

Addendum No. 3
August 6, 2021

Project Name/Description: RFP for Earth Works and Site Servicing
for 470,599,600,622 and 652 Tremblay Road

Location: Ottawa, Ontario

Owner: Canada Lands Company

RFP Coordinator: Krisendat Sewgoolam
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RFP Number: 602199-02

RFP Issue Date: July 8, 2021

RFP Closing Date: August 27, 2021 at 10am EDT

Total number of pages
within this issued Addendum: 2 plus the following attachments:

- Revised Schedule 1
- Revised Schedule 6
- Revised Schedule 10
- City of Ottawa STD F1.

All Addenda shall form an integral part of the RFP and are to be read in conjunction therewith. The Addenda shall take precedence over the aforementioned RFP which may prove to be at variance or may otherwise be qualified in writing by authorized personnel.

This information shall be incorporated into and be read together with the relevant Sections of the Request for Proposal document.

Schedule 1 is hereby deleted and replaced with the attached Revised Schedule 1.

Schedule 6 is hereby deleted and replaced with the attached Revised Schedule 6.

Schedule 10 is hereby deleted and replaced with the attached Revised Schedule 10.

Question 1:

How does a Proponent obtain electronic copies of the geotechnical and hydrogeological reports available?

Answer:

As outlined under the “Historical Report Review” heading in Schedule 1, Scope of Work:



“The Company will be providing an electronic document transfer of copies of all relevant supporting studies to the Proponent upon execution of a Non-Disclosure Agreement attached as Schedule 12 for submission to the Company.”

Proponents interested in receiving a copy of relevant supporting studies must execute and submit a Non-Disclosure Agreement to the RFP Coordinator.

Question 2:

In order to provide the Insurance and Bonding – the Proponent is inquiring about the approximate Value of the Work.

Answer:

Bonding requirements are a percentage of the submitted proposal price, as outlined in Section 3.3.8 of the RFP and will therefore be dependent on each Proponent’s individual proposal price.

Insurance requirements are outlined in Schedule C of the Form of Agreement (Schedule 10 to the RFP).

Question 3:

Please clarify the Submission time, BuyandSell says 2:00PM and the RFP says 10:00AM

Answer:

Submission time shall be as per the RFP – **August 27th,2021 at 10:00am** EDT. The BuyandSell site will be revised to reflect.

Question 4:

Can an Excel version of Annex 6 – Price be provided

Answer:

Excel Version of Annex 6 – Price has been provided with Addendum 3 and can be downloaded.

Question 5:

Is it possible to send typical detail of the guardrails indicated on the plans (Railings, City STD F1)

Answer:

See attached City of Ottawa STD F1.

Proponents are encouraged to Contact the City of Ottawa to obtain full standards, at their cost, at the following web address:

<https://ottawa.ca/en/planning-development-and-construction/developing-property/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans>

Schedule 1 Scope of Work

Main Objective

The purpose of this RFP is to retain a contractor to complete all required earth works and site servicing, including the construction of stormwater management pond, underground services comprising of watermains, sewers, service laterals, and related appurtenances and construction of roads to base course/intermediate asphalt, appurtenances thereof, site grading and general works at 470, 599, 600, 622, 652 Tremblay Road (altogether known as the “**Site**”). The successful Proponent will be required to work with the Company and their retained consulting team throughout the duration and completion of the works described within.

Overview

The Site is located at 470 Tremblay Road in the Alta Vista Ward (Ward 18), bound by Highway 417 to the north, St. Laurent Boulevard to the east, Avenue U to the west, and the VIA Rail Corridor to the south.

The 10.67 hectare Site was purchased in 2009 by Public Services and Procurement Canada (PSPC), as the location for a new federal employment node within a mixed-use community.

More recently, the Government has asked the Company to take on innovative projects in collaboration with PSPC to address under-utilized and obsolete federal assets. Reporting to the same Minister, PSPC and the Company are undertaking a series of collaboration projects focusing on the redevelopment of existing federal office campuses in the National Capital Region into sustainable mixed use live-work-play communities.

In 2019, PSPC and the Company entered into a memorandum of understanding for collaboration to develop the Site. The Company retained WSP Canada Inc. as lead consultant to develop a concept plan and solicit feedback from the public.

The subdivision application submitted by the Company in September 2020, which received draft approval from the City of Ottawa in May 2021, proposes to subdivide the Site into 7 development blocks, and will see the development of 7.53 hectare of land, with a remnant 3.17-hectare parcel to be retained by the Federal Government (PSPC) for future development through a Site Plan Control application. The intent is for the Company to acquire and develop the 7.53 hectares, including five (5) development blocks (residential and mixed-use) totalling just under 800 units, a park, open space and storm water management pond. The plan creates two (2) new public streets including the realignment of existing Tremblay Road. The old alignment of Tremblay Road will be transferred to PSPC.

Project Schedule

The following is an anticipated schedule for the substantial completion of the works described in this Schedule:

Contract I Works: Earth Works by no later than March 31, 2022, and;

Contract II Works: Underground Site Servicing to Base course/Intermediate Asphalt including Stormwater Management Pond work by no later than July 31, 2022

Scope of Work Specifications Overview

Detailed Specifications for Works have been included within Schedule 1 of this RFP and Schedule A of the Form of Agreement. The successful Proponent will be responsible to complete the works as outlined in the Specifications. The successful Proponent shall be required to complete all additional work that may be required to ensure that the construction works comply with any further requirements imposed by a governmental authority (which may be subject to change from time to time) or which may be required by site conditions. For the purposes of this RFP, in the specifications and drawings references to "Owner" and "Tenderer/Contractor" shall be deemed to have the same meaning as "Company" and "Contractor" respectively.

Historical Report Review

The Company will be providing an electronic document transfer of copies of all relevant supporting studies to the Proponent upon execution of a Non-Disclosure Agreement attached as Schedule 12 for submission to the Company.

Additional Work

Prior to beginning any additional work the successful Proponent shall complete and submit a fee proposal for approval by the Company. Any changes to the Work detailed in the Agreement will be documented as a Change Order/change directive. The successful Proponent is expected to maintain pricing commensurate with pricing offered in its Proposal.

Only in cases where the work required is considered an emergency or safety hazard, will the successful Proponent proceed with the added work in advance of a Change Order. In any event, the Company must be notified as soon as possible that any additional work is proceeding.

**CONTRACT I SPECIFICATIONS
SPECIAL CONDITIONS OF THE CONTRACT**

ARTICLE SC1 - Acceptance of Site

All Proponents are required to satisfy themselves by personal examination of the site, of the work and of the existing conditions, which may be encountered on the site. The submission of a bid shall be deemed proof that the Proponents have satisfied themselves as to all the provisions of the Contract, of all of the conditions which may be encountered, equipment they will be required to supply, or any other matter which may enter into the carrying out of the Contract to a satisfactory conclusion. No claims will be entertained by the Company based on the assertion by the Contractors that they were not informed as to any of the provisions of conditions intended to be covered by the Contract. The submission of the price provided within the Pricing Schedule shall be presumptive evidence the Contractor has satisfied himself of the site conditions.

Following completion of underground servicing and roads to base course asphalt, the Contractor MUST restore any disturbed lots and blocks to the pre-grade elevations, including removal and disposal of surplus material and provide a topographical survey certified by an Ontario Land Surveyor confirming the same, as per SC28 – As-Built Information. The Company reserves the right to credit from the payment to the Contractor for any incomplete restoration works. The deduction amount will equal the cost for the Company to complete the restoration work by another contractor.

The Contractor must submit to the Company, in writing, that all disturbed lots and blocks are to be restored to the pre-grade elevations by the Contractor as described above prior to contract execution. The Contractor is to protect all surface features on adjacent roads and adjacent lots. Any damage to any public roads or infrastructure shall be rectified by the Contractor at his own expense to the satisfaction of the City of Ottawa and the Consultant.

The Contractor shall satisfy himself of all geotechnical and hydrogeological information, including boreholes, in-situ conditions, and recommendations identified in the identified reports. The only access to the site shall be from Tremblay Road and St. Laurent Boulevard at the location noted on the drawings. The Contractor shall not impede or restrict traffic operations on Tremblay Road and St. Laurent Boulevard and shall implement traffic controls to the satisfaction of the City of Ottawa where required. Parking of vehicles is not permitted on City of Ottawa roads, including Tremblay Road and St. Laurent Boulevard. The access points must be secured at the end of the day and over the weekends to prevent unauthorized access.

The topographic survey of existing ground was prepared by the Company's Surveyor. This topographic survey will be provided to the Contractor in digital format upon contract award. The Contractor is responsible for verifying this topographic survey for their use. This survey will be used as the original ground for the basis of calculation of earthworks quantities.

All costs associated with the above requirements are to be included in the unit prices. The Company will entertain no claims for extras for these requirements.

ARTICLE SC2 - Limit of the Working Area

On the Company's land, the Contractor shall limit his operations to the limit of construction shown on the engineering drawings, unless otherwise approved by the Consultant.

At no time is the Contractor to encroach on the following areas:

- 1) Private property without written permission from the landowner; and
- 2) Public property without written permission from the City of Ottawa.

ARTICLE SC3 - Existing Utilities and Services

The position of all existing poles, overhead lines, conduits, watermains, sewers and other underground or aboveground utilities, structures and appurtenances are not necessarily shown on the drawings, and where shown, the accuracy of the position of such utilities is not guaranteed by the Company or the Consultant. The Contractor shall have all utilities field located prior to the start of construction.

The Contractor shall be responsible for locating and adequately protecting all existing utilities and services and restoring all disturbed bedding and backfill in accordance with the requirements of the utility, and City of Ottawa. Any damage to any existing service or utility shall be repaired at the Contractor's expense. The cost of all excavations for verification, protection during construction, and support during installation of utilities, and restoration of all surface features damaged or destroyed are to be included in the unit prices provided within the Pricing Schedule. The Contractor should note that some utilities may require excavations in the vicinity of their existing plant be hand dug to locate the existing services. All cost for hand-digging excavations shall be included in the prices provided within the Pricing Schedule .

ARTICLE SC4 - Restoration

The cost of restoration shall include, but is not limited to bedding, backfill, and compaction for existing utilities, pavements, tie-backs, sidewalks, curbs and sodding which must be disturbed to carry out the works required during the execution of this contract. The cost of the restoration of all surface features damaged or destroyed during the construction of the services under this Contract is to be included in the price provided within the Pricing Schedule and will be the responsibility of the Contractor. The Company reserves the right to withhold from payment the estimated cost of remediation costs which have not been completed.

ARTICLE SC5 - Surface Drainage

The Contractor shall be responsible for maintaining good road and site drainage to catchbasins or other approved outlets for the duration of the Contract. The Contractor shall be responsible for providing temporary drainage swales, ditches, and sedimentation/erosion controls as necessary. This includes road grading such as to avoid creating ponding on the lots by grading temporary ditches across the road to drain such ponding areas.

The Contractor will be held responsible for all damage which may be caused or result from water backing up or flowing over, though, from or along any part of the works, or which any of his operations may cause to flow elsewhere. Siltation control devices shall be installed, and the control of siltation shall be the Contractor's responsibility throughout the undertaking of his Contract. The Contractor will also be responsible for all damage or fines resulting from the improper control of siltation.

The Contractor shall dewater all work sites and excavations as necessary or as directed to enable the works to be constructed in a satisfactory manner. Water produced from any dewatering operations to be treated in a "Wetland Filter Bag" or other means acceptable to the governing authorities and discharge only as approved by the Consultant.

ARTICLE SC6 - Maintenance of Traffic

The Contractor must maintain traffic on adjacent roads, including providing signage and flag persons as required in accordance with the requirements of the City of Ottawa at all times for the duration of the Contract.

The Contractor shall provide all necessary signage and flagmen and shall maintain vehicular traffic on adjacent roads at all times during construction in accordance with MTO's "Manual of Uniform Traffic Control Devices" and/or MTO "Book 7".

The cost for all necessary permits, traffic signage, traffic control devices and flag persons shall be included in the prices provided within the Pricing Schedule.

Prior to the start of any work within an existing road allowance, the Contractor shall obtain the necessary permits from the City of Ottawa to occupy the road allowance.

ARTICLE SC7 - Work Schedule

Contract I *September 2021 – March 2022*

Contract II *April 2022 – July 2022*

Within 7 days of Contract Award or receipt of a "letter of intent", the Contractor shall provide the Consultant with a detailed work schedule. It shall contain sufficient detail for the Consultant to monitor progress of the work. Future delay claims will be rejected if the Contractor fails to provide the original construction schedule.

- a) Completion Dates specified assume the Contractor has received the written permission and notification to commence work on the Start Date specified as being no later than the Start Dates listed above. Any delays in the Start Dates mentioned above will be added to the Completion Dates.
- b) Each calendar day from the project Start Date to the project Completion Date, inclusive, shall be considered work days. If work on Saturday/Sunday or statutory holidays is required to meet the schedule, no additional claims will be accepted.
- c) The construction schedule, insurance certificates, bonds and all other required documents must be provided to the Consultant prior to commencement.

The Company reserves the right to adjust the schedule to delay the start dates until all approvals are obtained. Any delay in the commencement of the project caused by the Company, will result in the contract schedule being extended by an equivalent period of time.

The Contractor shall commence work and carry it on at whatever location or locations the Consultant may direct. No work shall be undertaken without the Consultant's approval and no work shall be suspended without his written permission except as described in the Contract Documents.

Siltation controls must be installed prior to demolition and grading.

Prices provided within the Pricing Schedule shall be valid through the 2022 calendar year.

ARTICLE SC8 - Contractor Certification of Imported Fill Material

In the event the Contractor is asked to provide fill, the Contractor shall identify the source of imported fill material. The source must be approved by the Company and the Company's Geotechnical Consultant.

The Contractor shall provide written certification to the satisfaction of the Consultant that:

1. Only material from an approved source will be placed on site.

2. The material is free of organics and other unsuitable debris and is suitable for engineered fill as assessed by the Geotechnical Consultant, and accompanied by a stamped, signed and dated report prepared by a licensed professional engineer in the Province of Ontario.
3. The material meets Ministry of Environment Decommissioning Guidelines for residential uses or other applicable regulations noted in the report provided above in item #2.

The Company reserves the right to undertake independent testing of the material. Any material, deemed unsuitable by the Company's consultant shall be disposed of off-site at Contractor's expense.

ARTICLE SC9 - Independent Testing

The Contractor shall retain independent specialized testing companies to provide the following services as required by the project.

i) **Compaction Tests**

Provide Proctor and field density tests, certifying adequate bearing capacity and compaction of trench backfill, fill sub-base and granular base as required in accordance with the applicable specifications.

ii) **Gradation Tests**

Provide gradation tests for granular or stone aggregates, backfill material and granular or stone base material as required to verify conformance with the applicable specifications.

iii) **Concrete Tests**

Provide strength tests for concrete in conformity with the applicable specifications.

iv) **Asphalt Tests**

Provide adequate testing as required to verify conformance with the applicable specifications and to determine the asphalt cement content.

v) **Camera Inspection**

Carry out camera inspections on all sewers and the Contractor shall provide at no additional cost, such skilled assistance as the Company may require. Provided that no defective work is indicated by such inspections, the whole of the cost of the inspection shall be borne by the Company. If, however, defective work is discovered by such inspection, the Contractor shall bear a part of the total cost of the first inspection, in the proportion that the number of defective sections of sewer bears to the total number of sections inspected. For this purpose, a section is defined as a length of pipe between adjacent manholes.

The cost of testing or inspecting any portion of the works which has been previously tested and found to be defective and then subsequently rectified shall be borne by the Contractor.

ARTICLE SC10 - Temporary Facilities

The Contractor shall provide the following at his own expense:

a) Accommodation

Provide and maintain in a suitable position on the site a weatherproof field office, minimum size 10 m × 3 m × 2.5 m high with windows, tables, chairs, two desks and monitors with the ability to connect laptops, a first aid kit, a drawing table, filing cabinet drawing rack and locking doors, including air-conditioning (summer only), heat and light, for the exclusive use of the Consultant and Company.

The accommodations, equipment and furniture shall be subject to acceptance by the Contract Administrator and shall not be removed from the site without the Contract Administrator's permission.

The Contractor shall bear the costs of heating, cooling, and lighting the field office and the installation and rental charges for the telephone. The Contractor shall indemnify the Company against loss and fire, theft and injury to the building and its contents.

The Accommodations shall be equipped with electric light and propane or electric heat thermostatically controlled (winter) and air conditioning (summer). Where a local hydro service is not readily available, the Contractor shall supply and maintain an electric generator for the provision of electricity within the accommodations. All windows and doors shall be provided with screens and weekly janitorial service shall be provided by the Contractor. This facility shall be for the sole use of the Company and its representatives and must have an exterior padlock with two keys available to the Company staff. The Contractor will be responsible to unlock and lock the accommodations daily. The accommodations shall be erected and serviced prior to delivery of any materials to the site or commencement of any work. The accommodations will include two office areas, one for the Company and one for the Contractor. The accommodations will be large enough to adhere to physical distancing guidelines as set by the Ontario Government.

The accommodations, equipment and furniture shall be subject to acceptance by the Contract Administrator and shall not be removed from the site without the Contract Administrator's permission.

The Contractor shall bear the costs of heating, cooling, and lighting the field office and the installation and rental charges for the telephone. The Contractor will not be required to pay for long distance calls made by the Company or its representative. The Contractor shall indemnify the Company against loss and fire, theft and injury to the building and its contents.

The accommodations will adhere to all Covid-19 legislation. The Contractor will provide disinfecting wipes, glove, masks and other personal protection equipment (PPE).

b) Telephone

Contractor shall arrange and pay for telephone service, answering machine and facsimile transmission machine for the duration of the Work. Long distance calls, except to the Contractor's other offices, made by the Consultant will be paid by the Consultant upon receipt of an invoice by the Contractor.

c) Convenience

Provide and maintain for the duration of the Work such temporary sanitary facilities or other convenience as may be required by local bylaws or ordinances for the use of all personnel employed on the Work. . A sanitary facility (portable toilet) or equivalent must be provided by the Contractor and erected and maintained within 10 metres of the accommodations.

d) Storage

Erect any temporary buildings or workshops which may be required for workmen and for weathertight storage of products.

ARTICLE SC11 - Construction Layout

The Contractor will be responsible for providing all construction layout necessary for all aspects of area grading, underground services and surface works.

The Consultant will provide the Contractor, in writing, with bench marks and points of reference to be used by him in setting out the works. From these bench marks and points of reference, the Contractor will do his own construction layout and shall include but shall not be limited to the preparation of grade sheets, the installation of centre line stakes, grade stakes, offsets, site rails and screeds. The Contractor shall provide the Consultant with a copy of all grade sheets as they are prepared.

The Contractor shall review all drawings included in the contract for errors or omissions. The Contractor shall also review the adequacy of layout information provided and shall submit any requests for additional information or clarification to the Engineer at least 36 hours in advance of his need for such information.

The Contractor shall be responsible for the true and proper layout of the works and for the correctness of the position, levels, dimensions and alignment of all parts of the works, and for the provision of all necessary instruments and labour in connection therewith. If at any time during the progress of the works, any error shall appear or arise in the position, levels, dimensions or alignment of any part of the works, the Contractor shall, at his own expense, rectify such error to the satisfaction of the Consultant, unless such error is based on incorrect data supplied in writing by the Consultant. The checking of the layout of any line or level by the Consultant shall not in any way relieve the Contractor of his responsibility for the correctness thereof and the Contractor shall carefully protect and preserve all bench marks, stakes and other things used in setting out works.

The Contractor is to furnish the Consultant or any of his assistants, with any reasonable help which he or they may require at any time in checking the work. He shall also furnish the said parties, or any of the Inspectors, at all times, with convenient means of access to all parts of the works, and also with all required assistance to facilitate thorough examination of the same, and inspection, separation and removal of doubtful or defective material, and for any other purpose required in connection with the said works or in the discharge of their respective duties, for which services no additional allowance will be made.

The Contractor's layout crews will be required to report to the Consultant as to schedules and progress. The Contractor's layout crews will be required to take direction from the Consultant for work on the project where such work is deemed to be urgent by the Consultant.

The Contractor shall provide to the Consultant certification from an Ontario Land Surveyor or a Licensed Professional Engineer that the final grades are within tolerances specified for rough grading in Specification No. 3 - General Grading and Earthwork.

ARTICLE SC12 - Extra Construction Layout

The Contractor shall be responsible for any extra costs incurred by the Consultant in providing additional layout extra to that provided for in Article SC9 above. Re-staking or additional layout required due to the Contractor's operation will be charged to the Contractor's account in the following manner.

The Consultant will determine the applicable charges for extra construction layout and will invoice the Company. The amount of these invoices will be deducted from the Contractor's monthly payment certificate, and the Company will then reimburse the Consultant.

ARTICLE SC13 - Noise, Vibration, Mud and Dust Control

The Contractor shall establish and maintain site procedures such that noise levels from construction activities are minimized and are in accordance with local by-laws. It is the Contractor's responsibility to obtain a copy of the City of Ottawa noise by-law and maintain on-site for reference, and comply with all local by-laws with regards to restrictions on working hours and construction activities as related to noise. If the Contractor wishes to obtain an exemption from any by-laws the Contractor will include all associated costs in the unit prices provided within the Pricing Schedule. The Company will entertain no claims for extras or delays in the schedule in the future to satisfy this requirement.

In addition, the Contractor must be in compliance with all requirements of the Environmental Protection Act. In particular related to noise, dust and vibration the Contractor must be in compliance with Section 157(1) of the EPA.

The Contractor shall undertake all mud and dust control measures required to prevent dust nuisances caused by construction activities both on-site and on adjacent roads to the satisfaction of the Consultant and City of Ottawa. The cost of these control measures shall be included in the price provided within the Pricing Schedule.

Mud and sediment controls shall be maintained per ESC1 - 4 notes and details.

The Contractor is responsible for cleanup of mud tracking on existing road surfaces on a daily basis or on a more frequent basis if directed by the Consultant or City of Ottawa. All construction vehicles leaving the site must cross over a rip-rap vibration pad to reduce mud-tracking. The total Contract price shall include cleanup of mud tracking or the reconstruction of the rip-rap vibration pad to the satisfaction of the Consultant.

ARTICLE SC14 - Siltation and Erosion Control

Contractor and engineer shall complete pre-construction site walk to assess condition of existing siltation control fence prior to mobilizing.

Prior to commencing topsoil stripping of the site, erosion and sediment control measures must be installed as shown on the Engineering drawings.

The Contractor is responsible to restore, maintain and remove when directed those sedimentation and erosion control works shown on the plans, either proposed or existing in the field to satisfaction of the Consultant and City of Ottawa.

The Contractor shall inspect the site weekly and before and after every significant rainfall and make repairs as required to conform with the engineering drawings, including removal of sediment. The Contractor will also be responsible for all damage or fines resulting from the improper control of siltation.

All costs associated with this requirement will be included in the unit prices provided within the Pricing Schedule. The Company will entertain no claims for extras for this requirement.

ARTICLE SC15 - Security of the Site

Security of the site will be the responsibility of the Contractor. The Contractor to provide barricades to the construction access outside the hours of construction to prevent access and trespassing onto the lands within the limits of construction. The barricades shall be in accordance with those specified on the Engineering Drawings. Contractor is to post signs adjacent to the site noting that:

- a) It is illegal to dump material onto the site; and
- b) It is illegal to trespass onto private property.

Unit prices provided within the Pricing Schedule shall include the cost of warning signs and barricading the construction access. Any material dumped on the site by others shall be removed and disposed off-site by the Contractor only with the approval of the Consultant, at the Contractor's expense.

ARTICLE SC16 - Coordination with Other Contractors

The Contractor should note that other Contractors may be working on lands adjacent to the site. The Contractor shall co-operate fully with other Contractors at the construction interfaces.

Construction activity in the vicinity of this Contract may be underway during the construction period. The Contractor shall accept the presence of other Contractors within the working area and shall be responsible for all necessary co-ordination.

The unit prices provided within the Pricing Schedule will be compensation in full for this requirement. The Company will entertain no claims for extras for this requirement at a later date. Any delays shall be the responsibility of the Contractor

ARTICLE SC17 - Protection of Trees

The Contractor shall be responsible for the protection of tops, trunks and roots of existing trees designated to be saved on the project site. Trees within the construction area, that are to be saved, shall be fenced around the drip line prior to construction. Interfering branches may be removed under the direction of the Landscape Architect provided there is not injury to the trunk or resultant scars are covered immediately with an approved tree wound dressing. The Contractor shall provide access for the Landscape Architect to all trees to be saved for the purposes of fertilizing and maintaining the trees.

There are no trees within the limits of construction which have been identified for preservation. The Contractor shall be responsible for any damages and resulting repair or replacement costs for any trees on neighboring properties.

ARTICLE SC18 - Occupational Health and Safety Act

The Contractor is responsible for construction safety for all of the Work done under this contract and shall comply with all of the rules, regulations and practices required under the current Ontario Occupational Health and Safety Act together with all other applicable legislation, regulations and standards as laid out by any other governing body.

For the purpose of this contract the Contractor will direct and control the activities of all suppliers, contractors, and visitors within the site. On that basis the Contractor will be the Constructor for the purposes of the Ontario Occupational Health and Safety Act.

The Contractor shall indemnify to Company and Company's agents by a letter that contractor is solely responsible for OHS and to ensure time and space separation between construction activities of all contractors who may be on-site.

The Contractor shall ensure that its subcontractors also comply with all such construction safety requirements. The Contractor shall indemnify and hold harmless and cause its subcontractors to indemnify and hold harmless, the Company, WSP Canada Inc., the Company's agents and any subconsultants. All costs associated with compliance with the pertinent safety requirements shall be the sole responsibility of the Contractor and included in the unit prices provided within the Pricing Schedule.

ARTICLE SC19 - Harmonized Sales Tax

As per previously mentioned terms of this agreement.

ARTICLE SC20 - Local By-Laws and Regulations

All work must conform with local by-laws and regulations including but not limited to the "Occupational Health and Safety Act and Regulations for Construction Projects" and any applicable regulations and local by-laws for erosion and sediment control.

ARTICLE SC21 - Provisional Items

Where it occurs in this document, the notation "Provisional" shall be understood to mean that the inclusion in the Contract of Items so described shall be at the direction of the Consultant.

No claims for extra payment due to the exclusion of any or all of these items will be accepted by the Company.

ARTICLE SC22 - Superintendence

The Company and the Consultant reserve the right to order the Contractor to replace personnel or subcontractors on the project if performance becomes unsatisfactory.

ARTICLE SC23 - Insurance

All insurance policies to be provided by the Contractor to the Company under this Contract shall include the following as additional insured:

- a) The City of Ottawa
- b) Rideau Valley Conservation Authority
- c) WSP Canada Inc.
- d) Canada Lands Company CLC Limited
- e) Public Services and Procurement Canada (PSPC)

ARTICLE SC24 - Progress Certificates

Payment certificates are to include an updated overall project schedule and detailed topographic surveys of the works are provided, per RFP Information Section 11 and Project Specification #3:

- After topsoil stripping
- After placement of fill to final pre-grades or windrow location as specified by the Consultant and certification by the Geotechnical Consultant
- After placement of topsoil to final pre-grades or windrow location as specified by the Consultant and certification by the Geotechnical Consultant

If requested, the Consultant will provide the Contractor with the Pricing Schedule in digital format Microsoft Excel 2010. It shall be the Contractor's responsibility to modify the date as necessary.

ARTICLE SC25 - Plan Quantities for Payment

Quantities provided in the Pricing Schedule are estimates only. The unit price bid shall be applied to the plan quantities regardless of any change with respect to the estimated quantities.

The Company reserves the right to delete any item. No compensation will be paid to cover claims for overhead cost and lost profit.

ARTICLE SC26 - Frozen Ground Conditions

No extra payment shall be made to the Contractor should he encounter frost difficulties. The cost of such work shall be included in the Contractor's bid price for underground construction.

Frozen ground shall not be opened further in advance of construction than one day's underground service installation. Frozen excavation materials shall be separated from the unfrozen material.

Backfilling, as specified in Specification No.4 – Excavation and Backfill, shall be carried out using unfrozen material. The frozen material may then be mounded over the trench. Particular care shall be taken to prevent frozen materials from being buried around maintenance holes.

ARTICLE SC27 – Winter Heat and Protection

The unit prices provided include all necessary equipment, labour, and materials to provide winter heat and protection required to satisfy the requirements of the Contract. The Company will entertain no claims for extras related to this requirement.

ARTICLE SC28 - As-Built Information

It is the Contractors responsibility to prepare as-built drawings.

The Contractor is to supply the Consultant with as-constructed sewer, watermain and services information as well as centreline of base road, final road, area grading, boulevard elevations and all other surface features in accordance with current City of Ottawa specifications (including a red-line drawing).

Following construction of roads to base course asphalt, the Contractor shall provide to the Consultant a topographic survey of the as-constructed rough grading on the lots and blocks. The topographic survey shall conform to the following requirements.

- date of the field survey following the date of construction to base course asphalt.
- coordinate system to be identical to that utilized for the boundary survey and must include the survey of a minimum of four boundary monuments from the site.
- vertical datum to be geodetic or that supplied by the Consultant for this project. Evidence of acceptable closure into at least two benchmarks is required.
- submission shall include a digital file suitable for use with AutoCAD
- survey to include spot elevations at a maximum spacing of 15 metres, including, but not limited to, elevations at the four (4) corners of each lot and at any change in grade (proposed and/or actual) along each lot line. Additional points beyond the 15-metre spacing will likely be required to adequately represent all changes in grade.

- survey to be completed by a survey firm approved by the Company and certified by an Ontario Land Surveyor or a Professional Engineer.
- survey to note limits of engineered fill, underside of engineered fill and top of engineered fill.

The Consultant will compare the as-constructed survey with the proposed rough grade elevation and generate on a 5-metre grid elevation differences between the as-constructed and proposed rough grading and also the volume differential.

In areas where tolerances exceed those noted in the earthwork specification, additional grading will be required. Once the rectifications are completed a revised survey will be required.

All costs associated with completing the original survey as well as any follow up surveys shall be borne by the Contractor.

ARTICLE SC29 – Protection of Survey Monuments

Prior to commencing work, the Contractor shall mark all survey bars identified by the Consultant with three (3) 50x50x1200mm brightly painted wooden stakes and shall protect all bars from damage during construction.

Bars damaged by the Contractor's negligence shall be replaced at his expense.

ARTICLE SC30 – Payment Terms

As per previously mentioned terms of this agreement.

ARTICLE SC31 - Bonds

As per previously mentioned terms of this agreement.

ARTICLE SC32 - Warranty Periods

As per previously mentioned terms of this agreement.

ARTICLE SC33 - Extended Warranty Period

N/A

ARTICLE SC34 - Substantial Performance

As per previously mentioned terms of this agreement.

ARTICLE SC35 - Work Standards

All work is to be carried out to the satisfaction of the Consultant and the Municipal Authorities. (City of Ottawa)

ARTICLE SC36 – Acceptance of Work

The Contractor agrees that all work completed will be reviewed for acceptance by WSP Canada Inc. (Consultant) and ultimately the City of Ottawa.

ARTICLE SC37 - Blasting

Blasting is not allowed on this project unless specific applications are made and approvals received from the Company, Consultant and all affected agencies.

ARTICLE SC38 - Deletions

The Company reserves the right to delete any item. No compensation will be paid to cover claims for overhead cost and lost profit.

ARTICLE SC39- Additional Charges

No claim for extras will be considered under the scope of work described in the Contract unless there are design changes made by the Consultant.

ARTICLE SC40 - Permits

The Contractor is responsible to obtain all required permits to complete the works as noted in the contract documents, in accordance with the procedures and requirements of City of Ottawa. This includes but is not limited to all necessary Road Occupancy requirements.

ARTICLE SC41 - Pre-Construction Meeting

A Pre-Construction meeting shall be coordinated by the Consultant prior to construction commencing. Attendees at this meeting shall include, but not be limited to, representatives from the Contractor, Consultant, City of Ottawa, and the Geotechnical Consultant.

At this meeting the limit of the working area will be established and a construction Work Schedule shall be presented by the Contractor that meets the completion date specified in Article SC4 – Work Schedule. No additional payment shall be made to the Contractor for attendance at this or any other construction meeting.

ARTICLE SC42 – Contractor Reimbursement for Document and Drawing Charges

The Contractor will be provided with 6 sets of the Issued for Construction drawings and specifications. Any additional copies of the drawings requested by the contractor will be provided solely at the cost of the contractor and will be charged at a fixed rate to be confirmed by the consultant. Contractor will reimburse the consultant directly for all reproductions.

ARTICLE SC43 – Dumping

In the event that dumping of materials has occurred due to the Contractor's lack of security or control of the site under this Contract, the Company reserves the right to deduct the costs of the off-site disposal from the Company's payment to the Contractor.

Alternatively, any material dumped on the site by others shall be removed and disposed off-site by the Contractor only with the approval of the Consultant, at the Company's expense.

ARTICLE SC44 – Shop Drawings

The Contractor shall submit for the Consultant's review full primary structural details, designs and shop drawings stamped by a professional engineer licensed to practice in Ontario.

This submission is subject to review, and comments by the Consultant. The Contractor shall provide additional information and details in order to satisfy all concerns of the Consultant. Two unstamped copies of the shop drawings will be returned to the Contractor with the Consultant's comments. Four final (4) copies of Shop drawings shall be submitted to the Consultant for final review and direction to proceed. All final Shop drawings are to be stamped, signed and dated by a professional engineer

licensed to practice in the province of Ontario. Direction to proceed from the consultant is required prior to production of any component. The Company will not accept claims for any additional production of materials that proceed prior to receiving direction to proceed from the Consultant.

ARTICLE SC45 – CCTV Inspection

The Contractor will be required to satisfy the City's requirements for CCTV Inspection.

ARTICLE SC46 – Dewatering

The Contractor shall include all necessary costs of dewatering in order to complete the works as proposed under this contract. The Contractor should familiarize themselves with the geotechnical reports and hydrogeological reports available for review from the Consultant's office.

ARTICLE SC47 – Temporary Stockpiling and Testing

The Company reserves the right to have sufficient time to undertake the necessary testing of the temporary stockpiles to determine the nature and classification of the materials.

ARTICLE SC48 – Extras

As per previously mentioned terms of this agreement.

ARTICLE SC249 – Transfer of Electronic Data

Electronic data shall only be provided to the Contractor upon execution of an agreement for the transfer of Electronic Data.

The Contractor understands that the use of the Electronic Data transmitted is intended for conceptual review purposes only. It is expressly not intended for and should not be used as a substitute or replacement for standard construction design or as-built documents, or for any purpose that would customarily rely upon such original hard copy documents.

Electronic data includes, but is not limited to, Building Information Modelling (BIM) files, and Computer-Aided Design (CAD) files, including native 2D and 3D file formats (RVT, RFA, NWC, NWD, NWF, DWF, DWFx, DWG, DGN, IFC, DXF as examples), files produced by word processing, spreadsheet, scheduling, data base, and other software programs. The electronic data may be provided in an original format produced by WSP or an alternate, "translated" format as requested.

ARTICLE SC50 -Documents Required from the Contractor

1. Prior to Commencement

- a) Certified copies of the Contractor's insurance.
- b) WSIB Certificate showing the Contractor is in good standing.
- c) A project schedule.

2. For Progress Payments

- a) The Contractor's Payment Certificate (quantities to be reviewed by Consultant prior to submission).
- b) Certificate of Clearance from the Workers' Compensation Board.
- c) Documentation to substantiate payment of extra work including payroll burden, overhead and profit.
- d) Statutory declaration.

- e) Invoice.
- f) Copy of needed surveys as determined by the Consultant.

3. Prior to Statutory Holdback Release

- a) Certificate of Clearance from the Workers' Compensation Board.
- b) A Statutory Declaration that all financial liabilities incurred by the Contractor have been paid and that there are no liens, garnishees, attachments or potential claims relating to the work.
- c) A copy of the Certificate of Substantial Performance advertised in a construction trade newspaper.
- d) A letter stating that the Contractor is in agreement with all final contract quantities paid to date and that no further claims will be made.
- e) All outstanding surveys and as-built information as determined by the Consultant.

4. Prior to Final Acceptance of Work

- a) A Statutory Declaration as in (3b).
- b) A Letter of Release from Contractor as in (3d).

ARTICLE SC51 - Noise, Mud and Dust Control

The Contractor shall establish and maintain site procedures such that noise levels from construction activities are in accordance with local bylaws.

The Contractor shall undertake all dust control measures required to prevent dust nuisances caused by construction activities both on site and on adjacent roads. The cost of these control measures shall be included in the price provided within the Pricing Schedule.

ARTICLE SC55 - Measurement of Quantities

Payment for all items shown as PQM (Plan Quantity Measurement) will be based on Pricing Schedule Plan Quantities and will not be measured in the field unless design drawings for that item are altered.

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SPECIFICATION NO. 1 GENERAL REQUIREMENTS

1.0 DESCRIPTION

The requirements of this specification shall apply to the Contract as a whole and pertain to all of the Work as specified by the Contract Documents.

2.0 ACCEPTANCE OF SITE

It will be the Contractor's responsibility to visit and examine the site of the Work prior to submitting their RFP response.

Execution of the Contract Documents by the Contractor will imply acceptance of the surfaces and conditions and no claim for damages or extras resulting from such conditions or defects will be allowed thereafter.

3.0 TRAFFIC

Traffic may be restricted on roads, only with the written permission of the appropriate municipal authority. Unless otherwise directed, obtain all required permits. Copies of the permits to be delivered to the Consultant at least 48 hours in advance of occupying the road.

Communicate the details of any traffic restrictions to the local police department, fire department and transit authority.

