 SITE OFFICE, LUNCH FACILITIES AND WASHROOMS

.1 The Contractor shall provide for adequate first aid, lunch and washroom facilities for all sub-trades on this project.

.2 All temporary buildings and storage must be maintained in a neat and orderly condition.

.3 Site areas not under construction are to be off limits to all contractors unless agreed upon by the Contract Administrator.

.4 Smoking is specifically forbidden on Site.

.5 Provide an adequate number of refuse containers, and ensure they are emptied regularly.

1.2 TEMPORARY ELECTRICITY

.1 Cost: By Contractor; provide, maintain, and pay for power service if required.

.2 All temporary lighting, wiring, starters, etc. shall be supplied by the Contractor.

1.3 TEMPORARY HEAT

.1 Provide and pay for heating devices and heat as needed to maintain specified conditions for construction operations and to protect Works and material against damage by dampness, cold and freezing and to facilitate completion of Works.

.2 Provide attendance, fuel, equipment, and materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapours, or gases.

1.4 TEMPORARY VENTILATION

.1 Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulations of dust, fumes, vapours, or gases.

1.5 TEMPORARY WATER SERVICE

.1 Potable water will not be available on Site for construction operations.

1.6 TEMPORARY FIRE PROTECTION

.1 Provide qualified personnel and appropriate fire protection equipment and materials during Work.

.2 Take particular care when carrying out Work which involves a high degree of risk of fire, such as welding, cutting, fuel storage and handling etc. Provide fire

extinguishers adjacent to the area where such Work is to be carried out. Hot work permit must be obtained from the Contract Administrator.

.3 Be familiar with the City of Winnipeg's regulations for carrying out Work which is a fire risk and be familiar with location, type and availability of hydrants and other existing firefighting equipment.

1.7 PORTABLE TOILETS

.1 Provide a minimum of one portable sanitary toilet.

.2 Remove and dispose of sanitary wastes offsite on a periodic basis as required and in accordance with applicable laws and regulations.

1.8 LAYDOWN AREAS

.1 The City of Winnipeg shall provide area for use by the Contractor within Contract limits as an exterior laydown area(s) for storage of equipment and construction materials which may be stored outside. Preparation and maintenance of the laydown area is the responsibility of the Contractor.

.2 Contractor shall co-ordinate use of laydown space by trades.

.3 Location of storage area(s) will be identified at the pre-bid meeting.

1.9 BARRIERS

.1 Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from construction operations.

.2 Provide protection for plant life designated to remain. Replace damaged plant life.

.3 Protect vehicular traffic, stored materials, Site, and structures from damage.

1.10 WATER CONTROL

.1 Grade Site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

.2 Protect Site from puddling or running water. Provide water barriers as required to protect Site from soil erosion.

.3 Prevent surface water runoff from leaving Work areas.

.4 Do not discharge decontaminated water, or surface water runoff, or groundwater which may have come in contact with refuse, offsite or to municipal sewers.

.5 Provide, operate, and maintain necessary equipment appropriately sized to keep excavations, the staging pads, and other Work areas free from water.

.6 At all times have on hand sufficient pumping equipment, machinery and tankage in good working condition for ordinary emergencies, including power outage, and have available at all times competent workers for the operation of the pumping equipment.

.7 Direct surface waters that have not contacted refuse (non-contact water) to an approved sediment basin by pumping unless otherwise approved in writing by Contract Administrator. Non-contact water from Site excavations is not to be discharged to a location which will allow runoff to any watercourse or body of water without control of sediments.

.8 Control surface drainage including ensuring that gutters are kept open at all times, water is not directed across or over pavements or sidewalks except through approved pipes or properly constructed troughs and runoff from unstabilized areas is intercepted and diverted to a suitable outlet.

.9 Dispose of water in a manner not injurious to public health or safety, to property or to any part of Works completed or under construction.

.10 Contain and collect surface water runoff from potentially contaminated materials which originated from or has been in contact with refuse and discharge to the existing leachate collection system, subject to approval by Contract Administrator.

.11 Contain and collect groundwater encountered while excavating outside of the limit or refuse, and discharge to a location approved by Contract Administrator.

1.11 DEWATERING

.1 Dewater the various parts of Works including, without limitation, excavations, structures, foundations, and Work areas.

.2 Employ construction methods, plant, procedures, and precautions that will ensure Works, including excavations, are stable, free from disturbance, and dry.

.3 Construction methods: Includes sheeting and shoring; groundwater control systems; surface or free water control systems employing ditches, diversions, drains, pipes and/ or pumps; and any other measures necessary to enable the whole of Works to be carried out in the dry.

.4 Provide sufficient and appropriate labour, plant, and equipment necessary to keep Works free of water including standby equipment necessary to ensure continuous operation of dewatering system.

.5 Take precautions necessary to prevent uplift of any structure or pipeline and protect excavations from flooding and damage due to surface runoff.

1.12 EROSION AND SEDIMENT CONTROL

.1 Plan and execute construction by methods to control surface drainage from cuts and fills, from stockpiles, staging areas, and other Work areas. Prevent erosion and sedimentation.

.2 Minimize amount of soil exposed at one time. Stabilize disturbed soil as quickly as practical. Strip vegetation, regrade, or otherwise develop in such a way as to minimize erosion. Remove accumulated sediment resulting from construction activity from adjoining surfaces, drainage systems, and water courses and repair damage caused by soil erosion and erosion and sedimentation as directed by Contract Administrator.

.3 Provide and maintain temporary measures which may include, but are not limited to, silt fences, hay or straw bales, ditches, geotextiles, drain, berms, terracing, riprap, temporary drainage piping, sedimentation basins, vegetative cover, dikes, and any other construction required to prevent erosion and migration of silt, mud, sediment, and other debris off of Site or to other areas of Site where damage might result or that might otherwise be required by laws and regulations. Make sediment control measures available at all times during construction. Place silt fences and/ or hay bales in ditches to prevent sediments from escaping from the ditch termination.

.4 Installation:

.1 Actual alignment and/or location of the various temporary erosion control items as directed by Contract Administrator.

.2 Do not construct straw bale barriers and silt fence in flowing streams or in swales where there is possibility of a washout.

.3 Check weekly and after each rainfall erosion and sediment control measures. During prolonged rainfall, daily checking is necessary.

.4 Straw bales and/or silt fence may be removed at the beginning of the workday, but replace at the end of the workday.

.5 Whenever sedimentation is caused by stripping vegetation, regrading, or other development, remove it from all adjoining surfaces, drainage systems, and watercourses, and repair any damage as quickly as possible.

.6 Prior to or during construction, Contract Administrator may require the installation or construction of improvements to prevent or correct temporary conditions of Site. Improvements may include berms, mulching, sediment traps, detention and retention basins, grading, planting, retaining walls, culverts, pipes, guardrails, temporary roads, and other measures appropriate to the specific condition. All temporary improvements shall remain in place and in operation until otherwise directed by Contract Administrator.

.7 Pay close attention to the repair of damaged bales, end runs, and undercutting beneath bales.

.8 Unless otherwise specified on drawings, or directed by Contract Administrator, remove all items upon completion of Works. Spread

accumulated sediments to form a suitable surface for seeding or disposed of, and shape the area to permit natural drainage; all to the satisfaction of Contract Administrator. All materials once removed become the property of Contractor.

.5 Do not disturb existing embankments or embankment protection.

.6 Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

.7 Unless specified otherwise, provide erosion and sediment control in accordance with the City of Winnipeg's Best Management Practices Handbook for Activities in and Around the City's Waterways and Watercourses.

.8 If soil and debris from Site accumulate in low areas, storm sewers, roadways, gutters, ditches, or other areas, where in the Contract Administrator's determination it is undesirable, remove the accumulation and restore the area to its original condition.

1.13 NOISE CONTROL

.1 If machinery, motors, pumps, and other similar equipment must be operated beyond the normal working hours, keep the noise below a level acceptable to Contract Administrator by housing the equipment as required.

.2 Equip vehicles and equipment with efficient muffling devices. Provide and use devices that will minimize noise levels in the construction areas. Adhere to all local noise bylaws.

1.14 ODOUR CONTROL

.1 The lengths of trenches shall be kept to a minimum. Excavations will be limited to that which can be reasonably utilized in each day.

.2 The length of open trenches at the end of each day is to be kept to a minimum. It will be limited to a reasonable length which will not affect the work plan for the next day.

.3 All waste that is removed for trenching will be replaced as soon as possible. Any excess waste is to be deposited at the tipping face where it will be covered at the end of the day or more frequently as required by site conditions.

1.15 DUST AND PARTICULATE CONTROL

.1 Provide and maintain dust and particulate control measures such as a water misting system as required to prevent the generation of dust and particulate.

.2 Contract Administrator may stop Work at any time when the Contractor's control of dusts is inadequate for the wind conditions present at Site.

.3 Use potable water for dust control.

.4 Do not use chemical means for dust and particulate control without Contract Administrator's prior written approval.

.5 As a minimum, use appropriate covers on trucks hauling fine or dusty material and use watertight vehicles to haul wet materials.

.6 Control dust so as not to be nuisance to adjacent property, owners or occupants.

.7 In the event that the Contractor's dust control is not sufficient for controlling dusts from Site, Work shall be discontinued and a meeting shall be held between Contract Administrator and Contractor to discuss the procedures that Contractor proposes to resolve the problem. Make all necessary changes to his operation prior to resuming any excavation, handling, processing, or any other Work that may cause a release of dusts.

1.16 POLLUTION CONTROL

.1 Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge or noxious toxic substances and pollutants produced by construction operations.

.2 Be prepared to intercept, clean up, and dispose of spills or releases that may occur whether on land or water. Maintain materials and equipment required for cleanup of spills or releases readily accessible on Site.

.3 Promptly report spills and releases potentially causing damage to the environment to:

.1 Manitoba Conservation and Climate (formerly Manitoba Sustainable Development) – Environmental Emergency Line at 1-204-944-4888

.2 City of Winnipeg (Landfill Owner) – Mr. Ash Raichura 1-204-986-2962

.3 The owner of the pollutant, if known.

.4 The person having control over the pollutant, if known.

.5 Contract Administrator.

.4 Contact the manufacturer of the pollutant if known and ascertain the hazards involved, precautions required and best measures to be used in any cleanup of the mitigating action.

.5 Take immediate action using available resources to contain and mitigate the effects on the environment and persons from any spill or release.

1.17 PROTECTION OF INSTALLED WORK

.1 Protect installed Work and provide special protection where specified in individual specification Sections.

.2 Provide temporary and removable protection for installed products. Control activity in immediate Work area to prevent damage.

.3 Prohibit traffic upon landscaped areas.

.4 Maintenance of flow: Maintain the flow of water in the water distribution system and in existing sewers, drains, and watercourses. In the event that any emergency or situation should arise which requires interruption of normal operation of any existing systems, restore normal operation as soon as possible even though permission for such planned shutdown was obtained.

.5 Flotation: Take all necessary precautions against the flotation of any structures during construction. Make good any damage caused by flotation.

1.18 SECURITY

.1 Provide additional security and facilities to protect Works and Site from unauthorized entry, vandalism, or theft as deemed necessary.

1.19 ACCESS ROADS

.1 All contractors, subcontractors, and suppliers entering the Site must report to landfill scale house prior to entry and exit.

.2 Construct and maintain temporary access roads from public thoroughfares and Site roadways to serve construction area at a width and load bearing capacity to provide unimpeded traffic for construction purposes as Contractor requires for performance of Works.

.3 Construct and maintain temporary bridges and culverts to span low areas and allow unimpeded drainage.

.4 Extend and relocate temporary roads as Work progress requires. Provide detours as necessary for unimpeded traffic flow.

.5 Provide unimpeded access for emergency vehicles. Maintain sufficient width and turning space.

.6 Provide and maintain access to fire hydrants and control valves, free of obstructions.

.7 Provide means of removing mud from vehicle wheels before entering public roads.

.8 Existing onsite roads may be used for construction traffic.

.9 Maintain access roads in a sound condition and properly graded, free of ruts, washboard potholes, ponding, ice, snow, mud, any soft material, and free of excavated material, construction equipment, and products. Maintain access roads throughout the Contract period to ensure unimpeded access at all times for passenger automobiles as well as construction vehicles. Contractor will be permitted reasonable use of all existing access roads at Site subject to the following conditions:

.1 Do not interrupt or interfere with traffic on roads or parking areas at any time except where open-trench crossings are specified on drawings and proper notice regarding open-trench crossings has been given to Contract Administrator.

.2 Comply with weight and load size restrictions where applicable.

.3 Abide by regulations issued by the City of Winnipeg with regard to traffic circulation at the Site.

.10 Maintain existing and permanent paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original or specified condition.

.11 Obtain Contract Administrator's prior approval for location and extent of temporary roads.

.12 Construction of access roads: Includes such improvement of existing roads as Contractor may require to perform Works. Repair wear and tear and damage to access roads.

.13 Maintenance of access roads: Includes provision of signs, barricades, gate persons, flag persons, flares and lights, and other measures required; provide flag persons for construction traffic crossing or entering local traffic routes or otherwise required on Site.

.14 Contract Administrator may collect soil sample for chemical analyses from the traveling surfaces of constructed and existing access routes both prior to, during and upon completion of removal and haul activities. Excavate and dispose of clean soil contaminated by Contractor's activities.

.15 Take appropriate measures to prevent contamination of access roads and other clean areas during performance of Works. Scrape up debris or material on access roads, which is suspected to be contaminated, as determined by Contract Administrator; transport and place into designated area approved by Contract Administrator. Clean access roads at least once per shift.

.16 Repair existing facilities damaged by use to original condition.

.17 Existing pavements: Use of existing on-Site roads used for construction traffic is permitted. Tracked vehicles are not allowed on paved areas.

.18 The City of Winnipeg, Contract Administrator and other contractors will be allowed reasonable use of any roads constructed by Contractor.

1.20 PARKING

.1 Locate parking areas as directed by Contract Administrator.

1.21 TRAFFIC REGULATION

.1 Control vehicular parking to prevent interference with access by emergency vehicles and the City of Winnipeg's operations.

.2 Prevent parking on or adjacent to access roads or in non-designated areas.

.3 Consult with authority having jurisdiction, establish thoroughfares to be used for haul routes and Site access.

.4 Comply with the requirements of the road occupancy permit.

1.22 PROGRESS CLEANING AND WASTE REMOVAL

.1 Maintain areas free of waste materials, debris, trash, and rubbish. Maintain Work areas in a clean and orderly condition throughout the construction period.

.2 Pickup all refuse, litter, debris, and other materials attributable to Works or the activities of Contractor's employees, subcontractors, and suppliers that accumulates on property in vicinity of Site.

.3 Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

1.23 EQUIPMENT DECONTAMINATION

.1 Decontaminate equipment after working in refuse disposal areas and prior to subsequent Work or travel outside the limit of refuse.

.2 At a minimum, perform the following steps during equipment decontamination:

- .1 Mechanically remove packed dirt, grit, and debris by scraping and brushing without the use of steam or high-pressure water.
- .2 If directed by Contract Administrator, use high-pressure, low-volume, hot water or steam within the active area of the landfill as appropriate and as approved by Contract Administrator.
- .3 Pay particular attention to tire treads, equipment track, spring, joints, sprockets, and undercarriages.
- .4 Scrub surfaces with long handle scrub brushes and cleaning agent.
- .5 Air dry equipment before removing from Site or travel on clean areas.
- .6 Perform an assessment to determine the effectiveness of the decontamination as directed by Contract Administrator.