Provide flagpersons, barricades and road signs in accordance with the requirements of the appropriate authority and to the satisfaction of the Consultant. Flagpersons to be in constant communication visually or by radio.

Maintain safe access for the public. Should any unsafe condition occur, take immediate steps to rectify the situation. If work is not commenced within 24 hours of notification, the Company reserves the right to perform remedial work at the expense of the Contractor.

Construct temporary detours as specified. The details to be as specified by the Consultant and the road authority.

4.0 DISPOSAL SITES

Unless otherwise specified, where the Contractor is required to dispose of timber, trash, debris, boulders, surplus or unsuitable earth etc. off-site, he shall arrange a disposal site at his own expense.

Supply to the Consultant written permission from the Company of the property upon which the material is to be placed and save the Company and Consultant harmless for any claims that may arise from such disposal.

5.0 WEATHER CONDITIONS

Provide adequate means of heating materials and protect the work from damage by frost in freezing weather.

Provide all labour, materials and equipment to remove frozen ground to permit continuation of the work during freezing weather conditions.

Protect existing utilities from freezing and ensure continuity of service when water mains, sewers and service connections are encountered in excavations or when ground cover is removed or reduced during grading operations.

Remove all ice and snow from access, work and storage areas and do not perform any ditching, stripping, excavation or grading before the removal of ice and snow.

6.0 CLASSIFICATION OF EXCAVATED MATERIALS

Excavated material shall be classified as "Rock" or "Earth".

6.1 Rock Excavation

-Material excavated from solid masses of igneous, sedimentary or metamorphic rock which, prior to removal, was integral with the parent mass; and

-Buried boulders, rock fragments or broken concrete refuse which measure, in volume, 1 cubic metre or more.

The removal of pavements, curb and gutter, surface boulders, concrete structures, masonry walls and stone fences shall not be classified as Rock Excavation and shall be removed as specified in Specification No. 2 - Site Preparation.

6.2 Earth Excavation

All materials not described under Item 6.1 above and including dense tills, hard pan and other similar materials.

7.0 BLASTING

Blasting will not be permitted under this Contract without the written approval of the Consultant and other governing authorities.

If the Work under the Contract requires the Contractor to excavate rock by means of blasting the following shall apply:

The Contractor shall comply with all the statutes, regulations, by-laws and orders relating to the supply, hauling, handling, use of, and storing of explosives.

The Contractor shall provide the necessary notices including notification of the Consultant in all cases and Police & Fire Departments when blasting is done within 100 metres from existing buildings or public roads. Notification shall be at least 24 hours in advance of blasting operations.

Immediately prior to a blast, the Contractor shall clear the blasting area of all vehicular and pedestrian traffic and shall post flagmen on each road or trail entering the blasting area who shall stop all traffic and shall prevent such traffic from entering the area until the blast has taken place. The Contractor shall provide and use a siren to warn the public and the workmen that a blast is to be set off and to indicate the "All Clear" after the blast has taken place. Four short soundings of the siren two minutes before detonation of a blast shall be used for warning

and protection, and one long 10 to 15 second sounding of the siren shall be used to give the "All Clear" signal.

The type of explosives, drilling and method of blasting to be used must be authorized by the Consultant. The use of explosives in large blasts, as in seams, drifts, shafts, pits or coyote holes, or in similar devices, is prohibited, unless done on the written authority of the Consultant.

Protective measures shall be used where blasting may damage adjoining property or public utilities.

The Contractor shall be responsible for all damages.

Notwithstanding any direction by the Consultant in regard to explosives, drilling or methods of blasting used, the Contractor shall take all precautions necessary to ensure the safety of persons and adjoining property and structures, including public utilities and shall be responsible for all claims, whatsoever, arising from the hauling, handling, use of, and storing of explosives, and all affects, direct or indirect, of the blasting operations.

No extra payment will be made for protection measures; nor for damages to persons, properties or structures; nor for damages or repairs to public utilities; nor for any claim whatsoever arising from blasting operations. All such costs, shall be included in the Contract Unit Prices for "Rock Excavation".

If specified with Special Conditions under "Independent Testing", the Contractor shall arrange for a "Pre-blasting Survey" of adjacent buildings and structures. This survey shall be carried out by an independent organization, satisfactory to the Consultant.

8.0 MATERIALS AND QUALITY CONTROL

The Company will pay the costs of quality control tests except as noted. The Consultant may approve or reject any materials supplied for the Work in accordance with the Specifications herein. He may request the name and address of the manufacturers supplying materials as well as samples of materials for testing purposes. These shall be supplied at no cost to the Consultant or the Company.

When requested by the Consultant, provide an affidavit from the Manufacturer that materials are in accordance with the specifications before delivery of the materials.

When a specific item or material is required, the manufacturer and catalogue number will be specified in the Contract documents.

Replace materials that do not satisfy the specification, at no cost to the Company.

Pay for additional testing required due to failure to meet specifications.

9.0 INDEPENDENT TESTING AND INSPECTION

9.1 Testing Companies

Testing companies commissioned for the performance of tests shall be independent of the Contractor or Suppliers of products or materials to be tested and/or inspected. The selection of testing companies will be subject to approval the Consultant.

9.2 Reports

Testing and inspection reports shall be submitted directly to the Consultant with copies to the Contractor and the Company.

9.3 Payment

The cost of repeat tests, until satisfactory results are obtained will be at the expense of the Contractor.

9.4 Required Tests

Tests and/or inspections to be carried out by independent testing companies are listed elsewhere in the contract and may include: Compaction; Gradation; Concrete and Asphalt.

10.0 LIMITS OF CONTRACT

Confine work to the limits or boundaries shown on the Contract Drawings or as otherwise specified. The Contractor shall protect all existing trees where possible and shall make his own arrangements for working on private property.

11.0 EXISTING STRUCTURES AND UTILITIES

Examine the location of the Work and make such enquiries necessary to determine the existence and location of structures and utilities, both above and below ground which may be in the line of the Work or affected by construction operations.

Existing structures and utilities shown on the drawings are for information only and the Consultant will assume no responsibility for completeness or accuracy.

The Contractor shall be responsible for adequately protecting all existing utilities and services and for permanently supporting utilities which are affected by work to be done under this Contract. The Contractor shall be responsible for any damages caused to existing utilities during construction. The Contractor shall arrange for all field stakeouts of existing utilities and will expose any utility deemed necessary by the Consultant.

Satisfy the requirements of the utility authorities including the railways, regarding location, stakeouts and construction activities in the proximity of the utility or railway.

12.0 RELOCATION OF EXISTING STRUCTURES AND UTILITIES

Existing structures and utilities which are known to require permanent realignment or relocation will be completed at no cost to the Contractor except when specified otherwise.

Do not interfere with the work of utility or railway companies, their Contractor or agents and provide reasonable co-operation and schedule the work accordingly.

Other structures or utilities encountered during the progress of the work which require permanent relocation shall be relocated by the Owner of the structure or utility, or if agreed, the Contractor shall carry out the work. The Contractor shall not be entitled to claim any damages or extra compensation for any delay due to such removal or rearrangement.

13.0 TEMPORARY RELOCATION OR SUPPORT

Temporary relocation of structures or utilities will be completed by the Contractor or arranged by him with the Utility at the contractors expense.

Provide temporary support for utilities crossing the excavation. Construct supports as detailed on the Drawings.

14.0 EXISTING DRAINAGE

Maintain the flow in existing pipes, conduits, ditches and watercourses. Where this is not feasible, alternative arrangements must be approved by the Consultant.

15.0 MUNICIPAL REQUIREMENTS

Without altering the intent of the Contract Documents all work is to be done to the satisfaction of the Local Authorities for the Municipality where the Work is performed. Acceptance of the Work will be subject to receipt of approval by the aforementioned Municipal Authorities.

16.0 ONTARIO MINISTRY OF TRANSPORTATION (M.T.O.) STANDARDS

When specified that work shall be completed in accordance with M.T.O. standards, the words "the Consultant" shall be substituted for "the Ministry". Payment information in M.T.O. forms shall not apply to this Contract.

17.0 SURVEY MONUMENTS

The Contractor shall protect and maintain all monuments, bars, pins, stakes, markers and such survey points as may be placed by the Consultant or Land Surveyors and they shall be at all times made accessible to the Consultant. The Company shall have the right to charge the Contractor for the reinstatement of any such survey points if they have been removed, damaged, buried or otherwise rendered unusable by the Contractor or his agents. No charge shall be made for any survey points which, in the opinion of the Consultant, have to be moved or reinstated in order to construct the works.

Prior to commencing work, the Contractor shall mark all survey bars identified by the Consultant with a minimum of two 50 mm x 50mm x 1200 mm brightly, painted wooden stakes.

18.0 TEMPORARY FACILITIES

The Contractor shall provide, at his own expense, such temporary facilities as outlined and specified in the Special Conditions of the Contract.

19.0 FINAL MEASUREMENTS AND ADJUSTMENTS

19.1 Unit Price Items

When a unit price is submitted, the Contract quantity will be adjusted in accordance with the final measurements, unless otherwise specified. Final prices will not be adjusted for measurements under 1.0 m. Supplier's weigh tickets shall be provided when requested by the Consultant.

19.2 Lump Sum Price

When a lump sum price is submitted, it shall be payment in full for the items as detailed. Additions, deletions and design changes will be negotiated at the time of installation.

19.3 Claims for Anticipated Profit

As per previously mentioned terms of this agreement.

19.4 Claims for Interest

The Contractor shall not be entitled to claim, demand or receive any interest upon any invoice for work done on account of delay in the approval of the Work by the Consultant.

20.0 PAYMENT

Except where specifically noted, payment for work under this section shall be included in the Contract Price and no extra compensation will be made for any labour, materials, consumables or equipment necessary to fulfill the requirements of this specification in completing the Work of the Contract.

21.0 EQUIPMENT RENTAL

If the Consultant directs or otherwise authorizes the Contractor in writing to undertake additional work consisting of rental of equipment at the rates set out in the Schedule of Additional Unit Prices and if "standby time" is authorized by the Consultant the following shall apply:

- a) "Standby Time" means any period of time which is not considered working time and which together with the working time does not exceed 10 hours in any one working day and during which time a unit of equipment cannot practically be used on other work but must remain on the site in order to continue with its assigned task and during which time the unit is in fully operable condition.
- b) The contractor shall be reimbursed for the standby time of owned and rented equipment at one-third the O.P.S.S. 127 rate, less any discount rate agreed upon in the contract.
- c) In addition, the cost of labour, the wages, salary and payroll burden of the operator or operating crew who cannot be otherwise employed during the standby period, will be paid.
- d) "The 127 Rate" means the rate for a unit of equipment as listed in O.P.S.S. 127 (Schedule of Rental Rates for Construction Equipment) which is current at the time the extra work is carried out or for equipment which is not so listed, the rate which has been calculated by the Consultant, using the same principles as used in determining the O.P.S.S. 127 rates.

22.0 WORK SCHEDULE

The Contractor shall:

- a) Prepare and submit to the Company and the Consultant prior to the first application for payment, a construction schedule that indicates the timing of the major activities of the Work and provides sufficient detail of the critical events and their inter-relationship to demonstrate the Work will be performed in conformity with the Contract Time;

- b) Monitor the progress of the Work relative to the construction schedule and update the schedule on a monthly basis or as stipulated by the Contract Documents; and
- c) Advise the Consultant of any revisions required to the schedule as the result of extensions of the Contract Time as provided in Part 6 of the General Conditions - Changes in the Work.

SPECIFICATION NO. 2 SITE PREPARATION

1.0 DESCRIPTION

The work covered by this specification shall include the supply of all labour, materials, consumables and equipment, excavation, control of ground and surface water, backfill and compaction to complete the clearing of vegetation, grubbing, stripping of topsoil and the removal of existing structures as specified.

The Contractor shall include everything required and necessary to complete the work notwithstanding that every item may not be specifically mentioned.

1.1 Clearing

Clearing shall consist of cutting off at the specified height all saplings, trees, brush and other vegetation within the designated area and the disposal of timber, brush, windfalls and other surface litter.

1.2 Grubbing

Grubbing shall consist of the removal and disposal of all stumps, roots, embedded logs, wood chips, surface boulders and all debris from the designated areas.

A surface boulder is defined as a boulder, rock fragment or rubble less than 1 m³ in volume which can be removed without requiring excavation to facilitate such removal.

Surface boulders, boulders in piles and stone fence rows shall be considered as debris and grubbing shall include their removal and disposal.

1.3 Stripping

Stripping shall consist of the removal of existing surface topsoil from the designated areas. Topsoil is that soil which in the opinion of the Consultant is suitable for the growth of future vegetation.

1.4 Structures

Removal of existing structures shall consist of items such as pavement, curbs, sidewalks, buildings, concrete structures, masonry walls, tanks, pipes, etc., which are designated to be removed or partially removed.

2.0 CONSTRUCTION

2.1 Clearing

Remove trees, shrubs and vegetation as specified on the Drawings. Protect from injury all trees, shrubs and vegetation designated to be preserved during construction operations in the manner specified.

Cut trees to a height of 0.5 metres above the surrounding ground and fell toward the centre of the area to be cleared. Where trees cannot be felled without danger to traffic or injury to other trees, structures, or property, they shall be cut in sections from the top down.

Disposal of tree products shall be the responsibility of the Contractor unless otherwise specified.

2.2 Grubbing

Disposal offsite, of grubbed material shall be the responsibility of the Contractor, unless otherwise specified.

Obtain permits and satisfy all requirements of the authorities having jurisdiction prior to any burning operations.

Level all areas where clearing and grubbing has been completed. Topsoil or seeding will not be required unless otherwise specified.

2.3 Stripping

Remove topsoil from the designated area. When constructing roads remove topsoil for the full width of the road allowance less 600 mm.

Remove topsoil and all organic material for its full depth and retain in designated stockpile areas after clearing and grubbing and before any other construction activity to prevent contamination with subsoil.

Locate and construct stockpiles to prevent ponding of water.

2.4 Removal and Disposal of Existing Structures

Carry out demolition in such a manner so as not to disturb adjacent pavement, utilities or other works to be left in place and to protect materials designated to be salvaged.

Material other than salvage shall become the property of the Contractor and shall be removed from the site unless otherwise specified.

Deliver salvage material, and stockpile without undue damage in the location designated by the Consultant.

Backfill excavations with native material and compact to a minimum density of 95% Standard Proctor density.

Square off broken edges of pavements sidewalks, curbs, etc. in a manner satisfactory to the Consultant.

2.5 Approval

Contractor shall provide the Consultant with a letter from the Company of the property upon which the excavated material shall be disposed giving written permission for the disposal of the noted material.

3.0 MEASUREMENT

Area measurements will be made in horizontal planes.

3.1 Clearing

Unless otherwise specified, measurement will be by general area.

3.2 Grubbing

Unless otherwise specified measurement will be by general area. Depth of material to be removed by grubbing operation will be as specified and will not be measured.

3.3 Topsoil Stripping

Unless otherwise specified topsoil stripping will not be measured but will be based on a volume calculated by area times average topsoil thickness to be agreed by the Contractor after reviewing soils data.

3.4 Existing Structures and Utilities

Measurement as specified in the Schedule of Contract Unit Prices.

4.0 PAYMENT

Payment at the contract price(s) for clearing, grubbing, stripping topsoil and the removal of existing structures shall be compensation in full for supplying all labour, equipment, excavation, backfill, materials and everything necessary to complete the works as specified.

4.1 Clearing and Grubbing

Clearing and grubbing may be issued for pricing as separate items or may be combined into a single item including both operations as specified in the Schedule of Contract Unit Prices.

The prices provided shall include:

- (a) disposal off the project site of all timber, brush, stumps, logs, surface boulders and debris.
- (b) backfill and grading as specified.

4.2 Topsoil Stripping

The price provided shall be compensation in full for stripping and stockpiling topsoil in the designated areas.

4.3 Existing Structures and Utilities

Payment at the specified price as listed in the pricing schedule for removal of existing structures and utilities shall include delivery of the salvage to the specified location, disposal off the contract site of all other material, backfilling and grading as specified.

Payment will be made only for those existing structures and utilities itemized in the Schedule of Contract Unit Prices. All other existing structures and utilities shall be considered debris and removed and disposed of as part of the grubbing operation and no separate payment allowed.

SPECIFICATION NO. 3 GENERAL GRADING AND EARTHWORK

1.0 DESCRIPTION

The work covered by this specification shall include the supply of all labour, material, consumables and equipment to do all the excavation, grading and filling with earth required for the execution of specified grading and earthworks. This specification does not cover rock fills. "Rock Excavation" as defined in Specification No. 1, General Requirements, is not considered part of this Specification and is covered in Specification No. 4, Excavation and Backfill.

Unless otherwise specified, prior to commencing work the Contractor shall verify the rough grading earthwork quantities either by taking their own cross-sections or by reviewing the Consultants cross-sections. Claims for discrepancies in earthwork quantities will not be considered.

All cutting and filling shall be performed in such a manner to avoid flooding or ponding of water on the site or any adjacent properties. Surface drainage shall be provided during all stages of the work and fill materials placed as soon as possible to prevent ponding in sub-excavated areas.

Provide temporary support for any existing structures and utilities affected by the work as specified in Specification No. 1 - General Requirements.

2.0 CONSTRUCTION

2.1 Rough Grading

Excavate, fill and compact to the specified subgrade elevations and cross-sections over all road allowances and areas designated for area grading. Fill material shall be approved by the Consultant and contain no frozen lumps, topsoil, organic materials or other objectionable matter.

Fill material on lots designated for area grading will not require compaction other than that resulting from normal filling, spreading and earthwork operations. Compact all other areas designated to 95% Standard Proctor Density, unless otherwise specified.

If the subgrade soil conditions are unsuitable, additional excavation may be required. Any excavated material not suitable, or not required for the purpose of filling or grading shall be spread or stockpiled in designated areas within the site or hauled away from the site as directed by the Consultant.

Place and compact material obtained from areas to be excavated or imported material in low areas and fill to required subgrade elevations. Transport material from the specified borrow area when insufficient cut material is available.

Should the Contractor erroneously excavate below the subgrade elevations he shall backfill such excavation with approved material and compact to 95% Standard Proctor Density at no cost to the Company.

Where specified, cut roadside and other drainage ditches including culverts during rough grading operations so as to provide satisfactory drainage of the subgrade at all times.

Place culverts of the sizes and gauges shown in the Schedule of Contract Unit Prices where indicated on the Drawings. Unless otherwise specified, culverts shall be carefully bedded on a minimum thickness of 150 mm of well-compacted granular material, and backfilled with well-tamped granular material for a width of 150 mm on each side of the culvert and to a minimum depth of 150 mm above the culvert. Backfill and compact the remainder of the trench with material containing no stones larger than 150 mm in diameter and in layers not exceeding 300 mm in depth.

Rough grading elevations shall be achieved within a tolerance of 50 mm. In addition, deviations from specified grades within the required tolerance shall be random so that no surplus or deficit of material results on any individual lot.

2.2 Fine Grading

Fine grade, shape and compact the rough subgrade to the specified grade and cross-section. Unless otherwise specified, compact to 95% Standard Proctor Density.

Finished surfaces shall not deviate more than 25 mm from the specified grades and cross-sections. The deviation, within the specified tolerance, shall be random.

Maintain the specified grade, cross-sections, tolerances and compacted density until the work is accepted or until the construction of the granular base, when this work is a part of the Contract.

No ruts or depressions shall be allowed to form in the compacted subgrade and all traffic must be kept off the subgrade where possible until the sub-base is applied.

3.0 MEASUREMENT

3.1 Rough Grading

Unless otherwise specified, no measurement of earthworks will be made.

Culverts and drainage ditches, where specified for payment, will be measured on a linear metre basis.

3.2 Fine Grading

No measurement of areas requiring fine grading will be made.

4.0 PAYMENT

4.1 Rough Grading

The stipulated sum provided within the Pricing Schedule for Earthwork and Grading shall be compensation in full for all labour, material, consumables and equipment to do all excavation, transportation, filling and compaction, control of surface and ground water to complete rough grading.

The stipulated sum provided within the Pricing Schedule for Earthwork and Grading shall also be compensation in full for stripping and stockpiling topsoil as outlined in Specification No. 2.

The stipulated sum provided within the Pricing Schedule for Earthwork and Grading shall also include the cost of locating an offsite dump area for excess material and/or locating an offsite borrow area should imported fill be required.

Where specified, payment for drainage ditches and culverts shall be at the price provided within the Pricing Schedule in the Schedule of Contract Unit Prices.

4.2 Fine Grading

The price provided within the Pricing Schedule shall be compensation in full for all labour, material, consumables, and equipment to do all excavation, filling and compaction, control of surface and ground water to complete the fine grading.

SPECIFICATION NO. 4 EXCAVATION AND BACKFILL

1.0 DESCRIPTION

The work covered by this specification includes the supply of all labour, materials, consumables and equipment for excavating and backfilling of trenches for pipes, conduits and appurtenances.

The work includes but is not limited to the following; sheet piling, sheathing, shoring and bracing; installation and operation of all equipment required for dewatering excavations and control of ground and surface water; protection and supporting of existing structures and utilities; removal of all debris and surplus material; compaction of the backfill, rough grading and restoration of surfaces; maintenance of existing travel on streets and roads and access to private and public property and each and everything required to complete the work as specified. Comply with safety requirements of the Federal and Provincial Governments and of the local municipal authority.

2.0 EXCAVATION FOR STRUCTURES

2.1 Depth

The excavation to the bottom of the foundation or the underside of the working mat when a working mat is permitted.

Remove material deemed unsuitable at the bottom of an excavation to a depth determined by the Consultant, and backfill with approved material.

Backfill and compact excessive depth with approved material at no additional cost to the Company unless the removal is authorized by the Consultant.

2.2 Length and Width

Provide sufficient horizontal dimensions to permit adequate space to safely complete the structure, place and remove any formwork required.

3.0 TRENCH EXCAVATIONS

3.1 Alignment and Depth

Excavate trenches to the alignment and depths specified on the contract drawings for the class of pipe bedding specified and only so far in advance of pipe laying as permitted by the Consultant.

Where, in the opinion of the Consultant, the material at the bottom of the trench is unsuitable to receive the pipe bedding, excavate to a depth as deemed necessary by the Consultant and backfill with an approved material.

In the event that the trench is over excavated without the authorization of the Consultant, fill and compact the excavation to the correct grade with an approved material without compensation.

3.2 Trench Width

The trench width shall be measured at a height of 300 mm above the top of the pipe.

For parallel pipe installations the trench width shall be measured in a horizontal plane 300 mm above the top of the higher pipe.

When sheathing is required the trench width shall be the inside face to inside face of the sheathing.

Refer to the Project Specifications or drawings for maximum and minimum trench widths.

Should the Contractor excavate wider than specified, the Consultant may require the use of stronger pipe, a higher class of bedding, or both, supplied and installed without compensation.

4.0 DEWATERING

4.1 Equipment

Supply all necessary equipment required to keep excavations and trenches free from both ground and surface water.

4.2 Disposal

Dispose of water removed from excavations and trenches in such a manner so as to prevent injury to public health, damage to private or public property, or to any work under construction. Obtain all required permits for dewatering.

When deemed necessary by the Consultant, construct sedimentation ponds of sufficient size to remove sand and silts from the water before directing it to adjacent lands or watercourses. Outfall pipes shall be installed in such a manner as to prevent erosion of dykes, stream banks or slopes.

5.0 EXISTING PAVEMENTS

5.1 Size of Excavation

When the excavation is adjacent to existing pavements, structures or utilities employ sheathing and shoring or any other means as deemed necessary by the Consultant to keep the disturbed area to a minimum.

Road crossing shall be by vertical trenching unless permitted otherwise by the Consultant and the Governing road authority.

Employ methods to assure breaking of pavement along straight lines having a vertical face.

6.0 SUPPORTING OF EXCAVATIONS

6.1 Installation

Provide, install and maintain in good condition sheet piling, sheathing, shoring and bracing in accordance with Safety Regulations as may be required, due to ground conditions, limited working areas, adjacent utilities and structures, road crossings, methods of operation or when directed by the Consultant.

Fill and compact voids behind sheathing with an approved granular material or native material when permitted by the Consultant.

6.2 Removal

Construct sheathing and shoring in such a manner as to permit the removal without injury to the work, adjacent structures, utilities or pavements.

Remove sheathing, shoring and bracing as the excavation is backfilled except when the Consultant orders it left in place or when the Contractor requests to leave the same in place and the request is approved by the Consultant.

Remove sheathing and shoring in such a manner as to prevent the "caving in" of the excavation during backfilling operations.

Fill and compact cavities caused when sheathing is removed.

Cut off shoring left in place at least 1 m below the final ground surface unless instructed otherwise by the Consultant.

6.3 Responsibility

The right of the Consultant to order sheet piling, sheeting, shores, bracing, etc., left in place in the Work, or to order the use of same or to order a better quality or larger size of material does not relieve the Contractor of any of their obligations under this Contract, or relieve him of liability for damage to persons or property resulting from their failure to use or to leave in place sufficient sheeting, shoring, etc., to prevent any caving or moving of the ground, or resulting from any other negligence in the carrying out and final completion of the Work.

7.0 EXISTING UTILITIES AND STRUCTURES

Existing utilities and structures which are to remain in place shall be protected, supported or relocated as specified in Specification No. 1 - "General Requirements".

8.0 FROZEN GROUND MATERIAL

The replacement of frozen material with suitable material is the Contractor's responsibility under the Contractor's bid price.

Frozen ground shall not be opened further in advance of construction than one day's underground installation. Wherever possible, frozen excavated materials shall be separated from unfrozen material.

Backfilling shall be carried out using unfrozen material. The frozen material may then be mounded over the trench. Particular care shall be taken to prevent frozen materials from being buried around manholes.

9.0 PIPE BEDDING

9.1 Materials

Pipe bedding shall be supplied as specified on the contract drawings.

Materials used for bedding shall conform to Specification No. 8 - "Concrete" and Specification No. 9 - "Granular Materials".

9.2 Placing

Granular bedding shall be compacted underneath, beside and over the pipe to 98% Optimum Dry Density.

In the event that concrete bedding is specified the Contractor must use solid concrete blocks to support the pipe prior to placing the concrete. The compressive strength of the blocks shall be at least equivalent to that of the concrete bedding. Sufficient blocks shall be supplied and placed in such a manner to prevent movement of the pipe while placing the concrete bedding.

Concrete used for bedding shall be placed in two lifts if necessary. The level of the first lift shall not exceed 80 mm above the bottom of the pipe. The second lift shall be placed immediately after the initial wet of the first lift.

When concrete bedding is specified in rock trenches, separate the concrete from the rock by a compacted cushion of approved granular material, of at least 75 mm thickness, under the concrete bedding as well as both sides. As an alternate, 50 mm of rock deteriorating styrofoam may be placed on the sides.

When concrete bedding is placed against sheathing, a bond breaking material shall be placed between the sheathing and the concrete to permit removal of the sheathing.

10.0 BACKFILLING

10.1 Materials

Native material can be used for backfilling excavations and trenches except when otherwise specified or when the excavated material is deemed unsuitable by the Consultant.

Native material used for backfill shall consist of earth which is free of topsoil, trash, debris, boulders exceeding 300 mm or any other deleterious materials. No boulders exceeding 150 mm shall be placed in the top 300 mm of the backfill.

Stones over 50 mm will not be permitted to be placed within 300 mm of the pipe structure.

When rock is permitted as a backfill material, protect the pipe by a minimum of 450 mm of compacted material above the top of the pipe. This material shall be native material or granular as specified and free from stones exceeding 50 mm in diameter.

When granular material is specified as backfill or when ordered by the Consultant, it shall conform to the requirements of Specification No. 9 - "Granular Materials".

Do not backfill with frozen material without permission from the Consultant.

10.2 Placing

Place backfill against the pipe in such a manner so as to prevent any damage or movement.

Place backfill in uniform layers not exceeding 300 mm in thickness loose measurement. Compact each layer to 95% standard proctor maximum dry density.

Maintain backfill at uniform layers on each side of pipes and around structures.

Surplus excavated material may be disposed of in fill areas within the contract limits as directed by the Consultant and subject to the requirements of Specification No. 3 - "General Grading and Earthwork".

Any deficiency of backfill material shall be supplied by the Contractor and must meet the approval of the Consultant.

Correct any settlement occurring after backfilling without compensation.

No stub connections shall be backfilled until the Consultant has verified the locations and elevations at both ends and has given their written authorization to backfill.

10.3 Restoration of Surfaces

Surface areas disturbed during the construction operations are to be restored as specified.

11.0 PAYMENT

11.1 General

Unless otherwise specified, with the exception of rock, the payment for excavation of all materials encountered, dewatering, sheathing and shoring, for supplying, placing and compacting bedding and backfill, for supporting existing structures and utilities, maintaining traffic and access during construction, removing excess excavated material, restoring surfaces, shall be included in the price provided within the Pricing Schedule for supply and installation of pipes and structures.

11.2 Rock Excavation

Additional payment will be made for "Rock Excavation" as defined in Specification No. 1 - "General Requirements". The price provided within the Pricing Schedule shall include disposal outside the contract limits. Measurement will be made as follows:

- a) Maximum trench width or actual width of trench whichever is the smaller.
- b) Outside dimensions of structures plus a 300 mm envelope around the structure.
- c) Actual volume of boulders as determined by the product of the three maximum dimensions.
- d) No payment will be made for rock removed outside of the specified limits. No duplicate payments will be made for rock excavation.
- e) If blasting precedes the stripping of overburden, the Contractor shall accept the Consultant's estimate as to the elevation of top of rock.

11.3 Excess Excavation

When the Consultant instructs the Contractor to carry excavations below the specified depth to obtain a satisfactory foundation the volume of material excavated will be determined by the Consultant and payment made according to the Schedule of Contract Unit Prices.

The Price for excavation shall include the disposal of the material.

The Contractor shall provide material as specified by the Consultant to backfill the sub-excavation. Price provided within the Pricing Schedule will be full compensation for supplying, placing and compacting the material.

11.4 Sheathing and Shoring

Sheathing and shoring which is left in place on the instructions of the Consultant will be paid for at the provided within the Pricing Schedule price.

Payment will be made only for the actual length left in the ground, except where the cut-off is less than 1.3 metres when this length will be included for payment.

11.5 Backfilling

When granular material is specified for backfill, the supply, placing, compacting and removal of native material shall be included in the price provided within the Pricing Schedule for the installation of pipes and structures.

When the Consultant deems the native material unsuitable for backfill the Contractor shall supply, place and compact imported material at the price provided within the Pricing Schedule. The price provided within the Pricing Schedule shall include disposal of the unsuitable material outside the Contract limits.

Any shortage of backfill material due to the Contractor's method of operation shall be supplied and placed by the Contractor at no additional cost to the Company.

11.6 Frozen Ground Conditions

No extra payment shall be made to the Contractor should he encounter frost difficulties. The cost of such work shall be included in the Contractor's bid price for underground construction.

SPECIFICATIONS NO. 5 WATER DISTRIBUTION SYSTEM

1.0 DESCRIPTION

The work consists of the supply of all labour, materials, consumables, and equipment for the installation of watermains, fittings, valves, valve boxes, valve chambers, service connections, blowoffs, hydrants and appurtenances necessary for the complete construction, flushing and testing of the water distribution system as detailed on the Contract Drawings and as specified. Include everything requisite and necessary to properly complete the entire system, notwithstanding that every item may not be specifically mentioned.

When required in the Project Specifications disinfect the system as specified.

2.0 MATERIALS

Materials shall meet the requirements as specified herein.

Materials shall be of the kind, type, size and class as specified on the engineering drawings.

All fittings such as tees and elbows to be supplied in classes compatible with the pipe.

2.1 Ductile Iron Pipe

Ductile Iron Pipe to conform to AWWA C151 (ANSI A21.51) (CSA B131.13) standard lengths.

Push-on or mechanical joints to conform to AWWA C111 (ANSI A21.11) (CSA B31.10).

Cement Mortar lining to be standard thickness in accordance with AWWA C-104 (ANSI A21.4).

Electrical conductivity □ a low resistance electrical connection to be provided at each joint.

2.2 Concrete Pressure Pipe

Pipe and joints for prestressed concrete, steel cylinder type pipe to conform to AWWA C301.

Pipe and joints for non-cylindrical reinforced concrete pressure pipe to be in accordance with AWWA C302.

Pipe and joints for reinforced concrete pressure pipe, steel cylinder type, pretensioned to meet the AWWA C303 requirements.

Suitable flanged or threaded connections for mounting of valves or for branch lines to be as specified.

Welding/grouting sequence for welded joints to be submitted to the Consultant for review.

2.3 Polyethylene (P.E.) Pipe

Polyethylene pipe material to be in accordance with ASTM D1248.

Polyethylene pipe to be manufactured in accordance with CSA B137.

Joining of pipe to be accomplished by the butt fusion method.

Where required, flanged connection will be as specified.

2.4 Polyvinyl Chloride (PVC) Pipe

P.V.C. pipe in sizes 100 mm through 300 mm to conform to AWWA C900.

Unless specified otherwise, PVC 1120 pipe with a DR=18, pressure class of 1035 kPa at 23°C to be used. Wall thickness to conform to cast iron (CI) outside diameter (OD).

Pipes to have integral wall-thickened bell ends. Joining to be accomplished by using rubber rings conforming to ASTM D3139.

2.5 Fittings

Ductile iron fittings to conform to AWWA C110 (ANSI A21.10) with 1724 kPa pressure rating.

Joints to conform to AWWA C111 (ANSI A21.11) - push on or mechanical joint.

Where fittings are used with ductile iron pipe electrical conductivity must be provided.

2.6 Gate Valves

Gate valves to be iron body, bronze mounted, double-disc type, double faced and sealed, non-rising stem, conforming to AWWA C500.

Valve ends to be mechanical joint □ AWWA C111 (ANSI A21.11).

Minimum safe working pressure 1035 kPa.

Direction of opening - as specified in Project Specifications.

Operating nut - as specified in Project Specifications.

2.7 Butterfly Valves

Butterfly valves - as specified in Project Specifications.

2.8 Valve Boxes

Round, cast iron, 2 piece adjustable slide or auger type with lift out cover.

Upper section - minimum diameter 110 mm.

Adjustment - minimum ± 150 mm - overlap at full extensions shall be at least 150 mm.

Lower section - completely enclose bonnet of valve with guide plate attached to valve.

Markings - as specified.

2.9 Valve Chambers

Covers - grey cast iron - ASTM A48 (Class 30)

- machined bearing surfaces
- centre lift-out plug, minimum dia. 110 mm.
- pattern as specified.

Ladder rungs, aluminum type 6061 T4 alloy - CSA HA.5

Valve Chamber adjuster rings (Moduloc) ASTM C478.

Mortar as per Specification No. 8 - Concrete.

Precast Sections - ASTM C478

Gaskets - ASTM C443

2.10 Hydrants

- Hydrants
- AWWA C502
two piece barrel
 - compression type valve
 - break away flange placed 50 mm above finished grade.
 - mechanical joint inlet connection
 - self draining barrels.

Valves -as specified in Section 2.7

Valve box - as specified in Section 2.9

Nozzles and Threads - as specified.

Colour - as specified.

2.11 Service Connections

This specification applies to services 19 mm to 51 mm in diameter.

Diameter - as shown on drawings.

Pipe - seamless copper tubing ASTM B360, Type "K"

Main stops - AWWA C800 - copper flange outlet

Curb stops and fittings - AWWA C800 copper flange joints

- Curb boxes
- curb box extension limits as specified
 - threaded cover, bronze centre plug
 - "water" cast into top of cover
 - curb boxes in sidewalks shall be supplied with frost rings.

- Extension rods
- fasten to top of curb stop with corrosion resistant pin
 - top of rod - 150 mm to 450 mm below grade.

2.12 Pipe Bedding

Pipe bedding shall be as specified.

3.0 CONSTRUCTION

3.1 General

Excavation and backfill shall be in accordance with Specification No. 4 - Excavation and Backfill.

Place watermains and service connections at elevations which will ensure depth of cover specified.

The depth of cover is defined as the height from the top of the watermain to the finished grade shown on the drawings.

3.2 Pipe Laying

Lay pipes with bell ends facing in the direction of laying.

Lay and join pipes and fittings in accordance with manufacturer's instructions and as specified herein.

Lower material into the trench so that the material, protective coatings and linings are not damaged. Pipes and fittings shall not be dropped or dumped into the trench.

Watermains shall be laid true to line and grade within the following tolerances:

Plan dimensions	-	± 150 mm
Elevations	-	± 80 mm

When pipe laying is not in progress the open ends of pipes shall be protected to prevent foreign material and water from entering pipe.

3.3 Pipe Deflection

Pipes may be deflected from a straight line to form a smooth, long radius curve when permitted by the Consultant.

Lay and join pipes and fittings in accordance with manufacturer's instructions and as specified herein.

**MAXIMUM PERMISSIBLE APPROX. RADIUS OF CURVE PRODUCED
DEFLECTION PER LENGTH BY SUCCESSION OF JOINTS**

Size of Pipe	Mechanical Joint	Push-On Joint	Mechanical Joint	Push-On Joint
mm	mm	mm	m	m
75	787	457	38	62
100	787	457	38	62
150	686	457	44	62
200	508	457	54	62
250	508	457	59	62
300	508	457	59	62
350	343	457	87	79
400	343	381	87	79

For larger sizes of pipe the deflections shall not exceed the manufacturer's recommendations.

Provide bends to ensure that maximum deflections are not exceeded.

3.4 Cutting Pipe

Cut pipes without damaging the pipe, coating or cement lining and provide a smooth end at right angles to the axis of the pipe.

3.5 Connections to Existing Watermains

Obtain permission from the operating authority before making any connections to an existing water main.