.3 Each piece of equipment will be inspected by Contract Administrator after decontamination and prior to removal form Site and/or travel on clean areas. Contract Administrator will have right to require additional decontamination to be completed if deemed necessary.

1.24 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

.1 Remove temporary utilities, equipment, facilities, materials, prior to demobilization from Site.

.2 Remove any temporary underground installations.

.3 Clean and repair damage caused by installation or use of temporary Work.

.4 Restore existing and permanent facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

END OF SECTION 01 50 00

TABLE OF CONTENTS

PART 1 GENERAL

1.1 PRODUCTS

.1 Do not use materials and equipment removed from Site, except as specifically permitted by Contract Documents.

.2 Provide interchangeable components of the same manufacture, for components being replaced.

1.2 TRANSPORTATION AND HANDLING

.1 Transport and handle products in accordance with manufacturer's instructions.

.2 Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

.3 Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.3 STORAGE AND PROTECTION

.1 Store and protect products in accordance with manufacturers' instructions, with seals and labels intact and legible.

.2 Store sensitive products in weather tight, climate-controlled enclosures.

.3 For exterior storage of fabricated products, place on sloped supports, above ground.

.4 Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation or potential degradation of product.

.5 Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

.6 Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

.7 Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

.8 Protect delivered products from contamination.

1.4 PRODUCT OPTIONS

.1 Products specified by reference standards or by description only: The Contractor shall supply products meeting those standards or description which have been approved by the Contract Administrator.

.2 Products specified by naming one or more manufacturers: The Contractor shall supply products of the named manufacturer(s) and meeting the specifications. Options or substitutions shall be in accordance with Article 1.5 – Substitutions of this Section.

1.5 SUBSTITUTIONS

.1 B7. Substitutes specifies requirements and procedures for submitting request for substitutions during the bidding period.

.2 Document each request with complete data substantiating compliance of proposed substitution with the Contract.

.3 A request for substitution constitutes a representation that Contractor:

.1 Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.

.2 Will provide the same warranty for the substitution as for the specified product.

.3 Will coordinate installation and make changes to other Works which may be required for Works to be complete with no additional cost to the City of Winnipeg.

.4 Waives claims for additional costs or time extension, which may subsequently become apparent.

.4 Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract.

.5 Substitution submittal procedure after award of Contract:

.1 Submit four copies of request for substitution for consideration. Limit each request to one proposed substitution.

.2 Submit shop drawings, product data, and certified test results and other data as required attesting to the proposed product equivalence. Burden of proof is on Contractor to demonstrate equivalency.

.3 Contract Administrator will notify Contractor in writing of decision to accept or reject request.

.4 Contract Administrator will be sole judge as to the acceptance or rejection of Contractor’s request.

END OF SECTION 01 60 00

TABLE OF CONTENTS

PART 1 GENERAL

1.1 CLOSEOUT PROCEDURES

.1 Submit written notice to Contract Administrator that the entire Works or an agreed portion thereof is complete and ready for Contract Administrator's inspection prior to Substantial Performance.

.2 All required permits and approvals for work completed under this Contract must be received prior to Substantial Performance.

.3 Submit written certification that the Contract has been reviewed, work has been inspected, and that work is complete in accordance with the Contract and ready for Contract Administrator's review.

.4 Complete and furnish all submittals to Contract Administrator that are required by governing or other authorities and by the Contract. Final payment shall not become due and payable until all submittals have been made acceptable to Contract Administrator.

1.2 FINAL CLEANING

.1 Execute final cleaning prior to demobilization from Site.

.2 Remove surplus materials from Site.

.3 Remove litter and rubbish from Site.

1.3 ADJUSTING

.1 Adjust operating products and equipment to ensure smooth and unhindered operation.

1.4 FINAL DECONTAMINATION

.1 Perform final decontamination of construction facilities, equipment, and materials, which may have come in contact with refuse prior to removal from Site.

.2 Perform decontamination as specified in Section 01 50 00 – Temporary Facilities and Controls to the satisfaction of Contract Administrator. Contract Administrator will have right to direct Contractor to perform additional decontamination if required.

1.5 DEMOBILIZATION

.1 Following decontamination, remove temporary construction and support facilities provided by Contractor, disconnect temporary services and utilities and remove from Site.

1.6 FINAL GRADING

.1 Perform final grading prior to preliminary acceptance of Works.

1.7 SPARE PARTS AND MAINTENANCE AND EXTRA MATERIALS

.1 Furnish products, spare parts, maintenance, and extra materials in quantities specified in individual specification Sections.

.2 Deliver to Site and place in location as directed; obtain receipt prior to final payment.

END OF SECTION 01 77 00

TABLE OF CONTENTS

PART 1 GENERAL

1.1 STARTING, TESTING, ADJUSTING, AND BALANCING SYSTEMS

.1 Coordinate schedule for start-up and testing of various systems.

.2 Notify Contract Administrator 7 days prior to start-up and testing of each item.

.3 Verify that tests agree with those required by the equipment manufacturer. Record test data, calibration data, flow and pressure data.

.4 Verify that each piece of equipment or system has been checked for leakage, proper lubrication, drive rotation, alignment, clearances, safety devices, operating speed, belt tension, control sequence, and for other conditions which may cause damage.

.5 Verify that tests, meter readings, and specified electrical characteristics for equipment, instruments, and systems agree with those required by the equipment or system manufacturer. Record test data, meter readings, electrical data, instrument calibration data, flow and pressure data.

.6 Verify equipment, instrumentation, and systems wiring, connections and numbering, pipe connections, and support components for equipment are complete and tested.

.7 When specified in individual Technical Specification Sections, require manufacturer to provide authorized representative to be present at the Site to inspect, check, and approve, equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

.8 Execute start-up under supervision of applicable manufacturer's representative in accordance with manufacturer's instructions. Record performance of equipment, instrumentation, and systems at start-up.

.9 Start-up, testing, adjusting, and balancing will be performed by manufacturer's representative who is knowledgeable of the Works.

.10 Submit a written report in accordance with Section 01 45 00 – Quality Control that equipment, instruments, and system has been properly installed, tested, adjusted, balanced, and is functioning correctly.

.11 Reports will be submitted by the manufacturer's representative to the Contract Administrator indicating observations and results of tests and indicating compliance or non-compliance with the requirements of the Contract.

.12 Adjusting and balancing the landfill gas collection wellfield will be completed by others.

.13 Contractor shall supply qualified personnel to make repairs and/or adjustments throughout the commissioning stage of the Works.

1.2 DEMONSTRATION AND INSTRUCTIONS

.1 Demonstrate operation and maintenance of each piece of equipment, instrument, and system to the Contract Administrator, and the City of Winnipeg's personnel prior to date of Substantial Performance.

.2 Demonstrate operation and maintenance of each system. Instruction to be by a manufacturer's representative who is knowledgeable of the Works.

.3 Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with the Contract Administrator and the City of Winnipeg's personnel in detail to explain all aspects of operation and maintenance.

.4 Prepare and insert additional data in existing operations and maintenance manuals to reflect the work conducted in this Contract.

1.3 STAFF TRAINING PROGRAM

.1 A staff training program for the compressed air system is to be developed and provided for review a minimum of 7 days prior to commencement of a trial operating period.

1.4 COMMISSIONING AND TRIAL OPERATING PERIOD

.1 Coordinate schedule for commissioning and trial operation period with the Contract Administrator and the City of Winnipeg's personnel within 7 days following completion of initial phase of staff training.

.2 Successfully undertake a three day continuous trial operating period. This period will constitute part of the staff training program and is mandatory prior to granting Substantial Performance of the Contract. Test all operating, shut down, failure, and alarm conditions as a component of this period.

.3 Execute commissioning under supervision of Contract Administrator and qualified manufacturer's representative of the compressed air system.

1.5 MEASUREMENT AND PAYMENT

.1 Section 01 20 00 – Price and Payment Procedures: Requirements for measurement and payment.

.2 Landfill Gas Collection System Testing and Commissioning:

.1 Form B: Prices Item No. 21: Wellfield System Testing and Commissioning

.2 Measurement: Lump Sum.

.3 Payment: Includes system start-up, pressure testing and commissioning.

.3 Compressed Air System Testing and Commissioning:

.1 Form B: Prices Item No. 29: Compressed Air System Testing and Commissioning.

.2 Measurement: Lump Sum.

.3 Payment: Includes system start-up, testing, commissioning, demonstration and instructions, staff training program and trial operating period.

END OF SECTION 01 91 00

TABLE OF CONTENTS

PART 1 GENERAL

1.1 DESCRIPTION

.1 The supply, installation and commissioning of the prepackaged air compressor system as outlined in this section and all ancillary equipment to make the system operational under the Contract.

1.2 REFERENCES AND CODES

.1 ASME - Boiler and Pressure Vessel Code.

.2 ASME B16.3 - Malleable Iron Threaded Fittings.

.3 ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.

.4 ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

.5 ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes.

.6 ASME B31.1 - Power Piping.

.7 ASME B31.9 - Building Services Piping.

.8 ASTM A53/A53M - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

.9 ASTM A234/A234M - Piping Fittings of Wrought-Carbon Steel and Alloy Steel for Moderate and High Temperature Service.

.10 ASTM B32 - Solder Metal.

.11 ASTM B88 - Seamless Copper Water Tube.

.12 ASTM C335 - Standard Test Method for Steady-State Heat Transfer Properties of Pipe Insulation.

.13 ASTM C547 – Standard Specification for Mineral Fibre Pipe Insulation.

.14 ASTM D2513 - Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.

.15 ASTM D2683 - Socket-Type Polyethylene Fillings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.

.16 MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves.

.17 MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

.18 NFPA 70 - National Electrical Code.

1.3 SUBMITTALS

.1 Section 01 33 00 – Submittal Procedures.

.2 Project record documents: Record actual locations of equipment and components. Modify shop drawings to indicate final locations.

.3 Start-up report: Provide copy of compressed air start-up report from manufacturer's representative. The cost of start-up by the manufacturer's representative will be borne by Contractor.

.4 Operations and maintenance manual: the Contractor shall supply two hard copies and one electronic copy of the manufacturer's operations and maintenance manual upon commissioning of the compressed air system.

1.4 REGULATORY REQUIREMENTS

.1 Conform to applicable code for installation of pressure vessels.

.2 Products requiring electrical connection: Listed and classified by Canadian Standards Association, and suitable for the purpose specified and indicated.

.3 The Contractor shall obtain all permits and approvals required for the installation of the compressed air system, including but not limited to pressure vessels and piping, and building permit, as necessitated by the manufacturer's design.

1.5 DELIVERY, STORAGE, AND PROTECTION

.1 Refer to Section 01 60 00 – Product Requirements for transporting, handling, storing, and protecting products.

.2 Protect piping and equipment from weather and construction traffic.

1.6 MANUFACTURER REQUIREMENTS

.1 Company specializing in performing the work of this Section with a minimum of 5 years of experience.

.2 Approved Manufacturers:

.1 Air Unlimited: Mike Wolanski (204-223-6637)

.2 Atlas Copco: Veronica Gutierrez (905-816-9369)

.3 Or approved equal/equivalent in accordance with B7 *(substitutes clause)*.

PART 2 PRODUCTS

2.1 AIR COMPRESSOR

.1 Rotary Screw Air Compressor:

.1 Minimum capacity: 260 cfm at 100 psi
.2 Voltage: 575 V / 3 Phase / 60 Hz
.3 Motor nominal power: 45 kW (60 HP)
.4 Variable speed drive, inverter duty motor
.5 Oil-cooled compressor with oil-to-air aftercooler
.6 Automatic no-loss electronic drain valve
.7 Air inlet filter: minimum 99.9% efficient at 3 µm. Differential pressure across filter shall be continuously monitored.
.8 Coolant/lubrication oil filter: minimum 99% efficiency at 25 µm. Differential pressure across filter shall be continuously monitored.

2.2 AIR RECEIVERS

.1 Wet air receiver:

.1 Minimum capacity: 240 US gallons
.2 Vertically or horizontally mounted
.3 Maximum working pressure 200 psig at 400 deg F.
.4 Accessories:
.1 Pressure relief valve
.2 Pressure gauge
.3 Automatic electronic drain valve
.5 Built to ASME code and Canadian Registration Number (CRN) for pressure vessels.

.2 Dry Air Receiver:

.1 Minimum Capacity: 240 US Gallons
.2 Vertically or horizontally mounted
.3 Maximum working pressure 200 psig at 400 deg F.
.4 Accessories:
.1 Pressure relief valve
.2 Pressure gauge
.3 Automatic electronic drain valve
.5 Built to ASME code and Canadian Registration Number (CRN) for pressure vessels.

2.3 ELECTRONIC CONTROLLER

.1 The compressed air system shall be controlled, monitored and protected by an electronic control device. The controller shall:

.1 Automatically shut down the system when system parameters are exceeded.

.2 Automatic restart the system after a power failure.

.2 Display: Backlit LCD graphic display window.

.3 Trending Data: Store a minimum of 30 days of the following parameters.

.4 Communications: Modbus RTU/TCP and IP browser functionality to allow for operator notification and remote access.

2.4 DEMAND SIDE FLOW CONTROLLER

.1 Sized to suit air compressor capacity.

.2 Demand side pressure fluctuation +/- 1 psig.

.3 Manufacturer: Pneumatech/ConservAIR, or approved equal/equivalent in accordance with B7 (*substitutes clause*).

2.5 COMPRESSED AIR DRYER

.1 Heatless Desiccant type, compressed air dryer:

.1 Sized to suit air compressor capacity at 100°F inlet air temperature to maintain a pressure dew point of the dried air below -40°F.

.2 Twin drying towers

.3 Pre-filter: 0.01 µm filtration performance

.4 After-filter: 1 µm filtration performance

.5 Block and bypass valves.

.6 Controller to allow automatic cycling between towers.

.7 Display Panel showing Dryer ON/OFF, alarms and Tower Drying/Regen status.

.8 Energy management: hygrometer continuously monitors moisture content of dried gas downstream of desiccant. Towers to switch when desiccant is saturated.

2.6 CONDENSATE MANAGEMENT SYSTEM

.1 Oil/water condensate separator:

.1 Sized to suit air compressor capacity.

.2 Maximum oil content at discharge <15 mg/L

.2 All condensate generated by the compressed air system shall be collected and automatically drained outside of the air compressor container and connected to a 75 mm HDPE DR 11 condensate drain pipe as shown on the drawings.

2.7 PIPE/TUBING

.1 Steel pipe: ASTM A53, schedule 40 black.

.1 Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, forged steel welding type.

.2 Joints: Threaded or welded to ANSI B31.1/ANSI B31.9.

.2 Stainless steel tubing and fittings: 316SS Swagelok or approved equal/equivalent in accordance with B7 (*substitutes clause*).

.3 HDPE piping to wellfield compressed air and forcemain: See Section 33 52 16 – HDPE Wellfield Piping.

2.8 VALVES

.1 Valves for carbon steel pipe shall be corrosion resistant and rated for the process conditions.

.2 Valves for stainless steel tubing shall be of 316SS construction and rated for the process conditions.

.3 Quick couplings: stainless steel

2.9 UNIONS AND COUPLINGS

.1 Unions

.1 Ferrous Pipe: 1034 kPa(150 psi) malleable iron threaded unions.

.2 Copper Tube and Pipe: 1034 kPa(150 psi) bronze unions with soldered joints.

.2 Dielectric connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

.3 Flexible connectors: Neoprene with brass threaded connectors.

2.10 PIPE INSULATION

.1 Manufacturer and model: John Manville Micro-Lok

.2 Glass fibre insulation: ASTM C547, rigid moulded, non-combustible:

.1 'ksi'('K') value: ASTM C335, 0.033 at 24 degrees C (0.23 at 75 degrees F).