Valves on existing water mains shall not be operated by the Contractor unless approved by the Consultant and the operating authority.

All affected water users shall be notified at least 24 hours in advance of any planned interruption of service.

Swab fittings and pipes placed into the existing line with a solution of chlorine having a minimum strength of 50 ppm.

Take precautions to prevent contamination of the existing system and follow all instructions of the operating authority.

3.6 Assembly of Mechanical Joints

Seat spigot of the pipe in the bell before pressing the gasket into place.

Tighten nuts spaced 180 degrees apart alternately in order to provide equal pressure on all parts of the gland.

Tighten nuts with a "torque-limiting" wrench to the following range:

Size	Torque Range
mm	N.m.
15	54 - 81
20	81 - 122
25	95 - 136
30	122 - 163

3.7 Anchorage of Pipes, Fittings and Hydrants

Anchor pipes, fittings and hydrants to prevent movement.

Place concrete reaction backing or "thrust blocks" between the fitting and undisturbed soil.

Thrust blocks shall transfer the full thrust at test pressure without exceeding the bearing capacity of the soil.

Supply and place concrete in accordance with Specification No. 8 - Concrete. Unless otherwise specified concrete shall be Class "C".

Joints shall be accessible for repair.

Straps, rods or clamps shall be used for bends in the vertical plane and when the soil conditions do not provide adequate bearing.

3.8 Valves

Install valves with the stem vertical at the locations shown on the drawings.

3.9 Valve Boxes

Install valve boxes on all valves where valve chambers are not required.

Centre the valve box over the operating nut with the top at finished grade and the shaft placed vertical.

3.10 Valve Chambers

Construct valve chambers as detailed on the drawings at the locations shown.

Place covers flush with the finished grade so that the centre lift-out plug is plumb over the operating nut.

Construct chambers so that no loads from the structure are transferred to the pipes passing through the walls.

When detailed on the drawings install a drain.

3.11 Hydrants

Install hydrants as detailed on the drawings with the barrel vertical, hose connections parallel with the curb, pumper nozzle, (if specified) facing the curb, and bottom of flange 50 mm above the finished grade.

Connect hydrant to the main by means of a mechanical or push-on joint tee and ductile-iron pipe lead with a valve located as shown on the drawing.

Place clear limestone around the barrel and cover with 6 mil polyethylene to minimize contamination when backfilling.

Limestone - as per Specification No. 9 - "Granular Materials".

3.12 Service Connections

Install service connections as detailed.

Thread main stops 19 mm and 25 mm diameter directly into ductile iron pipe.

Install main stops with the water main under pressure using cutting and tapping equipment recommended by the manufacturer.

Leave main stops in the full open position before backfilling.

Install curb stops at the location specified, being placed vertical with the base resting on a wood block. Leave curb stop in the "off" position.

Place wood marker 5 cm - 10 cm, 1.5 m long at the end of each connection extending to a height of 600 mm above ground. Paint the top 300 mm blue.

3.13 Air Blow-Offs

Install blow-offs at the locations shown on the drawings.

Install fittings, meeting the requirements for service connections as shown on the drawings.

4.0 HYDROSTATIC TESTS AND FLUSHING

4.1 General

Perform tests only in the presence of the Consultant.

Notify the Consultant 48 hours in advance of performing any tests.

Install and backfill service connections, hydrants, thrust blocks, and appurtenances before testing.

Provide all apparatus, material and labour necessary to conduct the tests.

Use only potable water for testing and flushing. Provide potable water if not available from an existing municipal source.

When water is provided by the Contractor it shall be tested by the Consultant and shall not be introduced into the system until chlorine and bacteriological tests are satisfactory.

4.2 Procedure

Slowly fill each section of pipe to be tested with water to the specified test pressure by means of pumping, based on the elevation of the lowest point of the section under test and corrected to the elevation of the test gauge. Monitor, in a manner acceptable to the Consultant, the pressure for the duration of the test and measure the leakage as defined in Section 4.3.

Expell all air from the system before the test pressure is applied.

If hydrants, service connections or blow-offs are not available at high points for the release of air, provide main stops and insert brass plugs after testing has been completed.

Unless otherwise specified, the duration of each test shall be at least 2 hours and the initial hydrostatic test pressure 1035 kPa or one and one-half (1-1/2) the operating pressure for the district, whichever is greater. (1 metre head = 9.81 kPa).

4.3 Allowable Leakage

Leakage is defined as the quantity of water that must be introduced into a section of pipe to maintain the specified test pressure for the duration of the test.

The maximum leakage shall be determined by the formula:

$$L = \frac{ND(P^2)}{64,670}$$

Where N = number of joints
D = nominal diameter (mm)
P = test pressure kPa
L = allowable leakage (P/hr)

Allowable leakage for service connections 19 mm to 51 mm shall be 8.2 litres per 100 services per 2 hour test.

4.4 Flushing

Flush the system after a successful pressure/leakage test has been performed.

Provide means to discharge the water into storm or sanitary sewers, ditches or water courses without causing erosion, deposition of silt, ponding of water or damage to the environment.

5.0 CHLORINATION

5.1 General

Supply all material, labour and equipment necessary to perform the work to obtain the required standards for Chlorine Residual and Bacteriological Tests.

Disinfect the system after flushing by introducing a solution of chlorine (minimum strength 55 ppm) and ensuring that it is evenly distributed throughout the system.

A residual of chlorine of not less than 10 ppm will be required in the water after 24 hours.

The Consultant will test the initial and residual chlorine concentrations. The Contractor will provide all assistance required to obtain samples at the hydrants selected by the Consultant. All test equipment shall be supplied by the Contractor.

5.2 Flushing After Chlorination

When the required chlorine residual is obtained, flush the system as in Section 4.4 until all excess chlorine is removed. Chlorinated water to be neutralized before flushing.

Continue flushing until the chlorine content is equal to that of the water being used for flushing.

Discharge water containing high concentrations of chlorine to the sanitary sewers when possible.

5.3 Bacteriological Tests

Before the main is put into service, assist the Consultant to obtain water samples for bacteriological testing.

The Consultant will submit these samples to a recognized laboratory for testing.

The main shall not be put into service until the results are acceptable to the public health authority having jurisdiction.

6.0 MEASUREMENT

All linear measurements are made in the horizontal plane and are plan quantities. Field measurements will not be made unless drawings are revised.

6.1 Watermains

Length of watermains shall be as scaled from the Engineering drawings.

6.2 Appurtenances

Unless otherwise specified, no separate measurement will be made for valves and boxes, valves and chambers, hydrants, service connections and blow-offs.

Hydrant extensions will be measured in the vertical plane.

7.0 PAYMENT

7.1 Watermains

The price for watermain shall be considered full compensation for all pipe, fittings, thrust blocks and appurtenances, trench excavation, the control of ground and surface water; the preparation of subgrade; pipe bedding as specified; placing and joining the pipe, backfilling and compacting the trench; testing and flushing, reinstatement of surfaces and clean-up; and all the work necessary to install the main complete in place.

7.2 Valve and Valve Box

The lump sum price shall include supply of the valve and valve box and the complete installation, including adjusting to finished grade.

7.3 Valve and Valve Chamber

The lump sum price shall include the supply of the valve and all materials and the complete installation as detailed including adjusting the cover to final grade.

7.4 Hydrants

The price provided within the Pricing Schedule for hydrants shall include the supply of all materials and the complete installation of the hydrant, gate valve and valve box (if required), tee on main, lead, stone fill and blocking, tie rods, and setting to final grade.

7.5 Service Connections

The price provided within the Pricing Schedule shall include the supply and installation of the pipe, the main stop, curb stop, curb box, wood marker, saddle and all other materials required.

7.6 Blow-Offs

The lump sum price shall include the complete supply and installation of blow-offs at the locations shown on the drawings including adjusting to final grade.

7.7 Connection to Existing Mains

The lump sum price provided within the Pricing Schedule shall include the locating of existing mains and the complete supply and installation of all materials required to complete the connection.

7.8 Chlorination and Flushing After Chlorination

The price provided within the Pricing Schedule shall be compensation in full for the supply of all equipment, labour and materials to chlorinate and flush the main as specified.

The price shall include additional chlorination and flushing when:

- a) chlorine residual is less than specified,
- b) bacteriological tests are not acceptable to the public health authority having jurisdiction.

SPECIFICATION NO. 6 SEWERS AND APPURTENANCES

1.0 DESCRIPTION

The work shall include the supply of all labour, materials, consumables and equipment necessary for the installation of sewers, fittings, drain connections, manholes, frame and covers, safety grates, catchbasins and appurtenances required for the complete construction, flushing as directed by the Consultant of the sewage system(s). The Contractor shall include everything requisite and necessary to properly complete the entire system(s) notwithstanding that every item may not be specifically mentioned.

2.0 MATERIALS

Diameter, length, class and type of pipe is, as specified, on the engineering drawings and shall meet the following requirements. In all cases, the most current specification in effect shall govern.

2.1 Sewer Pipe

A. Concrete Pipe

- (i) Non-reinforced pipe and fittings - CSA A257.1
- (ii) Reinforced pipe and fittings - CSA A257.2
- (iii) Rubber gasket joints - CSA A257.3

B. Vitrified Clay (VC) Pipe

- (i) Pipe and fittings - CSA A60.1M
- (ii) Joint - Flex-lox - CSA A60.3M

C. Polyvinylchloride (PVC) Pipe (Non Pressure)

- (i) Pipe and fittings - ASTM D3034
- (ii) Joints - rubber Ring Bell Joint - rubber ring - ASTM D-1869

D. Polyethylene (PE) Pipe

- (i) Pipe and fittings - ASTM D1248
- (ii) Joints - Butt fusion - CGSB Std. No. 41-GP-25

E. Corrugated Steel Pipe

- (i) Corrugated steel pipe and pipe arches shall be as specified.
- (ii) Corrugated steel pipe shall meet the requirements of "Specification for Corrugated Steel Pipe Products - Number 501" issued by the Corrugated Steel Pipe Institute.

2.2 Sewer Laterals

A. Concrete Pipe

- (i) Pipe and fittings - CSA A257.1 or A257.2
- (ii) Rubber gasket joints - CSA A257.3

B. Vitrified Clay Pipe

- (i) Pipe - Plain End - CSA A60.1M
Joints - Flexible External Sleeves, CSA A60.3M

C. Polyvinylchloride Pipe

- (i) Pipe and fittings - CSA B182.1
- (ii) Joints - rubber ring bell Joint, rubber ring ASTM D3212

D. Polyethylene Pipe

- (i) Pipe and fittings - ASTM D1248
- (ii) Joints - butt fusion - CGSB Std. No. 41-GP 25.

E. Service Saddles

Not to be used on sewers smaller than 500 mm.

- (i) cast iron with flange curbed to fit the sewer pipe with rubber gasket to ensure a positive leak-free seal.
- (ii) Strap-on saddles, steel band with steel spade bolts, nuts and washers.
- (iii) Mortar-on-saddles, slots provided around flange to provide a Key for the cement mortar.

2.3 Manholes - (Precast or Cast-in-place as specified)

A. Precast Sections - ASTM C478

Gaskets - ASTM C443

B. Covers, grey cast iron, ASTM A48 (Class 30), pattern as specified.

C. Ladder Rungs, aluminum type 6061 T4 alloy CSA HA.5 - width 400 mm.

D. Safety Gratings - aluminum type 6061 T4 alloy CSA HA.5

E. Manhole Adjuster Rings (Moduloc) - ASTM C478.

2.4 Catchbasins - (Precast or Cast-in-place as specified)

A. Frame and grate, gray cast iron - ASTM A48 (Class 30) pattern as specified.

B. Catchbasin Adjuster Rings (Moduloc) - ASTM C478.

2.5 Pipe Bedding

Pipe bedding materials shall be concrete, granular material or crushed limestone, as required, and in accordance with Specification No. 8 - Concrete or No. 9 -Granular Materials.

3.0 CONSTRUCTION

3.1 General

Excavation and backfill in accordance with Specification No. 4, Excavation and Backfill.

Sewer and catchbasin leads shall be installed to the line and grade specified on the drawings.

Drain connections shall be placed at elevations as specified.

Clean by flushing sewer lines, manholes, catchbasins and leads prior to inspection by the Consultant.

3.2 Pipe Laying

Lay pipes with bell ends facing upstream with respect to the direction of flow in the pipe.

Lay and join pipes and fittings in accordance with manufacturer's instructions and as specified herein.

Lower material into the trench so that the material is not damaged. Pipes and fittings shall not be dropped or dumped into the trench.

Sewers shall be laid true to line and grade within the following tolerances unless otherwise noted on the drawings:

$$\text{Plan Dimensions -} \quad \text{Diameter (mm)} \times \frac{\% \text{ Slope}}{100} \times 10 =$$

$$\text{Elevations -} \quad \text{Diameter (mm)} \times \frac{\% \text{ Slope}}{100} \times 5 =$$

When pipe laying is not in progress the open ends of pipes shall be protected to prevent foreign material and water from entering the pipe

On sewers 500 mm diameter and less, provide a prefabricated tee or "Y" branch for each private drain connection.

Pipes are to be supported by compacted bedding which has filled all voids to the original ground unless otherwise specified.

3.3 Radius Pipe

Where radius pipe is specified, prepare and submit to the Consultant an appropriate detail drawing indicating sections of pipe and configuration of installation.

3.4 Cutting Pipe

Pipes shall be cut in accordance with the manufacturer's recommendations, without damaging the pipe and provide a smooth end at the required angle to the axis of the pipe.

Asbestos cement pipe shall be supplied in standard lengths with short lengths to install fittings in specified locations. Both ends of all pieces shall be machined.

3.5 Connections To Existing Sewers

Obtain permission from the operating authority before making any connections to an existing sewer.

Prevent foreign material from entering the existing system and follow instructions of the operating authority.

Provide approved adaptors and make connections to existing sewers in an approved manner including benching.

3.6 Sewer Laterals

Provide connections at the locations shown on the drawings.

Strap-on-saddles may be used only when the main sewer line is greater than 500 mm in diameter or when connecting to an existing sewer of diameter greater than 500 mm and approved by the operating authority.

Proper tools must be used to cut the pipe - breaking the main with hammer, chisel etc. will not be permitted.

Lay connections at right angles to the main in a straight line with a grade of not less than two percent unless otherwise specified.

Terminate connections complete with fittings as specified. Supply cover plates stamped with the word "Storm" or "Sanitary". Paint cover plates for sanitary cleanouts red.

Block plugs to undisturbed soil to prevent movement during testing.

Place wood markers 5 cm × 20 cm, 1.5 m long at the end of each connection and extended to a height of 600 mm above ground. Paint the top 300 mm green for storm connections and red for sanitary connections.

3.7 Manholes

Construct manholes as detailed on the drawings and provide drop connections where indicated.

Grout pipes into the walls and cut flush with the inside face of the wall.

Provide a joint on each sewer line and service connection within one metre of the outside wall of the manhole. The pipe must be supported by specified bedding to undisturbed ground.

Bench manholes with concrete as specified to provide an invert conforming to the sewer.

Unless otherwise specified, grout-in-place manhole covers flush with final grades except for manholes located in pavement where road construction follows the installation of undergrounds. In such cases finish top of concrete flush with road subgrade.

Unless otherwise specified, and where approved by the operating authority, adjust manhole covers using steel "lift rings" and using "manhole adjuster rings" (moduloc).

Install safety gratings as detailed on the drawings.

3.8 Catchbasins and Catchbasin Leads

Cut off pipes flush with the inside face of the catchbasin and grout into place.

Connect catchbasin leads to the main storm sewer by means of a prefabricated tee or 'Y' fitting installed at the time of laying the main sewer for pipes 500 mm diameter and less, unless otherwise specified.

Support catchbasin leads on specified bedding to original ground. Unless otherwise specified, in disturbed ground, bed catchbasin leads on concrete to undisturbed ground.

Place grates so that no ponding will occur in the area drained by the catchbasin. Unless otherwise specified, grout-in-place catchbasin frames so that grates are flush with final grades except for catchbasins located in pavement where road construction follows the installation of undergrounds. In such cases finish top of concrete flush with road subgrade.

Unless otherwise specified, and where approved by the operating authority, adjust catchbasin frames and gratings using Catchbasin Adjuster Rings (Moduloc).

3.9 Concrete Headwalls

Concrete headwalls shall be constructed as specified. The structure shall be founded on undisturbed soil.

3.10 Corrugated Steel Pipe

Lay corrugated steel pipe on specified bedding. Join pipes with approved couplers conforming to the gauge and diameter of the pipe.

4.0 TESTING

4.1 General

Check the alignment of sewers between manholes as each section is laid.

Provide a strong light to be shone through the pipe from manhole to manhole. If the required tolerances are exceeded, realign the pipe until the tolerances are met.

Perform tests in the presence of the Consultant.

Notify the Consultant 48 hours in advance of performing any tests.

Complete and backfill sewer laterals, manholes and appurtenances on the section under consideration before testing.

Provide the apparatus, material and labour necessary to conduct any and all tests and re-tests as directed by the Consultant.

Provide water for flushing and testing at no expense to the Company, unless otherwise specified.

4.2 Procedure

Clean sewers of all foreign material, and correct all visible deficiencies before beginning the test.

Exfiltration

- Isolate the section to be tested by temporarily blocking the inlets of two manholes with expandable plugs or bulkheads.
- Fill the pipe and manhole with water to a depth of 600 mm above the crown of the pipe in the upstream manhole. Do not exceed 7.5 m maximum head at the downstream manhole.
- Allow 24 hours for absorption of water and escape of air from the line.
- The duration of a test shall be two hours. The actual exfiltration shall be determined by measuring the change of elevation of the water in the manhole.

Infiltration

- Isolate the upstream end of the section to be tested with a plug or bulkhead.
- Place a V notch weir or other approved measuring device in the pipe at the lower end.
- The duration of the test shall be two hours. The actual infiltration shall be the average of at least 8 readings taken at even intervals during the test.

Air Test

Low pressure air test may be requested by the Consultant, for all but concrete sewers, due to:

- A. Lack of water
- B. Steep grades - greater than 8 m head differential in adjacent manhole invert elevations.
- C. Freezing temperatures during the test period, etc.
- D. The test section shall be plugged at each end.
- E. All service laterals, stubs and fittings into the sewer test section shall be properly capped or plugged.
- F. Air shall be supplied to the test section slowly, until a constant pressure of 25 kPa is maintained. If the ground water is above the sewer line being tested, the air pressure shall be increased by 3.0 kPa for each foot the ground water level is above the invert of the pipe.

- G. A stabilization period of at least 5 minutes shall be allowed during which time the pressure shall be regulated to prevent it from fluctuating more than 10 kPa above or more than 3.5 kPa below the required pressure.

4.3 Allowable Limits

The Consultant will determine whether an infiltration and/or exfiltration test or air test will be performed.

In the case that both an infiltration and an exfiltration test are ordered for a particular line the requirements of each test must be met.

A test section shall not exceed the length between any two manholes or as directed by the Consultant.

Storm Sewers

A. Infiltration

0.28 litres per hour per millimetre of pipe diameter per 100 metres of sewer (0.28 l/hr/mm dia/100 m).

B. Exfiltration

0.35 litres per hour per millimetre of pipe diameter per 100 metres of sewer (0.35 l/hr/mm dia/100 m).

Sanitary Sewers

A. Infiltration

0.09 litres per hour per millimetre of pipe diameter per 100 metres of sewer (0.09 l/hr/mm dia/100 m).

B. Exfiltration

0.11 litres per hour per millimetre of pipe diameter per 100 metres of sewer (0.11 l/hr/mm dia/100 m).

C. Air Test

The test pressure shall be 3.5 kPa less than the above required pressure. The time required for a pressure loss of 3.5 kPa shall not be less than that shown in the following table.

Time Required for Air Testing

Pipe Size (mm)	Min	Time Sec
100	2	32
150	3	50
200	5	06
250	6	22
300	7	39
350	8	56
375	9	35
400	10	12
450	11	34
500	12	45
525	13	30

For larger diameter pipe, use the following: (minimum time in seconds = $1.52 \times$ pipe diameter in mm).

Manholes

A. Infiltration

All visible leaks into manholes shall be repaired and no allowance permitted when an infiltration test is performed.

B. Exfiltration

3.0 litres per hour per metre of head above the invert of the sewer for each manhole in the test section. (3 l/hr/m/head).

Pipes Larger Than 900 mm Diameter

Pipes greater than 900 mm will not be subjected to air testing. A visual inspection will be made after backfilling and all deficiencies corrected.

5.0 MEASUREMENT

All linear measurements are made in the horizontal plane and are plan quantities. Field measurements will not be made unless drawings are revised.

5.1 Sewers

Linearly from centre of manhole to centre of manhole (or end of pipe). Where the pipe connects to an existing pipe, measurement shall be to the inside wall of the existing pipe.

5.2 Catchbasin Leads

Linearly from centre of catchbasin to centreline of sewer. Where the pipe connects to an existing pipe, measurement shall be to the inside wall of the existing pipe.

5.3 Sewer Laterals

Unless otherwise specified, no measurement for drain connections will be made.

5.4 Manholes and Catchbasins

Unless otherwise specified, no measurement for manholes or catchbasins will be made.

6.0 PAYMENT

6.1 Sewers and Catchbasin Leads

The price provided within the Pricing Schedule for sewers shall include all pipe and fittings; excavation of the trench; control of ground and surface waters; preparation of subgrade; pipe bedding as specified; placing and joining the pipe; permanent supports where detailed; placing and compacting backfill; reinstatement of surfaces as specified and clean-up; all required flushing and testing; and all the work necessary to install the sewer complete in place.

6.2 Sewer Laterals

The price provided within the Pricing Schedule shall include the supply and installation of the pipe and fittings, connection to the main sewer, riser (if required), test fitting, plug, blocking, wood marker, reinstatement of surfaces, as specified and all other material required.

6.3 Manholes

The price provided within the Pricing Schedule shall include the excavation, complete supply and installation of the manhole including benching, ladder rungs, dragging hooks, safety grating and drop structure as specified, manhole adjusters, cover, backfilling with the specified granular material and adjusting to grades specified in Clause 3.7.

6.4 Catchbasins

The price provided within the Pricing Schedule shall include the excavation, bedding, backfill and complete installation including concrete, catchbasin adjusters, reinforcing steel, goss trap (if required), frame and grate and adjusting to grades as specified in item 3.8. Where perforated sub-drains are specified at catchbasin locations they shall be included in the price for the catchbasin.

6.5 Plumbing Permits

Where permits are required for work on private property the Contractor shall obtain the permits and will be reimbursed at cost.

6.6 Corrugated Steel Pipe

The price provided within the Pricing Schedule shall include the supply and placing of the specified bedding, backfill and compaction as specified, couplers and corrugated steel sections.

6.7 Connection to Existing Sewers

The provided within the Pricing Schedule price shall include inspection and other permits where required, the locating of existing sewers and the complete supply and installation of all

materials required to complete the connection to existing sewers where shown on the drawings, including the confirmation of existing inverts prior to starting any sewer installation.

6.8 Concrete Headwalls

Payment will be at the provided within the Pricing Schedule lump sum price and shall include all excavation, backfilling and grading.

SPECIFICATION NO. 7 ROADS, CURBS AND SIDEWALKS

1.0 DESCRIPTION

Supply all labour, materials and equipment for the complete installation of granular road base, asphaltic road surface, curbs and sidewalks to the dimensions, lines, grades and cross sections as detailed on the Contract Drawings and as specified in the General and Project Specifications.

2.0 MATERIAL

2.1 Granular Material

Granular material shall be supplied in accordance with General Specification No. 9 unless otherwise noted in the Project Specifications.

2.2 Asphaltic Material

The production, placing and compaction of hot mix, hot laid asphaltic material for pavement construction shall conform to MTO Form 310 or latest revision thereof and relevant City of Ottawa Standards.

Joint painting and tack coating material shall be SS-1 Emulsion and shall comply with MTO Form 1103 and relevant City of Ottawa Standards.

2.3 Concrete

The supply, forming, placing, finishing and curing of concrete shall conform to General Specification No. 8 - Concrete, unless otherwise noted.

Unless otherwise noted and as a minimum, concrete used for curb and gutter shall be Class C-3, 30 MPa concrete with 4% to 7% entrained air.

Unless otherwise noted and as a minimum, concrete used for sidewalk shall be Class C-3, 30 MPa concrete with 4% to 7% entrained air.

2.4 Expansion Joint Material

Expansion joint material shall be premoulded, non-extruding bituminous impregnated fibreboard, 15 mm thick conforming to ASTM designated D-544-49, Type V, unless specified otherwise on the construction details and shall be cut exactly to fit the sidewalk cross section.

2.5 Joint Sealing Compound

Joint sealing compound shall be hot poured rubbery bituminous type, conforming to U.S. Federal Specification 55-5-164.

3.0 CONSTRUCTION

3.1 Road Base and Sub-base

Construct granular road base in uniform layers not exceeding 100 mm for crusher-run limestone or Granular "A" and not exceeding 150 mm for Granular "B", "C" or "D". Compact each layer to a minimum of 100 percent optimum dry density using water if required.

Soft spots in the subgrade or sub-base shall be excavated, backfilled and compacted as directed by the Consultant.

Maximum deviation allowed from the specified grade and cross section is 10 mm in 3 metres.

Maintain the required grade, cross-section, tolerances and compacted density until the work is accepted or paved.

3.2 Asphaltic Pavement

Adjustments to Manholes, Valve Chambers and Catchbasins

- (i) Raise the tops and frames of manholes, catchbasins, meter and valve chambers with approved precast concrete adjustment rings.
- (ii) Raise valve and service boxes by appropriate means, to the required grades as shown on the Drawings or as supplied by the Consultant.

Prior to paving, reshape and compact the granular materials to achieve the cross- sections and elevations as shown on the drawings adding such materials as necessary to achieve this. Where the granular materials have been contaminated, replace and rework as directed by the Consultant.

Joints Between Existing and Proposed Asphalt

Unless otherwise specified, a 0.35 m long cold planed lap joint is to be provided at the connections with the proposed asphalt.

Manhole Ramping

When the final surface asphalt is not scheduled to immediately follow base course paving, ramp all manholes, valve chambers and catchbasins from the exposed top edge of the casting for a distance of 600 mm from the casting for protection until the surface course is laid.

Tack Coat

If paving operations are interrupted and extensive use is made of the lower binder courses prior to the laying of the wearing course, apply a tack coat prior to carrying on with the final course. Where such interruptions are occasioned by instruction of the Company or by the Consultant on behalf of the Company, the Contractor will be reimbursed for the cost of the necessary tack coat in accordance with the Schedule of Contract Unit Prices. Traffic must be kept off the tack coat until the wearing course is applied.

Clean Base Asphalt

Prior to placing the tack coat and if directed by the Consultant, the base asphalt is to be flushed and swept including any minor hand cleaning all at no additional cost.

Tolerance of Finished Asphalt Surface

Maximum tolerance transversely or longitudinally to be less than 10 mm in 3 metres for gradients of 1% or more. For gradients of less than 1% the maximum tolerance shall be 5 mm in 3 metres.

3.3 Concrete Curbs, Curb and Gutter and Sidewalks

Ensure that all curbs, curb and gutter, and sidewalks connect smoothly as to line, grade and form with existing installations.

Curbs and sidewalks shall be stamped with the Contractor's name and year of construction at spacings not exceeding 150 metres.

Place compacted backfill and complete all grading adjacent to the concrete installations to prevent erosion within 24 hours of the removal of the forms.

The maximum tolerance on any exposed surface of curb or sidewalk shall be less than 10 mm in 3 metres measured longitudinally.

Expansion joints shall be placed where new concrete structures abut other concrete structures and otherwise at regularly spaced intervals as specified. Expansion joints shall be formed in a rectangle around solid objects such as service frames and covers, water service boxes, hydrants, poles, etc. with the sides a minimum of 150 mm from the edge of the solid object.

Prior to the construction of the sidewalk, provide a sand bed 25 mm in thickness compacted to a minimum of 100% modified Proctor maximum dry density.

Place a 4 mil black polyethylene film for the full width of the sand bed. Lap joints at least 300 mm.

For sidewalks draw tool contraction joints across the sidewalk, one-third of the concrete thickness every 2 metres.

For curbs and curb and gutter draw tool a contraction joint every 5 metres with a depth of at least 50 mm, and at other locations specified on the detail drawings. When the joints are saw cut, they must be completed immediately after the initial concrete set.

Finish all edges and joints with an edging tool having a radius of 13 mm.

3.4 Rectification of Concrete Curbs, Curb and Gutter and Sidewalks

In addition to the items mentioned in Section 3.3:

- Break-out damaged concrete works as directed by the Consultant and dispose of concrete off-site.
- Repair all asphalt and sod disturbed during rectification of concrete work.

- Stamp with name of firm and year of construction at each end of the replaced concrete work.
- Sawcut ends of concrete work to provide a neat joint.
- Sawcut and caulk cracks with an approved caulking compound where specified by the Consultant.

4.0 MEASUREMENT

All linear and area measurements are in the horizontal plane and are plan quantities. Field measurements will not be made unless drawings are revised.

4.1 Road Base, Sub-base and Asphaltic Pavement

Unless otherwise specified measurement shall be as follows:

- Granular "A", "B", "C" and "D" by area in square metres to the specified thickness.
- Crusher-run limestone by area in square metres to the specified thickness.
- Base course asphaltic pavement by area in square metres to the specified thickness. The plan measurement for base asphalt shall not include the fillet laid over the top of the base curb which ultimately is trimmed off to permit top stage construction.
- Finish course asphaltic pavement by area in square metres to the specified thickness.
- Tack coat by area in square metres.

Area measurements shall be calculated from the Engineering Drawings.

4.2 Manhole Adjustments

Adjustment of manholes, catchbasins and valve chambers will be on a per unit basis.

The adjustment of catchbasins will include the restoration of curb and gutter adjacent to each catchbasin.

4.3 Manhole Ramping

Ramping of asphalt around manholes, catchbasins and valve chambers will be on a per unit basis.

4.4 Sidewalks

Sidewalks will be measured on a linear metre basis for the specified width and thickness.

4.5 Concrete Curbs, Curb and Gutter

Curbs or curbs and gutter will be measured on a linear metre basis.

5.0 PAYMENT

5.1 Road Base, Sub-base and Asphaltic Pavement

Payment for granular materials, crusher-run limestone, and asphalt shall be compensation in full for all labour, equipment and material required to supply, lay, grade and compact in accordance with the Drawings and Specifications.

5.2 Manhole Adjustments

Payment for adjusting manholes, catchbasins and valve chambers shall be compensation in full for all labour, equipment and material required including concrete adjusting rings, modoloc steps if required and sealing component, and regrading and recompaction of the disturbed subgrade.

5.3 Manhole Ramping

Payments for ramping of asphalt around manholes, catchbasins and valve chambers shall be compensation in full for all labour, equipment and material required including cleaning and brushing of the base course, applying tack coat, and compaction of asphalt.

5.4 Sidewalks

Payment for sidewalk shall be compensation in full for all labour, equipment and material required including excavation and fine grading, disposal of surplus material, supply of fill material and polyethylene film, expansion joints, edge scoring of both edges, regrading to boulevard level, application of curing compound, cold weather protection and cleaning and brushing of sidewalks and application of sealer.

5.5 Concrete Curb, Curb and Gutter

Payment for curb or curb and gutter shall be compensation in full for all labour, equipment and material required including Granular "B" bedding, reinforcing bars, stirrups, expansion joints, temporary asphalt filler around catchbasins, application of bonding and curing agents, contraction joints caulking compound and filling behind curb with approved material.

Payment shall also include cleaning base curb, trimming and replacing base course asphalt, removal of asphalt filler behind catchbasin and any required asphalt patching prior to placing the top section of a two-stage curb.

5.6 Rectification of Concrete Curbs, Curb and Gutter and Sidewalks

Payment for rectification of curbs, curb and gutter, and sidewalks will be on a linear metre basis for those damages which are not deemed the responsibility of the contractor.

SPECIFICATION NO. 8 CONCRETE

1.0 GENERAL

This specification covers materials to be used and methods to be followed for the proportioning, manufacture, transporting and placement of plain and reinforced concrete, either site-mixed or ready-mixed.

Materials and workmanship shall conform to the Canadian Standards Association CSA Standard CAN/CSA-A23.1 (Concrete Materials and Methods of Concrete Construction) and methods of test for concrete shall conform to CSA Standard CAN/CSA-A23.2 (Methods of Test for Concrete). All standards referred to are the latest editions thereof. This specification is intended to supplement and amplify CSA Standard Specification and the most stringent requirements of these standards and the specifications shall apply. The Contractor shall have on site a copy of the CSA Standards A23.1 and A23.2.

2.0 DESCRIPTION

Portland Cement shall be Normal Portland Cement conforming to the requirements of CSA Standard CAN/CSA-A5, Portland Cements.

3.0 WATER

Water for use in Portland cement concrete shall be clear and free from injurious amounts of oil, acid, alkali, organic matter, sediment or any other deleterious substances.

4.0 AGGREGATES - GENERAL

Fine and course aggregates shall meet the requirements of CSA Standard CAN/CSA-A23.1 for general characteristics, grading, limits of deleterious substances, cement-aggregate reactivity, soundness and organic impurities. Maximum size of course aggregate to be 20 mm unless otherwise specified.

Representative samples of all aggregates proposed for use shall be submitted to the Consultant not less than three weeks in advance of the commencement of operations to permit the carrying out of required tests. Sampling of aggregates shall be done in accordance with CSA Standard CAN/CSA-A23.2.

5.0 ADMIXTURES

When admixtures are specified or used they shall conform to the requirements of CSA Standards CAN3-A266.1, Air-Entraining Admixtures for Concrete, CAN3-A266.2, Chemical Admixtures for Concrete, and CAN3-A266.4, Guidelines for the Use of Admixtures in Concrete. Any materials not included in CSA Standard CAN/CSA-A23.1, and proposed as admixtures for use in Portland cement concrete may only be used upon the written authority of the Consultant.

6.0 REINFORCING STEEL

Reinforcing steel shall meet the requirements of CSA Standards G30.5, Welded Steel Wire Fabric for Concrete Reinforcement, CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction, CAN/CSA-G30.18, Billet Steel Bars for Concrete Reinforcement and A.C.1-315

Detail and Detailing of Concrete Reinforcement. Reinforcing steel yield strength shall be 400 MPa unless otherwise noted on the drawings.

7.0 STORAGE OF MATERIALS

Store all materials in a manner that will prevent contamination or deterioration. Any material that has deteriorated or that has been contaminated shall not be used in the concrete and shall be removed from the site.

Store cement in a suitable bin or building which will provide protection against dampness and inclement weather conditions. Access to the storage facilities shall be provided to allow proper inspection. If cement becomes lumpy due to partial hydration, it shall be removed from the site unless it can be proven by testing to the satisfaction of the Consultant that, with corrective measures, the hydration does not have a detrimental effect on the quality and strength of the concrete.

Store each size of aggregate separately in a free draining stockpile in a manner that will prevent contamination, intermixing and segregation. The equipment and methods of handling aggregate shall be such as to prevent deterioration, breakage and contamination of the stockpiles and breakage of the aggregates.

All other materials such as admixtures and curing compounds shall be stored in accordance with manufacturers instructions.

Store reinforcing steel on racks or sills that will permit easy access for identification and handling.

8.0 PROPORTIONING

Concrete shall be proportioned in accordance with CSA Standard CAN/CSA-A23.1.

Class*	Minimum Specified 28 day Strength (MPa)	Max. W/C Ratio	Maximum Size of Coarse Aggregates (mm)	Air Content (%)
C-1	35	0.40	20	5-8
C-2	32	0.45	20	5-8
C-3	30	0.50	20	4-7
C-4	25	0.55	20	4-7
F-1	30	0.50	20	5-8
F-2	25	0.55	20	4-7
N-1	15			
N-2	10			
S-1	35	0.40		Type 50 Cement
S-2	32	0.45		Type 50 Cement
S-3	30	0.50		Type 20 Cement

* By strength

Slump for concrete to be consolidated with the use of high frequency vibrators shall be 75 mm maximum and 25 mm minimum, except as follows:

	Maximum	Minimum
Pavements, curbs, sidewalks	50 mm	25 mm
Heavy mass construction	50 mm	25 mm

9.0 TESTING

Field tests for concrete quality shall be carried out by an independent testing agency acceptable to the Consultant. The cost of tests shall be paid for in accordance with the Special Conditions and the applicable cash allowance. Provide unhindered access to the work for the purposes of inspection and selection of samples, and provide, without charge, the concrete and constituent materials required for quality control tests and such assistance, tools, equipment and sampling containers as is required to prepare and ship the test samples.

Sampling and testing of concrete shall be in accordance with the requirements of CSA Standard CAN/CSA-A23.1/A23.2.

Concrete strength testing is to be performed for every 50 m³ of concrete placed and in no case shall there be less than one test for each class of concrete or each separate type of structural component, as designated by Consultant, placed on any one day. Deviations from this requirement can be made only as deemed necessary by the Consultant. Four standard test specimens shall comprise a strength test. The specimens shall be tested at the age of 24 hours, 7 days, 28 days and 56 days if required. Additional tests of autogenously cured specimens by an accelerated testing method may be required by the Consultant. Additional tests of specimens cured entirely under field conditions may also be required by the Consultant to check the strength gain under field conditions.

For concrete work failing to meet the test requirements, the Consultant has the right to require one or more of the procedures outlined in CSA Standard CAN/CSA-A23.1 to determine acceptability of the work or where the work fails to meet the specified quality after carrying out these procedures, the Consultant may demand strengthening or replacement of those portions which failed to develop the required strength.

Air content tests done in accordance with CSA Standard CAN/CSA-A23.2 shall be performed to measure the air-entrainment. For concrete which will be subjected to severe exposure, the minimum number of air tests to be made shall be as follows:

Ready-mixed concrete	-	1 test per load
Site-mixed concrete	-	1 test per 10 m ³

Where exposure is less severe, the frequency of testing may be reduced at the discretion of the Consultant.

Slump tests shall be made frequently to ensure uniform consistency of concrete. In addition a slump test shall be made with every strength test. Tests shall be made in accordance with CSA Standard CAN/CSA-A23.2.

10.0 MEASUREMENT OF MATERIALS

Weigh cement on a scale separate from those used for other materials. Cement in standard sacks need not be weighed but the use of fractional sacks shall not be permitted unless weighed.

Weigh fine and coarse aggregate separately with batched weights based on dry materials and shall be the required weights of dry materials plus the total weight of moisture (both absorbed and surface) contained in the aggregates.

Measure water either by weight or by volume. Water as weighed or measured shall be within approximately 1% of required amount.

The weighing equipment shall be capable of being operated to control delivery of materials so that any inaccuracies in feeding and measuring do not exceed the following limits:

- i) Cement - Approximately 1%
- ii) Aggregates - Approximately 2% on each individual aggregate
- Approximately 1% of the total weight of the aggregates
- iii) Admixtures - Powdered admixtures shall be measured by weight and paste or liquid admixtures by weight or volume within a limit of accuracy of 3%.

Shovel and volume methods of measurement are not permitted.

11.0 MECHANICAL BATCH MIXING

Mix concrete in a mechanical batch mixer of a type approved by the Consultant.

Do not load mixer beyond its rated capacity which shall be shown on a manufacturer's rating plate on the equipment.

The drum, blades and discharging device shall be such that a concrete of uniform consistency will be produced.

The entire contents of the mixer shall be discharged before recharging.

The mixer shall be cleaned after each period of continuous use and shall be maintained in such condition that the mixing action will not be impaired.

Until acceptable performance tests have been made, mixers with a capacity of one cubic metre (1 m³) or less shall mix for a minimum of one and one-half (1.5) minute after all materials, including the mixing water, are in the drum. For larger capacities, the minimum time shall be increased by twenty (20) seconds for each additional one cubic metre (1 m³) capacity or fraction thereof. The batch shall be charged into the mixer so that some water will enter in advance of the cement and aggregate and all water shall be in the drum by the end of the first one-fourth of the specified mixing time.

The rated capacity of the mixer shall not be less than one-half cubic metre (0.5 m³).

Retempering (remixing with additional water) of concrete or mortar that has stiffened shall not be permitted.

12.0 READY-MIXED CONCRETE

Ready mixed concrete shall be mixed and transported in accordance with CSA Standard CAN/CSA-A23.1.

13.0 HAND MIXED CONCRETE

Concrete shall be mixed by hand only in special circumstances and with prior consent of the Consultant. The cement and fine aggregate shall be mixed dry on a properly constructed platform until it has obtained an even and uniform colour throughout. The mixture shall then be spread to make a bed of uniform thickness on which the coarse aggregate shall be spread and whole wetted with the required amount of water and turned with shovels until a uniform mixture is obtained. Materials shall be proportioned as specified above.

14.0 PLACING - GENERAL

All concrete placing methods shall be in accordance with CSA Standard CAN/CSA-A23.1 and shall be subject to the approval of the Consultant.

To prevent damage to fresh concrete during placing, suitable measures shall be taken to protect the plastic concrete.

Concrete placing shall not be started until the Consultant has inspected and approved all preparations including forms, foundations, reinforcing steel, construction joints, and all mixing, conveying, spreading, compacting, finishing, curing and protection equipment.

15.0 CONVEYING

Concrete handling methods shall be in accordance with CSA Standard CAN/CSA-A23.1. Concrete shall be conveyed from the mixer to the point of deposit as rapidly as practicable, using means and equipment which will prevent segregation or loss of materials.

Equipment for conveying concrete such as buckets, cars and trucks, belt conveyors, and pumps shall be of such design, size and condition to ensure as continuous a supply of concrete as practicable to the point of delivery, without segregation.

Conveying equipment, if supported by formwork, shall not impart harmful vibration to the freshly placed concrete nor cause misalignment of forms.

The conveying equipment shall be kept free from hardened concrete and foreign materials, and shall be cleaned at frequent intervals. Wash water shall not be permitted to enter the forms of fresh concrete.

16.0 DEPOSITING

Concrete deposition methods shall be in accordance with CSA Standard CAN/CSA-A23.1. Deposit concrete in the forms as close as practicable to its final position and in layers that are approximately horizontal. Concrete shall be confined in a suitable vertical drop pipe to within 1.50 metre or less of the concrete in place in order to prevent segregation by ricocheting off tie rods, spacers, reinforcement and forms and to protect these items from displacement. Concrete which has partially hardened shall not be subjected to injurious vibration or shock,

except for controlled revibration where specified. The size of section to be placed in one continuous operation shall be as shown on the drawings or as directed by the Consultant.

Mixing and placing equipment shall be such that when concreting has once started, the depositing of concrete shall be carried on as a continuous operation until the placing of the panel or section is completed. Concreting shall be carried out at such a rate that the concrete is at all times sufficiently plastic to ensure proper bonding of successive layers. The maximum permissible time interval between placing successive layers of concrete shall be established by the Consultant.

17.0 BONDING TO EXISTING CONCRETE

When fresh concrete is to be bonded to hardened concrete, the surface of the set concrete shall be thoroughly cleaned of foreign matter and laitance and saturated with water for the period 24 hours immediately prior to concreting. Immediately before depositing fresh concrete on hardened concrete, all free water shall be removed from the surface. The first layer of concrete to be placed on the surface of set concrete shall be of the quality specified but shall contain an excess of mortar and shall be vibrated to achieve maximum bond.

18.0 COMPACTING

All methods of compacting shall be subject to the approval of the Consultant. As concrete is being placed it shall be compacted thoroughly and uniformly by means of tamping, hand tools, vibrators or finishing machines to secure a dense homogeneous structure.

For compacting the concrete, internal vibrators shall be used whenever practicable. Vibrators shall be approved by the Consultant and they shall be operated at a frequency of not less than 7 000 impulses per minute when fully immersed. Application of vibrators shall be made systematically and at such intervals that the zones of influence of the vibrator overlap.

The vibrator shall be applied, at any one point, only until the concrete is compacted and not for such a time that will cause segregation. Extreme care shall be taken to ensure that the vibrators do not disturb the reinforcing steel or its bond to the partially hardened concrete will be impaired. Vibrators shall not be used so close to the forms that they drive the coarse aggregate away from the face.

The vibrator shall be used only for consolidation purposes and shall not be used to move concrete more than a short distance.

19.0 FINISHING

Rough or board form surfaces shall be reasonably true to line and plane. Tie holes and defects shall be patched and fins exceeding 6 mm in height shall be rubbed down with wooden bows.

Plywood or metal formed surfaces shall be true to line and plane. Tie holes and defects shall be patched and all fins completely removed.

Related unformed surface shall be struck smooth after concrete is placed and shall be floated to a texture consistent with that of the formed surfaces.

The top or final surface of concrete slabs and other flat work shall be finished by screeding, floating and trowelling to a smooth, dense finish, free from defects and blemishes. All concrete surfaces exposed to view shall have sack rubbed finish.

20.0 CURING AND PROTECTION

Refer to CSA Standard CAN/CSA-A23.1 for complete curing and protection requirements. Key items are highlighted below. Freshly deposited concrete shall be protected from premature drying and excessively hot or cold temperatures, and shall be maintained with minimal moisture loss at a relatively constant temperature for the period of time necessary for the hydration of the cement and proper hardening of the concrete.

After the concrete has set sufficiently, the exposed surfaces shall be kept continuously moist for at least three consecutive days after placing, when normal Portland cement is used and for at least one day when high early strength Portland cement is used. During the curing period the temperature of the air in contact with the concrete shall be maintained at not less than 10EC.

Where the use of curing compound is authorized by the Consultant it shall meet the requirements of ASTM Standard C309, Liquid Membrane Forming Compounds for Curing Concrete.

Steel forms heated by the sun and all wood forms in contact with the concrete during the final curing period shall be kept wet. If forms are to be removed during the curing period, one of the above curing materials or methods shall be employed immediately. Such curing shall be continued for the remainder of the curing period.

(a) Cold Weather Protection

When the air temperature is at or below 4.5EC or when there is a possibility of it falling to that limit within 24 hours of placing, cold weather protection measures shall be used. When necessary, arrangement for heating, covering, insulating, or housing the concrete work shall be made in advance of placement and shall be adequate to maintain the required temperature and moisture conditions without injury due to concentration of heat. Refer to CSA Standard CAN/CSA-A23.1 for additional information.

(b) Hot Weather Protection

When necessary, arrangements for installation of windbreaks, shading, fog spraying, sprinkling, ponding, or wet covering of a light color shall be made in advance of placement and such protective measures shall be taken as quickly as concrete hardening and finishing operations will allow.

(c) Protection from Mechanical Injury

During the curing period, the concrete shall be protected from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration. All finished concrete surfaces shall be protected from damage caused by construction equipment, materials, or methods and by rain or running water. Self-supporting structures shall not be loaded in such a way as to overstress the concrete.

21.0 FORMS

Form design shall be established prior to the start of framing. The proposed method of construction shall be submitted to the Consultant for their review. Form design and its adequacy remains the responsibility of the Contractor. Refer to CSA Standards CSA-S269.1, Falsework for Concrete Purpose; CSA-S269.3, Concrete Formwork; and CSA-0151, Canadian Softwood Plywood, and CSA-0121, Douglas Fir Plywood.

Forms shall be built with sufficient strength and rigidity to carry the weight or fluid pressure of the concrete and of any equipment or runways which might be placed upon them.

Lumber used in forms shall be free from warp, and shall be sawn straight so that lines and shapes will be accurately maintained.

For exposed concrete surfaces, plywood or steel panel forms shall be used. Forms shall be free from defects that would be reproduced as concrete blemishes.

For concealed concrete surfaces, boards may be used where authorized by the Consultant, provided the edge contacts are made sufficiently tight to hold mortar.

For plywood or similar finished forms or for steel-panel forms, where stripped concrete is to be exposed, the panel assembly shall be established and makeup or patching strips between panels held to a minimum. The panel arrangement shall be wedged, and have means for bolting the edges to maintain accurate face alignment.

Internal form ties shall be of metal and of a type approved by the Consultant.

Forms shall be so constructed that the finished concrete will conform to the shape and dimensions specified.

Immediately before concrete is placed, all forms shall be carefully inspected to ensure that they are properly placed, sufficiently rigid and tight, thoroughly clean, properly surface treated, and free from snow, ice or other foreign materials.

Temporary ports or openings shall be provided at the bottom of all deep units, such as columns and walls, to facilitate cleaning and inspection. In restricted units they shall be located so that water can be used to wash out debris. They shall be closed with patches flush on the inside.

A non-staining mineral oil shall be used as a parting agent for forms, applied to the forms prior to placing of the reinforcing steel. The amount of oil used shall be kept to a minimum and any which contacts reinforcing shall be removed with solvents.

Untreated forms shall be kept wetted down to prevent shrinkage prior to the placing of the concrete and shall be surface wetted at the time of placing.

Prior to placing concrete, suitable means for checking the alignment and elevations of forms during placing shall be provided. These checks shall be made frequently during placement of the concrete. Checking and corrective wedging or shoring shall be carried out both horizontally and vertically as required, until all concrete is in place. Forms shall not be disturbed until the concrete has hardened adequately.

22.0 REINFORCING

Shop drawings, showing all dimensions necessary for fabrication and placing of the reinforcing steel and accessories shall be submitted for review by the Consultant prior to fabrication. Detailing of reinforcing steel shall be in strict accordance with the latest issue of ACI-315, "Manual of Standard Practice for Detailing Reinforced Concrete Structures". All bars shall be bent cold.

Reinforcement, at the time concrete is placed, shall be free from scale or other coatings that will destroy or reduce the bond.

Where there is a delay in depositing concrete, reinforcement shall be reinspected and cleaned when necessary.

Metal reinforcement shall be adequately placed and adequately secured in position by concrete or metal chairs or spacers.

Exposed reinforcing bars intended for bonding with future extensions shall be protected from corrosion by concrete or other adequate covering.

23.0 JOINTS AND EMBEDDED ITEMS

The locations and details of construction joints not indicated on the drawings shall be subject to the approval of the Consultant.

Construction joints shall be located and designed so as to least impair the strength and appearance of the structure.

Reinforcement shall continue in its normal position through the joint.

Shear keys shall be formed with bevelled strips.

Where construction joints are planned or permitted by the Consultant in watertight concrete construction, there shall be reinforcing steel on both sides of the wall or slab and shear keys provided.

A waterstop of a type, size, and material approved by the Consultant shall be carefully installed. Where waterstops cross or lap they shall be vulcanized to ensure that a continuous watertight diaphragm is formed.

Where a horizontal construction joint is permitted in a wall, the top of the first lift shall be carefully cleaned off and the procedure in Clause 17 - Bonding to Existing Concrete of this Section 8 - Concrete, shall be followed.

All sleeves, inserts, anchors, and embedded items required for adjoining work or for its support shall be placed prior to concreting.

Expansion joint material, waterstops, and embedded items shall be positioned accurately and supported against displacement. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.

24.0 MORTAR

All mortar shall be prepared from the specified materials in accordance with the following latest CSA Standard edition codes:

CAN/CSA-A5	-	"Portland Cement"
CAN/CSA-A8	-	"Masonry Cement"
CSA A82.43	-	"Hydrated lime for Masonry Purposes"
CSA A82.56	-	"Aggregates for Masonry Mortar"

It shall be thoroughly mixed dry in the proportions specified. The required amount of water as per CSA Standard CAN/CSA-A23.1 shall be added to produce a paste of satisfactory

consistency. The mortar shall be freshly mixed by hand in boxes made for the purpose. No mortar shall be used that has become stiff or that has stood more than 12 hours after mixing. Sand shall be measured by loose volume as shovelled into the measuring box.

The proportions by volume for different classes of work, unless otherwise specified, shall be as follows:

	Cement	Hydrated Lime	Sand
Brick Masonry	1	1	6
Pointing or Grouting of Pipe Jointing	1	-	1
Parging	1	1	6

SPECIFICATION NO. 9 GRANULAR MATERIALS

1.0 DESCRIPTION

This specification covers the requirements for aggregates for use as granular subbase, base and surface course; shouldering; pipe bedding; and backfill to pipes, manholes and other structures.

2.0 MATERIALS

Aggregates for the above uses shall meet the requirements for MTO Form 1010 - "Material Specifications for Aggregates, Granular A, B, C, D and 16 mm crushed Types A and B".

2.1 MTO Form 1010 - Granular A

Granular A - MTO Form 1010, Section 1010.04 shall be modified to specify crushed gravel and thereby eliminate the use of crushed rock or crushed slag.

Crusher-Run Limestone - MTO Form 1010, Section 1010.04 shall be modified to specify crushed rock and thereby eliminate the use of crushed gravel and crushed slag.

2.2 Crusher-Run Limestone

51.0 mm and 19.0 mm crusher-run limestone shall conform within the following gradation envelope:

Canadian Standard Sieve Series	51.0 mm Crusher Run Limestone % Passing	19.0 mm Crusher Run Limestone % Passing
51.00 mm	100%	-
38.00 mm	75 - 100	-
19.00 mm	45 - 75	100%
12.70 mm	-	70 - 90
4.75 mm	20 - 47	35 - 60
1.18 mm	11 - 32	15 - 37
0.30 mm	4 - 18	6 - 20
0.075 mm	2 - 8	3 - 10

51.0 mm and 19.0 mm clear stone shall conform within the following gradation envelope:

Canadian Standard Sieve Series	51.0 mm Clear Limestone % Passing	19.0 mm Clear Limestone % Passing
64 mm	100%	-
51 mm	90 - 100	-
38 mm	35 - 70	-
25 mm	15 - 40	100%
22 mm	-	-
19 mm	0 - 10	85 -100
16 mm	-	55 - 90
13 mm	-	30 - 70
10 mm	-	15 - 40
#4	-	0 - 10

3.0 MEASUREMENT AND PAYMENT

Unless otherwise specified, Granular Materials will be measured and paid for in accordance with the specification covering the application or as described in the Schedule of Contract Unit Prices.

SPECIFICATION NO. 10 TOPSOIL, SEEDING AND SODDING

1.0 DESCRIPTION

The work covered by this specification shall include the supply of all labour, materials, consumables, and equipment to apply topsoil, seed or sod areas as shown on the drawings and as specified herein.

1.1 Maintenance

Maintain seeded and sodded areas as required to establish vigorous growth. Reseed or resod, within the time periods contained in this specification, any eroded or deteriorated areas or where satisfactory growth has not been established.

2.0 MATERIALS

2.1 Topsoil

Obtain topsoil from existing stockpiles within the contract site or import, as required. Imported topsoil shall be fertile, friable, natural loam containing not less than 4% organic matter for clay loams and not less than 2% for sandy loams with an acidity value ranging from ph 6.0 to ph 7.5. Frozen or muddy topsoil will not be acceptable. Topsoil from stockpiles shall be tested for NPK and organic content. Amendments shall be made in accordance with directions by the testing agent or Consultant.

2.2 Seed

Seed shall meet the requirements of The Seeds Act for Canada No. 1. Unless otherwise specified, seed shall be mixed in the following proportions:

- 40% Bluegrass
- 25% Tall Fescue
- 20% Perennial Rye
- 15% Creeping Red Fescue

Seed supplied shall be of the best quality and of such brands as approved by the Consultant. They shall be furnished on the job in their original sealed packages bearing the brand and name of the producer, or distributor. Only seeds harvested the preceding season will be accepted.

2.3 Sod

Unless otherwise specified, sod shall be No. 1 Kentucky Bluegrass Fescue Sod grown and sold in accordance with the latest specifications of the Nursery Sod Growers Association of Ontario (NSGA). Sod shall be permeated with roots; be uniform in texture and free from weeds; be in a good healthy condition with no sign of decay; and contain sufficient moisture to maintain its

vitality during transportation and placement. Each section shall be approximately 450 mm wide, 1.80 m long and at least 20 mm thick.

2.4 Mulch

Mulch shall be "Verdyol Mulch Standard Quality" or approved equal and conform to the manufacturers specification. Alternate mulching materials such as oat or wheat straw with asphalt emulsion must be approved by the Consultant.

2.5 Wooden Pegs

Wooden pegs for staking sod shall be approved hardwood pegs 25 mm x 25 mm square and at least 300 mm long.

2.6 Wire Mesh

Wire mesh, to be installed under sodded areas where specified, shall be #9 gauge galvanized wire-woven farm fencing or approved equal.

2.7 Fertilizer

Where required, fertilizer will be applied to topsoil as required subject to testing.

3.0 CONSTRUCTION

3.1 Site Preparation

Fine grade the sub-grade level to a uniform surface free from all debris. Scarify the sub-grade to a minimum depth of 75 mm to produce a loose textured surface free of weeds, stones, roots and branches. The finished sub-grade shall be approved by the Consultant prior to placing topsoil.

3.2 Topsoil Placing

Spread topsoil to the required minimum depth, but not less than 75 mm, over the prepared sub-grade, pulverize all clods or lumps and rake and roll to produce an even firm surface free from all stones, roots, branches, etc. larger than 50 mm in diameter immediately prior to placing seed or sod. Compact surface firm to footprints.

3.3 Seeding

Seed only those areas free from frost, snow or water and which can be mulched within the same day. Apply seed with a mechanical dry seeder (Method A) in areas having slopes in the 1-25% range or with a hydraulic seeder (Method B) on slopes exceeding 25% during the following time periods:

1. August 15 to September 15 (preferred)
2. Early spring up to May 30th.

Method A - mechanical dry seeder

Apply fertilizers, as specified, in accordance with the rates of application indicated followed by rolling immediately prior to seeding. Supply seed in two (2) intersecting directions by means of an approved mechanical dry seeder at a rate of 160 kg/hectare.

Method B - hydraulic seeder

Charge an approved hydraulic seeder with seed, water and fertilizer as specified and apply at rate recommended by supplier.

Other methods of applying seed may be permitted if approved by the Consultant.

3.4 Mulching

Immediately following seeding, apply mulch by means of an approved mulch blower or to the manufacturers specification at a rate of 1,700 kg/hectare to form a uniform mat.

3.5 Sodding

Apply fertilizers, as specified, in accordance with the rates of application indicated and work well into the topsoil within 48 hours before laying sod.

Lay sod as soon as possible after arrival on site but in any event within 48 hours. Place sod closely together without open joints or overlaps to blend uniformly with adjoining grassed areas, curbs, sidewalks, etc. Stagger joints in adjacent rows.

On slopes greater than 3:1, place sod perpendicular to the slope on wire mesh when specified and stake with wooden pegs at 0.6 m intervals providing a minimum of 1 stake per sod. Drive pegs flush with sod. Wire mesh will be provided beneath sod where intermittent water flows are expected.

Immediately after installation, water to saturate sod and underlying topsoil. When sod has sufficiently dried, roll to ensure a good bond between sod and topsoil and to remove minor depressions and irregularities.

Place sod prior to November 1 unless authorized by the Consultant.

4.0 MEASUREMENT

Unless otherwise specified, the measurement for topsoil, seeding and sodding are in the horizontal plane and are plan quantities. Field measurements will not be made unless drawings are revised.

Mulch, fertilizer, wire mesh and wooden pegs will not be measured, but will be included in the area measurements for sod and seeding.

5.0 ACCEPTANCE

On sites which will be mown in future, acceptance will be granted when:

- in seed area - a green sward has been established at least one time; or

- in sod areas - grass roots have knit to soil and grass has been mown at least one time;
and
- grass is green and exceeds no more than 60 mm in height

On naturalized sites, acceptance will be granted when:

- sod and seed areas are free of non-specified herbaceous plants and free of bare areas

6.0 PAYMENT

Payment will be in accordance with and at the rates shown in the Schedule of Contract Unit Prices and will include the provision and placement of topsoil, whether from on site sources or imported, seed or sod, mulch, wooden pegs, wire mesh and any other items necessary to complete the work. No additional payment will be allowed for watering, mowing, fertilizing, weeding, reseeding or resodding any other maintenance required to establish satisfactory growth.

Where restoration is designated, the seeding or sodding work will be included in the price provided within the Pricing Schedule for sewers, water mains, roads, structures etc. unless otherwise noted in the Schedule of Contract Unit Prices.

SPECIFICATION NO. 12

RIP-RAP

1.0 DESCRIPTION

This Specification covers the construction of a protective covering of approved rock with or without grout as specified, including excavating, trimming, compacting of subgrade, supplying and placing of specified materials and labour and equipment incidental to the construction.

2.0 MATERIALS

2.1 Rock

The quality and source of rock shall be approved by the Consultant. Rock subject to marked deterioration by water or weather will not be accepted.

Fractured rock will not be accepted.

The rock shall be free from earth and clay.

Rock shape shall be as near to cubical as possible, in particular thin slab shapes shall be avoided.

The gradation of the rip-rap rock is specified in the Project Specification.

2.2 Filter Material

The filter material shall be as described in the Project Specifications.

2.3 Grout

The grout shall be as described in the Project Specifications.

3.0 CONSTRUCTION

3.1 Rock

Place material in such a manner that the larger fragments occur at the bottom of the slopes, the rocks fit together tightly and chink the voids with spalls. The surface of the finished rip-rap shall have a uniform appearance conforming to the elevations and sections as detailed on the drawings.

3.2 Grouting

When specified, fill the spaces between thoroughly wetted stones with mortar. All voids shall be filled and the outer faces of the stones left exposed.

Remove excess mortar from the exposed faces of the stones.

Cure and protect mortar grout as specified in Specification No. 8 - Concrete.

3.3 Filter Material

Place filter material in the manner outlined by the manufacturer or as specified in the Project Specification.

4.0 MEASUREMENT

Area measurements will be made in the plane of the surface rip-rapped and payment will be as specified within the Schedule of Contract Unit Prices. Field measurements will not be made unless drawings are revised.

5.0 PAYMENT

The price provided within the Pricing Schedule is payment in full for supplying labour, material and equipment to excavate the foundation, prepare the bedding, dispose of debris, and place rip-rap to the required dimensions indicated.

“Excavate the foundation” includes all excavation to the subgrade of the rip-rap unless otherwise specified.

When specified this price shall include grouting.

SPECIFICATION NO. 15 ENGINEERED FILL

1.0 DESCRIPTION

The work covered by this specification shall include the supply of all labour, material, consumables and equipment to do all the excavation, grading and filling with earth required for the execution of specified engineered fill requirements. This specification does not cover rock fills. "Rock Excavation" as defined in Specification No. 1, General Requirements, is not considered part of this specification and is covered in Specification No. 4, Excavation and Backfill.

2.0 CONSTRUCTION

2.1 Survey and As-built Requirements for Engineered Fill

The Contractor will retain an Ontario Land Surveyor (OLS) or Professional Engineer (P.Eng.) to supervise and where required herein certify all work associated with the survey and as-built requirements for Engineered Fill.

This article is to be read in conjunction with the Engineered Fill Certification requirements of the Company's geotechnical consultant included as an appendix to this document.

The Contractor will layout the limits of the fill envelope as shown on the drawings.

Following stripping, including any necessary subexcavation, the Contractor will take as-built elevations of the stripped ground within the limits of the engineered fill envelope. The ground elevations and the limits of the fill envelope will be certified and dated by the Contractor's OLS or P.Eng. and provided to the Consultant.

The Contractor will provide survey stakes and grade sheets to identify the specified height, by geodetic datum, of the engineered fill (at specified intervals if not all at one level) for each lot within the engineered fill envelope.

The Contractor will provide a copy of the grade sheets, prepared under the direction of the Contractor's OLS or P.Eng., to the Consultant's representative or designate.

Immediately following the completion of the engineered fill within an envelope the Contractor's OLS or P.Eng. will take elevations at the top of the fill line on a 10 metre grid across the envelope and again identify the limits of the fill envelope. The OLS or P.Eng. will reference all property lines, side and rear lot lines to the grid. These elevations and reference locations will be certified and dated by the Contractor's OLS or P.Eng.

A dated plot and digital disc of the top and bottom of the engineered fill and defined envelope, referenced to the property lines of each lot within the fill envelope will be submitted "certified" by the Contractor's OLS or P.Eng.

If required by the Consultant, the Contractor will calculate a volumetric quantity of engineered fill within the envelope, certified by the Contractor's OLS or P.Eng.

3.0 MEASUREMENT

Unless otherwise specified, no measurement of earthworks will be made.

4.0 PAYMENT

The price provided within the Pricing Schedule shall be compensation in full for all labour, material, consumables, and equipment to do all excavation, filling and compaction, control of surface and groundwater to complete the engineered fill requirements.

PROJECT SPECIFICATION NO. 1

GENERAL REQUIREMENTS

This specification is to be read in conjunction with the General Specification No. 1 - General Requirements.

Information provided in this specification supplements the General Specification and in the event of conflict between this specification and the general Specification, this specification shall govern.

2.0 DESCRIPTION

The 470 Tremblay site owned by Canada Lands Company CLC Limited is comprised of the proposed development of mixed-use, residential, park and stormwater management block components as well as the realignment of Tremblay Road.

The proposed work in Contract I includes mass earthworks operations to achieve the required balance line elevations and the installation of temporary erosion and sedimentation control measures. The proposed work in Contract II includes the installation of proposed underground services and their associated appurtenances, R.O.W. fine grading and construction of road structure to base asphalt. The Contractor shall accept the site as it is at the time of completing the Pricing Schedule for this RFP.

Notwithstanding the above, following completion of underground servicing and roads to base course asphalt, the Contractor must provide a topographical survey certified by Ontario Land Surveyor confirming the restored elevations as per SC 28. The Company reserves the right to credit from the payment to the Contractor for any incomplete restoration as substantial work. The deduction will equal the cost for the Company to complete the substantial restoration by another contractor.

The Contractor shall coordinate their work with any other contractors working on site at the time.

3.0 TRAFFIC

Access to the site will be from Existing Tremblay Road and St Laurent Boulevard only. Access points other than those noted on the engineering drawings are prohibited unless otherwise approved by the Consultant. Parking is not permitted on existing City roads (Existing Tremblay Road and St Laurent Boulevard) unless approved by the City.

Where construction occurs on Tremblay Road and St Laurent Boulevard, all lanes of traffic are to be maintained in each direction at all times. The Contractor is to submit a traffic control plan to the satisfaction of the City. The traffic control plan must be approved by the City a minimum of 10 days in advance of any disruption to traffic. The Contractor is responsible for obtaining road occupancy permits and road cut permits as required.

The Contractor is responsible for maintaining access to all dwelling units and businesses at all times. Driveway access is to be restored as quickly as possible.

The Contractor must perform operations, machine and equipment movements, deliveries and removals at times that will minimize disruption to traffic.

Refer also to Special Conditions Article SC6.

3.1 Traffic Control

The cost for all necessary permits, traffic signage, traffic control devices, temporary lane painting, delineators and flag persons shall be included in the prices provided within the Pricing Schedule. The Company will not entertain any claims for extras with regards to traffic control.

4.0 DISPOSAL SITES

The Contractor shall arrange for off-site disposal of any roots garbage, debris, excess excavated material, and/or unsuitable fill material. The cost of this disposal as well as the cost of loading and transporting of material to the disposal site shall be included in the provided within the Pricing Schedule prices.

6.0 CLASSIFICATION OF EXCAVATED MATERIALS

Unless otherwise noted the following will apply for the purpose of this contract:

Structural Fill shall be fill compacted using the necessary equipment and procedures to achieve a minimum of 95% and 100% Standard Proctor dry density for roads and building foundation respectively.

6.1 Rock Excavation

For the purpose of this Contract, neither weathered nor sound shale shall be classified as rock, but as earth. No extra payment for excavation in shale shall be considered.

6.4 Ontario Regulation 347, General Waste

Ontario Regulation 347, General Waste shall be applied to this Contract. Any excavated materials shall be tested and classified per this regulation and segregated into temporary stockpiles for inspection prior to disposal offsite. Only materials which meet the requirements for residential uses shall be reused on site.

10.0 LIMITS OF CONTRACT

On the Company's land, the Contractor shall limit their operations to within limits shown on the Engineering Drawings. The Contractor shall make their own arrangements for working on adjacent private property if required except where directed to do such work by the Company or the Consultant.

11.0 EXISTING STRUCTURES AND UTILITIES

The available information pertaining to existing infrastructure in the project area is reflected on the engineering drawings. The Company and Consultant take no responsibility for the completeness, accuracy or validity of the information provided by the various utilities. The Contractor must satisfy themselves of the location of these existing services.

The Contractor must contact the various utilities, and obtain a field locate at least 5 days prior to the start of construction.

The Contractor should note that some utilities may require that excavations in the vicinity of their existing plant be hand dug when crossing their existing services. All costs for hand digging excavations shall be included in the contract unit prices. The Contractor should note that existing utilities may have to be relocated. The Contractor shall be responsible for coordination of utility relocation with any and all utility companies.

The Contractor is to ensure existing hydro, communications, cable T.V. and gas are supported in accordance with the requirements of the utility during the installation of any and all service connections, sewers and/or watermains.

Contract prices shall include locating, maintaining, supporting and repairing damaged utilities. Refer also to Special Conditions - Article SC3.

13.0 TEMPORARY RELOCATION OR SUPPORT

Temporary relocation or support of an existing buried or overhead utility shall be provided by the Contractor in accordance with the requirements of the City of Ottawa and the respective utilities. The means of support and protection shall be designed to be in conformance with the latest requirements of the Occupational Health and Safety Act of the Province. The Contractor will provide the utility, Company, and the Consultant a copy of the proposed means of support at least 5 working days prior to the start of work. It is the responsibility of the Contractor to contact the respective utilities to confirm their respective requirements based on the Contractor's proposed construction methodology and equipment. Support, backfill and restoration shall be in accordance with the requirements of the utility agency. Clearance from overhead lines is the responsibility of the Contractor. The Company shall not entertain any additional costs for any of the above.

14.0 EXISTING DRAINAGE

The contractor shall maintain adequate site drainage and siltation control for the duration of the Contract including construction and maintenance of swales, temporary ditches, berms, drainage structures and temporary culverts whether they are shown on the drawings or not.

The Company shall not entertain any additional costs related to the siltation of neighbouring natural features or properties.

All costs related to the requirements of this specification shall be included in the provided within the Pricing Schedule unit prices.

Refer to Special Conditions SC5.

23.0 OTHER CONTRACTORS

The Contractor shall make all necessary arrangements and coordination with other contractors and shall not claim extra payment due to the presence of such other contractors. At no time shall Contractors work in the same place and time.

24.0 MEETINGS

A representative of the Contractor (and any Subcontractors) shall attend the pre-construction meeting and periodic site meetings for the duration of the work.

PROJECT SPECIFICATION NO. 2

SITE PREPARATION

This specification is to be read in conjunction with General Specification No. 2 - Site Preparation.

Information presented in this specification supplements the General Specification and in the event of conflict between this specification and the General Specification, this specification shall govern.

2.0 DESCRIPTION

The Proponent must examine the site prior to submitting their Pricing Schedule. The Proponent must satisfy themselves of the existing site conditions and include in the Pricing Schedule prices requested any costs required to complete the works as specified in the contract drawings and specifications. The Contractor shall supply written confirmation that they have undertaken their own documentation of the quantities and satisfied themselves, prior to the submission of the Pricing Schedule. The contractor will accept the site "as is" at the time of the start of work. The submission of a Pricing Schedule shall constitute presumptive evidence that this requirement has been satisfied.

1.1,1.2 Clearing and Grubbing

The Contractor is advised to examine the site at the time of completing the Pricing Schedule. Any remaining clearing, grubbing, or stripping which the contractor determines is required to be completed shall be included in the Pricing Schedule.

1.3 Stripping

All topsoil stripping and earthworks are being carried out under this contract to prepare all roads, lots and blocks to pre-grade elevations. The Contractor will restore all disturbed area grading on lots and blocks to previous condition based on the balance lines specified in the Earthworks Contract, and provide a survey confirming the same.

In the event existing topsoil piles impede the operation of the Contractor in completing the requirements of this contract, he shall identify the area of concern in sufficient advance time, to allow the Company sufficient time to make arrangements to have the necessary portion of the pile relocated.

At no time shall topsoil be used for the purpose of backfilling or in areas which are unacceptable to the Company's Geotechnical Consultant. The definition of topsoil for the purpose of this contract will be equivalent to that of the Company's Geotechnical Consultant.

2.0 CONSTRUCTION

2.6 Existing Structures and Utilities

The Contractor is responsible for the field location and identification of existing utilities overhead and underground prior to the start of work. This includes arranging for non-mechanical type excavations, such as Hydrovac or hand digging to undertake the exposure of the existing utilities or structures within the roadway or boulevard and as required by utility companies.

Those existing services and utilities to be crossed by the Contractor to complete the works shall be supported in accordance with the requirements of the utility, City of Ottawa and the requirements of the Occupational Health and Safety Act.

2.7 Sediment Control Devices

Sedimentation control devices shall be supplied and installed as shown on the drawings. The Contractor shall clean and maintain the sedimentation control devices periodically to the satisfaction of the Consultant and City of Ottawa requirements.

3.0 MEASUREMENT

3.3 Topsoil Stripping

Stripped topsoil will be paid on a cubic metre basis. The volume will be determined by the Consultant based on surveys taken prior to stripping and after stripped and calculated using AutoCAD Civil 3D.

4.0 PAYMENT

There is no additional itemized payment for clearing and grubbing, restoration of area grading, surveys, or topsoil stripping. In the event the Contractor encounters additional topsoil the Company and the Consultant shall be notified in sufficient time to allow for its removal with no delay to the Contractor's schedule.

The requirements of this Specification will be included in the unit prices within the Pricing Schedule.

PROJECT SPECIFICATION NO. 3

GENERAL GRADING AND EARTHWORK

This specification is to be read in conjunction with General Specification No. 3 - General Grading and Earthwork.

Information presented in this specification supplements the General Specification and in the event of conflict between this specification and the General Specification, this specification shall govern.

1.0 DESCRIPTION

The Contractor will accept the site "as is" at the time of the start of work. Submission of the Pricing Schedule will constitute presumptive evidence that the Contractor has undertaken the necessary inspection of the site to satisfy themselves of the site conditions.

The Contractor is responsible to:

- Monitor the status of the sedimentation and erosion controls and maintain as necessary as required by the Consultant and City of Ottawa.
- Proofroll the subgrade of all fill areas prior to filling, and remove, replace or compact any soft or unsuitable areas identified by the geotechnical consultants.
- Provide positive drainage to existing outlets to avoid any ponding.

Provide and maintain positive drainage to approved outlets for all areas during and upon completion of this contract. The same specifications shall apply to completion of rough grading required under this contract. Following completion of underground servicing, the contractor must complete a topographical survey certified by an Ontario Land Surveyor confirming the restored elevations, as per SC 28. The Company reserves the right to credit from the payment to the Contractor for any incomplete restoration as substantial work. The deduction amount will equal the cost for the Company to complete the substantial restoration by another contractor.

2.0 CONSTRUCTION

2.2 Rough Grading

Rough grading shall be carried out to the subgrade elevation provided by the consultant.

Rough grading shall be in accordance with the requirement and procedures noted in the Geotechnical report.

2.2 Fine Grading

Fine grading shall be in accordance with the requirement and procedures noted in the Geotechnical report.