.2 Minimum thickness: 51 mm (2”)

.3 Minimum service temperature: -18 degrees C

.4 Maximum service temperature: 454 degrees C

.5 Maximum moisture absorption: 0.2 percent by volume.

.6 Rated 25/50 per ASTM E84, UL 723 and NFPA 255.

.7 When being used over stainless steel, product must comply with the requirements of ASTM C795.

.3 Vapour barrier jacket:

.1 White kraft paper reinforced with glass fibre yarn and bonded to aluminized film.

.2 Moisture vapour transmission: ASTM E96; 0.03 ng/(Pa s sq m)(0.02 perm inches).

.3 Secure with self-sealing longitudinal laps and butt strips.

.4 Secure with outward clinch expanding staples and vapour barrier mastic.

.4 Jackets:

.1 Aluminum jacket: ASTM B209.

.1 Thickness: 0.45 mm (0.016 inch) sheet.

.2 Finish: Smooth.

.3 Joining: Longitudinal slip joints and 50 mm (2 inch) laps.

.4 Fittings: 0.45 mm (0.016 inch) thick die shaped fitting covers with factory attached protective liner.

.5 Metal jacket bands: 10 mm (3/8 inch) wide; 0.38 mm (0.015 inch) thick aluminum.

.2 Stainless steel jacket: Type 304 stainless steel.

.1 Thickness: 0.25 mm (0.010 inch).

.2 Finish: Smooth.

.3 Metal jacket bands: 10 mm (3/8 inch) wide; 0.25 mm (0.010 inch) thick stainless steel.

2.11 HEAT TRACING

.1 Self-Regulating.

.2 Wattage: 5 W/ft.

.3 Heat tracing to be fed from a Class ‘A’ GFCI breaker.

2.12 ADDITIONAL MONITORING DEVICES

.1 The following additional monitoring devices and connections shall be supplied, installed and connected to the Electrical Container PLC panel via the control wiring conduit and as per the E8002 cable schedule:

.1 Compressed air system discharge pressure: Installed inside enclosure, downstream of demand side flow controller. Model: Wika A-10 (0 – 160 psi), or approved equal/equivalent in accordance with B7 *(substitutes clause)*.

.2 Condensate drain line low temperature switch: Mount switch inside container and install remote capillary bulb under insulation on exterior aboveground condensate drain piping. Model: Honeywell T675A, or approved equal/equivalent in accordance with B7 *(substitutes clause)*.

.3 Ambient Air Compressor Enclosure Temperature Switches:

.1 Two temperature switches required to monitor low and high ambient temperatures inside the air compressor enclosure.

.2 Model: Honeywell T631C or approved equal/equivalent in accordance with B7 *(substitutes clause)*.

2.13 OUTDOOR ENCLOSURE

.1 Outdoor enclosure package including:

.1 Shop drawings to be prepared and submitted to Contract Administrator for approval prior to construction.

.2 Enclosure shall be a roughly 20 ft long x 8 ft wide x 9.5 ft high unitized welded heavy-duty structural steel enclosure.

.3 Removable panels for service technician access.

.4 Slip resistant, fire resistant floor.

.5 Enclosure shall be equipped with lights, emergency exit signs, auxiliary heat source, insulation, and ventilation in accordance with all applicable regulations.

.6 Enclosure shall be new, single use.

.7 Enclosure to have a minimum of R-12 insulation.

.8 Thermostatically controlled heater.

.9 Intake louvre with electronic actuator.

.10 Exhaust fan with gravity damper.

.11 Dampers used for ventilation shall include removable filters/screens and hoods.

.12 Wired to all equipment including circuit panel and disconnect switch with receptacles.

.13 Non-fusible disconnect switch installed by air compressor manufacturer on outside of enclosure.

.14 A Start/Stop button shall be located on outside of enclosure to allow the compressed air system to be tuned on and off without entering the enclosure.

.15 Completely painted after fabrication.

.16 A minimum SP-6 surface preparation with primer and topcoat paint applied in accordance with paint manufacturers recommendations. Surface preparation, primer and topcoat painting to be completed following

installation of all required penetrations. Colour to be Contract Administrator approved prior to painting.

.17 All factory-finished equipment shall be protected from damage during shipment, thoroughly cleaned after shipment, and touched up as directed by the Contract Administrator. If the factory finish had, in the opinion of the Contract Administrator, been damaged, the equipment shall be given two additional finish field coats. The colour or the finished paint shall be determined by the Contract Administrator.

2.14 REINFORCED CONCRETE SLAB

.1 See Drawing S6001 for Reinforced Concrete Slab specifications.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install equipment in accordance with manufacturer's instructions.

.2 Install valved drip connections at low points of piping system.

.3 Install take offs to outlets from top of main, with shut off valve after take off. Slope take off piping to outlets.

.4 Install compressed air couplings, female quick connectors, and pressure gauges where outlets are indicated.

.5 Install tees instead of elbows at changes in direction of piping. Fit open end of each tee with plug.

3.2 FIELD QUALITY CONTROL

.1 Compressed air piping leak test: Prior to initial operation, clean and test compressed air piping to ANSI B31.1. All joints shall be "soap tested" during the pressure test.

.2 Repair or replace compressed air piping as required to eliminate leaks, and retest to demonstrate compliance.

.3 Cap and seal ends of piping when not connected to mechanical equipment.

3.3 REINFORCED CONCRETE SLAB

.1 Install foundation slabs/foundations as shown on drawings.

.2 Follow specifications detailed on structural drawings.

.3 Penetrations through the slab for piping, conduit or otherwise are not permitted.

3.4 HDPE PIPING

.1 See Section 33 52 16 – HDPE Wellfield Piping

PART 4 MEASUREMENT AND PAYMENT

4.1 GENERAL

.1 Section 01 20 00 – Price and Payment Procedures: Requirements for measurement and payment.

4.2 REINFORCED CONCRETE SLAB FOR COMPRESSED AIR SYSTEM

.1 Form B: Prices Item No. 22.

.2 Payment: Includes supply of equipment, materials and labour for installation the reinforced concrete slab.

4.3 COMPRESSED AIR SYSTEM

.1 Form B: Prices Item No. 23.

.2 Measurement: Lump Sum

.3 Payment basis: Includes supply and installation of the air compressor, air receivers, electronic controller, demand side flow controller, compressed air dryer, oil/water separator, piping, valves, fittings, insulation, heat tracing, additional monitoring devices, disconnect switch and all other appurtenances required to make the compressed air system operational under the Contract.

END OF SECTION 22 15 00

TABLE OF CONTENTS

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 15 00 – General Requirements.

1.2 ELECTRICAL UTILITY SERVICE CONNECTIONS

.1 Unless otherwise noted in the Contract or on the drawings, the power and communications utility connection charges outside the property boundaries will be carried directly by the City of Winnipeg. The electrical subcontractor shall bring any applicable utilities to the property line in coordination with the utility companies.

.2 The electrical subcontractor shall coordinate the location of all incoming utilities with the applicable utility supplier and adjust the trench and feeder locations accordingly.

.3 Where required, the electrical subcontractor, in conjunction with the Contractor and the Contract Administrator, will initiate the request for power and communications service with the applicable utility companies. The electrical subcontractor will provide any required technical assistance necessary to expedite the utility applications. Applicable building and site load values may be obtained from the Contract Administrator upon request.

1.3 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

.1 Section 01 33 00 – Submittal Procedures: Requirements for shop drawings, product data and samples.

.2 Submit shop drawings, product data and samples as specified, indicating details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment and materials. Include data on manufacturer's recommended environmental conditions for equipment affected by temperature and humidity.

.3 Provide to the Contract Administrator one set of electronic shop drawings of all applicable electrical components to be included in the Work. One copy of the reviewed electronic drawings will be returned to the Contractor for distribution back to the applicable trades.

.4 No electrical equipment shall be ordered or delivered to site until the applicable shop drawings are reviewed & approved.

1.4 AS-BUILT DRAWINGS

.1 Section 01 33 00 – Submittal Procedures: Requirements for as-built drawings.

.2 The electrical subcontractor shall continuously maintain and make available, on site, one set of red-line electrical drawings depicting all up-to-date addendums, field orders, change orders and Site revisions as applicable.

.3 Upon project completion, submit to the Contract Administrator the original copy of the red-line drawings for electronic drawing preparation. The original red-line drawings will be returned to the electrician upon request.

1.5 REGULATORY REQUIREMENTS

.1 Comply with the Workplace Safety and Health Act and regulations made pursuant thereto, including the Manitoba Electrical and the Canadian Electrical Code.

.2 Unless otherwise indicated, all references in the Contract documents to Canadian Electrical Code (CEC) shall mean the edition of the Canadian Electrical Code, Part I, CSA C22.1 and the variations made thereto by Provincial regulation, which are in force as of the submission deadline stated in B2.

.3 All electrical products shall be new, tested, certified and labelled in accordance with a certification program accredited by the Standards Council of Canada. Where a product is not so labelled, provide written approval by the authority having jurisdiction.

.4 If required, submit to the authority having jurisdiction and the utility company, necessary number of drawings and specifications for examination and approval prior to commencement of electrical Work. Pay any associated fees.

.5 Apply, pay for and arrange for all applicable permits, inspections and related fees associated with the electrical components of the Work. Submit copies of the electrical permit and all electrical inspection reports, including the final electrical inspection report, to the Contract Administrator.

1.6 REFERENCES AND CODES

.1 Comply with applicable standards of the following organizations:

.1 Electrical and Electronic Manufacturers Association of Canada (EEMAC).

.2 National Electrical Manufacturers Association. (NEMA).

.3 Institute of Electrical and Electronic Engineers (IEEE).

.4 Insulated Power Cable Engineers Association (IPCEA).

.2 The electrical subcontractor shall provide a complete and operational electrical system using highest quality workmanship and CSA approved materials by licensed journeymen and qualified apprentices.

.3 Unless otherwise noted on the drawings or in the Technical Specifications, uniformity of manufacture shall be maintained for any like particular item or piece of equipment.

1.7 DRAWINGS AND TECHNICAL SPECIFICATIONS

.1 The drawings and Technical Specifications are complimentary to each other. What is called for in one shall be considered as called for in both.

.2 Report any discrepancies in the Contract documents to the Contract Administrator as they relate to the scope of the Work prior to the Bid Opportunity Submission Deadline, as applicable. All necessary addenda shall be issued to clarify the discrepancy within the time frame noted in the bid opportunity.

1.8 CHANGES TO THE SCOPE OF WORK

.1 Changes in the scope of work involving additional work or deletions shall only be undertaken with prior written approval from the Contract Administrator. Changes are subject to approval as described in the Contract.

.2 Pricing submitted for additional work or deletions are to include a price breakdown for all materials and labour, and if requested shall be justified by material invoices and labour time sheets, etc.

1.9 EXAMINATION OF THE SITE

.1 The electrical subcontractor shall visit the Site to review any conditions that will affect his Work, either directly or indirectly, and account for the same in his Bid. Requests for changes will not be accepted for work that would have been evident upon examination of the Site.

1.10 LAYING OUT OF THE WORK

.1 The electrical subcontractor shall be responsible for laying out its portion of the Work and making good any damage caused by that Work.

.2 Coordinate Work with that of other trades to minimize conflicts and to ensure a smooth functioning construction site.

1.11 EXCAVATION AND BACKFILL

.1 Provide all excavation, shading, backfill and compaction required for the underground trenching portion of the electrical installation.

.2 Trenches to be level and utilize 75mm of screened sand below and above underground conduits. Balance of backfill to be suitable native soil or engineered backfill. Install marker tape as required by the CEC.

.3 Grounding rods and conductors to be installed with a minimum cover of 18”.

1.12 EQUIVALENT PRODUCTS

.1 Electrical products specified or given written approval from the Contract Administrator are to be the basis of the electrical Work. Requests for substitutes shall be in accordance with B7 (*substitutes clause*).

.2 Any costs associated with the use of any approved substitute shall be included in the bid price.

.3 Approval of substitute products does not relieve the electrical subcontractor from providing all the necessary components and finishes as intended in the Contract.

1.13 MOUNTING HEIGHTS

.1 Unless otherwise noted on the drawings or directed by the Contract Administrator, use the following mounting heights, as measured from the floor level to the bottom of device:

.1 Switches - 1200mm (48")
.2 Pull stations - 1350mm (54")
.3 Power outlets, voice/data outlets & catv outlets - 305mm (12")
.4 Counter height outlets - 1100mm (44")
.5 Thermostats & mechanical controls - 1500mm (60")
.6 Emergency lights - min. 2290mm (90") or to suit local racking
.7 Horn strobe device - min. 2290mm (90")

1.14 CLEANING

.1 During construction, the electrical subcontractor is required to keep the Site free from debris, packaging, etc. resulting from the Work of the electrical subcontractor.

.2 Prior to preliminary acceptance of the Work, remove all construction dust and debris and clean all electrical equipment and lighting fixtures to the satisfaction of the Contract Administrator.

1.15 WARRANTIES

.1 See D24 for warranty requirements.

END OF SECTION 26 00 10

TABLE OF CONTENTS

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 26 05 13 – Wire and Cable.

.2 Section 26 05 34 – Conduit for Electrical Systems.

.3 Section 26 05 43 – Underground Ductbanks.

.4 Section 31 23 00 – Excavation, Backfilling and Compacting.

1.2 COORDINATION

.1 Section 01 15 00 – General Requirements: Requirements for coordination.

.2 Coordinate Work of this Section with the Contract Administrator as to minimize disruptions to the landfill gas flaring facility.

1.3 QUALITY ASSURANCE

.1 Regulatory requirements: Install materials in accordance with governing standards, safety code requirements, requirements of electric utility and authority having jurisdiction.

PART 2 PRODUCTS

2.1 BEDDING FOR DIRECT BURIED CONDUIT AND DUCTS

.1 Imported and screened sand.

2.2 MARKING TAPE

.1 As required by the Canadian Electrical Code.

2.3 BACKFILL

.1 Native soil or engineered backfill.

PART 3 EXECUTION

3.1 TRENCHING

.1 Excavate trenches for underground electrical services as follows:

.1 Excavate along service routing indicated on the drawings.

.2 Excavate to depth required to ensure minimum 760 mm cover between top of conduit and finished grade.

3.2 BEDDING, BACKFILLING AND COMPACTING

.1 Level bottom of trench with minimum 75 mm layer of sand prior to conduit or duct installation.

.2 Backfill and compact with sand to 75 mm over conduit or duct.

.3 Backfill and compact to finished grade with native soil or engineered backfill. See Section 31 23 00 – Excavation, Backfilling and Compacting for backfilling and compaction execution requirements.

PART 4 MEASUREMENT AND PAYMENT

4.1 GENERAL

.1 Section 01 20 00 – Price and Payment Procedures: Requirements for measurement and payment.

4.2 INSTALLATION OF UNDERGROUND CONDUITS

.1 No separate payment will be made.

.2 Payment: Included in other Payment Items.

END OF SECTION 26 04 10

TABLE OF CONTENTS

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 26 00 10 – Electrical General Requirements.

1.2 REFERENCES AND CODES

.1 Canadian Standards Association (CSA):

.1 CAN/CSA C22.2 No. 48-M90: Non-metallic sheathed cable.
.2 CSA C22.2 No. 51-14: Armoured cables.
.3 CSA C22.2 No. 52-17: Underground service entrance cables.
.4 CSA C22.2 No. 75-17: Thermoplastic-insulated wire and cables.
.5 CAN/CSA C22.2 No 131-17: Type TECK 90 cable.
.6 CSA C22.2 No. 0.3-09: Test methods for electrical wires and cables.
.7 CSA C22.2 No. 38-18: Thermoset-insulated wires and cables.
.8 CSA C22.2 No. 188-18: Splicing wire connectors.
.9 CSA C22.2 No. 198.2-05: Sealed wire connector systems.
.10 CSA C22.2 No. 38-18: Thermoset.