3.0,4.0 MEASUREMENT AND PAYMENT

The Contractor will provide the following surveys under the seal of a licensed Professional Engineer or Ontario Land Surveyor:

- Existing ground will be taken from the survey completed by the Company's O.L.S..
- Subsequent to the topsoil stripping and related operations, a survey of the stripped ground with spot elevations at 5m intervals internally and along boundary areas, indicating the pre-filling sub-grade for reference.
- Surveys of the final topsoil stockpiles (in the event topsoil is kept on site), top of engineered fill, prior to topsoil re-use and burial (top & bottom of trench) within the Company's lands. The survey of the lots will be provided as required by the Consultant and Geotechnical consultant in order to properly complete the determination of the extent and certification of engineered fill as described under this specification. A bulking factor of 0.80 will be used on any stockpile to determine the in-situ volume for payment.
- Subsequent to the completion of the cutting and filling of all roads, a survey of the centreline, both streetlines and easements.

All surveys will be completed and delivered in an Autodesk Civil 3D Version 2018 or newer format in addition to the hard copy under seal, with reference to at least two independent benchmarks, and tied to established boundary monumentation. The works associated with each survey will be deemed incomplete until the surveys are received by the Consultant and the Geotechnical Consultant in an acceptable form.

Substantial Completion will not be approved until the Consultant has received and is satisfied with all the surveys required under this specification.

The Company reserves the right to confirm using independent means the accuracy of the surveys provided by the Contractor. In the event the Contractor's surveys are found to be inaccurate, the costs of the Company's survey and any necessary subsequent surveys, will be deducted from the progress payments to the Contractor.

The Consultant will only review and certify to the Company survey information provided by the Contractor which the Contractor declares complete. One review will be the initial review and comments, and a second review subsequent to rectification of deficiencies if required. Costs of any additional reviews will be undertaken at the cost of the Contractor. These costs will be deducted from the payment by the Company to the Contractor.

The lump sum or unit prices provided within the Pricing Schedule shall apply in this Contract regardless of the final quantity of topsoil, or earth moved or work carried out to achieve the required grades specified in this contract and the approved drawings and in accordance with the requirements of SC7 - Work Schedule. The lump sum prices provided within the Pricing Schedule for the work done governed under this specification shall be full compensation for all labour, materials, permits, coordination, surveys and plant required to complete the work.

Quantities shall be calculated by the Consultant utilizing Autodesk Civil 3D. The quantities determined by the Consultant will be final.

All costs related to the on-site disposal and burial of boulders shall be included in the prices provided within the Pricing Schedule.

5.0 BENCHMARKS

Elevations are in metres and are derived from Geological Survey of Canada benchmarks. Elevations are geodetic and refer to the Canadian Geodetic Vertical Datum (1928), pre-1978 adjustment.

PROJECT SPECIFICATION NO. 4

EXCAVATION AND BACKFILL

This specification is to be read in conjunction with General Specification No. 4 - Excavation and Backfill.

Information presented in this specification supplements the General Specification and in the event of conflict between this specification and the General Specification, this specification shall govern. In the event of a conflict between this specification and the recommendations of the Geotechnical Study prepared by the Company's geotechnical consultant, the geotechnical recommendations shall govern.

3.0 TRENCH EXCAVATIONS

All trenching to be in accordance with the latest revisions of the Occupational Health and Safety Act and Regulations for construction projects.

3.1 Alignment and Depth

Backfill and compact with granular material in accordance with the requirements of the Company's Geotechnical Consultant reports and recommendations and City of Ottawa current standards.

When for any reason the trench is over-excavated, the Contractor shall, at their own cost, backfill to the correct grade in accordance to the requirements and procedure specified by the Geotechnical consultant.

3.2 Trench Width

1. Maximum and minimum trench widths shall be as details on the drawings for common trench sewers. For separate trench storm and sanitary sewers refer to O.P.S.D. 802.010 for PVC pipes and 802.030 Class B for concrete pipes.
2. The Company's Geotechnical Consultant will be present to monitor the trench slope stability during construction activity.
3. Vertical trench is to be used where required due to existing soil conditions.
4. Sheet piling or other approved vertical trenching techniques to be used as required for sewer construction.

3.0 DEWATERING

All dewatering costs to be included in the unit price for the individual infrastructure (sewers, manholes, watermains etc.) within the contract, including dewatering and sand or granular seams that may be encountered. The Contractor is encouraged to review the available subsurface information related to existing ground conditions.

The Contractor should familiarize themselves with the geotechnical and hydrogeological reports included with this contract. The contractor shall pay particular attention to dewatering requirements. All costs for equipment, material and labour shall be included in the unit prices. There will be no separate payment for dewatering.

5.0 EXISTING PAVEMENTS

5.1 Size of Excavation

For this Contract, the method of trenching shall be chosen by the Contractor.

The Contractor shall be responsible for restoration of existing asphalt pavement, curbs, sidewalks and other surface features disturbed by their operations.

All joints with existing pavement in the municipal rights of way shall be treated and restored in accordance with the municipality's requirements, to the same depths of asphalt, and granular base materials including all necessary compactive effort.

The Contractor shall include all costs related to restoration and joint treatment in their unit prices provided within the Pricing Schedule. The Company will not entertain any extras with respect to restoration of existing surface features.

5.2 Disposal

Any existing asphalt pavement, concrete etc. which has been removed by the Contractor to complete the works outlined in this specification shall be disposed of off-site by the Contractor, at no additional cost to the Company.

7.0 EXISTING UTILITIES AND STRUCTURES

The Contractor shall protect all existing and temporary utilities. It is the Contractor's responsibility to obtain all necessary permits and field locates prior to digging, all in conformance with the utility's or municipal authority requirements.

8.0 FROZEN GROUND MATERIAL

Frozen materials or earth will not be permitted for use as backfill. The determination of frozen materials will lie in the sole discretion of the Company's Geotechnical Consultant.

9.0 PIPE BEDDING

9.1 Materials

Refer to Company's Geotechnical Consultant reports. Also see item 3.1 above

9.2 Placing

Granular bedding materials should be placed as detailed on the contract drawings and should be compacted to 98% Standard Proctor Maximum Dry Density. Refer to Notes drawing NT1 for bedding requirement.

10.0 BACKFILLING

Backfilling shall be carried out in accordance with the Company's Geotechnical Report recommendations. The Contractor is encouraged to review the Geotechnical Reports. Prior to backfilling of any trench the Contractor shall confirm and provide written evidence that the necessary ties, and elevations have been obtained by the Contractor's surveyor. Also see item 3.1 above.

11.0 PAYMENT

The Contract Price shall be compensation in full for all excavation in any material including dealing with frozen materials, sheeting and shoring and dewatering if necessary, and backfill and compaction as required and as directed by the Consultant.

The unit prices provided within the Pricing Schedule for manholes shall include the cost of granular backfill as specified.

The contract price shall include aerating and/or drying wet material as required and as directed prior to backfilling.

The lump sum and unit prices provided within the Pricing Schedule shall apply to the Contract regardless of the final quantity of the materials or earth moved or work carried out to achieve the required grades specified on the approved drawings and in accordance with this specification.

Upon completion of the backfilling of trenches, the contractor shall carry out the necessary rough grading to allow for the construction of the final surfaces as specified such as roads, lots, walkways or landscaped areas. The unit prices provided within the Pricing Schedule shall include all costs associated with this requirement. The Company will entertain no extras for this requirement.

The unit prices provided within the Pricing Schedule for the work under this specification shall include all necessary arrangements for offsite disposal, including all labour, equipment and materials required for the excavation, haulage and disposal fees.

Any disturb areas must be brought back to preconstruction grade unless otherwise directed by the Consultant.

11.3 Excess Excavation

There shall be no payment for the backfilling of any over-excavation in accordance with specifications of this contract by the Contractor.

Payment for the backfilling of any over-excavation as directed by the Consultant shall be made in accordance with the Schedule of Additional Unit Prices.

PROJECT SPECIFICATION NO. 5

WATER DISTRIBUTION SYSTEM

This specification is to be read in conjunction with General Specification No. 5 - Watermains and Appurtenances.

Information presented in this specification supplements the General Specification and in the event of conflict between this specification and the General Specifications, this specification shall govern.

2.0 MATERIALS

Watermains and appurtenances to be to City of Ottawa Specifications.

3.0 CONSTRUCTION

3.1 General

Watermains shall have 2.40 metre minimum cover at all locations along its length unless otherwise directed by the Engineer. Where the depth of the watermain or appurtenances does not meet the requirements of City of Ottawa, the main or appurtenance will be provided with sufficient insulation to compensate for the lack of cover per City of Ottawa Std. W25.2. All metallic components shall be protected from corrosion by cathodic protection per the latest OPSD or AWWA and City of Ottawa standards.

3.5 Connections to Existing Watermains

All connections to existing watermains must be coordinated by the Contractor with the City of Ottawa officials and the Consultant.

Watermain bedding shall be in accordance with City of Ottawa Standard W17.

3.7 Anchorage of Pipes, Fittings, and Hydrants

Thrust blocks are to be installed as per the City of Ottawa Standard W25.3 and W25.4. Watermains in fill areas are to be installed with restrained joints as per City of Ottawa W25.5 and W25.6.

3.9 Valve Boxes

The price for valve boxes located within boulevards shall include the setting and adjustment of the top to finished grade. The price for valve boxes within roads shall include setting and adjustment of the top to base course asphalt level. The price for valve boxes within roads shall also include adjustment of the top from base course asphalt level to top asphalt level.

3.10 Valve Chambers

Chamber drain may be connected to storm sewers only with agreement of Drinking Water Services provided that an approved backflow prevention device is included per Section 4.4.7.4 of Ottawa Design Guidelines – Water Distribution.

3.11 Hydrants

All hydrants shall be installed as per City of Ottawa Std. W19 and located as per City of Ottawa Std W18.

3.12 Service Connections

Type K soft copper as per City of Ottawa Std. W26 unless otherwise specified.

4.0 HYDROSTATIC TESTS AND FLUSHING

4.3 Allowable Leakage

Leakage tests shall be applied to the mains in suitable sections after the backfilling is completed. The ends of the mains shall be capped or valves closed and the main filled with water under a pressure of 1035 kPa after which all visible leaks shall be stopped. Leakage shall then be measured by a calibrated meter supplied by the Contractor with readings taken at fifteen minute intervals for a period of three hours. The average rate of leakage shall not exceed 115 L/day per 25 mm of diameter per km of pipe, and if the leakage exceeds this figure the Contractor shall locate and correct the leaks. Tests shall be repeated until the leakage is less than the specified amount. The pipe shall be left exposed where directed until the completion of the test, after which backfilling shall be completed. The cost of the labour and the materials required to locate and correct the leaks shall be borne by the Contractor. Leakage tests shall be borne by the Contractor. Leakage tests shall be carried out by the Contractor.

4.3.1. Swabbing

As a requirement to this Contract all watermains shall be swabbed immediately after the leakage test and prior to disinfection. In most cases watermains are usually swabbed using fire hydrants as points for entry and exit. Because of this, the main valve seat must be removed and a blind seat installed to prevent undermining the soil at the hydrant boot. The practice also prevents damage to the original hydrant seat as debris passes through the hydrant. All swabs must be inspected prior to insertion and immediately after they exit the main to ensure that they have remained intact and that pieces of the foam do not stay in the main. The swabs should also be numbered and carefully controlled by the Contractor and Consultant to ensure that all swabs that are introduced to the main are accounted for. Only new swabs will be permitted for use and in no case will used swabs be allowed.

All watermain pipes must be swabbed a minimum of one time plus a minimum of one swab shall be passed through each hydrant lead, stub or blow-off. Additional swabs shall be used as directed by the Consultant if discharge water does not run clear within ten (10) seconds of the swab exiting the discharge point. Swabs shall be forced through the watermain using potable water so that they maintain a velocity of 0.5 to 1 metre per second. Any method of disposal of the discharged water must be approved by the Consultant. The Contractor shall take the necessary precautions to minimize soil erosion and to reinstate the area upon completion. All swabbing must be completed before any services are connected.

The swabs must be an open cell polyurethane foam, having a density of 1.5 pounds per cubic foot (19 grams per cubic metre), and are to be a minimum of 50 mm larger than the nominal pipe diameter with a length of at least one and a half times its diameter. Watermains 300 mm or smaller can be swabbed through hydrants on approval by the Consultant.

4.3.2 Disinfection

After swabbing, the watermains shall be chlorinated. The work of chlorination and sterilization will be performed by the Contractor for a period of 24 hours.

4.4 Flushing

Immediately after sterilizing, swabbing and hydrostatic and leakage tests are completed, the main shall be flushed again according to City of Ottawa Standards and left charged, so that the work of connecting the water services may proceed at once. Care should be exercised to ensure that the flushed wastewater shall be disposed of in such a manner to protect the environment as well as being approved by the Consultant.

5.3 Bacteriological Tests

The Contractor shall collect samples from the disinfected watermains for the performance of bacteriological tests. Should the tests prove unsatisfactory, the watermains in question shall be rechlorinated, flushed and tested until satisfactory results can be obtained. All costs for further disinfection shall be borne by the Contractor.

7.0 PAYMENT

7.1 Watermains

The Unit Price for watermain shall include all labour, materials and equipment required to construct watermains and appurtenances as per the drawings and specifications including all necessary excavation, bedding, backfill, insulation, compaction, restoration, plugs, restrained joints, thrust blocks, testing and other requirements of City of Ottawa, also corrosion prevention as described in General Notes – NT1.

The Unit Prices provided within the Pricing Schedule for works under this specification shall include disposal off-site of any surplus materials at completion of the work per SC1.

The Unit prices shall include all traffic controls and temporary detour provisions for those works in this specification, within existing road allowances or adjoining rights of way where other traffic may travel. This includes both pedestrian and vehicular traffic controls and provisions.

The Unit Price also includes extra depth watermain and crossings under existing utilities where indicated on drawings, and full compaction of backfill in trenches under pavements.

The Unit Prices provided within the Pricing Schedule shall include all necessary layout and preparation of As-Constructed red-line plans in accordance with the requirements of the Special Conditions, and City of Ottawa for the work under this specification.

PROJECT SPECIFICATION NO. 6

SEWERS AND APPURTENANCES

This specification is to be read in conjunction with General Specification No. 6 - Sewers and Appurtenances.

Information presented in this specification supplements the General Specification and in the event of conflict between this specification and the General Specifications, this specification shall govern.

2.0 MATERIALS

2.1 Sewer Pipe

- .1 Concrete pipe up to and including 900 mm dia. shall be supplied by a manufacturer which has obtained prequalification by the Joint OCPA/MEA/MECP Prequalification Committee.
- .2 All sewer joints to be fitted with rubber gaskets.
- .3 PVC sewer pipe shall be equal to CSA 182.2 or latest amendment Class DR-18, SDR-26, SDR-35 as specified on the drawings.

2.3 Manholes

- .1 Sanitary manhole frames and covers to be in accordance with City of Ottawa Std S24 and S25. All adjustment units, frame and grates are to be sealed as per the inflow and infiltration mitigation measures detail.
- .2 Storm manhole frames and covers to be in accordance with City of Ottawa Std S24.1 and S25.
- .3 Manholes to be in accordance with OPSD standards.

2.4 Catchbasins

- .1 Catchbasin and double catchbasins to be in accordance with City of Ottawa Std S1 and O.P.S.D. 705.020 respectively. Frames and grates per City of Ottawa Std. S19.1.
- .2 Curb inlet catchbasin to be in accordance with City of Ottawa Std S3. Frames and grates per City of Ottawa Std. S22 and S23.

2.5 Pipe Bedding

All bedding for sewers is to be installed as per the recommendations of the Geotechnical Consultant and the notes as shown on Drawing No NT1.

3.0 CONSTRUCTION

3.2 Pipe laying

Where a sewer crosses another sewer or watermain with less than 300 mm separation, the pipes shall be encased in 20 MPa concrete from the base of the lower to the springline of the higher. Concrete encasement is to be completed from pipe joint to pipe joint. Concrete encasement is to be included in the price provided within the Pricing Schedule for sewer construction.

Where trenchless methods are used, the Contractor shall submit the necessary shop drawings which include the hydrostatic joint rating being proposed.

3.6 Sewer Laterals

Sewer laterals are to be installed as per notes on Drawing NT1.

3.7 Manholes

Concrete pipe to be supported from maintenance hole to the first pipe joint 1.0 m from outside wall with 20 MPa concrete to undisturbed ground. Maintenance holes shall be backfilled with Granular "B".

Minimum width of manhole benching is to be 230mm except beneath the access where it shall be at least 450mm.

All poured in place manholes are to be founded on compacted Granular 'A' or equivalent approved by the Geotechnical Consultant. A minimum thickness of 300 mm compacted to 100% Standard Proctor Maximum Dry Density (SPMDD) shall be provided unless otherwise noted by the Geotechnical Consultant.

Any soft subgrade sections are to be removed and replaced with 50 mm crusher run limestone or equivalent approved by the Geotechnical Consultant.

All adjustment units, frame and grates are to be sealed as per the inflow and infiltration measures detail.

3.8 Catchbasins and Catchbasin Leads

Subdrains shall be connected to all catchbasins.

4.0 TESTING

4.2 Procedure

1. The Contractor shall carry out T.V. camera inspections of all sewers up to and including 1500 mm diameter installed under this Contract. The camera can be either pulled or self propelled through the pipes, the equipment is to have features to enable closer examination of faults and to view up lateral connections. The equipment is to provide "measured" location of the camera relative to manholes in order to locate faults, laterals, etc. Two copies are to be provided on CD and shall be submitted directly to the Consultant. Three T.V. camera inspections are required; one following base asphalt, second prior to the first occupancy, and a final prior to assumption. The two copies of each video recording shall be delivered by the Contractor to the Consultant along with a written report with photographs of problem areas.
2. The air-test, infiltration test and exfiltration test for the sanitary sewer system is to be completed at three times during the construction of the proposed works. First upon completion of the sanitary sewer system, second upon completion of base asphalt and finally prior to the first occupancy.

3. Prior to assumption the Contractor shall conduct smoke tests of all sanitary sewers to confirm that there are no cross connections. Supplemental dye testing shall also be conducted when directed by the Engineer as described in the City of Ottawa Standards.

4.3 Allowable Limits

The Contractor shall verify the allowable limits for all testing procedures according to the requirements of City of Ottawa.

5.0 MEASUREMENT

No measurement of sewers or maintenance holes for payment purposes will be undertaken in the field.

6.0 PAYMENT

The unit prices provided within the Pricing Schedule for the works under this specification include all necessary work to obtain and prepare the As-Constructed information required under the Special Conditions.

The Unit Prices provided within the Pricing Schedule for works under this specification shall include disposal off-site of any surplus materials at completion of the work per SC1.

The Unit Prices provided within the Pricing Schedule or works within existing road allowances under this specification shall include all necessary traffic controls and detours, both vehicular and pedestrian, in accordance with specifications of this Contract and City of Ottawa requirements; restoration of existing roads including backfill, granular base and subgrade base asphalt and top asphalt to match existing conditions; and restoration of existing boulevards, including backfill, topsoil, and sod.

The Contract Price shall include all costs associated with T.V. inspections. No additional amount shall be paid for this work. Any cost of repairing defective work and subsequent re-inspection shall be at the Contractor's sole expense.

The Contract Price for sewers shall include any temporary pumping required if no outfall is available due to scheduling the work program.

The prices provided within the Pricing Schedule in the pipe and manhole items for storm sewer shall include the cost of all required testing.

All costs associated with the testing of the sanitary sewer is to be included in the prices provided in the contract price.

All costs associated with the inflow and infiltration mitigation measures are to be included in the unit prices for the manholes and manholes adjustment as noted.

6.3 Maintenance Holes

The unit prices provided within the Pricing Schedule for maintenance holes shall include backfill approved by the Geotechnical consultant, the placement of 15 MPa concrete fill under the maintenance holes to undistributed ground in locations where the maintenance hole foundation has been excavated or otherwise substantially disturbed.

The unit prices provided within the Pricing Schedule for maintenance holes shall in all cases include drop connections and safety platforms as required on the drawings, whether or not such specials are highlighted in the Pricing Schedule.

6.4 Catchbasins

The price provided within the Pricing Schedule for single and double catchbasins shall also include the cost of supplying and installing the appropriate lead and any bedding material required in addition to that specified to make up the difference between undisturbed ground and the underside of the catchbasin.

6.9 Testing

The unit prices provided within the Pricing Schedule shall include all costs related to the tests as noted in Section 4.0 which may be requested by the Consultant. This includes the cost of television camera inspection of all sanitary sewers and the provision of the required video tapes and report to City of Ottawa.

7.0 SILTATION CONTROL DEVICES

The Contractor will be responsible for installing siltation control facilities (sediment ponds and hickenbottom drains with outlets or temporary catchbasin sedimentation control devices) at various points within the site. In some cases the Consultant may direct the reconstruction of the ponds or outlets and to connect the outlet pipes as directed with payment to be based on the additional unit prices provided in the Contract, and the review and approval by the Consultant.

PROJECT SPECIFICATION NO. 7

ROADS, CURBS AND SIDEWALKS

This specification is to be read in conjunction with General Specification No. 7 - Roads, Curbs and Sidewalks.

Information presented in this specification supplements the General Specification and in the event of conflict between this specification and the General Specifications, this specification shall govern.

3.0 CONSTRUCTION

Sub-drains to be laid continuously beneath all curbs in accordance with City of Ottawa Standard R1.

3.1 Road Base, Driveways, Parking Areas and Sub-Base

Subgrade

Any topsoil found within the roadway areas should be removed prior to commencement of sub-grade preparation. All sub-grades shall be proof-rolled with a representative of the Geotechnical consultant to identify and remove soft-spots. Contractor to notify the Consultant 48 hours prior to any proof rolls.

The sub-grade shall be compacted in accordance with the procedures as noted in the Geotechnical report.

2. Sub-base

The granular sub-base shall be installed in accordance with the requirement and procedures noted in the Geotechnical report.

3.2 Asphaltic Pavement

Where noted all existing pavement shall be saw cut as necessary to provide the required trench widths and joints to proposed asphalt. Joints will be provided as detailed on the applicable drawings.

The compaction and asphalt mix design shall be in accordance with the Geotechnical consultant report, OPSS and City of Ottawa Standards.

The contractor is to submit proposed asphalt mix design for review by the various authorities and Geotechnical consultant two weeks prior to the proposed start of paving. All mix designs must be provided to the Geotechnical Consultant for review and approval prior to construction.

3.2.1 Joints Between Existing and Proposed Asphalt

A 300 mm wide by 40 mm deep step joint is to be provided between existing and proposed pavement, and filled with a compacted layer of 40 mm HL3. All joints shall be routed and sealed with a hot rubber sealing compound as per OPSS 1212.

Prior to placing the tack coat and if directed by the Consultant, the base asphalt is to be flushed and swept including any minor hand cleaning all at no additional cost.

3.2.3 Joints Between Existing Base Asphalt and Proposed Asphalt

At an interface with existing asphalt roads with only base asphalt, the contractor shall provide a butt joint between the existing asphalt and proposed asphalt. The Contractor shall trim the existing asphalt to provide a straight edge for the butt joint and fill the joint with rubberized asphalt sealant as per OPSD 508.010.

3.2.4 Adjustments to Manholes, Valve Chambers and Catchbasins

The tops and frames of manholes and catchbasins shall be adjusted to the top of base asphalt using modoloc rings.

4.0 MEASUREMENT

All road quantities shall be measured on the Engineering Drawings in square metres at the specified thickness as indicated on the Engineering Drawings.

The measurement of base course asphalt shall not include the fillet laid over the top of the base curb which ultimately is trimmed off to permit top stage curb construction.

Adjustment of maintenance holes and catchbasins will be measured on a unit basis as described in Project Specification No. 6.

5.0 PAYMENT

5.1 Road Base, Sub-Base and Asphaltic Pavement

The Unit Prices provided within the Pricing Schedule for works under this specification shall also include disposal off-site of any surplus materials at completion of the work per SC1.

Payment for base asphalt and top asphalt shall be on a square metre basis of asphalt placed to the minimum specified compacted depth.

Unit prices for base asphalt shall include any immediate rectification of damaged areas or settlements and padding necessary for these settlements.

Unit prices for top asphalt shall include all machine or hand padding or scratchcoats required due to settlements of the base asphalt to provide the correct top asphalt crown. The unit price shall also include all necessary base asphalt repairs and patching required prior to top paving, including alligatored, broken or badly cracked asphalt, including the removal and disposal of broken asphalt offsite. The Contractor will not be responsible for damage by a third party. The Consultant shall determine if the repairs and/or patching is the result of a third party action.

Unit prices for asphalt shall be adjusted according to the rate of asphaltic cement used at the time of construction. The cost of asphaltic cement at the time of submission of the Pricing Schedule shall be specified by the contractor as a basis for adjusting the unit price for asphalt.

5.2, 5.3 Maintenance Hole Adjustments and Ramping

The unit price provided within the Pricing Schedule for the adjustment of manholes, chamber tops, access locations, and catchbasins shall include all the necessary materials, equipment and labour required to complete the works as specified.

5.4 Sidewalks

Payment for sidewalk shall be compensation in full for all labour, equipment and material required including excavation and fine grading, disposal of surplus material, supply of fill material and polyethylene film, expansion joints, edge scoring of both edges, regrading to boulevard level, application of curing compound, cold weather protection and cleaning and brushing of sidewalks and application of sealer.

**CONTRACT I SPECIFICATIONS
SPECIAL CONDITIONS OF THE CONTRACT**

ARTICLE SC1 - Acceptance of Site

All Proponents are required to satisfy themselves by personal examination of the site, of the work and of the existing conditions, which may be encountered on the site. The submission of a bid shall be deemed proof that the Proponents have satisfied themselves as to all the provisions of the Contract, of all of the conditions which may be encountered, equipment they will be required to supply, or any other matter which may enter into the carrying out of the Contract to a satisfactory conclusion. No claims will be entertained by the Company based on the assertion by the Contractors that they were not informed as to any of the provisions of conditions intended to be covered by the Contract. The submission of the price provided within the Pricing Schedule shall be presumptive evidence the Contractor has satisfied himself of the site conditions.

Following completion of underground servicing and roads to base course asphalt, the Contractor MUST restore any disturbed lots and blocks to the pre-grade elevations, including removal and disposal of surplus material and provide a topographical survey certified by an Ontario Land Surveyor confirming the same, as per SC28 – As-Built Information. The Company reserves the right to credit from the payment to the Contractor for any incomplete restoration works. The deduction amount will equal the cost for the Company to complete the restoration work by another contractor.

The Contractor must submit to the Company, in writing, that all disturbed lots and blocks are to be restored to the pre-grade elevations by the Contractor as described above prior to contract execution. The Contractor is to protect all surface features on adjacent roads and adjacent lots. Any damage to any public roads or infrastructure shall be rectified by the Contractor at his own expense to the satisfaction of the City of Ottawa and the Consultant.

The Contractor shall satisfy himself of all geotechnical and hydrogeological information, including boreholes, in-situ conditions, and recommendations identified in the identified reports. The only access to the site shall be from Tremblay Road and St. Laurent Boulevard at the location noted on the drawings. The Contractor shall not impede or restrict traffic operations on Tremblay Road and St. Laurent Boulevard and shall implement traffic controls to the satisfaction of the City of Ottawa where required. Parking of vehicles is not permitted on City of Ottawa roads, including Tremblay Road and St. Laurent Boulevard. The access points must be secured at the end of the day and over the weekends to prevent unauthorized access.

The topographic survey of existing ground was prepared by the Company's Surveyor. This topographic survey will be provided to the Contractor in digital format upon contract award. The Contractor is responsible for verifying this topographic survey for their use. This survey will be used as the original ground for the basis of calculation of earthworks quantities.

All costs associated with the above requirements are to be included in the unit prices. The Company will entertain no claims for extras for these requirements.

ARTICLE SC2 - Limit of the Working Area

On the Company's land, the Contractor shall limit his operations to the limit of construction shown on the engineering drawings, unless otherwise approved by the Consultant.

At no time is the Contractor to encroach on the following areas:

- 1) Private property without written permission from the landowner; and
- 2) Public property without written permission from the City of Ottawa.

ARTICLE SC3 - Existing Utilities and Services

The position of all existing poles, overhead lines, conduits, watermains, sewers and other underground or aboveground utilities, structures and appurtenances are not necessarily shown on the drawings, and where shown, the accuracy of the position of such utilities is not guaranteed by the Company or the Consultant. The Contractor shall have all utilities field located prior to the start of construction.

The Contractor shall be responsible for locating and adequately protecting all existing utilities and services and restoring all disturbed bedding and backfill in accordance with the requirements of the utility, and City of Ottawa. Any damage to any existing service or utility shall be repaired at the Contractor's expense. The cost of all excavations for verification, protection during construction, and support during installation of utilities, and restoration of all surface features damaged or destroyed are to be included in the unit prices provided within the Pricing Schedule. The Contractor should note that some utilities may require excavations in the vicinity of their existing plant be hand dug to locate the existing services. All cost for hand-digging excavations shall be included in the prices provided within the Pricing Schedule .

ARTICLE SC4 - Restoration

The cost of restoration shall include, but is not limited to bedding, backfill, and compaction for existing utilities, pavements, tie-backs, sidewalks, curbs and sodding which must be disturbed to carry out the works required during the execution of this contract. The cost of the restoration of all surface features damaged or destroyed during the construction of the services under this Contract is to be included in the price provided within the Pricing Schedule and will be the responsibility of the Contractor. The Company reserves the right to withhold from payment the estimated cost of remediation costs which have not been completed.

ARTICLE SC5 - Surface Drainage

The Contractor shall be responsible for maintaining good road and site drainage to catchbasins or other approved outlets for the duration of the Contract. The Contractor shall be responsible for providing temporary drainage swales, ditches, and sedimentation/erosion controls as necessary. This includes road grading such as to avoid creating ponding on the lots by grading temporary ditches across the road to drain such ponding areas.

The Contractor will be held responsible for all damage which may be caused or result from water backing up or flowing over, though, from or along any part of the works, or which any of his operations may cause to flow elsewhere. Siltation control devices shall be installed, and the control of siltation shall be the Contractor's responsibility throughout the undertaking of his Contract. The Contractor will also be responsible for all damage or fines resulting from the improper control of siltation.

The Contractor shall dewater all work sites and excavations as necessary or as directed to enable the works to be constructed in a satisfactory manner. Water produced from any dewatering operations to be treated in a "Wetland Filter Bag" or other means acceptable to the governing authorities and discharge only as approved by the Consultant.

ARTICLE SC6 - Maintenance of Traffic

The Contractor must maintain traffic on adjacent roads, including providing signage and flag persons as required in accordance with the requirements of the City of Ottawa at all times for the duration of the Contract.

The Contractor shall provide all necessary signage and flagmen and shall maintain vehicular traffic on adjacent roads at all times during construction in accordance with MTO's "Manual of Uniform Traffic Control Devices" and/or MTO "Book 7".

The cost for all necessary permits, traffic signage, traffic control devices and flag persons shall be included in the prices provided within the Pricing Schedule.

Prior to the start of any work within an existing road allowance, the Contractor shall obtain the necessary permits from the City of Ottawa to occupy the road allowance.

ARTICLE SC7 - Work Schedule

Contract I *September 2021 – March 2022*

Contract II *April 2022 – July 2022*

Within 7 days of Contract Award or receipt of a "letter of intent", the Contractor shall provide the Consultant with a detailed work schedule. It shall contain sufficient detail for the Consultant to monitor progress of the work. Future delay claims will be rejected if the Contractor fails to provide the original construction schedule.

- a) Completion Dates specified assume the Contractor has received the written permission and notification to commence work on the Start Date specified as being no later than the Start Dates listed above. Any delays in the Start Dates mentioned above will be added to the Completion Dates.
- b) Each calendar day from the project Start Date to the project Completion Date, inclusive, shall be considered work days. If work on Saturday/Sunday or statutory holidays is required to meet the schedule, no additional claims will be accepted.
- c) The construction schedule, insurance certificates, bonds and all other required documents must be provided to the Consultant prior to commencement.

The Company reserves the right to adjust the schedule to delay the start dates until all approvals are obtained. Any delay in the commencement of the project caused by the Company, will result in the contract schedule being extended by an equivalent period of time.

The Contractor shall commence work and carry it on at whatever location or locations the Consultant may direct. No work shall be undertaken without the Consultant's approval and no work shall be suspended without his written permission except as described in the Contract Documents.

Siltation controls must be installed prior to demolition and grading.

Prices provided within the Pricing Schedule shall be valid through the 2022 calendar year.

ARTICLE SC8 - Contractor Certification of Imported Fill Material

In the event the Contractor is asked to provide fill, the Contractor shall identify the source of imported fill material. The source must be approved by the Company and the Company's Geotechnical Consultant.

The Contractor shall provide written certification to the satisfaction of the Consultant that:

4. Only material from an approved source will be placed on site.

5. The material is free of organics and other unsuitable debris and is suitable for engineered fill as assessed by the Geotechnical Consultant, and accompanied by a stamped, signed and dated report prepared by a licensed professional engineer in the Province of Ontario.
6. The material meets Ministry of Environment Decommissioning Guidelines for residential uses or other applicable regulations noted in the report provided above in item #2.

The Company reserves the right to undertake independent testing of the material. Any material, deemed unsuitable by the Company's consultant shall be disposed of off-site at Contractor's expense.

ARTICLE SC9 - Independent Testing

The Contractor shall retain independent specialized testing companies to provide the following services as required by the project.

ii) **Compaction Tests**

Provide Proctor and field density tests, certifying adequate bearing capacity and compaction of trench backfill, fill sub-base and granular base as required in accordance with the applicable specifications.

ii) **Gradation Tests**

Provide gradation tests for granular or stone aggregates, backfill material and granular or stone base material as required to verify conformance with the applicable specifications.

iii) **Concrete Tests**

Provide strength tests for concrete in conformity with the applicable specifications.

iv) **Asphalt Tests**

Provide adequate testing as required to verify conformance with the applicable specifications and to determine the asphalt cement content.

v) **Camera Inspection**

Carry out camera inspections on all sewers and the Contractor shall provide at no additional cost, such skilled assistance as the Company may require. Provided that no defective work is indicated by such inspections, the whole of the cost of the inspection shall be borne by the Company. If, however, defective work is discovered by such inspection, the Contractor shall bear a part of the total cost of the first inspection, in the proportion that the number of defective sections of sewer bears to the total number of sections inspected. For this purpose, a section is defined as a length of pipe between adjacent manholes.

The cost of testing or inspecting any portion of the works which has been previously tested and found to be defective and then subsequently rectified shall be borne by the Contractor.

ARTICLE SC10 - Temporary Facilities

The Contractor shall provide the following at his own expense:

c) Accommodation

Provide and maintain in a suitable position on the site a weatherproof field office, minimum size 10 m × 3 m × 2.5 m high with windows, tables, chairs, two desks and monitors with the ability to connect laptops, a first aid kit, a drawing table, filing cabinet drawing rack and locking doors, including air-conditioning (summer only), heat and light, for the exclusive use of the Consultant and Company.

The accommodations, equipment and furniture shall be subject to acceptance by the Contract Administrator and shall not be removed from the site without the Contract Administrator's permission.

The Contractor shall bear the costs of heating, cooling, and lighting the field office and the installation and rental charges for the telephone. The Contractor shall indemnify the Company against loss and fire, theft and injury to the building and its contents.

The Accommodations shall be equipped with electric light and propane or electric heat thermostatically controlled (winter) and air conditioning (summer). Where a local hydro service is not readily available, the Contractor shall supply and maintain an electric generator for the provision of electricity within the accommodations. All windows and doors shall be provided with screens and weekly janitorial service shall be provided by the Contractor. This facility shall be for the sole use of the Company and its representatives and must have an exterior padlock with two keys available to the Company staff. The Contractor will be responsible to unlock and lock the accommodations daily. The accommodations shall be erected and serviced prior to delivery of any materials to the site or commencement of any work. The accommodations will include two office areas, one for the Company and one for the Contractor. The accommodations will be large enough to adhere to physical distancing guidelines as set by the Ontario Government.

The accommodations, equipment and furniture shall be subject to acceptance by the Contract Administrator and shall not be removed from the site without the Contract Administrator's permission.

The Contractor shall bear the costs of heating, cooling, and lighting the field office and the installation and rental charges for the telephone. The Contractor will not be required to pay for long distance calls made by the Company or its representative. The Contractor shall indemnify the Company against loss and fire, theft and injury to the building and its contents.

The accommodations will adhere to all Covid-19 legislation. The Contractor will provide disinfecting wipes, glove, masks and other personal protection equipment (PPE).

d) Telephone

Contractor shall arrange and pay for telephone service, answering machine and facsimile transmission machine for the duration of the Work. Long distance calls, except to the Contractor's other offices, made by the Consultant will be paid by the Consultant upon receipt of an invoice by the Contractor.

c) Convenience

Provide and maintain for the duration of the Work such temporary sanitary facilities or other convenience as may be required by local bylaws or ordinances for the use of all personnel employed on the Work. . A sanitary facility (portable toilet) or equivalent must be provided by the Contractor and erected and maintained within 10 metres of the accommodations.

e) Storage

Erect any temporary buildings or workshops which may be required for workmen and for weathertight storage of products.

ARTICLE SC11 - Construction Layout

The Contractor will be responsible for providing all construction layout necessary for all aspects of area grading, underground services and surface works.

The Consultant will provide the Contractor, in writing, with bench marks and points of reference to be used by him in setting out the works. From these bench marks and points of reference, the Contractor will do his own construction layout and shall include but shall not be limited to the preparation of grade sheets, the installation of centre line stakes, grade stakes, offsets, site rails and screeds. The Contractor shall provide the Consultant with a copy of all grade sheets as they are prepared.

The Contractor shall review all drawings included in the contract for errors or omissions. The Contractor shall also review the adequacy of layout information provided and shall submit any requests for additional information or clarification to the Engineer at least 36 hours in advance of his need for such information.

The Contractor shall be responsible for the true and proper layout of the works and for the correctness of the position, levels, dimensions and alignment of all parts of the works, and for the provision of all necessary instruments and labour in connection therewith. If at any time during the progress of the works, any error shall appear or arise in the position, levels, dimensions or alignment of any part of the works, the Contractor shall, at his own expense, rectify such error to the satisfaction of the Consultant, unless such error is based on incorrect data supplied in writing by the Consultant. The checking of the layout of any line or level by the Consultant shall not in any way relieve the Contractor of his responsibility for the correctness thereof and the Contractor shall carefully protect and preserve all bench marks, stakes and other things used in setting out works.

The Contractor is to furnish the Consultant or any of his assistants, with any reasonable help which he or they may require at any time in checking the work. He shall also furnish the said parties, or any of the Inspectors, at all times, with convenient means of access to all parts of the works, and also with all required assistance to facilitate thorough examination of the same, and inspection, separation and removal of doubtful or defective material, and for any other purpose required in connection with the said works or in the discharge of their respective duties, for which services no additional allowance will be made.

The Contractor's layout crews will be required to report to the Consultant as to schedules and progress. The Contractor's layout crews will be required to take direction from the Consultant for work on the project where such work is deemed to be urgent by the Consultant.

The Contractor shall provide to the Consultant certification from an Ontario Land Surveyor or a Licensed Professional Engineer that the final grades are within tolerances specified for rough grading in Specification No. 3 - General Grading and Earthwork.

ARTICLE SC12 - Extra Construction Layout

The Contractor shall be responsible for any extra costs incurred by the Consultant in providing additional layout extra to that provided for in Article SC9 above. Re-staking or additional layout required due to the Contractor's operation will be charged to the Contractor's account in the following manner.

The Consultant will determine the applicable charges for extra construction layout and will invoice the Company. The amount of these invoices will be deducted from the Contractor's monthly payment certificate, and the Company will then reimburse the Consultant.

ARTICLE SC13 - Noise, Vibration, Mud and Dust Control

The Contractor shall establish and maintain site procedures such that noise levels from construction activities are minimized and are in accordance with local by-laws. It is the Contractor's responsibility to obtain a copy of the City of Ottawa noise by-law and maintain on-site for reference, and comply with all local by-laws with regards to restrictions on working hours and construction activities as related to noise. If the Contractor wishes to obtain an exemption from any by-laws the Contractor will include all associated costs in the unit prices provided within the Pricing Schedule. The Company will entertain no claims for extras or delays in the schedule in the future to satisfy this requirement.

In addition, the Contractor must be in compliance with all requirements of the Environmental Protection Act. In particular related to noise, dust and vibration the Contractor must be in compliance with Section 157(1) of the EPA.

The Contractor shall undertake all mud and dust control measures required to prevent dust nuisances caused by construction activities both on-site and on adjacent roads to the satisfaction of the Consultant and City of Ottawa. The cost of these control measures shall be included in the price provided within the Pricing Schedule.

Mud and sediment controls shall be maintained per ESC1 – 4 notes and details.

The Contractor is responsible for cleanup of mud tracking on existing road surfaces on a daily basis or on a more frequent basis if directed by the Consultant or City of Ottawa. All construction vehicles leaving the site must cross over a rip-rap vibration pad to reduce mud-tracking. The total Contract price shall include cleanup of mud tracking or the reconstruction of the rip-rap vibration pad to the satisfaction of the Consultant.

ARTICLE SC14 - Siltation and Erosion Control

Contractor and engineer shall complete pre-construction site walk to assess condition of existing siltation control fence prior to mobilizing.

Prior to commencing topsoil stripping of the site, erosion and sediment control measures must be installed as shown on the Engineering drawings.

The Contractor is responsible to restore, maintain and remove when directed those sedimentation and erosion control works shown on the plans, either proposed or existing in the field to satisfaction of the Consultant and City of Ottawa.

The Contractor shall inspect the site weekly and before and after every significant rainfall and make repairs as required to conform with the engineering drawings, including removal of sediment. The Contractor will also be responsible for all damage or fines resulting from the improper control of siltation.

All costs associated with this requirement will be included in the unit prices provided within the Pricing Schedule. The Company will entertain no claims for extras for this requirement.

ARTICLE SC15 - Security of the Site

Security of the site will be the responsibility of the Contractor. The Contractor to provide barricades to the construction access outside the hours of construction to prevent access and trespassing onto the

lands within the limits of construction. The barricades shall be in accordance with those specified on the Engineering Drawings. Contractor is to post signs adjacent to the site noting that:

- c) It is illegal to dump material onto the site; and
- d) It is illegal to trespass onto private property.

Unit prices provided within the Pricing Schedule shall include the cost of warning signs and barricading the construction access. Any material dumped on the site by others shall be removed and disposed off-site by the Contractor only with the approval of the Consultant, at the Contractor's expense.

ARTICLE SC16 - Coordination with Other Contractors

The Contractor should note that other Contractors may be working on lands adjacent to the site. The Contractor shall co-operate fully with other Contractors at the construction interfaces.

Construction activity in the vicinity of this Contract may be underway during the construction period. The Contractor shall accept the presence of other Contractors within the working area and shall be responsible for all necessary co-ordination.

The unit prices provided within the Pricing Schedule will be compensation in full for this requirement. The Company will entertain no claims for extras for this requirement at a later date. Any delays shall be the responsibility of the Contractor

ARTICLE SC17 - Protection of Trees

The Contractor shall be responsible for the protection of tops, trunks and roots of existing trees designated to be saved on the project site. Trees within the construction area, that are to be saved, shall be fenced around the drip line prior to construction. Interfering branches may be removed under the direction of the Landscape Architect provided there is not injury to the trunk or resultant scars are covered immediately with an approved tree wound dressing. The Contractor shall provide access for the Landscape Architect to all trees to be saved for the purposes of fertilizing and maintaining the trees.

There are no trees within the limits of construction which have been identified for preservation. The Contractor shall be responsible for any damages and resulting repair or replacement costs for any trees on neighboring properties.

ARTICLE SC18 - Occupational Health and Safety Act

The Contractor is responsible for construction safety for all of the Work done under this contract and shall comply with all of the rules, regulations and practices required under the current Ontario Occupational Health and Safety Act together with all other applicable legislation, regulations and standards as laid out by any other governing body.

For the purpose of this contract the Contractor will direct and control the activities of all suppliers, contractors, and visitors within the site. On that basis the Contractor will be the Constructor for the purposes of the Ontario Occupational Health and Safety Act.

The Contractor shall indemnify to Company and Company's agents by a letter that contractor is solely responsible for OHS and to ensure time and space separation between construction activities of all contractors who may be on-site.

The Contractor shall ensure that its subcontractors also comply with all such construction safety requirements. The Contractor shall indemnify and hold harmless and cause its subcontractors to indemnify and hold harmless, the Company, WSP Canada Inc., the Company's agents and any subconsultants. All costs associated with compliance with the pertinent safety requirements shall be

the sole responsibility of the Contractor and included in the unit prices provided within the Pricing Schedule.

ARTICLE SC19 - Harmonized Sales Tax

As per previously mentioned terms of this agreement.

ARTICLE SC20 - Local By-Laws and Regulations

All work must conform with local by-laws and regulations including but not limited to the "Occupational Health and Safety Act and Regulations for Construction Projects" and any applicable regulations and local by-laws for erosion and sediment control.

ARTICLE SC21 - Provisional Items

Where it occurs in this document, the notation "Provisional" shall be understood to mean that the inclusion in the Contract of Items so described shall be at the direction of the Consultant.

No claims for extra payment due to the exclusion of any or all of these items will be accepted by the Company.

ARTICLE SC22 - Superintendence

The Company and the Consultant reserve the right to order the Contractor to replace personnel or subcontractors on the project if performance becomes unsatisfactory.

ARTICLE SC23 - Insurance

All insurance policies to be provided by the Contractor to the Company under this Contract shall include the following as additional insured:

- f) The City of Ottawa
- g) Rideau Valley Conservation Authority
- h) WSP Canada Inc.
- i) Canada Lands Company CLC Limited
- j) Public Services and Procurement Canada (PSPC)

ARTICLE SC24 - Progress Certificates

Payment certificates are to include an updated overall project schedule and detailed topographic surveys of the works are provided, per RFP Information Section 11 and Project Specification #3:

- After topsoil stripping
- After placement of fill to final pre-grades or windrow location as specified by the Consultant and certification by the Geotechnical Consultant
- After placement of topsoil to final pre-grades or windrow location as specified by the Consultant and certification by the Geotechnical Consultant

If requested, the Consultant will provide the Contractor with the Pricing Schedule in digital format Microsoft Excel 2010. It shall be the Contractor's responsibility to modify the date as necessary.

ARTICLE SC25 - Plan Quantities for Payment

Quantities provided in the Pricing Schedule are estimates only. The unit price bid shall be applied to the plan quantities regardless of any change with respect to the estimated quantities. The Company reserves the right to delete any item. No compensation will be paid to cover claims for overhead cost and lost profit.

ARTICLE SC26 - Frozen Ground Conditions

No extra payment shall be made to the Contractor should he encounter frost difficulties. The cost of such work shall be included in the Contractor's bid price for underground construction.

Frozen ground shall not be opened further in advance of construction than one day's underground service installation. Frozen excavation materials shall be separated from the unfrozen material.

Backfilling, as specified in Specification No.4 - Excavation and Backfill, shall be carried out using unfrozen material. The frozen material may then be mounded over the trench. Particular care shall be taken to prevent frozen materials from being buried around maintenance holes.

ARTICLE SC27 - Winter Heat and Protection

The unit prices provided include all necessary equipment, labour, and materials to provide winter heat and protection required to satisfy the requirements of the Contract. The Company will entertain no claims for extras related to this requirement.

ARTICLE SC28 - As-Built Information

It is the Contractor's responsibility to prepare as-built drawings.

The Contractor is to supply the Consultant with as-constructed sewer, watermain and services information as well as centreline of base road, final road, area grading, boulevard elevations and all other surface features in accordance with current City of Ottawa specifications (including a red-line drawing).

Following construction of roads to base course asphalt, the Contractor shall provide to the Consultant a topographic survey of the as-constructed rough grading on the lots and blocks. The topographic survey shall conform to the following requirements.

- date of the field survey following the date of construction to base course asphalt.
- coordinate system to be identical to that utilized for the boundary survey and must include the survey of a minimum of four boundary monuments from the site.
- vertical datum to be geodetic or that supplied by the Consultant for this project. Evidence of acceptable closure into at least two benchmarks is required.
- submission shall include a digital file suitable for use with AutoCAD
- survey to include spot elevations at a maximum spacing of 15 metres, including, but not limited to, elevations at the four (4) corners of each lot and at any change in grade (proposed and/or actual) along each lot line. Additional points beyond the 15-metre spacing will likely be required to adequately represent all changes in grade.
- survey to be completed by a survey firm approved by the Company and certified by an Ontario Land Surveyor or a Professional Engineer.
- survey to note limits of engineered fill, underside of engineered fill and top of engineered fill.

The Consultant will compare the as-constructed survey with the proposed rough grade elevation and generate on a 5-metre grid elevation differences between the as-constructed and proposed rough grading and also the volume differential.

In areas where tolerances exceed those noted in the earthwork specification, additional grading will be required. Once the rectifications are completed a revised survey will be required.

All costs associated with completing the original survey as well as any follow up surveys shall be borne by the Contractor.

ARTICLE SC29 – Protection of Survey Monuments

Prior to commencing work, the Contractor shall mark all survey bars identified by the Consultant with three (3) 50x50x1200mm brightly painted wooden stakes and shall protect all bars from damage during construction.

Bars damaged by the Contractor's negligence shall be replaced at his expense.

ARTICLE SC30 – Payment Terms

As per previously mentioned terms of this agreement.

ARTICLE SC31 - Bonds

As per previously mentioned terms of this agreement.

ARTICLE SC32 - Warranty Periods

As per previously mentioned terms of this agreement.

ARTICLE SC33 - Extended Warranty Period

N/A

ARTICLE SC34 - Substantial Performance

As per previously mentioned terms of this agreement.

ARTICLE SC35 - Work Standards

All work is to be carried out to the satisfaction of the Consultant and the Municipal Authorities. (City of Ottawa)

ARTICLE SC36 – Acceptance of Work

The Contractor agrees that all work completed will be reviewed for acceptance by WSP Canada Inc. (Consultant) and ultimately the City of Ottawa.

ARTICLE SC37 - Blasting

Blasting is not allowed on this project unless specific applications are made and approvals received from the Company, Consultant and all affected agencies.

ARTICLE SC38 - Deletions

The Company reserves the right to delete any item. No compensation will be paid to cover claims for overhead cost and lost profit.

ARTICLE SC39- Additional Charges

No claim for extras will be considered under the scope of work described in the Contract unless there are design changes made by the Consultant.

ARTICLE SC40 - Permits

The Contractor is responsible to obtain all required permits to complete the works as noted in the contract documents, in accordance with the procedures and requirements of City of Ottawa. This includes but is not limited to all necessary Road Occupancy requirements.

ARTICLE SC41 - Pre-Construction Meeting

A Pre-Construction meeting shall be coordinated by the Consultant prior to construction commencing. Attendees at this meeting shall include, but not be limited to, representatives from the Contractor, Consultant, City of Ottawa, and the Geotechnical Consultant.

At this meeting the limit of the working area will be established and a construction Work Schedule shall be presented by the Contractor that meets the completion date specified in Article SC4 – Work Schedule. No additional payment shall be made to the Contractor for attendance at this or any other construction meeting.

ARTICLE SC42 – Contractor Reimbursement for Document and Drawing Charges

The Contractor will be provided with 6 sets of the Issued for Construction drawings and specifications. Any additional copies of the drawings requested by the contractor will be provided solely at the cost of the contractor and will be charged at a fixed rate to be confirmed by the consultant. Contractor will reimburse the consultant directly for all reproductions.

ARTICLE SC43 – Dumping

In the event that dumping of materials has occurred due to the Contractor's lack of security or control of the site under this Contract, the Company reserves the right to deduct the costs of the off-site disposal from the Company's payment to the Contractor.

Alternatively, any material dumped on the site by others shall be removed and disposed off-site by the Contractor only with the approval of the Consultant, at the Company's expense.

ARTICLE SC44 – Shop Drawings

The Contractor shall submit for the Consultant's review full primary structural details, designs and shop drawings stamped by a professional engineer licensed to practice in Ontario.

This submission is subject to review, and comments by the Consultant. The Contractor shall provide additional information and details in order to satisfy all concerns of the Consultant. Two unstamped copies of the shop drawings will be returned to the Contractor with the Consultant's comments. Four final (4) copies of Shop drawings shall be submitted to the Consultant for final review and direction to proceed. All final Shop drawings are to be stamped, signed and dated by a professional engineer licensed to practice in the province of Ontario. Direction to proceed from the consultant is required prior to production of any component. The Company will not accept claims for any additional production of materials that proceed prior to receiving direction to proceed from the Consultant.

ARTICLE SC45 – CCTV Inspection

The Contractor will be required to satisfy the City's requirements for CCTV Inspection.

ARTICLE SC46 – Dewatering

The Contractor shall include all necessary costs of dewatering in order to complete the works as proposed under this contract. The Contractor should familiarize themselves with the geotechnical reports and hydrogeological reports available for review from the Consultant's office.

ARTICLE SC47 – Temporary Stockpiling and Testing

The Company reserves the right to have sufficient time to undertake the necessary testing of the temporary stockpiles to determine the nature and classification of the materials.

ARTICLE SC48 – Extras

As per previously mentioned terms of this agreement.

ARTICLE SC249 – Transfer of Electronic Data

Electronic data shall only be provided to the Contractor upon execution of an agreement for the transfer of Electronic Data.

The Contractor understands that the use of the Electronic Data transmitted is intended for conceptual review purposes only. It is expressly not intended for and should not be used as a substitute or replacement for standard construction design or as-built documents, or for any purpose that would customarily rely upon such original hard copy documents.

Electronic data includes, but is not limited to, Building Information Modelling (BIM) files, and Computer-Aided Design (CAD) files, including native 2D and 3D file formats (RVT, RFA, NWC, NWD, NWF, DWF, DWFX, DWG, DGN, IFC, DXF as examples), files produced by word processing, spreadsheet, scheduling, data base, and other software programs. The electronic data may be provided in an original format produced by WSP or an alternate, "translated" format as requested.

ARTICLE SC50 -Documents Required from the Contractor

1. Prior to Commencement

- d) Certified copies of the Contractor's insurance.
- e) WSIB Certificate showing the Contractor is in good standing.
- f) A project schedule.

2. For Progress Payments

- g) The Contractor's Payment Certificate (quantities to be reviewed by Consultant prior to submission).
- h) Certificate of Clearance from the Workers' Compensation Board.
- i) Documentation to substantiate payment of extra work including payroll burden, overhead and profit.
- j) Statutory declaration.
- k) Invoice.
- l) Copy of needed surveys as determined by the Consultant.

3. Prior to Statutory Holdback Release

- f) Certificate of Clearance from the Workers' Compensation Board.
- g) A Statutory Declaration that all financial liabilities incurred by the Contractor have been paid and that there are no liens, garnishees, attachments or potential claims relating to the work.
- h) A copy of the Certificate of Substantial Performance advertised in a construction trade newspaper.
- i) A letter stating that the Contractor is in agreement with all final contract quantities paid to date and that no further claims will be made.
- j) All outstanding surveys and as-built information as determined by the Consultant.

4. Prior to Final Acceptance of Work

- c) A Statutory Declaration as in (3b).
- d) A Letter of Release from Contractor as in (3d).

ARTICLE SC51 - Noise, Mud and Dust Control

The Contractor shall establish and maintain site procedures such that noise levels from construction activities are in accordance with local bylaws.

The Contractor shall undertake all dust control measures required to prevent dust nuisances caused by construction activities both on site and on adjacent roads. The cost of these control measures shall be included in the price provided within the Pricing Schedule.

ARTICLE SC55 - Measurement of Quantities

Payment for all items shown as PQM (Plan Quantity Measurement) will be based on Pricing Schedule Plan Quantities and will not be measured in the field unless design drawings for that item are altered.

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PROJECT SPECIFICATION NO. 5 - WATER DISTRIBUTION SYSTEM

- 2.0 MATERIALS
- 3.0 CONSTRUCTION
 - 3.1 General
 - 3.5 Connections to Existing Watermains
 - 3.7 Anchorage of Pipes, Fittings, and Hydrants
 - 3.9 Valve Boxes
 - 3.10 Valve Chambers
 - 3.11 Hydrants
 - 3.12 Service Connections
- 4.0 HYDROSTATIC TESTS AND FLUSHING
 - 4.3 Allowable Leakage
 - 4.3.1. Swabbing
 - 4.3.2 Disinfection
 - 4.4 Flushing

5.3 Bacteriological Tests

7.0 PAYMENT

7.1 Watermains

PROJECT SPECIFICATION NO. 6 - SEWERS AND APPURTENANCES

2.0 *MATERIALS*

2.1 Sewer Pipe

2.3 Manholes

2.4 Catchbasins

2.5 Pipe Bedding

3.0 CONSTRUCTION

3.2 Pipe laying

3.6 Sewer Laterals

3.7 Manholes

3.8 Catchbasins and Catchbasin Leads

4.0 TESTING

4.2 Procedure

4.3 Allowable Limits

5.0 MEASUREMENT

6.0 PAYMENT

6.3 Maintenance Holes

6.4 Catchbasins

6.9 Testing

7.0 SILTATION CONTROL DEVICES

PROJECT SPECIFICATION NO. 7 - ROADS, CURBS AND SIDEWALKS

3.0 CONSTRUCTION

3.1 Road Base, Driveways, Parking Areas and Sub-Base

3. Sub-base

3.2 Asphaltic Pavement

3.2.1 Joints Between Existing and Proposed Asphalt

3.2.3 Joints Between Existing Base Asphalt and Proposed Asphalt

3.2.4 Adjustments to Manholes, Valve Chambers and Catchbasins

4.0 MEASUREMENT

5.0 PAYMENT

5.1 Road Base, Sub-Base and Asphaltic Pavement

5.2, 5.3 Maintenance Hole Adjustments and Ramping

5.4 Sidewalks

SPECIFICATION NO. 1 GENERAL REQUIREMENTS

1.0 DESCRIPTION

The requirements of this specification shall apply to the Contract as a whole and pertain to all of the Work as specified by the Contract Documents.

2.0 ACCEPTANCE OF SITE

It will be the Contractor's responsibility to visit and examine the site of the Work prior to submitting their RFP response.

Execution of the Contract Documents by the Contractor will imply acceptance of the surfaces and conditions and no claim for damages or extras resulting from such conditions or defects will be allowed thereafter.

3.0 TRAFFIC

Traffic may be restricted on roads, only with the written permission of the appropriate municipal authority. Unless otherwise directed, obtain all required permits. Copies of the permits to be delivered to the Consultant at least 48 hours in advance of occupying the road.

Communicate the details of any traffic restrictions to the local police department, fire department and transit authority.

Provide flagpersons, barricades and road signs in accordance with the requirements of the appropriate authority and to the satisfaction of the Consultant. Flagpersons to be in constant communication visually or by radio.

Maintain safe access for the public. Should any unsafe condition occur, take immediate steps to rectify the situation. If work is not commenced within 24 hours of notification, the Company reserves the right to perform remedial work at the expense of the Contractor.

Construct temporary detours as specified. The details to be as specified by the Consultant and the road authority.

4.0 DISPOSAL SITES

Unless otherwise specified, where the Contractor is required to dispose of timber, trash, debris, boulders, surplus or unsuitable earth etc. off-site, he shall arrange a disposal site at his own expense.

Supply to the Consultant written permission from the owner of the property upon which the material is to be placed and save the Company and Consultant harmless for any claims that may arise from such disposal.

5.0 WEATHER CONDITIONS

Provide adequate means of heating materials and protect the work from damage by frost in freezing weather.

Provide all labour, materials and equipment to remove frozen ground to permit continuation of the work during freezing weather conditions.

Protect existing utilities from freezing and ensure continuity of service when water mains, sewers and service connections are encountered in excavations or when ground cover is removed or reduced during grading operations.

Remove all ice and snow from access, work and storage areas and do not perform any ditching, stripping, excavation or grading before the removal of ice and snow.

6.0 CLASSIFICATION OF EXCAVATED MATERIALS

Excavated material shall be classified as "Rock" or "Earth".

6.1 Rock Excavation

-Material excavated from solid masses of igneous, sedimentary or metamorphic rock which, prior to removal, was integral with the parent mass; and

-Buried boulders, rock fragments or broken concrete refuse which measure, in volume, 1 cubic metre or more.

The removal of pavements, curb and gutter, surface boulders, concrete structures, masonry walls and stone fences shall not be classified as Rock Excavation and shall be removed as specified in Specification No. 2 - Site Preparation.

6.2 Earth Excavation

All materials not described under Item 6.1 above and including dense tills, hard pan and other similar materials.

7.0 BLASTING

Blasting will not be permitted under this Contract without the written approval of the Consultant and other governing authorities.

If the Work under the Contract requires the Contractor to excavate rock by means of blasting the following shall apply:

The Contractor shall comply with all the statutes, regulations, by-laws and orders relating to the supply, hauling, handling, use of, and storing of explosives.

The Contractor shall provide the necessary notices including notification of the Consultant in all cases and Police & Fire Departments when blasting is done within 100 metres from existing buildings or public roads. Notification shall be at least 24 hours in advance of blasting operations.

Immediately prior to a blast, the Contractor shall clear the blasting area of all vehicular and pedestrian traffic and shall post flagmen on each road or trail entering the blasting area who shall stop all traffic and shall prevent such traffic from entering the area until the blast has taken place. The Contractor shall provide and use a siren to warn the public and the workmen that a blast is to be set off and to indicate the "All Clear" after the blast has taken place. Four short soundings of the siren two minutes before detonation of a blast shall be used for warning

and protection, and one long 10 to 15 second sounding of the siren shall be used to give the "All Clear" signal.

The type of explosives, drilling and method of blasting to be used must be authorized by the Consultant. The use of explosives in large blasts, as in seams, drifts, shafts, pits or coyote holes, or in similar devices, is prohibited, unless done on the written authority of the Consultant.

Protective measures shall be used where blasting may damage adjoining property or public utilities.

The Contractor shall be responsible for all damages.

Notwithstanding any direction by the Consultant in regard to explosives, drilling or methods of blasting used, the Contractor shall take all precautions necessary to ensure the safety of persons and adjoining property and structures, including public utilities and shall be responsible for all claims, whatsoever, arising from the hauling, handling, use of, and storing of explosives, and all affects, direct or indirect, of the blasting operations.

No extra payment will be made for protection measures; nor for damages to persons, properties or structures; nor for damages or repairs to public utilities; nor for any claim whatsoever arising from blasting operations. All such costs, shall be included in the Contract Unit Prices for "Rock Excavation".

If specified with Special Conditions under "Independent Testing", the Contractor shall arrange for a "Pre-blasting Survey" of adjacent buildings and structures. This survey shall be carried out by an independent organization, satisfactory to the Consultant.

8.0 MATERIALS AND QUALITY CONTROL

The Company will pay the costs of quality control tests except as noted. The Consultant may approve or reject any materials supplied for the Work in accordance with the Specifications herein. He may request the name and address of the manufacturers supplying materials as well as samples of materials for testing purposes. These shall be supplied at no cost to the Consultant or the Company.

When requested by the Consultant, provide an affidavit from the Manufacturer that materials are in accordance with the specifications before delivery of the materials.

When a specific item or material is required, the manufacturer and catalogue number will be specified in the Contract documents.

Replace materials that do not satisfy the specification, at no cost to the Company.

Pay for additional testing required due to failure to meet specifications.

9.0 INDEPENDENT TESTING AND INSPECTION

9.1 Testing Companies

Testing companies commissioned for the performance of tests shall be independent of the Contractor or Suppliers of products or materials to be tested and/or inspected. The selection of testing companies will be subject to approval the Consultant.

9.2 Reports

Testing and inspection reports shall be submitted directly to the Consultant with copies to the Contractor and the Company.

9.3 Payment

The cost of repeat tests, until satisfactory results are obtained will be at the expense of the Contractor.

9.4 Required Tests

Tests and/or inspections to be carried out by independent testing companies are listed elsewhere in the contract and may include: Compaction; Gradation; Concrete and Asphalt.

10.0 LIMITS OF CONTRACT

Confine work to the limits or boundaries shown on the Contract Drawings or as otherwise specified. The Contractor shall protect all existing trees where possible and shall make his own arrangements for working on private property.

11.0 EXISTING STRUCTURES AND UTILITIES

Examine the location of the Work and make such enquiries necessary to determine the existence and location of structures and utilities, both above and below ground which may be in the line of the Work or affected by construction operations.

Existing structures and utilities shown on the drawings are for information only and the Consultant will assume no responsibility for completeness or accuracy.

The Contractor shall be responsible for adequately protecting all existing utilities and services and for permanently supporting utilities which are affected by work to be done under this Contract. The Contractor shall be responsible for any damages caused to existing utilities during construction. The Contractor shall arrange for all field stakeouts of existing utilities and will expose any utility deemed necessary by the Consultant.

Satisfy the requirements of the utility authorities including the railways, regarding location, stakeouts and construction activities in the proximity of the utility or railway.

12.0 RELOCATION OF EXISTING STRUCTURES AND UTILITIES

Existing structures and utilities which are known to require permanent realignment or relocation will be completed at no cost to the Contractor except when specified otherwise.

Do not interfere with the work of utility or railway companies, their Contractor or agents and provide reasonable co-operation and schedule the work accordingly.

Other structures or utilities encountered during the progress of the work which require permanent relocation shall be relocated by the Owner of the structure or utility, or if agreed, the Contractor shall carry out the work. The Contractor shall not be entitled to claim any damages or extra compensation for any delay due to such removal or rearrangement.

13.0 TEMPORARY RELOCATION OR SUPPORT

Temporary relocation of structures or utilities will be completed by the Contractor or arranged by him with the Utility at the contractors expense.

Provide temporary support for utilities crossing the excavation. Construct supports as detailed on the Drawings.

14.0 EXISTING DRAINAGE

Maintain the flow in existing pipes, conduits, ditches and watercourses. Where this is not feasible, alternative arrangements must be approved by the Consultant.

15.0 MUNICIPAL REQUIREMENTS

Without altering the intent of the Contract Documents all work is to be done to the satisfaction of the Local Authorities for the Municipality where the Work is performed. Acceptance of the Work will be subject to receipt of approval by the aforementioned Municipal Authorities.

16.0 ONTARIO MINISTRY OF TRANSPORTATION (M.T.O.) STANDARDS

When specified that work shall be completed in accordance with M.T.O. standards, the words "the Consultant" shall be substituted for "the Ministry". Payment information in M.T.O. forms shall not apply to this Contract.

17.0 SURVEY MONUMENTS

The Contractor shall protect and maintain all monuments, bars, pins, stakes, markers and such survey points as may be placed by the Consultant or Land Surveyors and they shall be at all times made accessible to the Consultant. The Company shall have the right to charge the Contractor for the reinstatement of any such survey points if they have been removed, damaged, buried or otherwise rendered unusable by the Contractor or his agents. No charge shall be made for any survey points which, in the opinion of the Consultant, have to be moved or reinstated in order to construct the works.

Prior to commencing work, the Contractor shall mark all survey bars identified by the Consultant with a minimum of two 50 mm x 50mm x 1200 mm brightly, painted wooden stakes.

18.0 TEMPORARY FACILITIES

The Contractor shall provide, at his own expense, such temporary facilities as outlined and specified in the Special Conditions of the Contract.

19.0 FINAL MEASUREMENTS AND ADJUSTMENTS

19.1 Unit Price Items

When a unit price is submitted, the Contract quantity will be adjusted in accordance with the final measurements, unless otherwise specified. Final prices will not be adjusted for measurements under 1.0 m. Supplier's weigh tickets shall be provided when requested by the Consultant.

19.2 Lump Sum Price

When a lump sum price is submitted, it shall be payment in full for the items as detailed. Additions, deletions and design changes will be negotiated at the time of installation.

19.3 Claims for Anticipated Profit

As per previously mentioned terms of this agreement.

19.4 Claims for Interest

The Contractor shall not be entitled to claim, demand or receive any interest upon any invoice for work done on account of delay in the approval of the Work by the Consultant.

20.0 PAYMENT

Except where specifically noted, payment for work under this section shall be included in the Contract Price and no extra compensation will be made for any labour, materials, consumables or equipment necessary to fulfill the requirements of this specification in completing the Work of the Contract.

21.0 EQUIPMENT RENTAL

If the Consultant directs or otherwise authorizes the Contractor in writing to undertake additional work consisting of rental of equipment at the rates set out in the Schedule of Additional Unit Prices and if "standby time" is authorized by the Consultant the following shall apply:

- a) "Standby Time" means any period of time which is not considered working time and which together with the working time does not exceed 10 hours in any one working day and during which time a unit of equipment cannot practically be used on other work but must remain on the site in order to continue with its assigned task and during which time the unit is in fully operable condition.
- b) The contractor shall be reimbursed for the standby time of owned and rented equipment at one-third the O.P.S.S. 127 rate, less any discount rate agreed upon in the contract.
- c) In addition, the cost of labour, the wages, salary and payroll burden of the operator or operating crew who cannot be otherwise employed during the standby period, will be paid.
- d) "The 127 Rate" means the rate for a unit of equipment as listed in O.P.S.S. 127 (Schedule of Rental Rates for Construction Equipment) which is current at the time the extra work is carried out or for equipment which is not so listed, the rate which has been calculated by the Consultant, using the same principles as used in determining the O.P.S.S. 127 rates.

22.0 WORK SCHEDULE

The Contractor shall:

- a) Prepare and submit to the Company and the Consultant prior to the first application for payment, a construction schedule that indicates the timing of the major activities of the Work and provides sufficient detail of the critical events and their inter-relationship to demonstrate the Work will be performed in conformity with the Contract Time;

- b) Monitor the progress of the Work relative to the construction schedule and update the schedule on a monthly basis or as stipulated by the Contract Documents; and
- c) Advise the Consultant of any revisions required to the schedule as the result of extensions of the Contract Time as provided in Part 6 of the General Conditions - Changes in the Work.

SPECIFICATION NO. 2 SITE PREPARATION

1.0 DESCRIPTION

The work covered by this specification shall include the supply of all labour, materials, consumables and equipment, excavation, control of ground and surface water, backfill and compaction to complete the clearing of vegetation, grubbing, stripping of topsoil and the removal of existing structures as specified.

The Contractor shall include everything required and necessary to complete the work notwithstanding that every item may not be specifically mentioned.

1.1 Clearing

Clearing shall consist of cutting off at the specified height all saplings, trees, brush and other vegetation within the designated area and the disposal of timber, brush, windfalls and other surface litter.

1.2 Grubbing

Grubbing shall consist of the removal and disposal of all stumps, roots, embedded logs, wood chips, surface boulders and all debris from the designated areas.

A surface boulder is defined as a boulder, rock fragment or rubble less than 1 m³ in volume which can be removed without requiring excavation to facilitate such removal.

Surface boulders, boulders in piles and stone fence rows shall be considered as debris and grubbing shall include their removal and disposal.

1.3 Stripping

Stripping shall consist of the removal of existing surface topsoil from the designated areas. Topsoil is that soil which in the opinion of the Consultant is suitable for the growth of future vegetation.

1.4 Structures

Removal of existing structures shall consist of items such as pavement, curbs, sidewalks, buildings, concrete structures, masonry walls, tanks, pipes, etc., which are designated to be removed or partially removed.

2.0 CONSTRUCTION

2.1 Clearing

Remove trees, shrubs and vegetation as specified on the Drawings. Protect from injury all trees, shrubs and vegetation designated to be preserved during construction operations in the manner specified.

Cut trees to a height of 0.5 metres above the surrounding ground and fell toward the centre of the area to be cleared. Where trees cannot be felled without danger to traffic or injury to other trees, structures, or property, they shall be cut in sections from the top down.

Disposal of tree products shall be the responsibility of the Contractor unless otherwise specified.

2.2 Grubbing

Disposal offsite, of grubbed material shall be the responsibility of the Contractor, unless otherwise specified.

Obtain permits and satisfy all requirements of the authorities having jurisdiction prior to any burning operations.

Level all areas where clearing and grubbing has been completed. Topsoil or seeding will not be required unless otherwise specified.

2.3 Stripping

Remove topsoil from the designated area. When constructing roads remove topsoil for the full width of the road allowance less 600 mm.

Remove topsoil and all organic material for its full depth and retain in designated stockpile areas after clearing and grubbing and before any other construction activity to prevent contamination with subsoil.

Locate and construct stockpiles to prevent ponding of water.

2.4 Removal and Disposal of Existing Structures

Carry out demolition in such a manner so as not to disturb adjacent pavement, utilities or other works to be left in place and to protect materials designated to be salvaged.

Material other than salvage shall become the property of the Contractor and shall be removed from the site unless otherwise specified.

Deliver salvage material, and stockpile without undue damage in the location designated by the Consultant.

Backfill excavations with native material and compact to a minimum density of 95% Standard Proctor density.

Square off broken edges of pavements sidewalks, curbs, etc. in a manner satisfactory to the Consultant.

2.5 Approval

Contractor shall provide the Consultant with a letter from the Owner of the property upon which the excavated material shall be disposed giving written permission for the disposal of the noted material.

3.0 MEASUREMENT

Area measurements will be made in horizontal planes.

3.1 Clearing

Unless otherwise specified, measurement will be by general area.

3.2 Grubbing

Unless otherwise specified measurement will be by general area. Depth of material to be removed by grubbing operation will be as specified and will not be measured.

3.3 Topsoil Stripping

Unless otherwise specified topsoil stripping will not be measured but will be based on a volume calculated by area times average topsoil thickness to be agreed by the Contractor after reviewing soils data.

3.4 Existing Structures and Utilities

Measurement as specified in the Schedule of Contract Unit Prices.

4.0 PAYMENT

Payment at the contract price(s) for clearing, grubbing, stripping topsoil and the removal of existing structures shall be compensation in full for supplying all labour, equipment, excavation, backfill, materials and everything necessary to complete the works as specified.

4.1 Clearing and Grubbing

Clearing and grubbing may be issued for pricing as separate items or may be combined into a single item including both operations as specified in the Schedule of Contract Unit Prices.

The prices provided shall include:

- (a) disposal off the project site of all timber, brush, stumps, logs, surface boulders and debris.
- (b) backfill and grading as specified.

4.2 Topsoil Stripping

The price provided shall be compensation in full for stripping and stockpiling topsoil in the designated areas.

4.3 Existing Structures and Utilities

Payment at the specified price as listed in the pricing schedule for removal of existing structures and utilities shall include delivery of the salvage to the specified location, disposal off the contract site of all other material, backfilling and grading as specified.

Payment will be made only for those existing structures and utilities itemized in the Schedule of Contract Unit Prices. All other existing structures and utilities shall be considered debris and removed and disposed of as part of the grubbing operation and no separate payment allowed.

SPECIFICATION NO. 3 GENERAL GRADING AND EARTHWORK

1.0 DESCRIPTION

The work covered by this specification shall include the supply of all labour, material, consumables and equipment to do all the excavation, grading and filling with earth required for the execution of specified grading and earthworks. This specification does not cover rock fills. "Rock Excavation" as defined in Specification No. 1, General Requirements, is not considered part of this Specification and is covered in Specification No. 4, Excavation and Backfill.