.2 American National Standards Institute/Insulated Cable Engineers Association (ANSI/ICEA):

.1 ICEA S-70-547: Weather-resistant polyolefin-covered wire and cable.
.2 ANSI/ICEA S-97-682 : Utility shielded power cables rated 5 through 46 kV.
.3 ICEA S-19-81: Rubber insulated wire and cable for the transmission and distribution of electrical energy.

.3 American National Standards Institute/National Electrical Manufacturers Association (ANSI/NEMA):

.1 ANSI/NEMA WC 70-2009/ICEA S-95-658-2009: Power cables rated 2000 V or less for the distribution of electrical energy.
.2 ANSI/NEMA WC 71-1999/ICEA S-96-659-199: Standard for non-shielded cables rated 2001-5000 Volts for use in the distribution of electric energy.

1.3 SUBMITTALS

.1 Section 01 33 00 – Submittal Procedures: Requirements for submittals.

1.4 QUALITY ASSURANCE

.1 Regulatory requirements: Install materials in accordance with governing standards, safety code requirements, requirements of electric utility and authority having jurisdiction.

PART 2 PRODUCTS

2.1 BUILDING WIRING

.1 Building wiring shall conform to CSA C22.2 No. 75 and as follows:

.1 Power feeder conductors: solid copper for No. 10 AWG and smaller, stranded copper for No. 8 AWG and larger.

.2 Control systems & instrumentation conductors: stranded copper for all sizes.

.3 Insulation: TWU, RW90 X link, THHN.

.4 Insulation rating: 600, 1000V.

.5 Sizes: as indicated in Wire Size Schedule of this Section.

2.2 CABLES

.1 Armoured cable shall conform to CSA C22.2 No. 51 and as follows:

.1 Conductor: Copper.

.2 Insulation: RW90 X link.

.3 Rating: 600 V.

.4 Size: 12 AWG gauge.

.5 Configuration: As indicated on drawings.

.6 Armour: Aluminum interlocking.

.7 Armoured cable shall only be used for open and concealed wiring in dry locations.

.2 Type TECK 90 cable: to CSA C22.2 No. 131 and as follows:

.1 Conductor: Copper.

.2 Insulation: Cross linked polyethylene (XLP).

.3 Rating: 600, 1000V.

.4 Size: As indicated on drawings.

.5 Configuration: As indicated on drawings and in schedules.

.6 Inner Jacket: PVC -40°C.

.7 Armour: Aluminum or galvanized steel.

.8 Outer Jacket: PVC -40°C.

.3 Service entrance cable shall conform to CSA C22.2 No. 52 and as follows:

.1 Conductor: Copper.

.2 Insulation: Cross linked polyethylene, RWU90.

.3 Rating: 600 V AC.

.4 Size: As specified in Wire Size Schedule of this Section or as indicated on drawings

.4 Control Wire and Cable

.1 Conductor: Copper.

.2 Insulation: 300 V insulation, rated 60°C.

.3 Configuration: Individual conductors twisted together, shielded (where required), and covered with a PVC jacket.

2.3 CONNECTORS

.1 Provide factory fabricated, metal connectors of sizes, ampacity ratings, materials, types and classes for applications and for services indicated.

PART 3 EXECUTION

3.1 WIRING, GENERAL

.1 Splice only in junction or outlet boxes.

.2 Conductor length for parallel circuits shall be identical.

.3 Neatly train and lace conductors inside cabinets, equipment and panelboards.

3.2 WIRING INSTALLATION IN RACEWAYS

.1 Swab raceway system before installing wiring.

.2 Use pulling lubricant.

3.3 WIRE CONNECTIONS AND TERMINATIONS

.1 Use insulated spring wire connectors with plastic caps for conductors No. 10 AWG and smaller.

.2 Use split bolt connectors for copper wire splices and taps, No. 6 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150% of insulation value of conductor

3.4 TECK 90 CABLE INSTALLATION

.1 Provide protection for exposed cables where subject to damage.

.2 Support horizontal runs on cable tray or channels complete with spacers and clamps.

.3 Support vertical runs on channels complete with spacers and clamps.

.4 Support cables minimum one diameter apart. Maintain equal spacing across supports.

3.5 WIRE SIZE SCHEDULE

.1 Lighting Circuits: No. 12 AWG minimum.

.2 Power Circuits: No. 12 AWG minimum, except as otherwise indicated on drawings or in schedules.

.3 Motor Circuits: No. 12 AWG minimum, except as otherwise indicated on drawings or in schedules.

.4 Feeder Circuits: as indicated on drawings or in schedules.

PART 4 MEASUREMENT AND PAYMENT

4.1 GENERAL

.1 Section 01 20 00 – Price and Payment Procedures: Requirements for measurement and payment.

4.2 ELECTRICAL AND CONTROL CONDUITS TO COMPRESSED AIR SYSTEM

.1 Form B: Prices Item No. 25.

.2 Measurement basis: Lump sum.

.3 Payment basis: Includes the supply and installation of all electrical wiring, cables, conduit, ductbanks, fittings and accessories to provide power and control connections from the existing electrical container to the new compressed air system. Also includes trenching, bedding, marker tape, backfilling, compacting and rough restoration of underground conduits.

END OF SECTION 26 05 13

TABLE OF CONTENTS

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 26 00 10 – Electrical General Requirements.

.3 Section 26 05 13 – Wire and Cable.

1.2 REFERENCES AND CODES

.1 Canadian Standards Association (CSA):

.1 CSA C22.2 No. 0.4-17: Bonding electrical equipment (protective grounding).

.2 CSA C22.2 No. 41-13: Grounding and bonding equipment.

.3 CSA T527-94 (R1999): Grounding and bonding for telecommunications in commercial buildings.

.4 CAN/CSA Z32-15: Electrical safety and essential electrical systems in health care facility.

.5 CAN/CSA B72-M87 (R2018): Installation code for lightning protective systems.

.2 IEEE Standards Association (IEEE):

.1 IEEE 837-2014: Qualifying permanent connections used in substation grounding.

1.3 COORDINATION

.1 Coordinate installation of ground rods and cables with trenching and work of other trades.

1.4 SUBMITTALS

.1 Section 01 33 00 – Submittal Procedures: Requirements for submittals.

1.5 QUALITY ASSURANCE

.1 Regulatory requirements: Install materials in accordance with governing standards, safety code requirements, requirements of electric utility and authority having jurisdiction.

PART 2 PRODUCTS

2.1 GROUNDING AND BONDING

.1 Grounding and bonding equipment shall conform to CSA C22.2 No. 41 and as follows:

.1 Ground rods: 20 mm x 3 m copper clad.

.2 Ground conductors: As indicated on drawings

.3 Ground grid:

.1 Number of ground rods as shown on drawings.

.2 Interconnect conductors: 2/0 bare copper.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Comply with requirements of CSA C22.2 No. 0.4 and Canadian Electrical Code.

.2 Install complete permanent grounding system including electrodes, conductors, connectors and accessories.

.3 Protect exposed ground conductors from mechanical injury.

.4 Make buried connections, and connections to electrodes using pressure connectors.

.5 Use mechanical connectors for ground connection to equipment provided with lugs.

.6 Do not solder joints.

.7 Install bonding wire in flexible metal conduit connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw.

.8 Install separate insulated ground conductor in conduit runs installed in concrete which is subject to moisture penetration and underground.

.9 Ensure a minimum of 455 mm of ground cover over rods and ground conductors.

3.2 SYSTEM GROUNDING

.1 Provide ground conductor to main system ground.

3.3 GROUND CONDUCTORS

.1 Use bare or insulated ground conductors as sized and specified on the drawings.

PART 4 MEASUREMENT AND PAYMENT

4.1 GENERAL

.1 Section 01 20 00 – Price and Payment Procedures: Requirements for measurement and payment.

4.2 GROUNDING AND BONDING OF COMPRESSED AIR SYSTEM

.1 Form B: Prices Item No. 26.

.2 Measurement Basis: Lump sum.

.3 Payment Basis: Includes the supply and installation of all grounding and bonding rods and wire for the compressed air system as shown on the drawings.

END OF SECTION 26 05 26

TABLE OF CONTENTS

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 26 00 10 – Electrical General Requirements.

.2 Section 26 04 10 – Underground Service and Service Entrance.

.3 Section 26 05 13 – Wire and Cable.

.4 Section 26 05 43 – Underground Ductbanks for Electrical Systems.

1.2 REFERENCES AND CODES

.1 Canadian Standards Association (CSA):

.1 CSA B137.1-13: Polyethylene (PE) pipe, tubing and fittings for cold water pressure services.

.2 CSA C22.2 No.45-M1981(R2008): Rigid metal conduit

.3 CSA C22.2 No. 56-17: Flexible metal conduit and liquid and liquid tight flexible metal conduit.

.4 CSA C22.2 No.83-M1985(R2017): Electrical metallic tubing.

.5 CSA C22.2 No. 211.1 06(R2016): Rigid types EB1 and DB2/ES2 PVC conduit.

.6 CSA C22.2 No.211.2-06(R2016): Rigid PVC (unplasticized) conduit.

.7 CSA C22.2 No. 211.3 96(R2007): Reinforced thermosetting resin conduit (RTRC) on fittings.

1.3 COORDINATION

.1 Section 01 15 00 – General Requirements: Requirements for coordination.

.2 Coordinate installation of conduit which penetrates fire rated walls or gas tight partitions, floors or ceilings with firestopping work. Ensure that integrity of the fire rated element is maintained.

PART 2 PRODUCTS

2.1 CONDUIT, GENERAL

.1 Except where otherwise required by Canadian Electrical Code (CEC), provide conduit of types specified in Conduit Installation Schedule of this Section and sizes indicated on drawings or specified.

.2 Where sizes are not indicated, select proper sizes to suit intended use, fulfill wiring requirements, and comply with Canadian Electrical Code (CEC).

2.2 METAL CONDUIT AND TUBING

.1 Rigid metal conduit conforming to CSA C22.2 No. 45 and as follows:

.1 Galvanized rigid steel conduit: zinc coated steel.

.2 PVC externally coated rigid steel conduit: zinc coated steel with additional external coating of PVC.

.3 Epoxy coated rigid steel conduit: zinc coated steel, with additional epoxy coating inside and outside.

.4 Rigid aluminum conduit: with factory applied, closed end thread protectors.

.5 Fittings: same material as conduit.

.2 Electrical metallic tubing (EMT) conforming to CSA C22.2 No. 83 with fittings as follows:

.1 Fitting material for 25 mm size conduit and smaller: zinc alloy or zinc coated steel.

.2 Fitting material for conduit larger than 25 mm size: zinc coated steel.

.3 Type: compression or set screw, liquid tight for wet or damp areas.

.3 Flexible metal conduit conforming to CSA C22.2 No. 56 and as follows:

.1 Flexible metal conduit: spirally wound, interlocked zinc coated strip steel, minimum 10 mm diameter.

.2 Flexible metal conduit fittings: threadless hinged clamp type.

.3 Liquid tight flexible metal conduit: continuous interlocked and double wrapped steel, zinc coated inside and outside, coated with liquid tight jacket of flexible PVC, minimum 12 mm diameter.

.4 Liquid tight flexible metal conduit fittings: cadmium plated, malleable iron fittings with compression type steel ferrule and neoprene gasket sealing rings.

.4 Miscellaneous fittings: locknuts, bushings, reducers, chase nipples, 3 piece unions, split couplings, plugs, and expansion fittings specifically designed for their particular application.

2.3 NON-METALLIC CONDUIT

.1 Rigid type RPVC conduit conforming to CSA C22.2 No. 211.1.

.2 Rigid type DB2/ES2 RPVC conduit conforming to CSA C22.2 No. 211.1.

PART 3 EXECUTION

3.1 CONDUIT, GENERAL

.1 Installed conduit shall be free from dents, bruises and other damage.

.2 Plug conduit ends to prevent entry of dirt and moisture.

.3 Seal conduit with duct seal compound or fibreglass where conduit leaves heated area and enters unheated area.

.4 Provide necessary flashing and pitchpockets, making watertight joints where conduit passes through roof or waterproofing membranes.

.5 Where conduit crosses building expansion joints, install expansion fitting approved by authority having jurisdiction, complete with grounding jumper. Provide bend or offset in conduit adjacent to building expansion joint where conduit is installed above suspended ceilings.

3.2 METAL CONDUIT AND TUBING

.1 Field bend conduit with benders designed for purpose so as not to distort nor vary internal diameter.

.2 Avoid use of dissimilar metals throughout system to eliminate possibility of electrolysis. Where dissimilar metals are in contact, coat surfaces with corrosion inhibiting compound before assembling.

3.3 RIGID METAL CONDUIT

.1 Cut conduit straight, properly ream, cut threads and brush threads clean.

.2 Fasten conduit terminations in sheet metal enclosures with two locknuts and terminate with bushing. Install locknuts inside and outside enclosure.

.3 Conduit installed underground shall be painted with two coats of corrosion inhibiting compound before backfilling.

3.4 NON-METALLIC CONDUIT

.1 Make field bends and solvent cemented joints in accordance with manufacturer's instructions.

3.5 EXPOSED AND SEMI-CONCEALED CONDUIT

.1 Comply with the following when installing conduit exposed in service areas, unfinished areas, finished areas, and in accessible spaces behind ceilings, walls and floors:

.1 Install conduit to conserve headroom and cause minimum interference in spaces through which conduit passes.

.2 Install conduit so as not to interfere with ceiling inserts, luminaires or ventilation ducts or outlets.

.3 Alter routing to avoid structural obstructions, keeping crossovers to a minimum.

.4 Install exposed conduit and extensions from concealed conduit systems neatly, parallel with, or at right angles to walls and structural members.

.5 Run conduit for outlets on waterproof walls exposed. Set anchors for supporting conduit on waterproof wall in waterproof cement.

3.6 CONDUIT INSTALLATION SCHEDULE

.1 Galvanized rigid steel:

.1 All service entrance elbows.

.2 Hazardous areas.

.2 Rigid type RPVC:

.1 Service entrances.

.2 All other exterior underground conduit runs.

.3 Flexible metal type AC90:

.1 Connections to luminaires.

.4 Liquid-tight:

.1 Connections to motors.

.5 Flexible metal:

.1 Connections to equipment in damp locations.

.6 EMT:

.1 All other applications.

PART 4 MEASUREMENT AND PAYMENT

4.1 GENERAL

.1 Section 01 20 00 – Price and Payment Procedures: Requirements for measurement and payment.

4.2 CONDUIT FOR ELECTRICAL SYSTEMS

.1 No separate payment will be made.

.2 Payment: Included in other Payment Items.

END OF SECTION 26 05 34

TABLE OF CONTENTS

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 26 04 10 – Underground Service and Service Entrance.

.3 Section 31 23 00 – Excavation Backfilling and Compacting.

1.2 COORDINATION

.1 Section 01 15 00 – General Requirements: Requirements for coordination.

.2 Coordinate Work of this Section with Work specified in all other Sections.

PART 2 PRODUCTS

2.1 CONDUIT

.1 Rigid polyvinyl chloride.

PART 3 EXECUTION

3.1 UNDERGROUND DUCTBANKS

.1 Install underground ductbanks at locations indicated on drawings.

.2 Build ductbank on well compacted sand fill not less than 75 mm thick.