Unless otherwise specified, prior to commencing work the Contractor shall verify the rough grading earthwork quantities either by taking their own cross-sections or by reviewing the Consultants cross-sections. Claims for discrepancies in earthwork quantities will not be considered.

All cutting and filling shall be performed in such a manner to avoid flooding or ponding of water on the site or any adjacent properties. Surface drainage shall be provided during all stages of the work and fill materials placed as soon as possible to prevent ponding in sub-excavated areas.

Provide temporary support for any existing structures and utilities affected by the work as specified in Specification No. 1 - General Requirements.

2.0 CONSTRUCTION

2.1 Rough Grading

Excavate, fill and compact to the specified subgrade elevations and cross-sections over all road allowances and areas designated for area grading. Fill material shall be approved by the Consultant and contain no frozen lumps, topsoil, organic materials or other objectionable matter.

Fill material on lots designated for area grading will not require compaction other than that resulting from normal filling, spreading and earthwork operations. Compact all other areas designated to 95% Standard Proctor Density, unless otherwise specified.

If the subgrade soil conditions are unsuitable, additional excavation may be required. Any excavated material not suitable, or not required for the purpose of filling or grading shall be spread or stockpiled in designated areas within the site or hauled away from the site as directed by the Consultant.

Place and compact material obtained from areas to be excavated or imported material in low areas and fill to required subgrade elevations. Transport material from the specified borrow area when insufficient cut material is available.

Should the Contractor erroneously excavate below the subgrade elevations he shall backfill such excavation with approved material and compact to 95% Standard Proctor Density at no cost to the Company.

Where specified, cut roadside and other drainage ditches including culverts during rough grading operations so as to provide satisfactory drainage of the subgrade at all times.

Place culverts of the sizes and gauges shown in the Schedule of Contract Unit Prices where indicated on the Drawings. Unless otherwise specified, culverts shall be carefully bedded on a minimum thickness of 150 mm of well-compacted granular material, and backfilled with well-tamped granular material for a width of 150 mm on each side of the culvert and to a minimum depth of 150 mm above the culvert. Backfill and compact the remainder of the trench with material containing no stones larger than 150 mm in diameter and in layers not exceeding 300 mm in depth.

Rough grading elevations shall be achieved within a tolerance of 50 mm. In addition, deviations from specified grades within the required tolerance shall be random so that no surplus or deficit of material results on any individual lot.

2.2 Fine Grading

Fine grade, shape and compact the rough subgrade to the specified grade and cross-section. Unless otherwise specified, compact to 95% Standard Proctor Density.

Finished surfaces shall not deviate more than 25 mm from the specified grades and cross-sections. The deviation, within the specified tolerance, shall be random.

Maintain the specified grade, cross-sections, tolerances and compacted density until the work is accepted or until the construction of the granular base, when this work is a part of the Contract.

No ruts or depressions shall be allowed to form in the compacted subgrade and all traffic must be kept off the subgrade where possible until the sub-base is applied.

3.0 MEASUREMENT

3.1 Rough Grading

Unless otherwise specified, no measurement of earthworks will be made.

Culverts and drainage ditches, where specified for payment, will be measured on a linear metre basis.

3.2 Fine Grading

No measurement of areas requiring fine grading will be made.

4.0 PAYMENT

4.1 Rough Grading

The stipulated sum provided within the Pricing Schedule for Earthwork and Grading shall be compensation in full for all labour, material, consumables and equipment to do all excavation, transportation, filling and compaction, control of surface and ground water to complete rough grading.

The stipulated sum provided within the Pricing Schedule for Earthwork and Grading shall also be compensation in full for stripping and stockpiling topsoil as outlined in Specification No. 2.

The stipulated sum provided within the Pricing Schedule for Earthwork and Grading shall also include the cost of locating an offsite dump area for excess material and/or locating an offsite borrow area should imported fill be required.

Where specified, payment for drainage ditches and culverts shall be at the price provided within the Pricing Schedule in the Schedule of Contract Unit Prices.

4.2 Fine Grading

The price provided within the Pricing Schedule shall be compensation in full for all labour, material, consumables, and equipment to do all excavation, filling and compaction, control of surface and ground water to complete the fine grading.

SPECIFICATION NO. 4 EXCAVATION AND BACKFILL

1.0 DESCRIPTION

The work covered by this specification includes the supply of all labour, materials, consumables and equipment for excavating and backfilling of trenches for pipes, conduits and appurtenances.

The work includes but is not limited to the following; sheet piling, sheathing, shoring and bracing; installation and operation of all equipment required for dewatering excavations and control of ground and surface water; protection and supporting of existing structures and utilities; removal of all debris and surplus material; compaction of the backfill, rough grading and restoration of surfaces; maintenance of existing travel on streets and roads and access to private and public property and each and everything required to complete the work as specified. Comply with safety requirements of the Federal and Provincial Governments and of the local municipal authority.

2.0 EXCAVATION FOR STRUCTURES

2.1 Depth

The excavation to the bottom of the foundation or the underside of the working mat when a working mat is permitted.

Remove material deemed unsuitable at the bottom of an excavation to a depth determined by the Consultant, and backfill with approved material.

Backfill and compact excessive depth with approved material at no additional cost to the Company unless the removal is authorized by the Consultant.

2.2 Length and Width

Provide sufficient horizontal dimensions to permit adequate space to safely complete the structure, place and remove any formwork required.

3.0 TRENCH EXCAVATIONS

3.1 Alignment and Depth

Excavate trenches to the alignment and depths specified on the contract drawings for the class of pipe bedding specified and only so far in advance of pipe laying as permitted by the Consultant.

Where, in the opinion of the Consultant, the material at the bottom of the trench is unsuitable to receive the pipe bedding, excavate to a depth as deemed necessary by the Consultant and backfill with an approved material.

In the event that the trench is over excavated without the authorization of the Consultant, fill and compact the excavation to the correct grade with an approved material without compensation.

3.2 Trench Width

The trench width shall be measured at a height of 300 mm above the top of the pipe.

For parallel pipe installations the trench width shall be measured in a horizontal plane 300 mm above the top of the higher pipe.

When sheathing is required the trench width shall be the inside face to inside face of the sheathing.

Refer to the Project Specifications or drawings for maximum and minimum trench widths.

Should the Contractor excavate wider than specified, the Consultant may require the use of stronger pipe, a higher class of bedding, or both, supplied and installed without compensation.

4.0 DEWATERING

4.1 Equipment

Supply all necessary equipment required to keep excavations and trenches free from both ground and surface water.

4.2 Disposal

Dispose of water removed from excavations and trenches in such a manner so as to prevent injury to public health, damage to private or public property, or to any work under construction. Obtain all required permits for dewatering.

When deemed necessary by the Consultant, construct sedimentation ponds of sufficient size to remove sand and silts from the water before directing it to adjacent lands or watercourses. Outfall pipes shall be installed in such a manner as to prevent erosion of dykes, stream banks or slopes.

5.0 EXISTING PAVEMENTS

5.1 Size of Excavation

When the excavation is adjacent to existing pavements, structures or utilities employ sheathing and shoring or any other means as deemed necessary by the Consultant to keep the disturbed area to a minimum.

Road crossing shall be by vertical trenching unless permitted otherwise by the Consultant and the Governing road authority.

Employ methods to assure breaking of pavement along straight lines having a vertical face.

6.0 SUPPORTING OF EXCAVATIONS

6.1 Installation

Provide, install and maintain in good condition sheet piling, sheathing, shoring and bracing in accordance with Safety Regulations as may be required, due to ground conditions, limited working areas, adjacent utilities and structures, road crossings, methods of operation or when directed by the Consultant.

Fill and compact voids behind sheathing with an approved granular material or native material when permitted by the Consultant.

6.2 Removal

Construct sheathing and shoring in such a manner as to permit the removal without injury to the work, adjacent structures, utilities or pavements.

Remove sheathing, shoring and bracing as the excavation is backfilled except when the Consultant orders it left in place or when the Contractor requests to leave the same in place and the request is approved by the Consultant.

Remove sheathing and shoring in such a manner as to prevent the "caving in" of the excavation during backfilling operations.

Fill and compact cavities caused when sheathing is removed.

Cut off shoring left in place at least 1 m below the final ground surface unless instructed otherwise by the Consultant.

6.3 Responsibility

The right of the Consultant to order sheet piling, sheeting, shores, bracing, etc., left in place in the Work, or to order the use of same or to order a better quality or larger size of material does not relieve the Contractor of any of their obligations under this Contract, or relieve him of liability for damage to persons or property resulting from their failure to use or to leave in place sufficient sheeting, shoring, etc., to prevent any caving or moving of the ground, or resulting from any other negligence in the carrying out and final completion of the Work.

7.0 EXISTING UTILITIES AND STRUCTURES

Existing utilities and structures which are to remain in place shall be protected, supported or relocated as specified in Specification No. 1 - "General Requirements".

8.0 FROZEN GROUND MATERIAL

The replacement of frozen material with suitable material is the Contractor's responsibility under the Contractor's bid price.

Frozen ground shall not be opened further in advance of construction than one day's underground installation. Wherever possible, frozen excavated materials shall be separated from unfrozen material.

Backfilling shall be carried out using unfrozen material. The frozen material may then be mounded over the trench. Particular care shall be taken to prevent frozen materials from being buried around manholes.

9.0 PIPE BEDDING

9.1 Materials

Pipe bedding shall be supplied as specified on the contract drawings.

Materials used for bedding shall conform to Specification No. 8 - "Concrete" and Specification No. 9 - "Granular Materials".

9.2 Placing

Granular bedding shall be compacted underneath, beside and over the pipe to 98% Optimum Dry Density.

In the event that concrete bedding is specified the Contractor must use solid concrete blocks to support the pipe prior to placing the concrete. The compressive strength of the blocks shall be at least equivalent to that of the concrete bedding. Sufficient blocks shall be supplied and placed in such a manner to prevent movement of the pipe while placing the concrete bedding.

Concrete used for bedding shall be placed in two lifts if necessary. The level of the first lift shall not exceed 80 mm above the bottom of the pipe. The second lift shall be placed immediately after the initial wet of the first lift.

When concrete bedding is specified in rock trenches, separate the concrete from the rock by a compacted cushion of approved granular material, of at least 75 mm thickness, under the concrete bedding as well as both sides. As an alternate, 50 mm of rock deteriorating styrofoam may be placed on the sides.

When concrete bedding is placed against sheathing, a bond breaking material shall be placed between the sheathing and the concrete to permit removal of the sheathing.

10.0 BACKFILLING

10.1 Materials

Native material can be used for backfilling excavations and trenches except when otherwise specified or when the excavated material is deemed unsuitable by the Consultant.

Native material used for backfill shall consist of earth which is free of topsoil, trash, debris, boulders exceeding 300 mm or any other deleterious materials. No boulders exceeding 150 mm shall be placed in the top 300 mm of the backfill.

Stones over 50 mm will not be permitted to be placed within 300 mm of the pipe structure.

When rock is permitted as a backfill material, protect the pipe by a minimum of 450 mm of compacted material above the top of the pipe. This material shall be native material or granular as specified and free from stones exceeding 50 mm in diameter.

When granular material is specified as backfill or when ordered by the Consultant, it shall conform to the requirements of Specification No. 9 - "Granular Materials".

Do not backfill with frozen material without permission from the Consultant.

10.2 Placing

Place backfill against the pipe in such a manner so as to prevent any damage or movement.

Place backfill in uniform layers not exceeding 300 mm in thickness loose measurement. Compact each layer to 95% standard proctor maximum dry density.

Maintain backfill at uniform layers on each side of pipes and around structures.

Surplus excavated material may be disposed of in fill areas within the contract limits as directed by the Consultant and subject to the requirements of Specification No. 3 - "General Grading and Earthwork".

Any deficiency of backfill material shall be supplied by the Contractor and must meet the approval of the Consultant.

Correct any settlement occurring after backfilling without compensation.

No stub connections shall be backfilled until the Consultant has verified the locations and elevations at both ends and has given their written authorization to backfill.

10.3 Restoration of Surfaces

Surface areas disturbed during the construction operations are to be restored as specified.

11.0 PAYMENT

11.1 General

Unless otherwise specified, with the exception of rock, the payment for excavation of all materials encountered, dewatering, sheathing and shoring, for supplying, placing and compacting bedding and backfill, for supporting existing structures and utilities, maintaining traffic and access during construction, removing excess excavated material, restoring surfaces, shall be included in the price provided within the Pricing Schedule for supply and installation of pipes and structures.

11.2 Rock Excavation

Additional payment will be made for "Rock Excavation" as defined in Specification No. 1 - "General Requirements". The price provided within the Pricing Schedule shall include disposal outside the contract limits. Measurement will be made as follows:

- a) Maximum trench width or actual width of trench whichever is the smaller.
- b) Outside dimensions of structures plus a 300 mm envelope around the structure.
- c) Actual volume of boulders as determined by the product of the three maximum dimensions.
- d) No payment will be made for rock removed outside of the specified limits. No duplicate payments will be made for rock excavation.
- e) If blasting precedes the stripping of overburden, the Contractor shall accept the Consultant's estimate as to the elevation of top of rock.

11.3 Excess Excavation

When the Consultant instructs the Contractor to carry excavations below the specified depth to obtain a satisfactory foundation the volume of material excavated will be determined by the Consultant and payment made according to the Schedule of Contract Unit Prices.

The Price for excavation shall include the disposal of the material.

The Contractor shall provide material as specified by the Consultant to backfill the sub-excavation. Price provided within the Pricing Schedule will be full compensation for supplying, placing and compacting the material.

11.4 Sheathing and Shoring

Sheathing and shoring which is left in place on the instructions of the Consultant will be paid for at the provided within the Pricing Schedule price.

Payment will be made only for the actual length left in the ground, except where the cut-off is less than 1.3 metres when this length will be included for payment.

11.5 Backfilling

When granular material is specified for backfill, the supply, placing, compacting and removal of native material shall be included in the price provided within the Pricing Schedule for the installation of pipes and structures.

When the Consultant deems the native material unsuitable for backfill the Contractor shall supply, place and compact imported material at the price provided within the Pricing Schedule. The price provided within the Pricing Schedule shall include disposal of the unsuitable material outside the Contract limits.

Any shortage of backfill material due to the Contractor's method of operation shall be supplied and placed by the Contractor at no additional cost to the Company.

11.6 Frozen Ground Conditions

No extra payment shall be made to the Contractor should he encounter frost difficulties. The cost of such work shall be included in the Contractor's bid price for underground construction.

SPECIFICATIONS NO. 5 WATER DISTRIBUTION SYSTEM

1.0 DESCRIPTION

The work consists of the supply of all labour, materials, consumables, and equipment for the installation of watermains, fittings, valves, valve boxes, valve chambers, service connections, blowoffs, hydrants and appurtenances necessary for the complete construction, flushing and testing of the water distribution system as detailed on the Contract Drawings and as specified. Include everything requisite and necessary to properly complete the entire system, notwithstanding that every item may not be specifically mentioned.

When required in the Project Specifications disinfect the system as specified.

2.0 MATERIALS

Materials shall meet the requirements as specified herein.

Materials shall be of the kind, type, size and class as specified on the engineering drawings.

All fittings such as tees and elbows to be supplied in classes compatible with the pipe.

2.1 Ductile Iron Pipe

Ductile Iron Pipe to conform to AWWA C151 (ANSI A21.51) (CSA B131.13) standard lengths.

Push-on or mechanical joints to conform to AWWA C111 (ANSI A21.11) (CSA B31.10).

Cement Mortar lining to be standard thickness in accordance with AWWA C-104 (ANSI A21.4).

Electrical conductivity □ a low resistance electrical connection to be provided at each joint.

2.2 Concrete Pressure Pipe

Pipe and joints for prestressed concrete, steel cylinder type pipe to conform to AWWA C301.

Pipe and joints for non-cylindrical reinforced concrete pressure pipe to be in accordance with AWWA C302.

Pipe and joints for reinforced concrete pressure pipe, steel cylinder type, pretensioned to meet the AWWA C303 requirements.

Suitable flanged or threaded connections for mounting of valves or for branch lines to be as specified.

Welding/grouting sequence for welded joints to be submitted to the Consultant for review.

2.3 Polyethylene (P.E.) Pipe

Polyethylene pipe material to be in accordance with ASTM D1248.

Polyethylene pipe to be manufactured in accordance with CSA B137.

Joining of pipe to be accomplished by the butt fusion method.

Where required, flanged connection will be as specified.

2.4 Polyvinyl Chloride (PVC) Pipe

P.V.C. pipe in sizes 100 mm through 300 mm to conform to AWWA C900.

Unless specified otherwise, PVC 1120 pipe with a DR=18, pressure class of 1035 kPa at 23°C to be used. Wall thickness to conform to cast iron (CI) outside diameter (OD).

Pipes to have integral wall-thickened bell ends. Joining to be accomplished by using rubber rings conforming to ASTM D3139.

2.5 Fittings

Ductile iron fittings to conform to AWWA C110 (ANSI A21.10) with 1724 kPa pressure rating.

Joints to conform to AWWA C111 (ANSI A21.11) - push on or mechanical joint.

Where fittings are used with ductile iron pipe electrical conductivity must be provided.

2.6 Gate Valves

Gate valves to be iron body, bronze mounted, double-disc type, double faced and sealed, non-rising stem, conforming to AWWA C500.

Valve ends to be mechanical joint □ AWWA C111 (ANSI A21.11).

Minimum safe working pressure 1035 kPa.

Direction of opening - as specified in Project Specifications.

Operating nut - as specified in Project Specifications.

2.7 Butterfly Valves

Butterfly valves - as specified in Project Specifications.

2.8 Valve Boxes

Round, cast iron, 2 piece adjustable slide or auger type with lift out cover.

Upper section - minimum diameter 110 mm.

Adjustment - minimum ± 150 mm - overlap at full extensions shall be at least 150 mm.

Lower section - completely enclose bonnet of valve with guide plate attached to valve.

Markings - as specified.

2.9 Valve Chambers

Covers - grey cast iron - ASTM A48 (Class 30)

- machined bearing surfaces
- centre lift-out plug, minimum dia. 110 mm.
- pattern as specified.

Ladder rungs, aluminum type 6061 T4 alloy - CSA HA.5

Valve Chamber adjuster rings (Moduloc) ASTM C478.

Mortar as per Specification No. 8 - Concrete.

Precast Sections - ASTM C478

Gaskets - ASTM C443

2.10 Hydrants

- Hydrants
- AWWA C502
two piece barrel
 - compression type valve
 - break away flange placed 50 mm above finished grade.
 - mechanical joint inlet connection
 - self draining barrels.

Valves -as specified in Section 2.7

Valve box - as specified in Section 2.9

Nozzles and Threads - as specified.

Colour - as specified.

2.11 Service Connections

This specification applies to services 19 mm to 51 mm in diameter.

Diameter - as shown on drawings.

Pipe - seamless copper tubing ASTM B360, Type "K"

Main stops - AWWA C800 - copper flange outlet

Curb stops and fittings - AWWA C800 copper flange joints

- Curb boxes
- curb box extension limits as specified
 - threaded cover, bronze centre plug
 - "water" cast into top of cover
 - curb boxes in sidewalks shall be supplied with frost rings.

- Extension rods
- fasten to top of curb stop with corrosion resistant pin
 - top of rod - 150 mm to 450 mm below grade.

2.12 Pipe Bedding

Pipe bedding shall be as specified.

3.0 CONSTRUCTION

3.1 General

Excavation and backfill shall be in accordance with Specification No. 4 - Excavation and Backfill.

Place watermains and service connections at elevations which will ensure depth of cover specified.

The depth of cover is defined as the height from the top of the watermain to the finished grade shown on the drawings.

3.2 Pipe Laying

Lay pipes with bell ends facing in the direction of laying.

Lay and join pipes and fittings in accordance with manufacturer's instructions and as specified herein.

Lower material into the trench so that the material, protective coatings and linings are not damaged. Pipes and fittings shall not be dropped or dumped into the trench.

Watermains shall be laid true to line and grade within the following tolerances:

Plan dimensions	-	± 150 mm
Elevations	-	± 80 mm

When pipe laying is not in progress the open ends of pipes shall be protected to prevent foreign material and water from entering pipe.

3.3 Pipe Deflection

Pipes may be deflected from a straight line to form a smooth, long radius curve when permitted by the Consultant.

Lay and join pipes and fittings in accordance with manufacturer's instructions and as specified herein.

**MAXIMUM PERMISSIBLE APPROX. RADIUS OF CURVE PRODUCED
DEFLECTION PER LENGTH BY SUCCESSION OF JOINTS**

Size of Pipe	Mechanical Joint	Push-On Joint	Mechanical Joint	Push-On Joint
mm	mm	mm	m	m
75	787	457	38	62
100	787	457	38	62
150	686	457	44	62
200	508	457	54	62
250	508	457	59	62
300	508	457	59	62
350	343	457	87	79
400	343	381	87	79

For larger sizes of pipe the deflections shall not exceed the manufacturer's recommendations.

Provide bends to ensure that maximum deflections are not exceeded.

3.4 Cutting Pipe

Cut pipes without damaging the pipe, coating or cement lining and provide a smooth end at right angles to the axis of the pipe.

3.5 Connections to Existing Watermains

Obtain permission from the operating authority before making any connections to an existing water main.

Valves on existing water mains shall not be operated by the Contractor unless approved by the Consultant and the operating authority.

All affected water users shall be notified at least 24 hours in advance of any planned interruption of service.

Swab fittings and pipes placed into the existing line with a solution of chlorine having a minimum strength of 50 ppm.

Take precautions to prevent contamination of the existing system and follow all instructions of the operating authority.

3.6 Assembly of Mechanical Joints

Seat spigot of the pipe in the bell before pressing the gasket into place.

Tighten nuts spaced 180 degrees apart alternately in order to provide equal pressure on all parts of the gland.

Tighten nuts with a "torque-limiting" wrench to the following range:

Size	Torque Range
mm	N.m.
15	54 - 81
20	81 - 122
25	95 - 136
30	122 - 163

3.7 Anchorage of Pipes, Fittings and Hydrants

Anchor pipes, fittings and hydrants to prevent movement.

Place concrete reaction backing or "thrust blocks" between the fitting and undisturbed soil.

Thrust blocks shall transfer the full thrust at test pressure without exceeding the bearing capacity of the soil.

Supply and place concrete in accordance with Specification No. 8 - Concrete. Unless otherwise specified concrete shall be Class "C".

Joints shall be accessible for repair.

Straps, rods or clamps shall be used for bends in the vertical plane and when the soil conditions do not provide adequate bearing.

3.8 Valves

Install valves with the stem vertical at the locations shown on the drawings.

3.9 Valve Boxes

Install valve boxes on all valves where valve chambers are not required.

Centre the valve box over the operating nut with the top at finished grade and the shaft placed vertical.

3.10 Valve Chambers

Construct valve chambers as detailed on the drawings at the locations shown.

Place covers flush with the finished grade so that the centre lift-out plug is plumb over the operating nut.

Construct chambers so that no loads from the structure are transferred to the pipes passing through the walls.

When detailed on the drawings install a drain.

3.11 Hydrants

Install hydrants as detailed on the drawings with the barrel vertical, hose connections parallel with the curb, pumper nozzle, (if specified) facing the curb, and bottom of flange 50 mm above the finished grade.

Connect hydrant to the main by means of a mechanical or push-on joint tee and ductile-iron pipe lead with a valve located as shown on the drawing.

Place clear limestone around the barrel and cover with 6 mil polyethylene to minimize contamination when backfilling.

Limestone - as per Specification No. 9 - "Granular Materials".

3.12 Service Connections

Install service connections as detailed.

Thread main stops 19 mm and 25 mm diameter directly into ductile iron pipe.

Install main stops with the water main under pressure using cutting and tapping equipment recommended by the manufacturer.

Leave main stops in the full open position before backfilling.

Install curb stops at the location specified, being placed vertical with the base resting on a wood block. Leave curb stop in the "off" position.

Place wood marker 5 cm - 10 cm, 1.5 m long at the end of each connection extending to a height of 600 mm above ground. Paint the top 300 mm blue.

3.13 Air Blow-Offs

Install blow-offs at the locations shown on the drawings.

Install fittings, meeting the requirements for service connections as shown on the drawings.

4.0 HYDROSTATIC TESTS AND FLUSHING

4.1 General

Perform tests only in the presence of the Consultant.

Notify the Consultant 48 hours in advance of performing any tests.

Install and backfill service connections, hydrants, thrust blocks, and appurtenances before testing.

Provide all apparatus, material and labour necessary to conduct the tests.

Use only potable water for testing and flushing. Provide potable water if not available from an existing municipal source.

When water is provided by the Contractor it shall be tested by the Consultant and shall not be introduced into the system until chlorine and bacteriological tests are satisfactory.

4.2 Procedure

Slowly fill each section of pipe to be tested with water to the specified test pressure by means of pumping, based on the elevation of the lowest point of the section under test and corrected to the elevation of the test gauge. Monitor, in a manner acceptable to the Consultant, the pressure for the duration of the test and measure the leakage as defined in Section 4.3.

Expell all air from the system before the test pressure is applied.

If hydrants, service connections or blow-offs are not available at high points for the release of air, provide main stops and insert brass plugs after testing has been completed.

Unless otherwise specified, the duration of each test shall be at least 2 hours and the initial hydrostatic test pressure 1035 kPa or one and one-half (1-1/2) the operating pressure for the district, whichever is greater. (1 metre head = 9.81 kPa).

4.3 Allowable Leakage

Leakage is defined as the quantity of water that must be introduced into a section of pipe to maintain the specified test pressure for the duration of the test.

The maximum leakage shall be determined by the formula:

$$L = \frac{ND(P^2)}{64,670}$$

Where N = number of joints
D = nominal diameter (mm)
P = test pressure kPa
L = allowable leakage (P/hr)

Allowable leakage for service connections 19 mm to 51 mm shall be 8.2 litres per 100 services per 2 hour test.

4.4 Flushing

Flush the system after a successful pressure/leakage test has been performed.

Provide means to discharge the water into storm or sanitary sewers, ditches or water courses without causing erosion, deposition of silt, ponding of water or damage to the environment.

5.0 CHLORINATION

5.1 General

Supply all material, labour and equipment necessary to perform the work to obtain the required standards for Chlorine Residual and Bacteriological Tests.

Disinfect the system after flushing by introducing a solution of chlorine (minimum strength 55 ppm) and ensuring that it is evenly distributed throughout the system.

A residual of chlorine of not less than 10 ppm will be required in the water after 24 hours.

The Consultant will test the initial and residual chlorine concentrations. The Contractor will provide all assistance required to obtain samples at the hydrants selected by the Consultant. All test equipment shall be supplied by the Contractor.

5.2 Flushing After Chlorination

When the required chlorine residual is obtained, flush the system as in Section 4.4 until all excess chlorine is removed. Chlorinated water to be neutralized before flushing.

Continue flushing until the chlorine content is equal to that of the water being used for flushing.

Discharge water containing high concentrations of chlorine to the sanitary sewers when possible.

5.3 Bacteriological Tests

Before the main is put into service, assist the Consultant to obtain water samples for bacteriological testing.

The Consultant will submit these samples to a recognized laboratory for testing.

The main shall not be put into service until the results are acceptable to the public health authority having jurisdiction.

6.0 MEASUREMENT

All linear measurements are made in the horizontal plane and are plan quantities. Field measurements will not be made unless drawings are revised.

6.1 Watermains

Length of watermains shall be as scaled from the Engineering drawings.

6.2 Appurtenances

Unless otherwise specified, no separate measurement will be made for valves and boxes, valves and chambers, hydrants, service connections and blow-offs.

Hydrant extensions will be measured in the vertical plane.

7.0 PAYMENT

7.1 Watermains

The price for watermain shall be considered full compensation for all pipe, fittings, thrust blocks and appurtenances, trench excavation, the control of ground and surface water; the preparation of subgrade; pipe bedding as specified; placing and joining the pipe, backfilling and compacting the trench; testing and flushing, reinstatement of surfaces and clean-up; and all the work necessary to install the main complete in place.

7.2 Valve and Valve Box

The lump sum price shall include supply of the valve and valve box and the complete installation, including adjusting to finished grade.

7.3 Valve and Valve Chamber

The lump sum price shall include the supply of the valve and all materials and the complete installation as detailed including adjusting the cover to final grade.

7.4 Hydrants

The price provided within the Pricing Schedule for hydrants shall include the supply of all materials and the complete installation of the hydrant, gate valve and valve box (if required), tee on main, lead, stone fill and blocking, tie rods, and setting to final grade.

7.5 Service Connections

The price provided within the Pricing Schedule shall include the supply and installation of the pipe, the main stop, curb stop, curb box, wood marker, saddle and all other materials required.

7.6 Blow-Offs

The lump sum price shall include the complete supply and installation of blow-offs at the locations shown on the drawings including adjusting to final grade.

7.7 Connection to Existing Mains

The lump sum price provided within the Pricing Schedule shall include the locating of existing mains and the complete supply and installation of all materials required to complete the connection.

7.8 Chlorination and Flushing After Chlorination

The price provided within the Pricing Schedule shall be compensation in full for the supply of all equipment, labour and materials to chlorinate and flush the main as specified.

The price shall include additional chlorination and flushing when:

- a) chlorine residual is less than specified,
- b) bacteriological tests are not acceptable to the public health authority having jurisdiction.

SPECIFICATION NO. 6 SEWERS AND APPURTENANCES

1.0 DESCRIPTION

The work shall include the supply of all labour, materials, consumables and equipment necessary for the installation of sewers, fittings, drain connections, manholes, frame and covers, safety grates, catchbasins and appurtenances required for the complete construction, flushing as directed by the Consultant of the sewage system(s). The Contractor shall include everything requisite and necessary to properly complete the entire system(s) notwithstanding that every item may not be specifically mentioned.

2.0 MATERIALS

Diameter, length, class and type of pipe is, as specified, on the engineering drawings and shall meet the following requirements. In all cases, the most current specification in effect shall govern.

2.1 Sewer Pipe

A. Concrete Pipe

- (i) Non-reinforced pipe and fittings - CSA A257.1
- (ii) Reinforced pipe and fittings - CSA A257.2
- (iii) Rubber gasket joints - CSA A257.3

B. Vitrified Clay (VC) Pipe

- (i) Pipe and fittings - CSA A60.1M
- (ii) Joint - Flex-lox - CSA A60.3M

C. Polyvinylchloride (PVC) Pipe (Non Pressure)

- (i) Pipe and fittings - ASTM D3034
- (ii) Joints - rubber Ring Bell Joint - rubber ring - ASTM D-1869

D. Polyethylene (PE) Pipe

- (i) Pipe and fittings - ASTM D1248
- (ii) Joints - Butt fusion - CGSB Std. No. 41-GP-25

E. Corrugated Steel Pipe

- (i) Corrugated steel pipe and pipe arches shall be as specified.
- (ii) Corrugated steel pipe shall meet the requirements of "Specification for Corrugated Steel Pipe Products - Number 501" issued by the Corrugated Steel Pipe Institute.

2.2 Sewer Laterals

A. Concrete Pipe

- (i) Pipe and fittings - CSA A257.1 or A257.2
- (ii) Rubber gasket joints - CSA A257.3

B. Vitrified Clay Pipe

- (i) Pipe - Plain End - CSA A60.1M
Joints - Flexible External Sleeves, CSA A60.3M

C. Polyvinylchloride Pipe

- (i) Pipe and fittings - CSA B182.1
- (ii) Joints - rubber ring bell Joint, rubber ring ASTM D3212

D. Polyethylene Pipe

- (i) Pipe and fittings - ASTM D1248
- (ii) Joints - butt fusion - CGSB Std. No. 41-GP 25.

E. Service Saddles

Not to be used on sewers smaller than 500 mm.

- (i) cast iron with flange curbed to fit the sewer pipe with rubber gasket to ensure a positive leak-free seal.
- (ii) Strap-on saddles, steel band with steel spade bolts, nuts and washers.
- (iii) Mortar-on-saddles, slots provided around flange to provide a Key for the cement mortar.

2.3 Manholes - (Precast or Cast-in-place as specified)

A. Precast Sections - ASTM C478

Gaskets - ASTM C443

B. Covers, grey cast iron, ASTM A48 (Class 30), pattern as specified.

C. Ladder Rungs, aluminum type 6061 T4 alloy CSA HA.5 - width 400 mm.

D. Safety Gratings - aluminum type 6061 T4 alloy CSA HA.5

E. Manhole Adjuster Rings (Moduloc) - ASTM C478.

2.4 Catchbasins - (Precast or Cast-in-place as specified)

A. Frame and grate, gray cast iron - ASTM A48 (Class 30) pattern as specified.

B. Catchbasin Adjuster Rings (Moduloc) - ASTM C478.

2.5 Pipe Bedding

Pipe bedding materials shall be concrete, granular material or crushed limestone, as required, and in accordance with Specification No. 8 - Concrete or No. 9 -Granular Materials.

3.0 CONSTRUCTION

3.1 General

Excavation and backfill in accordance with Specification No. 4, Excavation and Backfill.

Sewer and catchbasin leads shall be installed to the line and grade specified on the drawings.

Drain connections shall be placed at elevations as specified.

Clean by flushing sewer lines, manholes, catchbasins and leads prior to inspection by the Consultant.

3.2 Pipe Laying

Lay pipes with bell ends facing upstream with respect to the direction of flow in the pipe.

Lay and join pipes and fittings in accordance with manufacturer's instructions and as specified herein.

Lower material into the trench so that the material is not damaged. Pipes and fittings shall not be dropped or dumped into the trench.

Sewers shall be laid true to line and grade within the following tolerances unless otherwise noted on the drawings:

$$\text{Plan Dimensions -} \quad \text{Diameter (mm)} \times \frac{\% \text{ Slope}}{100} \times 10 =$$

$$\text{Elevations -} \quad \text{Diameter (mm)} \times \frac{\% \text{ Slope}}{100} \times 5 =$$

When pipe laying is not in progress the open ends of pipes shall be protected to prevent foreign material and water from entering the pipe

On sewers 500 mm diameter and less, provide a prefabricated tee or "Y" branch for each private drain connection.

Pipes are to be supported by compacted bedding which has filled all voids to the original ground unless otherwise specified.

3.3 Radius Pipe

Where radius pipe is specified, prepare and submit to the Consultant an appropriate detail drawing indicating sections of pipe and configuration of installation.

3.4 Cutting Pipe

Pipes shall be cut in accordance with the manufacturer's recommendations, without damaging the pipe and provide a smooth end at the required angle to the axis of the pipe.

Asbestos cement pipe shall be supplied in standard lengths with short lengths to install fittings in specified locations. Both ends of all pieces shall be machined.

3.5 Connections To Existing Sewers

Obtain permission from the operating authority before making any connections to an existing sewer.

Prevent foreign material from entering the existing system and follow instructions of the operating authority.

Provide approved adaptors and make connections to existing sewers in an approved manner including benching.

3.6 Sewer Laterals

Provide connections at the locations shown on the drawings.

Strap-on-saddles may be used only when the main sewer line is greater than 500 mm in diameter or when connecting to an existing sewer of diameter greater than 500 mm and approved by the operating authority.

Proper tools must be used to cut the pipe - breaking the main with hammer, chisel etc. will not be permitted.

Lay connections at right angles to the main in a straight line with a grade of not less than two percent unless otherwise specified.

Terminate connections complete with fittings as specified. Supply cover plates stamped with the word "Storm" or "Sanitary". Paint cover plates for sanitary cleanouts red.

Block plugs to undisturbed soil to prevent movement during testing.

Place wood markers 5 cm × 20 cm, 1.5 m long at the end of each connection and extended to a height of 600 mm above ground. Paint the top 300 mm green for storm connections and red for sanitary connections.

3.7 Manholes

Construct manholes as detailed on the drawings and provide drop connections where indicated.

Grout pipes into the walls and cut flush with the inside face of the wall.

Provide a joint on each sewer line and service connection within one metre of the outside wall of the manhole. The pipe must be supported by specified bedding to undisturbed ground.

Bench manholes with concrete as specified to provide an invert conforming to the sewer.

Unless otherwise specified, grout-in-place manhole covers flush with final grades except for manholes located in pavement where road construction follows the installation of undergrounds. In such cases finish top of concrete flush with road subgrade.

Unless otherwise specified, and where approved by the operating authority, adjust manhole covers using steel "lift rings" and using "manhole adjuster rings" (moduloc).

Install safety gratings as detailed on the drawings.

3.8 Catchbasins and Catchbasin Leads

Cut off pipes flush with the inside face of the catchbasin and grout into place.

Connect catchbasin leads to the main storm sewer by means of a prefabricated tee or 'Y' fitting installed at the time of laying the main sewer for pipes 500 mm diameter and less, unless otherwise specified.

Support catchbasin leads on specified bedding to original ground. Unless otherwise specified, in disturbed ground, bed catchbasin leads on concrete to undisturbed ground.

Place grates so that no ponding will occur in the area drained by the catchbasin. Unless otherwise specified, grout-in-place catchbasin frames so that grates are flush with final grades except for catchbasins located in pavement where road construction follows the installation of undergrounds. In such cases finish top of concrete flush with road subgrade.

Unless otherwise specified, and where approved by the operating authority, adjust catchbasin frames and gratings using Catchbasin Adjuster Rings (Moduloc).

3.9 Concrete Headwalls

Concrete headwalls shall be constructed as specified. The structure shall be founded on undisturbed soil.

3.10 Corrugated Steel Pipe

Lay corrugated steel pipe on specified bedding. Join pipes with approved couplers conforming to the gauge and diameter of the pipe.

4.0 TESTING

4.1 General

Check the alignment of sewers between manholes as each section is laid.

Provide a strong light to be shone through the pipe from manhole to manhole. If the required tolerances are exceeded, realign the pipe until the tolerances are met.