.3 Install ductbank with a minimum 150 mm per 30 m length slope.

.4 Use conduit to duct adapters when connecting to threaded galvanized rigid steel conduit.

PART 4 MEASUREMENT AND PAYMENT

4.1 GENERAL

.1 Section 01 20 00 – Price and Payment Procedures: Requirements for measurement and payment.

4.2 UNDERGROUND DUCTBANKS

.1 No separate payment will be made.

.2 Payment: Included in other Payment Items.

END OF SECTION 26 05 43

TABLE OF CONTENTS

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 26 00 10 – General Electrical Requirements

1.2 REFERENCES AND CODES

.1 Canadian Standards Association (CSA):

.1 CSA C22.2 No. 4-04 (R2014): Enclosed and dead-front switches

.2 CSA C22.2 No. 39-M1987 (R2013): Fuseholder assemblies

1.3 COORDINATION

.1 Section 01 15 00 – General Requirements: Requirements for coordination.

.2 Coordinate installation of disconnects for equipment specified in other Sections with installation of such equipment.

1.4 SOURCE OF SUPPLY

.1 All disconnects shall be by a single manufacturer.

PART 2 PRODUCTS

2.1 UNFUSED DISCONNECTS

.1 Unfused Disconnects conforming to CAN/CSA-C22.2 No. 4 and as follows:

.1 Poles, voltage, amperage, kW rating and enclosure: as indicated on drawings or schedules.

.2 Type: heavy duty.

.3 Operation: lever handle, capable of being locked in "On" or "Off" position.

2.2 FUSED DISCONNECTS

.1 Fused Disconnects conforming to CSA C22.2 No. 39 and as follows:

.1 Same as unfused disconnects except complete with fuse holders.

.2 Fuse holders shall be compatible with fuses as specified.

PART 3 EXECUTION

3.1 DISCONNECTS

.1 Install disconnects as per manufacturer instructions at locations indicated on drawings.

PART 4 MEASUREMENT AND PAYMENT

4.1 GENERAL

.1 Section 01 20 00 – Price and Payment Procedures: Requirements for measurement and payment.

4.2 DISCONNECT ON OUTSIDE OF ELECTRICAL CONTAINER

.1 Form B: Prices Item No. 24.

.2 Measurement basis: Lump sum.

.3 Payment basis: Includes the supply and installation of the disconnect switch on the outside of the existing electrical container and connection to existing electrical service.

4.3 DISCONNECT ON OUTSIDE OF COMPRESSED AIR SYSTEM CONTAINER

.1 No separate payment will be made.

.2 Payment: Included in other Payment Items.

END OF SECTION 26 28 17

TABLE OF CONTENTS

PART 1 GENERAL

1.1 DESCRIPTION

.1 Requirements for the restoration of areas disturbed during the installation of landfill gas collection piping and associated landfill gas collection and compressed air system infrastructure.

1.2 RELATED SECTIONS

.1 Section 22 15 00 – Compressed Air System

.2 Section 31 23 00 – Excavation, Backfilling and Compacting.

.3 Section 33 52 16 – HDPE Wellfield Piping: Installation of landfill gas piping below the final cover.

.4 Section 33 52 17 – Landfill Gas Appurtenances.

1.2 REFERENCES AND CODES

.1 Section 01 45 00 - Quality Control: Requirements for references.

.2 CW3540 – Topsoil.

.3 CW3520 – Seeding.

.4 MSCS 1298 – Supply and Place Erosion Control Blanket.

1.3 DELIVERY, STORAGE, AND HANDLING

.1 Section 01 60 00 – Product Requirements, stockpile material on Site in approved locations designated by Contract Administrator, and as specified in Section 31 23 00 – Excavation, Backfilling and Compacting.

1.4 ENVIRONMENTAL REQUIREMENTS

.1 Section 01 50 00 – Temporary Facilities and Controls: Requirements for construction facilities and temporary controls.

.2 Suspend operations whenever climatic conditions, as determined by Contract Administrator, are unsatisfactory for placing material to the requirements of this Section.

.3 After occurrence of heavy rains, do not operate equipment on previously placed material or on approved excavations until the material has dried sufficiently to prevent occurrence of excessive rutting.

.4 Do not place fill in a frozen state or against frozen excavations or previously placed material. Do not place fill on snow, ice, water, or other objectionable material or on improperly prepared excavations or previously placed material.

.5 Where excavations or previously placed material have been softened or eroded, remove soft and yielding material or otherwise objectionable or damage areas and replace with compacted fill as specified.

1.5 SEQUENCING AND SCHEDULING

.1 Section 01 15 00 – General Requirements: Requirements for coordination.

.2 Sequence delivery of materials to Site in a manner to minimize stockpiling and obtain approval from Contract Administrator to stockpile.

.3 Schedule completion of piping and repair of final cover in waste prior to conducting works outside of waste footprint.

PART 2 PRODUCTS

2.1 CLAY

.1 Existing clay excavated to be stockpiled and reused. Clay is to be clean and free of refuse/litter.

.2 Additional clay may be available from on-site source as directed by the Contract Administrator.

2.2 TOPSOIL

.1 Existing topsoil to be stockpiled and reused.

.2 Additional growth media may be available from on-site source as directed by the Contract Administrator.

2.3 SEED AND MULCH AND EROSION BLANKET

.1 Seed: native ditch mix consisting of the following:

.1 Creeping Red Fescue Festuca rubra: 20%
.2 Smooth Brome Bromus inermis Leyess: 10%
.3 Meadow Fescue Festuca pratensis: 10%
.4 Slender Wheat Grass Elymus trachycaulus: 15%
.5 Tall Wheat Grass Thinopyrum ponticum: 15%
.6 Alfalfa (creeping variety) Medicago media: 15%
.7 Alsike Clover Trifolium hybridum: 10%

.8 Birdsfoot Trefoil Lotus corniculatus: 5%

.2 Water is not available from on-site hydrants for hydro-seeder.

.3 Mulch to be Type C (Cellulose Pulp).

.4 Application rate to be 1 kg per 100 sq. metres.

.5 Place Type 'S' erosion control blanket as per Manufacturer's specification on restored and seeded areas as directed by the Contract Administrator. Straw fiber is to be a minimum 0.27 kg per sq. metre. Blanket to be type S75 as manufactured by North American Green or an approved equivalent.

PART 3 EXECUTION

3.1 GENERAL

.1 Restore all areas disturbed during the installation of landfill gas collection piping, associated landfill gas collection infrastructure and compressed air system to pre-construction conditions or better.

3.2 FINISH GRADING

.1 Restore all other locations affected by the Works of this Contract to pre-construction conditions.

.2 Disturbed areas of flaring compound shall be:

.1 Graded to positively drain away from concrete pads and away from the compound as per the Contract drawings.

.2 Finished with a minimum of 50 mm of gravel.

3.3 TOPSOIL PREPARATION

.1 All surface areas designated for reseeding shall have a fine graded uniform surface free of humps and hollows.

.2 Apply a minimum of 50 mm of topsoil to all surface areas designated for reseeding.

PART 4 MEASUREMENT AND PAYMENT

4.1 GENERAL

.1 Section 01 20 00 – Price and Payment Procedures: Requirements for measurement and payment.

4.2 WELLFIELD RESTORATION

.1 Form B: Prices Item No. 20

.2 Measurement: Lump sum.

.3 Payment: Includes supply of materials and labour for restoration of the landfill gas collection system wellfield area to pre-construction conditions.

4.3 COMPRESSED AIR SYSTEM RESTORATION

.1 Form B: Prices Item No. 28

.2 Measurement: Lump sum.

.3 Payment: Includes supply of materials and labour for restoration of the compressed air system area to pre-construction conditions.

END OF SECTION 31 22 19

TABLE OF CONTENTS

PART 1 GENERAL

1.1 DESCRIPTION

.1 Requirements for excavation, backfilling and compacting during the installation of landfill gas collection piping and associated landfill gas collection and compressed air system infrastructure.

1.2 RELATED SECTIONS

.1 Section 26 04 10 – Underground Service and Service Entrance

.2 Section 26 05 43 – Underground Ductbanks for Electrical Systems

.3 Section 33 52 16 – HDPE Wellfield Piping

.4 Section 33 52 17 – Landfill Gas Appurtenances

1.3 REFERENCES AND CODES

.1 Section 01 45 00 – Quality Control: Requirements for references.

.2 CW2030 – Excavation, Bedding and Backfill.

.3 CW2160 – Concrete Underground Structures and Works.

.4 CW3110 – Sub-Grade, Sub-Base and Base Course Construction.

.5 CW3170 – Earthwork and Grading.

1.4 SUBMITTALS

.1 Section 01 33 00 – Submittal Procedures: Requirements for submittals.

.2 Certificates: Provide all necessary certificates prior to use of sheeting, shoring, trench boxes, or other facilities used for earth support.

1.5 ENVIRONMENTAL REQUIREMENTS

.1 Section 01 50 00 – Temporary Facilities and Controls: Requirements for temporary controls.

.2 Follow health and safety plan at all times.

.3 Protect open excavations against damage due to surface runoff and run-on. Take necessary precautions to prevent erosion of excavated or disturbed surfaces.

.4 Suspend operation whenever climatic conditions, as determined by Contract Administrator, are unsatisfactory for placing fill to the requirements of this Section.

.5 After occurrences of heavy rains, do not operate equipment on approved excavations until the material has dried sufficiently to prevent occurrence of excessive rutting.

.6 Where excavations have been softened or eroded, remove soft and yielding material or otherwise objectionable or damaged areas and replace with fill as specified by Contract Administrator.

.7 Clean equipment involved in excavation activities, which may have come into contact with refuse before being removed from the Site or being relocated to clean areas offsite.

.8 Do not obstruct flow of surface drainage or natural watercourses.

1.6 SEQUENCING AND SCHEDULING

.1 Section 01 15 00 – General Requirements: Requirements for coordination.

.2 Sequence and schedule excavation activities with Work of other Sections.

.3 Do not commence excavation operations until the site-specific health and safety plan has been reviewed by Contract Administrator and implemented.

.4 Coordinate interruptions of utility services to existing facilities, which become necessary either directly or indirectly due to Work required under this Contract through Contract Administrator. Down time for service disruptions may be limited as to duration and time (weekend, nights, or holidays). Perform Works during the period designated.

.5 Coordinate and sequence excavation operations to minimize the need for temporary stockpiling excavated materials until required for back filling. Make every effort to balance cut and fill operations and to ensure that any excavated material designated for backfill is immediately placed as backfill in Works. Keep the time during which excavations remain open to the practicable minimum.

.6 Do not allow or cause any of Work performed to be covered up or enclosed prior to required inspections, tests, or approvals.

.7 The Contractor is to minimize amount of open trench on the landfill so as to minimize odours.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Gravel: Conform to Granular Base Course Material in CW3110.

.2 Sand Fill: Conform to CW2030.

.3 Unshrinkable Fill: Conform to Cement – Stabilized Fill in CW2160 with a maximum compressive strength at 28 days of 1.5 MPa.

2.2 ACCESSORIES

.1 Selected by Contractors for the purpose intended and subject to Contract Administrator's approval prior to use.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Section 01 15 00 - General Requirements: Verification of existing conditions before starting Work.

.2 Verify that survey benchmarks and intended elevations for Works are as indicated.

.3 Do not allow or cause any of the Work performed or installed to be covered up or enclosed by Work of this Section prior to required inspections, measurements, tests, or approvals.

.4 Obtain approval from Contract Administrator for completed excavations and previously placed material prior to placement of successive lifts.

.5 Obtain approval from Contract Administrator prior to placing fill against structures or around exposed buried utilities.

.6 Ensure areas to be backfilled are free from debris snow, ice, water, or frozen ground.

3.2 PREPARATION

.1 Identify required lines, levels, contours, and datum locations.

.2 Locate, identify, and protect utilities that remain from damage. Confirm locations of buried utilities and structures by careful test excavations or other suitable means.

.3 Protect plant life, lawns, and other features remaining as a portion of final landscaping.

.4 Protect benchmarks, survey control points, existing structures, fences, paving and curbs from excavating equipment and vehicular traffic.

.5 Maintain and protect from damage wells, utilities, and structures encountered. In the event of disturbance of or damage to any utility or structure immediately notify Contract Administrator. Repair or replace any utility or structure damaged by Contractor operations.

.6 Protect existing buildings and surface features, which may be affected while Work is in progress.

.7 Protect existing building and structures where temporary unbalanced earth pressures are liable to develop on walls or other structures utilizing bracing, shoring, or other approved methods to counteract unbalance.

.8 Protect monitoring wells and any other structures and pipelines from any uplift and displacement or disturbance during excavation operations.

.9 Employ procedures for excavation and trenching such that disturbance of existing infrastructure, utilities, structures, and their foundations are avoided.

.10 Protect excavations and trenches from contamination.

.11 Obtain direction form Contract Administrator before moving or otherwise disturbing utilities or structures.

.12 Remove surface features or obstructions including, but not necessarily limited to, trees, shrubs, bush, and other vegetation from surfaces to be excavated, as required to construct the finished Work. Dispose of such obstructions to an on-Site disposal area as directed by Contract Administrator.

.13 Compact sub grade to density requirements for subsequent backfill materials.

.14 Cut out soft areas of sub grade not capable of compaction in place. Backfill with approved native fill and compact to density equal to or greater than requirements for subsequent fill material.

.15 Remove debris, snow, ice, water, or frozen ground from areas to be backfilled.

.16 Proof roll sub grade surface to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.

.17 Decontaminate equipment, which has been used in refuse prior to being used for back filling operations.

3.3 TRENCHING FOR BURIED PIPING AND CONDUITS

.1 Excavate soil required for piping.

.2 Cut trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with Works.

.3 Do not interfere with 45- degree bearing splay of foundations.

.4 The banks of trenches shall be as nearly vertical as allowable and in accordance with the current Federal, Provincial and local safety legislation and requirements.

.5 In no case during performance of Works shall trenching advance ahead of the active installation more than necessary to facilitate proper placement.

.6 Accurately excavate and grade the bottom of trenches to provide uniform bearing and support for each section of the pipe on full thickness of approved bedding material at every point along its entire length.

.7 Remove lumped soil and boulders.

.8 Hand trim, make firm, and remove loose material, refuse and debris from trenches. Where natural or fill material at bottom of excavation is disturbed, compact disturbed soil to density at least equal to undisturbed soil or to the density specified for the succeeding layer of backfill, whichever is greater, or remove disturbed soil and refill the space as directed by Contract Administrator.

.9 Do not disturb soil within the branch spread of trees or shrubs that are to remain. If excavating through roots, excavate by hand and cut roots with sharp axe or saw. Seal cuts with approved tree wound dressing.

.10 Open trenches shall be Contractor's sole responsibility.

.11 Stockpile excavated material in area designated on Site.

3.4 BACKFILLING

.1 Granular materials: Place and compact materials in equal continuous layers not exceeding 200 mm (8 inches) uncompacted depth.

.2 Soil Native: Place and compact material in equal continuous layers not exceeding 200 mm compacted depth.

.3 Employ a placement method that does not disturb or damage other Work.

.4 Maintain optimum moisture content of backfill materials, other than refuse, required to attain specified compaction density of 95% Standard Proctor Density over, under and around all piping.

.5 Make gradual grade changes. Blend slope into level areas.

.6 Use fill types as specified. Completely use select native fill approved for backfilling before using imported fill.

.7 Do not use backfill material which is determined unsuitable by Contract Administrator.

.8 Backfill around exposed utilities by placing layers simultaneously on all sides to equalize loading. Do not dump directly against monitoring wells, utilities, or foundations.

.9 Do not operate heavy compaction equipment closer than 1 metre to foundations, underground utilities, or monitoring wells.

.10 Backfill around installations as follows:

.1 Place bedding and surround material as specified in the Section.

.2 Place layers simultaneously, on both sides of installed Work to equalize loading and minimize movement.

.3 Where temporary unbalanced earth pressures are liable to develop on walls or other structures, place material under, around, and over installations until 1.6 metres of cover is provided. Do not dump material directly on installations.

.11 Except as specified otherwise, place backfill continuously and in uniform layers not exceeding specified compacted thickness up to grades shown on Drawings.

.12 Compact each layer to the specified density before placing succeeding layers as specified in Article 3.5.

.13 When backfilling non-refuse material, it shall be free of refuse and litter.

3.5 COMPACTION

.1 Apply potable water as necessary during compaction to obtain the specified density. If the material to be compacted is excessively moist, aerate with suitable equipment and methods until the moisture content is corrected. In areas not accessible to rolling equipment, compact material to specified density with mechanical tampers approved by Contract Administrator.

.2 When granular material is wetted by sprinkling, after being spread on material in place, sprinkling shall be done by method approved by Contract Administrator. Do not direct jets of water at fill with such force that finer materials will be washed out.

.3 Compaction Equipment: The type, size, and efficiency of compaction equipment shall be capable of achieving specified degree of compaction. When operating equipment adjacent to and immediately above structures, exercise care so as not to cause damage or displacement of the structure.

3.6 EXCESS MATERIALS

.1 Dispose of surplus material onsite as directed by the Contract Administrator.

.2 Dispose of excavated refuse onsite in area as directed by the Contract Administrator.

3.7 FIELD QUALITY CONTROL

.1 Section 01 45 00 - Quality Control: Field inspection and testing.

.2 Testing by Contract Administrator:

.1 Contract Administrator may select samples of uncompacted fill intended for Works and samples of compacted fill in Works.

.2 Contract Administrator may perform tests in the field and in the laboratory on samples of backfill and imported fill to determine if materials meet specification. Testing of imported fill will include analysis for the presence of contaminates, grain size analysis, moisture content determination, bulk wet density, maximum dry density, and permeability. Testing for backfill will include moisture content determination, maximum dry density, and bulk wet density. Copies of test reports will be supplied to Contractor on request.

.3 Testing by Contract Administrator will in no way relieve Contractor of his responsibility to test all material prior to notifying Contract Administrator of the materials' suitability for the Work involved.

.3 Methods of Testing: Testing will be performed in accordance with CW2030.

.4 Failure to Meet Specified Requirements: If tests indicate that material specifications have not been achieved or cannot be obtained with equipment in use, the procedure being followed, or the material being incorporated, remove and replace Work and modify operations so that the equipment, procedures, and materials will produce the required results. Additional testing required by Contract Administrator will be Contractor's account.

3.8 ADJUSTING

.1 Finish compacted soil surfaces to within 25 mm of grades shown on Drawings but not uniformly high or low. Correct surface irregularities by loosening and adding or removing material until the surface is within specified grade.

.2 Leave Work areas in a properly graded condition sloped as required to permit proper drainage and free of depressions that will pond or collect water or debris that will restrict flow.

3.9 CLEANING

.1 Section 01 77 00 – Closeout Procedures: Requirements for cleaning installed Work.

.2 Clean and reinstate Work areas affected by equipment outside area specified to be excavated, to specified restoration condition.

.3 Upon completion of backfilling, remove excess material and debris from Work areas and travel routes.

3.10 TEMPORARY STOCKPILING

.1 Obtain Contract Administrator's approval for locations of temporary stockpiles. Obtain Contract Administrator's approval prior to placing material in such stockpiles.

.2 Construct stockpile sites so that they are level, well drained, free of foreign materials, and of adequate bearing capacity to support the weight of the materials to be placed thereon.

.3 Provide and maintain access to stockpiles.

.4 Separate differing materials with substantial dividers or stockpile apart to prevent mixing.

.5 Prevent intermixing of soil types or contamination or segregation.

.6 Direct surface water away from stockpile site to prevent corrosion or deterioration of materials.

.7 Maintain temporary stockpile slopes not steeper than 1.5 horizontal to 1 vertical. In no instance shall stockpiles be greater than 3 metres in height above original surrounding grade. Place hay bales or other soil erosion and sediment control fencing at the base of and around each temporary stockpile to contain soil that may be washed off the stockpile.

.8 Maintain area surrounding stockpiles in neat and tidy condition.

3.11 PROTECTION OF FINISHED WORK

.1 Section 01 50 00 – Temporary Facilities and Controls: Requirement for protecting installed Work.

.2 Reshape and recompact fills subjected to vehicular traffic.

PART 4 MEASUREMENT AND PAYMENT

4.1 GENERAL

.1 Section 01 20 00 – Price and Payment Procedures: Requirements for measurement and payment.

4.2 EXCAVATION, BACKFILLING, AND COMPACTING

.1 No separate payment will be made.

.2 Payment: Included in other Payment Items.

END OF SECTION 31 23 00

TABLE OF CONTENTS

PART 1 GENERAL

1.1 DESCRIPTION

.1 Requirements for the installation of vertical landfill gas extraction wells.

.2 The supply of all materials, equipment and labour for the installation of fifteen (15) landfill gas extraction wells as outlined in the drawings.

.3 Maximum well depth is approximately 32 metres. Total drill depth of the fifteen (15) wells is approximately 350 metres.

1.2 RELATED SECTIONS

.1 Section 33 52 17 – Landfill Gas Appurtenances

1.3 REFERENCES AND CODES

.1 Section 01 15 00 – General Requirements.

.2 Canadian Standards Association (CSA): B137.3 - Rigid Polyvinyl Chloride (PVC) Pipe.

1.4 SUBMITTALS

.1 Section 01 33 00 – Submittal Procedures: Requirements for submittals of products supplied by Contractor.

.2 Material Source: Submit name of proposed imported fill materials sources at least 14 days prior to commencing transport of the materials to the Site.

.3 Suppliers' Certificates: Submit certificate indicating that each type of fill materials meets or exceeds specified requirements.

.4 Drilling Firm: Resumé outlining experience of drilling firm with regard to installation of boreholes in waste and related hazards associated with landfill gas.

.5 Drilling Equipment: Indicate manufacturer and model number.

.6 Borehole Logs.

1.5 QUALITY ASSURANCE

.1 Procure permits, certificates, and licenses required by law for the execution of Works. Comply with Laws and Regulations relating to the performance of the Works.

1.6 QUALIFICATIONS

.1 Drilling Firm: Company specializing in performing the Work of this Section with a driller licensed in the Province of Manitoba with minimum 5 years experience.

.2 Drilling Crew: 1 crew member shall have minimum 5 years experience in performing the Work of this Section.

1.7 ENVIRONMENTAL REQUIREMENTS

.1 Section 01 50 00 – Temporary Facilities and Controls.

.2 Take necessary precautionary measures to prevent drilling into base of landfill.

.3 Contain waste cuttings and transport and dispose of in active landfill area or as directed by Contract Administrator.

1.8 SEQUENCING AND SCHEDULING

.1 Section 01 15 00 – General Requirements: Coordination.

.2 Sequence and schedule the Work subject to the following conditions:

.1 Contract Administrator will determine location and sequence of drilling events, and successful completion of a well.

.2 Cover uncompleted well at end of day to prevent access to hole and to minimize escape of gas.

.3 Complete drilling and installation activities at each well in its entirety before moving to a subsequent well.

.4 Contract Administrator will determine if and when refusal in a borehole has occurred and whether borehole is to be abandoned.

PART 2 PRODUCTS

2.1 RISER PIPE AND WELL SCREEN

.1 Pipe for landfill gas extraction wells - PVC: CSA B137.3, Schedule 80, 150 mm diameter with threaded joints. The configuration and size of perforations, where required, shall be as shown on drawing detail W1301-6.

.2 Caps:

.1 End Caps: PVC, size as noted on the drawings, slip end cap solvent welded or threaded and secured as shown on the drawings.

.2 Temporary Cap: PVC, size as noted on the drawings, slip end cap, do not solvent weld.

.3 Fittings (PVC): CSA B137.3, Schedule 80, as shown on the drawings.

.4 Fasteners: As shown on the drawings.

2.2 STONE

.1 Clear washed pea stone gravel (approximately 19 mm (3/4 inch)). No fines will be allowed.

.2 Content: No more than 3 percent limestone.

.3 Sieve analysis of the pea stone to be submitted upon award.

.4 Stone to meet the following:

US Std. Sieve Size		Cumulative Percent Passing
mm	inches	
50.8	2	100
38.1	1 ½	100
25.4	1	100
19	¾	70-90
13.2	½	20-40
9.5	3/8	0-5
4.8	No.4	0-1

2.3 BENTONITE GROUT SEAL

.1 The Bentonite seal is to be Volclay / Baroid / Benseal powder or approved equivalent, as approved by the Contract Administrator.

2.4 WATER

.1 Water used in equipment cleaning, drilling, landfill gas extraction well construction, or other activities shall be clean, potable water, supplied by Contractor.

2.5 DRILLING EQUIPMENT

.1 The drilling equipment employed should be at least equivalent to a Central Mining Equipment CME75 and capable of drilling the appropriate diameter hole through compacted silt fill, both unsaturated and saturated refuse, and gravel to a maximum depth of approximately 32 metres. Air rotary, hollow stem auger, or bucket auger drilling technique will be utilized. No drilling fluids will be used for construction without approval of the Contract Administrator. All boreholes are to be true to line and plumb. Exercise extreme caution when drilling extraction wells near the edge of the landfill to ensure the extraction wells do not exceed closer than 3 meters to the base of the landfill.

2.6 OTHER MATERIALS

.1 Selected by Contractor for the purpose intended and subject to Contract Administrator's approval prior to use.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Section 01 15 00 – General Requirements: Examination

.2 Verify that Site conditions will support equipment for performing drilling operations.

.3 Do not commence drilling operations until Contract Administrator has approved the location of each well.

.4 Obtain Contract Administrator's approval for all material to be introduced into borehole.

3.2 PREPARATION

.1 Construct temporary drilling platforms. Alter landfill sideslopes as approved by Contract Administrator.

3.3 DRILLING

.1 Use drilling equipment and methods approved by Contract Administrator.

.2 The location of all wells will be marked by the Contractor as per the layout shown in Drawing W1002, and approved by the Contract Administrator. These locations may be moved at the discretion of the site Contract Administrator. Circumstances which may dictate the moving of well locations include, but are not limited to:

.1 a change in piping layout

.2 a high leachate level in the landfill

.3 encountered obstruction (e.g. boulder, tires, roadway, etc.) which may preclude drilling in that location.

.3 Grade at well shall be verified by the Contractor prior to drilling, and provided to the Contract Administrator to confirm drill depth.

.4 Drill boreholes true to line and plumb.

.5 Construct each well in accordance with the details as shown on the Drawings and as directed by Contract Administrator.

.6 At least 1 metre stick-up from ground surface will be left after completion of the well installation. The well pipe will be temporarily capped with a loose-fit PVC slip cap.

.7 Each well must be completed before moving to another well location, unless instructed otherwise by the Contract Administrator.

.8 Exercise extreme caution when drilling wells to follow depth information provided and to ensure extraction wells do not extend to the base of the landfill. If liner penetration is suspected, Contractor is to immediately notify Contract Administrator and plug bottom of borehole with bentonite grout seal.

.9 Contractor to confirm total drilling depth with Contract Administrator prior to commencement of drilling activities.

.10 Any equipment lost or damaged is at the Contractor's expense to repair or replace.

3.4 BOREHOLE LOGGING

.1 Maintain a log or record and submit to Contract Administrator within 7 days of installation of each well which shall include the following information:

.1 The general character, thickness, and type of material encountered.

.2 The depth at which leachate was encountered, if any.

.3 The total depth of the extraction well

.4 The nature and extent of all other Work performed, including the time spent on each item of Work.

.5 The depth of solid and perforated/slotted pipe sections.

.6 Quantities of materials placed in the boreholes.

.7 Elevation of top of well riser.

3.5 WASTE HANDLING

.1 Collect cuttings and solid waste generated during extraction well construction and dispose of in active landfill area as directed by Contract Administrator.

3.6 WELL ABANDONMENT

.1 In the event of well abandonment because of loss of tools or equipment, caving-in of the drilled borehole, or due to Contractor negligence, if requested and as directed by Contract Administrator, fill the abandoned hole with drill cuttings and place a 500 mm bentonite seal directly below the final cover. Well abandonment due to Contractor's negligence will be at Contractor's expense. Ensure bentonite seal contacts clay cover. Restore final cover.

.2 Abandonment of a borehole shall be due to refusal beyond the Contractor's control, and not due to Contractor equipment loss, equipment failure, caving-in of the borehole, or negligence. Contract Administrator will make determination on whether hole is abandoned due to refusal.

.3 Refusal is the demonstrated inability to advance a borehole to the design depth for installation of a well or monitor being installed in the waste. Wells shall be considered complete if drilled to within 75 percent of total depth and refusal occurs.

3.7 TOLERANCES

.1 Maximum variation from plumb: 5 degrees.

3.8 CLEANING

.1 Clean drill augers and drilling rig before leaving the Site.

3.9 PROTECTION OF FINISHED WORK

.1 Protect completed wells and wells under construction from contamination.

PART 4 MEASUREMENT AND PAYMENT

4.1 GENERAL

.1 Section 01 20 00 – Price and Payment Procedures: Requirements for measurement and payment.

4.2 DRILL AND INSTALL VERTICAL GAS EXTRACTION WELLS

.1 Form B: Prices Item No. 1.

.2 Measurement Basis: By the vertical metre measured in place from existing ground surface to the stable base of the landfill gas extraction well.

.3 Payment Basis: Includes supply of drilling rig; access and setup including construction of drilling platforms, as necessary; drilling boreholes; cuttings disposal, supply and installation of bentonite seals, gravel, solid and perforated pipe, and caps; and solvent welding joints as required if threaded joints are not used; and any other materials as required to install a well as per drawing detail W1301-5.

4.3 WELL ABANDONMENT

.1 Form B: Prices Item No. 2.

.2 Measurement: By the vertical metre measured in place from existing ground surface to the depth at well abandonment.

.3 Payment: Includes the supply and installation of all materials to abandon the well.

END OF SECTION 33 51 26

TABLE OF CONTENTS

PART 1 GENERAL

1.1 DESCRIPTION

.1 Product and installation requirements for landfill gas collection, compressed air and forcemain/condensate piping in the wellfield.

1.2 RELATED SECTIONS

.1 Section 31 23 00 – Excavation, Backfilling and Compacting.

.2 Section 31 22 19 – Finish Grading.

.3 Section 33 52 17 – Landfill Gas Appurtenances.

1.3 REFERENCES AND CODES

.1 Section 01 45 00 – Quality Control: Requirements for references.

.2 ASTM D3350 – Polyethylene (PE) plastics pipe and fittings materials.

.3 ASTM F714 – Polyethylene (PE) Plastic pipe (SDR-PR) based on outside diameter.

.4 ASTM D3035 – Polyethylene (PE) plastic pipe (DR-PR) based on controlled outside diameter.

.5 ASTM D2837 – Standard test method for obtaining hydrostatic design basis for thermoplastic pipe materials.

.6 ASTM D2513 – Standard Specification for Polyethylene Gas Pressure Pipe, Tubing, and Fittings.

.7 ASTM D2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and other Gravity-Flow Applications.

.8 ASTM F2619 – Standard Specification for High-Density Polyethylene Line Pipe.

.9 CSA B137.4 – Polyethylene Piping Systems for Gas Services.

.10 CSA Z662 – Oil and Gas pipeline Systems.

.11 CW2030 – Excavation, Bedding and Backfill.

.12 CW2160 – Concrete Underground Structures and Works.

.13 CW3110 – Sub-Grade, Sub-Base and Base Course Construction.

.14 CW3170 – Earthwork and Grading

1.4 SUBMITTALS

.1 Section 01 33 00 – Submittal Procedures: Requirements for submittals.

.2 Product Data: Piping, fittings, warning tape, tracer wire, insulation, and geosynthetics.

.3 Manufacturer's Certificate: Quality control certificates pertaining to each lot of pipe produced.

.4 Manufacturer's Instructions: Indicate special procedures required to install products specified.

1.5 QUALITY ASSURANCE

.1 All high density polyethylene pipe will conform to the following requirements:

.1 Meet ASTM F2619 or have the same compound standards specified in CSA B137.4, Clause 4.1.1, for negative landfill gas pressure, compressed air, and condensate applications.

.2 Comply with ASTM D2513 for positive landfill gas pressure applications.

.3 Raw material will contain a minimum 2 percent carbon black, well dispersed by recompounding to protect the pipe from degradation by ultraviolet light.

.4 Pipe will not contain any recycled compound except that generated in the manufacturer's own plant from resin of the same specification from the same raw material supplier.

.5 Pipe sizes will conform to ASTM F714. Pipe sizes are stated in metric units; however, equivalent IPS pipe sizes must be used to avoid fitting problems with valves and existing pipe.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Section 01 60 00 – Product Requirements: Requirements for transporting, handling, storing, and protecting products.

.2 Deliver and store valves in shipping containers with labelling in place.

.3 Deliver, store, and handle pipe in accordance with applicable requirements of the specified references, the manufacturer's instructions and as specified herein.

.4 Use every precaution to prevent damage to the pipe. Do not permit metal tools or heavy objects to unnecessarily come in contact with the pipe.

PART 2 PRODUCTS

2.1 HDPE LANDFILL GAS, COMPRESSED AIR, AND CONDENSATE FORCEMAIN

.1 Landfill Gas Pipeline, Headers, Laterals and Sub-Laterals: HDPE SDR 17; size as shown on the drawings.

.2 Compressed Air piping: HDPE SDR 11; size as shown on the drawings.

.3 Forcemain piping: HDPE SDR 11; size as shown on the drawings.

.4 Accessories:

.1 Fittings: Fabricated sweeps shall be used where shown on the drawings. Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps, and other configurations required. Equivalent or greater pressure rating as pipe when installed.

.2 Joints: Thermal butt-fusion, except where connecting to valves, flanged connections at valves.

.3 Flanges: ASTM A536-84 ductile iron backing flanges with Class 150 ANSI B 16.5 standard drilling and corrosion resistant coatings. Complete with one-piece molded polyethylene stub ends. Connections to have same or greater pressure rating as pipe.

.4 Gaskets: Neoprene.

.5 Buried flanges: Where necessary to bury flanged connection, wrap flange in Denso LT tape over Denso Mastic.

.6 Electrofusion couplings: Friatec or approved equal/equivalent in accordance with B7 *(substitutes clause)*.

2.2 BEDDING AND COVER

.1 Bedding for landfill gas headers, laterals and sub-laterals, compressed air and condensate forcemain headers, laterals and sub-laterals: Imported sand unless indicated otherwise on the drawings.

.2 Cover: Final cover as specified in Section 31 22 19 – Finish Grading for pipes on landfill.

.3 Pipe bedding at road crossings should be unshrinkable fill and extend 2.0 meters past the road edges unless otherwise indicated on the drawings.

2.3 UNDERGROUND WARNING TAPE

.1 Description: 100 mm wide plastic tape, coloured yellow with suitable warning legend describing buried gas line.

2.4 TRACER WIRE

.1 A.W.G. No.10 gauge, insulated, solid copper wire, suitable for buried service.

.2 Minimum roll length: 300 m.

.3 Connections: Direct bury wire nuts for 10 gauge wire, wrap tightly with rubber, self fusing splicing tape, covered by vinyl tape to prevent corrosion.

2.5 PIPE INSULATION

.1 Insulation shall be closed-cell, rigid sheets manufactured from polystyrene foam suitable for buried installation, or approved equal/equivalent in accordance with B7 *(substitutes clause).* The material shall conform to the following specifications:

.1 Thermal resistance 1.76 $m^2 \cdot °C/W$ (R10.0) as per ASTM C177 and C518.

.2 Compressive strength 275 kPa (min.) as per ASTM D1621.

.3 Shear strength 200 kPa (avg.) as per ASTM D1621.

.4 Water absorption 0.7% by volume (max.) as per ASTM D2842.

.2 Shall be Dow HIGHLOAD 40, 50 mm (2") board thickness, or approved equal/equivalent in accordance with B7 *(substitutes clause).*

2.6 GEOSYNTHETICS

.1 HDPE geomembrane: 60 mil (1.5 mm), smooth on top surface of site, double sided textured along side slopes of site.

.2 Bi-Planar geocomposite: 220 mil (5.6 mm) thick biplanar geocomposite drainage layer, comprised of HDPE drainage net with a 6 oz. non-woven geotextile thermally bonded to one side of the drainage net.

.3 Drain Traps: Non-woven geotextile. Terrafix 420R, Layfield LP8, or approved equal.

.4 Geosynthetic Clay Liner (GCL):

.1 Bentonite mass/area: 0.75 lb. / sq ft minimum.

.2 Bentonite swell index: 24 ml/2g minimum.

.3 Hydrated grab strength: 30 lbs/in MARV.

.4 Hydraulic conductivity: 5.0E-9 cm/s maximum.

.5 Index flux: 1.0E-8 m3/m2/s maximum.

.6 Peel strength: 3.5 lbs/in minimum.

.7 CETCO Bentomat ST, or approved equal/equivalent in accordance with B7 *(substitutes clause).*

PART 3 EXECUTION

3.1 EXAMINATION

.1 Section 01 15 00 – General Requirements: Verification of existing conditions before starting work.

.2 Verify that excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on the drawings.

3.2 PREPARATION

.1 Hand trim excavations to required elevations. Correct over-excavation with Granular A.

.2 Remove large stones or other hard matter, which could damage piping or impede consistent backfilling or compaction.

3.3 BEDDING

.1 Excavate pipe trench in accordance with Section 31 23 00 – Excavation, Backfilling and Compaction for work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated.

.2 Place bedding material at trench bottom, level materials in continuous layer not exceeding 150 mm compacted depth.

.3 Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 HDPE PIPE

.1 Prevent debris and water from entering inside of pipe.

.2 Do not bend in a radius smaller than recommended by manufacturer when staged on Site or installed in the trench.

.3 The joining of HDPE pipe and fittings shall be performed in accordance with CSA Z662.

.4 Thermal fusion will be performed in an area near the installation location to avoid excessive transportation and possible damage to the pipe.

.5 Prior to initiating thermal fusion in the field on any pipe on a given day, Contractor will provide a test weld and operating data to Contract Administrator including welding temperature, machine number, date of last service and clearance certificate.

.6 Install pipe, fittings, and accessories in accordance with ASTM D2321-00 and manufacturer's instructions.

.7 Place pipe on minimum 100 mm deep bed of sand on landfill.

.8 Lay pipe to slope gradients noted on the drawings with maximum variation from true slope of 5 mm in 3 m. Maintain positive drainage for condensate on all pipe sections.

.9 Contract Administrator reserves right to modify design pipe alignments as deemed necessary.

.10 Install aggregate at sides and over top of pipe installation. Provide top cover to minimum compacted thickness of 300 mm, compact to 95 percent standard proctor density.

.11 Refer to Section 31 23 00 for trenching requirements. Do not displace or damage pipe when compacting.

.12 Install tracer wire continuous along top of pipe. Coordinate with Section 31 23 00 – Excavation, Backfilling and Compaction.

.13 Seal (cap) end of all landfill gas pipelines at the end of the working day or when work on a length of pipe is not scheduled to continue.

.14 Coordinate all thermal fusion joints to existing piping with the Contract Administrator to minimize excessive air intrusion into the existing landfill gas extraction system.

.15 The Contractor is to ensure that thermal fusion is conducted in a safe manner and explosive levels of landfill gas do not exist in the pipe to be joined using thermal fusion.

.16 For areas where minimum cover cannot be maintained, install insulation over HDPE pipe.

.17 Extrusion welding will not be permitted unless approved by Contract Administrator on a case by case basis.

3.5 PIPE INSULATION

.1 For areas where minimum cover cannot be maintained, install insulation over HDPE pipe in accordance with the following minimum cover requirements:

.1 Landfill gas collection and compressed air piping: 1.5 metres below ground surface

.2 Forcemain: 2.0 metres below ground surface.

3.6 FIELD QUALITY CONTROL

.1 Section 01 45 00 – Quality Control: Field inspection, testing, adjusting.

.2 Request inspection prior to placing aggregate cover over pipe.

.3 Compaction testing will be performed in accordance with CW2030.

.4 If tests indicate Works does not meet specified requirements, remove Works, replace and retest.

.5 Pressure and leakage test: Test as follows:

.1 Provide labour, equipment and materials required to perform leakage tests herein specified; notify Contract Administrator at least 24 hours in advance of all proposed tests; perform tests in the presence of Contract Administrator.

.2 Test at one time as much of the piping system as practical and authorized by Contract Administrator.

.3 Test all landfill gas piping at a pressure of 3 psi. Utilize compressed air to charge the pipelines and maintain pressure for adequate period to allow for expansion of the piping. All fittings, valves and expansion joints are to be accessible for inspection during the pressure test. A pressure test will be deemed successful if the designed pressure is maintained for a period of not less than 1 hour with no measurable drop in pressure. The temperature must be constant to within 1°C during this period or adjusted with the appropriate correction factor.

.4 Test all compressed air and forcemain piping at a pressure of 125 psi.

.5 Cap all seal and testing ports at the termination of the pressure test.

.6 Examine joints for leakage and remove any joints showing leakage from the pipeline, rejoin and retest the system.

.7 Ensure that normal safety precautions are observed for exposed piping.

.8 Locate and repair defects if leakage occurs.

.9 Repeat test until pressure drop is within specified allowance for full length of line.

.10 Use pressure gauge with appropriate range and scale.

.11 Submit pressure test report indicating date, test pressure, duration and pass/fail for each section of pipe tested.

3.7 PROTECTION OF FINISHED WORK

.1 Section 01 50 00 – Temporary Facilities and Controls: Requirements for protecting installed work.

.2 Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

3.8 REPAIR OF GEOSYNTHETICS

.1 Geosynthetics damaged during the installation of piping to be repaired and tested per manufacturer’s instructions.

PART 4 MEASUREMENT AND PAYMENT

4.1 GENERAL

.1 Section 01 20 00 – Price and Payment Procedures: Requirements for measurement and payment.

4.2 HDPE PIPING

.1 Form B: Prices Item Nos. 3, 4, 5, 6, 7, 8 and 27.

.2 Measurement: By the linear metre along the centerline of pipe, lump sum or per unit, as specified for each payment item.

.3 Payment: Includes excavation, bedding, pipe, all fittings including but not limited to tees, elbows and any other fittings, flanges, blind flanges, hardware, tracer wire, insulation, warning tape, disposal of excess refuse, backfill and compaction, and rough restoration.

4.3 PIPE STUBS AND TERMINATIONS

.1 No separate payment will be made.

.2 Payment: Included in HDPE Piping Measurement and Payment described in Article 4.2 of this Section.

4.4 PRESSURE TESTING

.1 No separate payment will be made.

.2 Payment: Included in Landfill Gas Collection System Testing and Commissioning Measurement and Payment described in Article 1.5.2 of Section 01 91 00 – Commissioning.

END OF SECTION 33 52 16

TABLE OF CONTENTS

PART 1 GENERAL

1.1 DESCRIPTION

.1 Requirements for the supply and installation of various landfill gas collection system components including wellheads, flow control assemblies, and drain traps. Also includes wellhead and leachate manhole retrofit Work as specified herein.

1.2 RELATED SECTIONS

Section 31 23 00 – Excavation, Backfilling and Compacting.

.1 Section 33 52 16 – HDPE Wellfield Piping.

1.3 REFERENCES

.1 Section 01 45 00 – Quality Control: Requirements for references.

.2 CW2030 – Excavation, Bedding and Backfill.

.3 CW2160 – Concrete Underground Structures and Works.

.4 CW3110 – Sub-Grade, Sub-Base and Base Course Construction.

.5 CW3130 – Supply and Installation of Geotextile Fabrics.

.6 CW3170 – Earthwork and Grading.

.7 City of Winnipeg Water and Waste Department – Approved Products for Underground Use Within the City of Winnipeg.

1.4 SUBMITTALS

.1 Section 01 33 00 – Submittals: Requirements for submittals of products supplied by Contractor.

.2 Product Data: Provide manufacturer's data on valves and valve boxes, wellhead fittings and accessories, pumps, manhole lids and accessories.

.3 Submittals must be received by Contract Administrator minimum of 14 days in advance of delivery to the Site.

1.5 ENVIRONMENTAL REQUIREMENTS

.1 Follow health and safety plan at all times.

.2 Protect open excavations against damage due to surface runoff and run-on. Take necessary precautions to prevent erosion of excavated or disturbed surfaces.

1.6 SEQUENCING AND SCHEDULING

.1 Section 01 15 00 – General Requirements: Requirements for coordination.

.2 Sequence and schedule excavation activities with Work of other Sections.

.3 Do not commence excavation operations until the site-specific health and safety plan has been reviewed by Contract Administrator and implemented.

.4 Coordinate and sequence excavation operations to minimize the need for temporary stockpiling excavated materials until required for back filling. Make every effort to balance cut and fill operations and to ensure that any excavated material designated for backfill is immediately placed as backfill in Works. Keep the time during which excavations remain open to the practicable minimum.

.5 Do not allow or cause any of Work performed to be covered up or enclosed prior to required inspections, tests, or approvals.

PART 2 PRODUCTS

2.1 HDPE PIPE AND FITTINGS

.1 All HDPE piping and fittings will conform to the requirements specified in Section 33 52 16 – HDPE Wellfield Piping.

2.2 PVC PIPE AND MISC. FITTINGS

.1 PVC pipe and fittings will be Schedule 80 Type IV, Grade 1, ASTM D1784-99a. Schedule 40 pipe and fittings shall not be used.

.2 Socket type joints will be solvent welded or cemented as per ASTM F438-99, ASTM F439-99a. Flanged connections will be provided as shown on the drawings to permit future disassembly.

.3 Fittings will be as specified under Item 2.2.1. PVC fittings will be standard commercial products fabricated by moulding or by extrusion and machining and will conform to the requirements of ASTM D1785-99, ASTM D2241-00, and ASTM D2467-99.

.4 Flanges to be as specified under Item 2.2.3 faced and drilled to 125- pound ANSI B16.1 standard. Gaskets will be flat full-faced, 3 mm thick, fabricated from neoprene with a hardness of 50 to 70 durometer A. When mating flange has raised face, use flat ring gasket and provide filler gasket between OD of raised face and flange OD to protect PVC flange from bolting moment.

.5 All bolting to meet Type 316 stainless steel, ASTM A193, Grade BEM hex head bolts and ASTM A194, Grade 8M hex nuts. Bolts will be fabricated in accordance with ANSI B18.2 and provided with washers of the same material as the bolts.

.6 Anti-seize lubricant must be used on bolts and threaded fasteners.

.7 All socket connections will be joined with PVC solvent cement conforming to ASTM F493-97. Manufacture and viscosity will be as recommended by the pipe and fitting manufacturer to assure compatibility.

.8 PVC fittings and pipe shall not be used for compressed air service.

.9 Minimum strength of heavy duty cement to be used for bonding of fittings.

2.3 FLOW CONTROL ASSEMBLIES

.1 Valves: See Article 2.4.

.2 Accessories: 50 mm operating nut, equipped and suitable for buried service, valve operator extension stem fabricated from 12 mm diameter steel rod with square socket on bottom and square nut on top and epoxy coated. Fabricate such that excessive torque will shear a shear pin holding square nut on top before damaging valve or valve operator. Submit sample for Contract Administrator approval. Provide steel T-bar of sufficient length to operate valves from ground surface.

2.4 LANDFILL GAS FLOW CONTROL VALVES AND ISOLATION VALVES

.1 All Flow Control Assembly valves shall be Model 397-982 full lug butterfly valves as manufactured by ABZ, or Series 31 Trim 125 or Series 3A butterfly valves as manufactured by Bray, or approved equal/equivalent in accordance with B7 *(substitutes clause)*.

.2 Size: As shown on the drawings.

.3 The valve body shall be of Cast Iron ASTM A-126 Class B or Ductile Iron ASTM A536 grade 65-45-12 with drilled and tapped lugs. The neck of the valve shall be extended to allow 2” of insulation.

.4 The disc and stem shall be 316 Stainless Steel and the shaft shall engage the disc with an internal drive. No screws or pins shall be used on the disc allowing for positive engagement with no possibility of the screws or pins to vibrate or shear free.

.5 The seat shall be Buna-N, and shall be molded to the body to prevent collapsing or stretching and allowing for complete dead end service rating with one flange removed. The seat shall be suitable for methane gas service.

.6 Bushing: Bushings shall be wear resistant graphite/Teflon impregnated or acetal and shall be self-lubricating.

.7 All butterfly valves shall be supplied with a manual gear actuator suitable for buried service. The gear shall have a ductile iron worm gear and a bronze segment gear assembly. The gear set shall be permanently grease packed to stop any ingress of water. The gear casing and cover shall be ductile iron and shall be sealed with a suitable non degradable cover gasket. The gear shall have heavy duty adjustable travel stops. The input shaft shall be 316/304 stainless steel and shall have an o-ring or loaded packing seal. The lower gear casing shall have an oil type seal. The butterfly/gear assembly shall have a 2" operating nut assembly to drive the valve open and close with a "T" style handle. All fasteners shall be stainless steel. The operating nut pin shall be suitable for bury service and shall NOT SHEAR under a heavy load.

.8 HDPE spacers shall be used on both sides of the valve to allow for clearance of the disc into the HDPE pipe and flange. HDPE spacers not required when using Bray Series 3A valves. The flange shall not be modified (cut back) to allow for disc clearance. The spacer shall be of the full-face style with drilled holes that allow for the flanged bolts to pass through the spacer and into the valve body allowing for positive alignment even if the piping moves in the ground under load. The spacer shall have a grooved face for positive sealing under pressure. A full face neoprene gasket shall be used to seal the spacer to the HPDE flange. Spacers provided shall be recommended and approved for use by the valve manufacturer for this application.

.9 The valve box shall be manufactured of PVC, green sewer pipe meeting ASTM D3034 and shall be provided with a slip cap with the o-ring removed. White Sch. 40 drain/waste/vent (DWV) pipe shall not be used unless approved by Contract Administrator.

.10 Ethylene propylene diene monomer (EPDM) seal and seat materials will not be accepted. Acceptable materials of construction will include Buna-N (nitrile), Teflon or Viton.

.11 Approved Suppliers: Innovation Process Control, Scott Beverley – 905-337-9100 or Bray, Neil De Melo – 905-569-2729, or approved equal/equivalent in accordance with B7 *(substitutes clause).*

2.5 LANDFILL GAS WELLHEAD ASSEMBLIES

.1 Valve: 75 mm diameter PVC Spears economy gate valve, Socket fittings, Buna-N seals.

.2 Flex Hose: 75 mm nominal diameter clear PVC hose and clamps. Hose to be Kanaflex 101PS with 89 mm I.D. Clamps to be 75 mm Powerlock Clamp PS.

.3 Pump: The leachate extraction pump will be a submersible pneumatic type capable of installation in 150 mm sumps. Pumps shall be QED Environmental Systems (QED) AP-3/BL AutoPump, or approved equal/equivalent in accordance with B7 *(substitutes clause)*, equipped as follows but not limited to:

.1 Fibreglass reinforced plastic casing

.2 Bottom loading intake with 3" extended screen

.3 Stainless steel 1" discharge check valve

.4 Stainless steel quick connects and tubing pigtails

.5 Stainless steel support harness

.6 2 year parts and labour warranty

.7 Jacketed tubing bundle. 3-Tube set (1" OD, ½" OD, 5/8" OD).

.8 Stainless Steel quick connect fittings at the pump for all connections

.4 The pump will come complete with sufficient tubing, piping, and fittings for use within the dual-purpose well.

.5 The well riser cap assembly suitable for 150 mm wells under pressure (vacuum) equipped as follows, but not limited to:

.1 Stainless Steel quick connect(s) on top of cap

.2 Stainless Steel barbs on bottom of the cap

.3 Stainless Steel eye bolt on the bottom of the cap with 5/8" Nylon rope secured with SS clamp

.4 ¾" threaded monitoring port and ¾" MPT plug

.5 5/8" air exhaust and SS vent

.6 Flexible seal for the casing, sized as appropriately

.6 FR-60 ¼" Filter regulator & pump cycle counter (QED drawing #602495), equipped as follows, but not limited to:

.1 5 micron filter element

.2 Regulator and 160 psi/11 bar gauge assembly

.3 Metal bowl

.4 Automatic condensate drain

.5 Mounting bracket

.6 Inlet side – supply hose SS quick connect

.7 Outlet side – SS elbow and pump cycle counter with digit counter with 6 digit counter, SS barb for 3/8" ID pump air hose

.7 Check valve for pump discharge cap shall be Chemkor PVC ball check valve, with threaded ends and Viton ball seat, or approved equal/equivalent in accordance with B7 *(substitutes clause).*

.8 Approved pump and accessories supplier: QED Environmental Systems, Inc., (800) 624-2026.

2.6 LEACHATE MANHOLE LID RETROFITS

.1 Refer to Manhole Work Schedule on drawing W1302 for retrofit requirements at each manhole.

.2 Lids shall be constructed with 25 mm minimum thickness HDPE plate, complete with 3 mm minimum thickness neoprene gasket.

.3 Lids shall be fastened to concrete manhole with eight (8) stainless steel stud anchors.

.4 Warning Signs for confined space entry shall conform to Manitoba Workplace Safety and Health requirements.

.5 25 mm threaded monitoring port and 25 mm MPT plug installed through HDPE lid only required at locations without a leachate pump.

2.7 LEACHATE MANHOLE GAS COLLECTION RETROFITS

.1 Refer to Manhole Work Schedule on drawing W1302 for retrofit requirements at each manhole.

.2 Wellheads: See Articles 2.5.1 and 2.5.2

.3 Pipe Seals: See Article 2.9

.4 Grout chamber penetration with non-shrink grout.

2.8 LEACHATE MANHOLE PUMPING RETROFITS

.1 Refer to Manhole Work Schedule on drawing W1302 for retrofit requirements at each manhole.

.2 Existing pump and tubing bundle shall be reused. Pump depth to be confirmed with Contract Administrator before cutting tubing bundle to length.

.3 Pump Appurtenances: See Articles 2.5.5 and 2.5.7

.4 Supply and install new SS support harness and nylon rope on existing pump.

.5 All penetrations in HDPE lid to be gas tight.

2.9 PIPE SEALS

.1 The seal for pipe entries into the manholes shall be a modular mechanical type consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and wall opening, as manufactured by Thunderline Corporation, Linkseal Model OS, or as manufactured by Advance Products & Systems, Inc. Innerlynx Model OS316.

.2 Wall opening: The wall opening size and type shall be selected according to manufacturer's recommendations.

.3 The elastomeric element shall be sized and selected per manufacturer's recommendations and have the following properties as designated by ASTM:

.1 For hydrocarbon service applications (-40 deg F to 210 deg F) NITRILE = ASTM D2000 M1BF510.

2.10 WELLBORE SEALS

.1 Wellbore seal: Landtec WBS-067 (7" x 7" Skirt) connected with stainless steel clamp.

2.11 IDENTIFICATION LABELS

.1 Label shall be:

.1 Affixed to all wellheads, flow control assemblies and drain traps.

.2 Weatherproof and rated for outdoor use.

.3 A sticker or engraved nameplate/tag style secured to well with a minimum text height of 3 cm.

.2 Approved supplier: ID-it (1-866-540-IDIT), or approved equal/equivalent in accordance with B7 *(substitutes clause)*.

2.12 GEOSYNTHETICS

.1 All geosynthetic materials will conform to the requirements specified in Section 33 52 16 – HDPE Wellfield Piping.

PART 3 EXECUTION

3.1 GENERAL

.1 Conduct the excavation, pipe and chamber installation and trench backfilling Work in accordance with all applicable federal, provincial and municipal regulations including the Workplace Safety and Health Act and regulations.

3.2 EXCAVATION AND BACKFILLING

.1 Conduct all excavation and backfilling Work required to install the gas and compressed air piping and condensate forcemain in accordance Section 33 52 16 – HDPE Wellfield Piping.

3.3 HDPE PIPING

.1 The installation, joining and testing of the HDPE components of the gas collection, compressed air and condensate forcemain piping will be in accordance with the drawings and will conform to the requirements specified in Section 33 52 16 – HDPE Wellfield Piping.

.2 Provide adequate support for all piping during installation.

.3 Coordinate installation of piping with other contractors.

3.4 PVC PIPE AND FITTINGS

.1 All rigid PVC pipe and fittings will be cut, assembled, and installed in accordance with the pipe manufacturer's recommendations.

.2 Pipe will not be laid when the temperature is below 4° C, nor above 32° C when exposed to direct sunlight. Ends to be jointed will be shielded from direct sunlight prior to and during the laying operation.

.3 Provide adequate ventilation when working with pipe joint solvent cement. PVC components to be solvent welded will be clean and dry.

3.5 INSTALLING VALVES AND FITTINGS

.1 Install valves and fittings in accordance with manufacturer's instructions.

.2 Ensure proper operation of valves in both fully closed and fully open positions.

.3 Install pipe spacers to ensure full range of valve operations for all pipe / valve connections.

3.6 INSTALLING WELLBORE SEAL

.1 Install wellbore seal boot in collapsed position as per manufacturer to accommodate landfill settlement.

.2 Repair all penetrations in wellbore seal as per manufacturer instructions.

3.7 LEACHATE MANHOLES

.1 Remove existing leachate manhole lids only when ready to install new lids to minimize odours.

.2 Dispose of or return existing lids to the City of Winnipeg, as directed by Contract Administrator.

.3 Cut and smooth edges of HDPE plates prior to installation.

.4 Do not allow cuttings, shavings, grouting or any debris to enter leachate manholes.

.5 Minimize gas collection piping depth at manholes while maintaining minimum cover and slope requirements as stated on the drawings.

.6 Prior to coring for gas collection piping, pump down leachate to below pipe elevation, if required.

.7 Dispose of leachate as directed by the Contract Administrator. Leachate shall not be discharged to ground surface.

3.8 TOLERANCES

.1 Maximum variation from plumb: 1 degree

.2 Maximum offset from true alignment: 100 mm.

PART 4 MEASUREMENT AND PAYMENT

4.1 GENERAL

.1 Section 01 20 00 – Price and Payment Procedures: Requirements for measurement and payment.

4.2 NEW DUAL-PURPOSE LANDFILL GAS WELLHEAD ASSEMBLY

.1 Form B: Prices Item No. 9

.2 Measurement: Each

.3 Payment: Includes supply and installation of all components in the dual-purpose wellhead assembly from the gas extraction well to the sub-lateral piping as shown on the drawings including, but not limited to, all fittings, flexible hose, pipe, wellbore seal, valves, pump and accessories. Also includes excavation, bedding, backfill and compaction.

4.3 LANDFILL GAS WELLHEAD ASSEMBLY TO HORIZONTALS & MANHOLES

.1 Form B: Prices Item No. 10

.2 Measurement: Each

.3 Payment: Includes supply and installation of all components in the wellhead assembly as shown on the drawings including, but not limited to, all fittings, flexible hose, pipe, valves, and accessories. Also includes excavation, bedding, backfill and compaction.

4.4 DUAL-PURPOSE RETROFITS AT EXISTING LANDFILL GAS WELLHEADS

.1 Form B: Prices Item No. 11

.2 Measurement: Each

.3 Payment: Includes supply and installation of all components in the dual-purpose wellhead assembly retrofit from the gas extraction well to the sub-lateral piping as shown on the drawings including, but not limited to, all fittings, flexible hose, pipe, valves, pump and accessories. Also includes excavation, bedding, backfill and compaction

4.5 WELLBORE SEALS AT EXISTING LANDFILL GAS WELLHEADS

.1 Form B: Prices Item No. 12

.2 Measurement: Each

.3 Payment: Includes supply and installation of all components of the wellbore seal at existing wells as shown on the drawings, including but not limited to fittings and repairs to penetrations in wellbore seal.

4.6 FLOW CONTROL ASSEMBLY

.1 Form B: Prices Item Nos. 13 and 14

.2 Measurement: Each

.3 Payment: Includes supply and installation of all components in the flow control assemblies as shown on the drawings, including, but not limited to all valves,

spacers, fittings and pipe. Also includes excavation, bedding, backfill and compaction.

4.7 GRAVITY DRAIN TRAP IN WASTE

.1 Form B: Prices Item No. 15

.2 Measurement: Each

.3 Payment: Includes the supply and installation of all components in the gravity drain trap assembly as shown on the drawings, including, but not limited to all fittings, piping, geotextile, filter cloth, hardware and gabion stone. Also includes excavation, bedding, backfill and compaction.

4.8 GRAVITY DRAIN TRAP TO LEACHATE CLEANOUT

.1 Form B: Prices Item No. 16

.2 Measurement: Each

.3 Payment: Includes supply and installation of all components in the drain trap assembly as shown on the drawings including, but not limited to, all fittings, drain pipe, valves and connection to leachate cleanout, where required. Also includes excavation, bedding, backfill, compaction and repairs to leachate cleanout, leachate collection system and landfill liner.

4.9 CORING AND PIPE SEALS AT MANHOLES FOR GAS COLLECTION

.1 Form B: Prices Item No. 17

.2 Measurement: Each

.3 Includes the supply and installation of all equipment and components to core and seal pipes into the leachate manhole wall below ground, including, but not limited to pipe seals and grouting. Also includes excavation, backfill and compaction.

4.10 LEACHATE MANHOLE LID RETROFIT

.1 Form B: Prices Item No. 18

.2 Measurement: Each

.3 Includes the supply and installation of all components to replace and seal lid of the leachate manhole as shown on the drawings, including but not limited to HDPE plate lid, warning sign, gasket, hardware and fittings.

4.11 LEACHATE PUMPING MANHOLE RETROFIT

.1 Form B: Prices Item No. 19

.2 Measurement: Each

.3 Includes the supply and installation of all components to retrofit the leachate pumping manhole as shown on the drawings, including but not limited to HDPE plate lid, warning sign, gaskets, hardware, fittings, flexible hose, pipe, valves, and accessories.

END OF SECTION 33 52 17