Perform tests in the presence of the Consultant.

Notify the Consultant 48 hours in advance of performing any tests.

Complete and backfill sewer laterals, manholes and appurtenances on the section under consideration before testing.

Provide the apparatus, material and labour necessary to conduct any and all tests and re-tests as directed by the Consultant.

Provide water for flushing and testing at no expense to the Company, unless otherwise specified.

4.2 Procedure

Clean sewers of all foreign material, and correct all visible deficiencies before beginning the test.

Exfiltration

- Isolate the section to be tested by temporarily blocking the inlets of two manholes with expandable plugs or bulkheads.
- Fill the pipe and manhole with water to a depth of 600 mm above the crown of the pipe in the upstream manhole. Do not exceed 7.5 m maximum head at the downstream manhole.
- Allow 24 hours for absorption of water and escape of air from the line.
- The duration of a test shall be two hours. The actual exfiltration shall be determined by measuring the change of elevation of the water in the manhole.

Infiltration

- Isolate the upstream end of the section to be tested with a plug or bulkhead.
- Place a V notch weir or other approved measuring device in the pipe at the lower end.
- The duration of the test shall be two hours. The actual infiltration shall be the average of at least 8 readings taken at even intervals during the test.

Air Test

Low pressure air test may be requested by the Consultant, for all but concrete sewers, due to:

- A. Lack of water
- B. Steep grades - greater than 8 m head differential in adjacent manhole invert elevations.
- C. Freezing temperatures during the test period, etc.
- D. The test section shall be plugged at each end.
- E. All service laterals, stubs and fittings into the sewer test section shall be properly capped or plugged.
- F. Air shall be supplied to the test section slowly, until a constant pressure of 25 kPa is maintained. If the ground water is above the sewer line being tested, the air pressure shall be increased by 3.0 kPa for each foot the ground water level is above the invert of the pipe.

- G. A stabilization period of at least 5 minutes shall be allowed during which time the pressure shall be regulated to prevent it from fluctuating more than 10 kPa above or more than 3.5 kPa below the required pressure.

4.3 Allowable Limits

The Consultant will determine whether an infiltration and/or exfiltration test or air test will be performed.

In the case that both an infiltration and an exfiltration test are ordered for a particular line the requirements of each test must be met.

A test section shall not exceed the length between any two manholes or as directed by the Consultant.

Storm Sewers

A. Infiltration

0.28 litres per hour per millimetre of pipe diameter per 100 metres of sewer (0.28 l/hr/mm dia/100 m).

B. Exfiltration

0.35 litres per hour per millimetre of pipe diameter per 100 metres of sewer (0.35 l/hr/mm dia/100 m).

Sanitary Sewers

A. Infiltration

0.09 litres per hour per millimetre of pipe diameter per 100 metres of sewer (0.09 l/hr/mm dia/100 m).

B. Exfiltration

0.11 litres per hour per millimetre of pipe diameter per 100 metres of sewer (0.11 l/hr/mm dia/100 m).

C. Air Test

The test pressure shall be 3.5 kPa less than the above required pressure. The time required for a pressure loss of 3.5 kPa shall not be less than that shown in the following table.

Time Required for Air Testing

Pipe Size (mm)	Min	Time Sec
100	2	32
150	3	50
200	5	06
250	6	22
300	7	39
350	8	56
375	9	35
400	10	12
450	11	34
500	12	45
525	13	30

For larger diameter pipe, use the following: (minimum time in seconds = $1.52 \times$ pipe diameter in mm).

Manholes

A. Infiltration

All visible leaks into manholes shall be repaired and no allowance permitted when an infiltration test is performed.

B. Exfiltration

3.0 litres per hour per metre of head above the invert of the sewer for each manhole in the test section. (3 l/hr/m/head).

Pipes Larger Than 900 mm Diameter

Pipes greater than 900 mm will not be subjected to air testing. A visual inspection will be made after backfilling and all deficiencies corrected.

5.0 MEASUREMENT

All linear measurements are made in the horizontal plane and are plan quantities. Field measurements will not be made unless drawings are revised.

5.1 Sewers

Linearly from centre of manhole to centre of manhole (or end of pipe). Where the pipe connects to an existing pipe, measurement shall be to the inside wall of the existing pipe.

5.2 Catchbasin Leads

Linearly from centre of catchbasin to centreline of sewer. Where the pipe connects to an existing pipe, measurement shall be to the inside wall of the existing pipe.

5.3 Sewer Laterals

Unless otherwise specified, no measurement for drain connections will be made.

5.4 Manholes and Catchbasins

Unless otherwise specified, no measurement for manholes or catchbasins will be made.

6.0 PAYMENT

6.1 Sewers and Catchbasin Leads

The price provided within the Pricing Schedule for sewers shall include all pipe and fittings; excavation of the trench; control of ground and surface waters; preparation of subgrade; pipe bedding as specified; placing and joining the pipe; permanent supports where detailed; placing and compacting backfill; reinstatement of surfaces as specified and clean-up; all required flushing and testing; and all the work necessary to install the sewer complete in place.

6.2 Sewer Laterals

The price provided within the Pricing Schedule shall include the supply and installation of the pipe and fittings, connection to the main sewer, riser (if required), test fitting, plug, blocking, wood marker, reinstatement of surfaces, as specified and all other material required.

6.3 Manholes

The price provided within the Pricing Schedule shall include the excavation, complete supply and installation of the manhole including benching, ladder rungs, dragging hooks, safety grating and drop structure as specified, manhole adjusters, cover, backfilling with the specified granular material and adjusting to grades specified in Clause 3.7.

6.4 Catchbasins

The price provided within the Pricing Schedule shall include the excavation, bedding, backfill and complete installation including concrete, catchbasin adjusters, reinforcing steel, goss trap (if required), frame and grate and adjusting to grades as specified in item 3.8. Where perforated sub-drains are specified at catchbasin locations they shall be included in the price for the catchbasin.

6.5 Plumbing Permits

Where permits are required for work on private property the Contractor shall obtain the permits and will be reimbursed at cost.

6.6 Corrugated Steel Pipe

The price provided within the Pricing Schedule shall include the supply and placing of the specified bedding, backfill and compaction as specified, couplers and corrugated steel sections.

6.7 Connection to Existing Sewers

The provided within the Pricing Schedule price shall include inspection and other permits where required, the locating of existing sewers and the complete supply and installation of all

materials required to complete the connection to existing sewers where shown on the drawings, including the confirmation of existing inverts prior to starting any sewer installation.

6.8 Concrete Headwalls

Payment will be at the provided within the Pricing Schedule lump sum price and shall include all excavation, backfilling and grading.

SPECIFICATION NO. 7 ROADS, CURBS AND SIDEWALKS

1.0 DESCRIPTION

Supply all labour, materials and equipment for the complete installation of granular road base, asphaltic road surface, curbs and sidewalks to the dimensions, lines, grades and cross sections as detailed on the Contract Drawings and as specified in the General and Project Specifications.

2.0 MATERIAL

2.1 Granular Material

Granular material shall be supplied in accordance with General Specification No. 9 unless otherwise noted in the Project Specifications.

2.2 Asphaltic Material

The production, placing and compaction of hot mix, hot laid asphaltic material for pavement construction shall conform to MTO Form 310 or latest revision thereof and relevant City of Ottawa Standards.

Joint painting and tack coating material shall be SS-1 Emulsion and shall comply with MTO Form 1103 and relevant City of Ottawa Standards.

2.3 Concrete

The supply, forming, placing, finishing and curing of concrete shall conform to General Specification No. 8 - Concrete, unless otherwise noted.

Unless otherwise noted and as a minimum, concrete used for curb and gutter shall be Class C-3, 30 MPa concrete with 4% to 7% entrained air.

Unless otherwise noted and as a minimum, concrete used for sidewalk shall be Class C-3, 30 MPa concrete with 4% to 7% entrained air.

2.4 Expansion Joint Material

Expansion joint material shall be premoulded, non-extruding bituminous impregnated fibreboard, 15 mm thick conforming to ASTM designated D-544-49, Type V, unless specified otherwise on the construction details and shall be cut exactly to fit the sidewalk cross section.

2.5 Joint Sealing Compound

Joint sealing compound shall be hot poured rubbery bituminous type, conforming to U.S. Federal Specification 55-5-164.

3.0 CONSTRUCTION

3.1 Road Base and Sub-base

Construct granular road base in uniform layers not exceeding 100 mm for crusher-run limestone or Granular "A" and not exceeding 150 mm for Granular "B", "C" or "D". Compact each layer to a minimum of 100 percent optimum dry density using water if required.

Soft spots in the subgrade or sub-base shall be excavated, backfilled and compacted as directed by the Consultant.

Maximum deviation allowed from the specified grade and cross section is 10 mm in 3 metres.

Maintain the required grade, cross-section, tolerances and compacted density until the work is accepted or paved.

3.2 Asphaltic Pavement

Adjustments to Manholes, Valve Chambers and Catchbasins

- (i) Raise the tops and frames of manholes, catchbasins, meter and valve chambers with approved precast concrete adjustment rings.
- (ii) Raise valve and service boxes by appropriate means, to the required grades as shown on the Drawings or as supplied by the Consultant.

Prior to paving, reshape and compact the granular materials to achieve the cross- sections and elevations as shown on the drawings adding such materials as necessary to achieve this. Where the granular materials have been contaminated, replace and rework as directed by the Consultant.

Joints Between Existing and Proposed Asphalt

Unless otherwise specified, a 0.35 m long cold planed lap joint is to be provided at the connections with the proposed asphalt.

Manhole Ramping

When the final surface asphalt is not scheduled to immediately follow base course paving, ramp all manholes, valve chambers and catchbasins from the exposed top edge of the casting for a distance of 600 mm from the casting for protection until the surface course is laid.

Tack Coat

If paving operations are interrupted and extensive use is made of the lower binder courses prior to the laying of the wearing course, apply a tack coat prior to carrying on with the final course. Where such interruptions are occasioned by instruction of the Company or by the Consultant on behalf of the Company, the Contractor will be reimbursed for the cost of the necessary tack coat in accordance with the Schedule of Contract Unit Prices. Traffic must be kept off the tack coat until the wearing course is applied.

Clean Base Asphalt

Prior to placing the tack coat and if directed by the Consultant, the base asphalt is to be flushed and swept including any minor hand cleaning all at no additional cost.

Tolerance of Finished Asphalt Surface

Maximum tolerance transversely or longitudinally to be less than 10 mm in 3 metres for gradients of 1% or more. For gradients of less than 1% the maximum tolerance shall be 5 mm in 3 metres.

3.3 Concrete Curbs, Curb and Gutter and Sidewalks

Ensure that all curbs, curb and gutter, and sidewalks connect smoothly as to line, grade and form with existing installations.

Curbs and sidewalks shall be stamped with the Contractor's name and year of construction at spacings not exceeding 150 metres.

Place compacted backfill and complete all grading adjacent to the concrete installations to prevent erosion within 24 hours of the removal of the forms.

The maximum tolerance on any exposed surface of curb or sidewalk shall be less than 10 mm in 3 metres measured longitudinally.

Expansion joints shall be placed where new concrete structures abut other concrete structures and otherwise at regularly spaced intervals as specified. Expansion joints shall be formed in a rectangle around solid objects such as service frames and covers, water service boxes, hydrants, poles, etc. with the sides a minimum of 150 mm from the edge of the solid object.

Prior to the construction of the sidewalk, provide a sand bed 25 mm in thickness compacted to a minimum of 100% modified Proctor maximum dry density.

Place a 4 mil black polyethylene film for the full width of the sand bed. Lap joints at least 300 mm.

For sidewalks draw tool contraction joints across the sidewalk, one-third of the concrete thickness every 2 metres.

For curbs and curb and gutter draw tool a contraction joint every 5 metres with a depth of at least 50 mm, and at other locations specified on the detail drawings. When the joints are saw cut, they must be completed immediately after the initial concrete set.

Finish all edges and joints with an edging tool having a radius of 13 mm.

3.4 Rectification of Concrete Curbs, Curb and Gutter and Sidewalks

In addition to the items mentioned in Section 3.3:

- Break-out damaged concrete works as directed by the Consultant and dispose of concrete off-site.
- Repair all asphalt and sod disturbed during rectification of concrete work.

- Stamp with name of firm and year of construction at each end of the replaced concrete work.
- Sawcut ends of concrete work to provide a neat joint.
- Sawcut and caulk cracks with an approved caulking compound where specified by the Consultant.

4.0 MEASUREMENT

All linear and area measurements are in the horizontal plane and are plan quantities. Field measurements will not be made unless drawings are revised.

4.1 Road Base, Sub-base and Asphaltic Pavement

Unless otherwise specified measurement shall be as follows:

- Granular "A", "B", "C" and "D" by area in square metres to the specified thickness.
- Crusher-run limestone by area in square metres to the specified thickness.
- Base course asphaltic pavement by area in square metres to the specified thickness. The plan measurement for base asphalt shall not include the fillet laid over the top of the base curb which ultimately is trimmed off to permit top stage construction.
- Finish course asphaltic pavement by area in square metres to the specified thickness.
- Tack coat by area in square metres.

Area measurements shall be calculated from the Engineering Drawings.

4.2 Manhole Adjustments

Adjustment of manholes, catchbasins and valve chambers will be on a per unit basis.

The adjustment of catchbasins will include the restoration of curb and gutter adjacent to each catchbasin.

4.3 Manhole Ramping

Ramping of asphalt around manholes, catchbasins and valve chambers will be on a per unit basis.

4.4 Sidewalks

Sidewalks will be measured on a linear metre basis for the specified width and thickness.

4.5 Concrete Curbs, Curb and Gutter

Curbs or curbs and gutter will be measured on a linear metre basis.

5.0 PAYMENT

5.1 Road Base, Sub-base and Asphaltic Pavement

Payment for granular materials, crusher-run limestone, and asphalt shall be compensation in full for all labour, equipment and material required to supply, lay, grade and compact in accordance with the Drawings and Specifications.

5.2 Manhole Adjustments

Payment for adjusting manholes, catchbasins and valve chambers shall be compensation in full for all labour, equipment and material required including concrete adjusting rings, modoloc steps if required and sealing component, and regrading and recompaction of the disturbed subgrade.

5.3 Manhole Ramping

Payments for ramping of asphalt around manholes, catchbasins and valve chambers shall be compensation in full for all labour, equipment and material required including cleaning and brushing of the base course, applying tack coat, and compaction of asphalt.

5.4 Sidewalks

Payment for sidewalk shall be compensation in full for all labour, equipment and material required including excavation and fine grading, disposal of surplus material, supply of fill material and polyethylene film, expansion joints, edge scoring of both edges, regrading to boulevard level, application of curing compound, cold weather protection and cleaning and brushing of sidewalks and application of sealer.

5.5 Concrete Curb, Curb and Gutter

Payment for curb or curb and gutter shall be compensation in full for all labour, equipment and material required including Granular "B" bedding, reinforcing bars, stirrups, expansion joints, temporary asphalt filler around catchbasins, application of bonding and curing agents, contraction joints caulking compound and filling behind curb with approved material.

Payment shall also include cleaning base curb, trimming and replacing base course asphalt, removal of asphalt filler behind catchbasin and any required asphalt patching prior to placing the top section of a two-stage curb.

5.6 Rectification of Concrete Curbs, Curb and Gutter and Sidewalks

Payment for rectification of curbs, curb and gutter, and sidewalks will be on a linear metre basis for those damages which are not deemed the responsibility of the contractor.

SPECIFICATION NO. 8 CONCRETE

1.0 GENERAL

This specification covers materials to be used and methods to be followed for the proportioning, manufacture, transporting and placement of plain and reinforced concrete, either site-mixed or ready-mixed.

Materials and workmanship shall conform to the Canadian Standards Association CSA Standard CAN/CSA-A23.1 (Concrete Materials and Methods of Concrete Construction) and methods of test for concrete shall conform to CSA Standard CAN/CSA-A23.2 (Methods of Test for Concrete). All standards referred to are the latest editions thereof. This specification is intended to supplement and amplify CSA Standard Specification and the most stringent requirements of these standards and the specifications shall apply. The Contractor shall have on site a copy of the CSA Standards A23.1 and A23.2.

2.0 DESCRIPTION

Portland Cement shall be Normal Portland Cement conforming to the requirements of CSA Standard CAN/CSA-A5, Portland Cements.

3.0 WATER

Water for use in Portland cement concrete shall be clear and free from injurious amounts of oil, acid, alkali, organic matter, sediment or any other deleterious substances.

4.0 AGGREGATES - GENERAL

Fine and course aggregates shall meet the requirements of CSA Standard CAN/CSA-A23.1 for general characteristics, grading, limits of deleterious substances, cement-aggregate reactivity, soundness and organic impurities. Maximum size of course aggregate to be 20 mm unless otherwise specified.

Representative samples of all aggregates proposed for use shall be submitted to the Consultant not less than three weeks in advance of the commencement of operations to permit the carrying out of required tests. Sampling of aggregates shall be done in accordance with CSA Standard CAN/CSA-A23.2.

5.0 ADMIXTURES

When admixtures are specified or used they shall conform to the requirements of CSA Standards CAN3-A266.1, Air-Entraining Admixtures for Concrete, CAN3-A266.2, Chemical Admixtures for Concrete, and CAN3-A266.4, Guidelines for the Use of Admixtures in Concrete. Any materials not included in CSA Standard CAN/CSA-A23.1, and proposed as admixtures for use in Portland cement concrete may only be used upon the written authority of the Consultant.

6.0 REINFORCING STEEL

Reinforcing steel shall meet the requirements of CSA Standards G30.5, Welded Steel Wire Fabric for Concrete Reinforcement, CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction, CAN/CSA-G30.18, Billet Steel Bars for Concrete Reinforcement and A.C.1-315

Detail and Detailing of Concrete Reinforcement. Reinforcing steel yield strength shall be 400 MPa unless otherwise noted on the drawings.

7.0 STORAGE OF MATERIALS

Store all materials in a manner that will prevent contamination or deterioration. Any material that has deteriorated or that has been contaminated shall not be used in the concrete and shall be removed from the site.

Store cement in a suitable bin or building which will provide protection against dampness and inclement weather conditions. Access to the storage facilities shall be provided to allow proper inspection. If cement becomes lumpy due to partial hydration, it shall be removed from the site unless it can be proven by testing to the satisfaction of the Consultant that, with corrective measures, the hydration does not have a detrimental effect on the quality and strength of the concrete.

Store each size of aggregate separately in a free draining stockpile in a manner that will prevent contamination, intermixing and segregation. The equipment and methods of handling aggregate shall be such as to prevent deterioration, breakage and contamination of the stockpiles and breakage of the aggregates.

All other materials such as admixtures and curing compounds shall be stored in accordance with manufacturers instructions.

Store reinforcing steel on racks or sills that will permit easy access for identification and handling.

8.0 PROPORTIONING

Concrete shall be proportioned in accordance with CSA Standard CAN/CSA-A23.1.

Class*	Minimum Specified 28 day Strength (MPa)	Max. W/C Ratio	Maximum Size of Coarse Aggregates (mm)	Air Content (%)
C-1	35	0.40	20	5-8
C-2	32	0.45	20	5-8
C-3	30	0.50	20	4-7
C-4	25	0.55	20	4-7
F-1	30	0.50	20	5-8
F-2	25	0.55	20	4-7
N-1	15			
N-2	10			
S-1	35	0.40		Type 50 Cement
S-2	32	0.45		Type 50 Cement
S-3	30	0.50		Type 20 Cement

* By strength

Slump for concrete to be consolidated with the use of high frequency vibrators shall be 75 mm maximum and 25 mm minimum, except as follows:

	Maximum	Minimum
Pavements, curbs, sidewalks	50 mm	25 mm
Heavy mass construction	50 mm	25 mm

9.0 TESTING

Field tests for concrete quality shall be carried out by an independent testing agency acceptable to the Consultant. The cost of tests shall be paid for in accordance with the Special Conditions and the applicable cash allowance. Provide unhindered access to the work for the purposes of inspection and selection of samples, and provide, without charge, the concrete and constituent materials required for quality control tests and such assistance, tools, equipment and sampling containers as is required to prepare and ship the test samples.

Sampling and testing of concrete shall be in accordance with the requirements of CSA Standard CAN/CSA-A23.1/A23.2.

Concrete strength testing is to be performed for every 50 m³ of concrete placed and in no case shall there be less than one test for each class of concrete or each separate type of structural component, as designated by Consultant, placed on any one day. Deviations from this requirement can be made only as deemed necessary by the Consultant. Four standard test specimens shall comprise a strength test. The specimens shall be tested at the age of 24 hours, 7 days, 28 days and 56 days if required. Additional tests of autogenously cured specimens by an accelerated testing method may be required by the Consultant. Additional tests of specimens cured entirely under field conditions may also be required by the Consultant to check the strength gain under field conditions.

For concrete work failing to meet the test requirements, the Consultant has the right to require one or more of the procedures outlined in CSA Standard CAN/CSA-A23.1 to determine acceptability of the work or where the work fails to meet the specified quality after carrying out these procedures, the Consultant may demand strengthening or replacement of those portions which failed to develop the required strength.

Air content tests done in accordance with CSA Standard CAN/CSA-A23.2 shall be performed to measure the air-entrainment. For concrete which will be subjected to severe exposure, the minimum number of air tests to be made shall be as follows:

Ready-mixed concrete	-	1 test per load
Site-mixed concrete	-	1 test per 10 m ³

Where exposure is less severe, the frequency of testing may be reduced at the discretion of the Consultant.

Slump tests shall be made frequently to ensure uniform consistency of concrete. In addition a slump test shall be made with every strength test. Tests shall be made in accordance with CSA Standard CAN/CSA-A23.2.

10.0 MEASUREMENT OF MATERIALS

Weigh cement on a scale separate from those used for other materials. Cement in standard sacks need not be weighed but the use of fractional sacks shall not be permitted unless weighed.

Weigh fine and coarse aggregate separately with batched weights based on dry materials and shall be the required weights of dry materials plus the total weight of moisture (both absorbed and surface) contained in the aggregates.

Measure water either by weight or by volume. Water as weighed or measured shall be within approximately 1% of required amount.

The weighing equipment shall be capable of being operated to control delivery of materials so that any inaccuracies in feeding and measuring do not exceed the following limits:

- i) Cement - Approximately 1%
- ii) Aggregates - Approximately 2% on each individual aggregate
- Approximately 1% of the total weight of the aggregates
- iii) Admixtures - Powdered admixtures shall be measured by weight and paste or liquid admixtures by weight or volume within a limit of accuracy of 3%.

Shovel and volume methods of measurement are not permitted.

11.0 MECHANICAL BATCH MIXING

Mix concrete in a mechanical batch mixer of a type approved by the Consultant.

Do not load mixer beyond its rated capacity which shall be shown on a manufacturer's rating plate on the equipment.

The drum, blades and discharging device shall be such that a concrete of uniform consistency will be produced.

The entire contents of the mixer shall be discharged before recharging.

The mixer shall be cleaned after each period of continuous use and shall be maintained in such condition that the mixing action will not be impaired.

Until acceptable performance tests have been made, mixers with a capacity of one cubic metre (1 m³) or less shall mix for a minimum of one and one-half (1.5) minute after all materials, including the mixing water, are in the drum. For larger capacities, the minimum time shall be increased by twenty (20) seconds for each additional one cubic metre (1 m³) capacity or fraction thereof. The batch shall be charged into the mixer so that some water will enter in advance of the cement and aggregate and all water shall be in the drum by the end of the first one-fourth of the specified mixing time.

The rated capacity of the mixer shall not be less than one-half cubic metre (0.5 m³).

Retempering (remixing with additional water) of concrete or mortar that has stiffened shall not be permitted.

12.0 READY-MIXED CONCRETE

Ready mixed concrete shall be mixed and transported in accordance with CSA Standard CAN/CSA-A23.1.

13.0 HAND MIXED CONCRETE

Concrete shall be mixed by hand only in special circumstances and with prior consent of the Consultant. The cement and fine aggregate shall be mixed dry on a properly constructed platform until it has obtained an even and uniform colour throughout. The mixture shall then be spread to make a bed of uniform thickness on which the coarse aggregate shall be spread and whole wetted with the required amount of water and turned with shovels until a uniform mixture is obtained. Materials shall be proportioned as specified above.

14.0 PLACING - GENERAL

All concrete placing methods shall be in accordance with CSA Standard CAN/CSA-A23.1 and shall be subject to the approval of the Consultant.

To prevent damage to fresh concrete during placing, suitable measures shall be taken to protect the plastic concrete.

Concrete placing shall not be started until the Consultant has inspected and approved all preparations including forms, foundations, reinforcing steel, construction joints, and all mixing, conveying, spreading, compacting, finishing, curing and protection equipment.

15.0 CONVEYING

Concrete handling methods shall be in accordance with CSA Standard CAN/CSA-A23.1. Concrete shall be conveyed from the mixer to the point of deposit as rapidly as practicable, using means and equipment which will prevent segregation or loss of materials.

Equipment for conveying concrete such as buckets, cars and trucks, belt conveyors, and pumps shall be of such design, size and condition to ensure as continuous a supply of concrete as practicable to the point of delivery, without segregation.

Conveying equipment, if supported by formwork, shall not impart harmful vibration to the freshly placed concrete nor cause misalignment of forms.

The conveying equipment shall be kept free from hardened concrete and foreign materials, and shall be cleaned at frequent intervals. Wash water shall not be permitted to enter the forms of fresh concrete.

16.0 DEPOSITING

Concrete deposition methods shall be in accordance with CSA Standard CAN/CSA-A23.1. Deposit concrete in the forms as close as practicable to its final position and in layers that are approximately horizontal. Concrete shall be confined in a suitable vertical drop pipe to within 1.50 metre or less of the concrete in place in order to prevent segregation by ricocheting off tie rods, spacers, reinforcement and forms and to protect these items from displacement. Concrete which has partially hardened shall not be subjected to injurious vibration or shock,

except for controlled revibration where specified. The size of section to be placed in one continuous operation shall be as shown on the drawings or as directed by the Consultant.

Mixing and placing equipment shall be such that when concreting has once started, the depositing of concrete shall be carried on as a continuous operation until the placing of the panel or section is completed. Concreting shall be carried out at such a rate that the concrete is at all times sufficiently plastic to ensure proper bonding of successive layers. The maximum permissible time interval between placing successive layers of concrete shall be established by the Consultant.

17.0 BONDING TO EXISTING CONCRETE

When fresh concrete is to be bonded to hardened concrete, the surface of the set concrete shall be thoroughly cleaned of foreign matter and laitance and saturated with water for the period 24 hours immediately prior to concreting. Immediately before depositing fresh concrete on hardened concrete, all free water shall be removed from the surface. The first layer of concrete to be placed on the surface of set concrete shall be of the quality specified but shall contain an excess of mortar and shall be vibrated to achieve maximum bond.

18.0 COMPACTING

All methods of compacting shall be subject to the approval of the Consultant. As concrete is being placed it shall be compacted thoroughly and uniformly by means of tamping, hand tools, vibrators or finishing machines to secure a dense homogeneous structure.

For compacting the concrete, internal vibrators shall be used whenever practicable. Vibrators shall be approved by the Consultant and they shall be operated at a frequency of not less than 7 000 impulses per minute when fully immersed. Application of vibrators shall be made systematically and at such intervals that the zones of influence of the vibrator overlap.

The vibrator shall be applied, at any one point, only until the concrete is compacted and not for such a time that will cause segregation. Extreme care shall be taken to ensure that the vibrators do not disturb the reinforcing steel or its bond to the partially hardened concrete will be impaired. Vibrators shall not be used so close to the forms that they drive the coarse aggregate away from the face.

The vibrator shall be used only for consolidation purposes and shall not be used to move concrete more than a short distance.

19.0 FINISHING

Rough or board form surfaces shall be reasonably true to line and plane. Tie holes and defects shall be patched and fins exceeding 6 mm in height shall be rubbed down with wooden bows.

Plywood or metal formed surfaces shall be true to line and plane. Tie holes and defects shall be patched and all fins completely removed.

Related unformed surface shall be struck smooth after concrete is placed and shall be floated to a texture consistent with that of the formed surfaces.

The top or final surface of concrete slabs and other flat work shall be finished by screeding, floating and trowelling to a smooth, dense finish, free from defects and blemishes. All concrete surfaces exposed to view shall have sack rubbed finish.

20.0 CURING AND PROTECTION

Refer to CSA Standard CAN/CSA-A23.1 for complete curing and protection requirements. Key items are highlighted below. Freshly deposited concrete shall be protected from premature drying and excessively hot or cold temperatures, and shall be maintained with minimal moisture loss at a relatively constant temperature for the period of time necessary for the hydration of the cement and proper hardening of the concrete.

After the concrete has set sufficiently, the exposed surfaces shall be kept continuously moist for at least three consecutive days after placing, when normal Portland cement is used and for at least one day when high early strength Portland cement is used. During the curing period the temperature of the air in contact with the concrete shall be maintained at not less than 10EC.

Where the use of curing compound is authorized by the Consultant it shall meet the requirements of ASTM Standard C309, Liquid Membrane Forming Compounds for Curing Concrete.

Steel forms heated by the sun and all wood forms in contact with the concrete during the final curing period shall be kept wet. If forms are to be removed during the curing period, one of the above curing materials or methods shall be employed immediately. Such curing shall be continued for the remainder of the curing period.

(a) Cold Weather Protection

When the air temperature is at or below 4.5EC or when there is a possibility of it falling to that limit within 24 hours of placing, cold weather protection measures shall be used. When necessary, arrangement for heating, covering, insulating, or housing the concrete work shall be made in advance of placement and shall be adequate to maintain the required temperature and moisture conditions without injury due to concentration of heat. Refer to CSA Standard CAN/CSA-A23.1 for additional information.

(b) Hot Weather Protection

When necessary, arrangements for installation of windbreaks, shading, fog spraying, sprinkling, ponding, or wet covering of a light color shall be made in advance of placement and such protective measures shall be taken as quickly as concrete hardening and finishing operations will allow.

(c) Protection from Mechanical Injury

During the curing period, the concrete shall be protected from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration. All finished concrete surfaces shall be protected from damage caused by construction equipment, materials, or methods and by rain or running water. Self-supporting structures shall not be loaded in such a way as to overstress the concrete.

21.0 FORMS

Form design shall be established prior to the start of framing. The proposed method of construction shall be submitted to the Consultant for their review. Form design and its adequacy remains the responsibility of the Contractor. Refer to CSA Standards CSA-S269.1, Falsework for Concrete Purpose; CSA-S269.3, Concrete Formwork; and CSA-0151, Canadian Softwood Plywood, and CSA-0121, Douglas Fir Plywood.

Forms shall be built with sufficient strength and rigidity to carry the weight or fluid pressure of the concrete and of any equipment or runways which might be placed upon them.

Lumber used in forms shall be free from warp, and shall be sawn straight so that lines and shapes will be accurately maintained.

For exposed concrete surfaces, plywood or steel panel forms shall be used. Forms shall be free from defects that would be reproduced as concrete blemishes.

For concealed concrete surfaces, boards may be used where authorized by the Consultant, provided the edge contacts are made sufficiently tight to hold mortar.

For plywood or similar finished forms or for steel-panel forms, where stripped concrete is to be exposed, the panel assembly shall be established and makeup or patching strips between panels held to a minimum. The panel arrangement shall be wedged, and have means for bolting the edges to maintain accurate face alignment.

Internal form ties shall be of metal and of a type approved by the Consultant.

Forms shall be so constructed that the finished concrete will conform to the shape and dimensions specified.

Immediately before concrete is placed, all forms shall be carefully inspected to ensure that they are properly placed, sufficiently rigid and tight, thoroughly clean, properly surface treated, and free from snow, ice or other foreign materials.

Temporary ports or openings shall be provided at the bottom of all deep units, such as columns and walls, to facilitate cleaning and inspection. In restricted units they shall be located so that water can be used to wash out debris. They shall be closed with patches flush on the inside.

A non-staining mineral oil shall be used as a parting agent for forms, applied to the forms prior to placing of the reinforcing steel. The amount of oil used shall be kept to a minimum and any which contacts reinforcing shall be removed with solvents.

Untreated forms shall be kept wetted down to prevent shrinkage prior to the placing of the concrete and shall be surface wetted at the time of placing.

Prior to placing concrete, suitable means for checking the alignment and elevations of forms during placing shall be provided. These checks shall be made frequently during placement of the concrete. Checking and corrective wedging or shoring shall be carried out both horizontally and vertically as required, until all concrete is in place. Forms shall not be disturbed until the concrete has hardened adequately.

22.0 REINFORCING

Shop drawings, showing all dimensions necessary for fabrication and placing of the reinforcing steel and accessories shall be submitted for review by the Consultant prior to fabrication. Detailing of reinforcing steel shall be in strict accordance with the latest issue of ACI-315, "Manual of Standard Practice for Detailing Reinforced Concrete Structures". All bars shall be bent cold.

Reinforcement, at the time concrete is placed, shall be free from scale or other coatings that will destroy or reduce the bond.

Where there is a delay in depositing concrete, reinforcement shall be reinspected and cleaned when necessary.

Metal reinforcement shall be adequately placed and adequately secured in position by concrete or metal chairs or spacers.

Exposed reinforcing bars intended for bonding with future extensions shall be protected from corrosion by concrete or other adequate covering.

23.0 JOINTS AND EMBEDDED ITEMS

The locations and details of construction joints not indicated on the drawings shall be subject to the approval of the Consultant.

Construction joints shall be located and designed so as to least impair the strength and appearance of the structure.

Reinforcement shall continue in its normal position through the joint.

Shear keys shall be formed with bevelled strips.

Where construction joints are planned or permitted by the Consultant in watertight concrete construction, there shall be reinforcing steel on both sides of the wall or slab and shear keys provided.

A waterstop of a type, size, and material approved by the Consultant shall be carefully installed. Where waterstops cross or lap they shall be vulcanized to ensure that a continuous watertight diaphragm is formed.

Where a horizontal construction joint is permitted in a wall, the top of the first lift shall be carefully cleaned off and the procedure in Clause 17 - Bonding to Existing Concrete of this Section 8 - Concrete, shall be followed.

All sleeves, inserts, anchors, and embedded items required for adjoining work or for its support shall be placed prior to concreting.

Expansion joint material, waterstops, and embedded items shall be positioned accurately and supported against displacement. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.

24.0 MORTAR

All mortar shall be prepared from the specified materials in accordance with the following latest CSA Standard edition codes:

CAN/CSA-A5	-	"Portland Cement"
CAN/CSA-A8	-	"Masonry Cement"
CSA A82.43	-	"Hydrated lime for Masonry Purposes"
CSA A82.56	-	"Aggregates for Masonry Mortar"

It shall be thoroughly mixed dry in the proportions specified. The required amount of water as per CSA Standard CAN/CSA-A23.1 shall be added to produce a paste of satisfactory

consistency. The mortar shall be freshly mixed by hand in boxes made for the purpose. No mortar shall be used that has become stiff or that has stood more than 12 hours after mixing. Sand shall be measured by loose volume as shovelled into the measuring box.

The proportions by volume for different classes of work, unless otherwise specified, shall be as follows:

	Cement	Hydrated Lime	Sand
Brick Masonry	1	1	6
Pointing or Grouting of Pipe Jointing	1	-	1
Parging	1	1	6

SPECIFICATION NO. 9 GRANULAR MATERIALS

1.0 DESCRIPTION

This specification covers the requirements for aggregates for use as granular subbase, base and surface course; shouldering; pipe bedding; and backfill to pipes, manholes and other structures.

2.0 MATERIALS

Aggregates for the above uses shall meet the requirements for MTO Form 1010 - "Material Specifications for Aggregates, Granular A, B, C, D and 16 mm crushed Types A and B".

2.1 MTO Form 1010 - Granular A

Granular A - MTO Form 1010, Section 1010.04 shall be modified to specify crushed gravel and thereby eliminate the use of crushed rock or crushed slag.

Crusher-Run Limestone - MTO Form 1010, Section 1010.04 shall be modified to specify crushed rock and thereby eliminate the use of crushed gravel and crushed slag.

2.2 Crusher-Run Limestone

51.0 mm and 19.0 mm crusher-run limestone shall conform within the following gradation envelope:

Canadian Standard Sieve Series	51.0 mm Crusher Run Limestone % Passing	19.0 mm Crusher Run Limestone % Passing
51.00 mm	100%	-
38.00 mm	75 - 100	-
19.00 mm	45 - 75	100%
12.70 mm	-	70 - 90
4.75 mm	20 - 47	35 - 60
1.18 mm	11 - 32	15 - 37
0.30 mm	4 - 18	6 - 20
0.075 mm	2 - 8	3 - 10

51.0 mm and 19.0 mm clear stone shall conform within the following gradation envelope:

Canadian Standard Sieve Series	51.0 mm Clear Limestone % Passing	19.0 mm Clear Limestone % Passing
64 mm	100%	-
51 mm	90 - 100	-
38 mm	35 - 70	-
25 mm	15 - 40	100%
22 mm	-	-
19 mm	0 - 10	85 -100
16 mm	-	55 - 90
13 mm	-	30 - 70
10 mm	-	15 - 40
#4	-	0 - 10

3.0 MEASUREMENT AND PAYMENT

Unless otherwise specified, Granular Materials will be measured and paid for in accordance with the specification covering the application or as described in the Schedule of Contract Unit Prices.

SPECIFICATION NO. 10 TOPSOIL, SEEDING AND SODDING

1.0 DESCRIPTION

The work covered by this specification shall include the supply of all labour, materials, consumables, and equipment to apply topsoil, seed or sod areas as shown on the drawings and as specified herein.

1.1 Maintenance

Maintain seeded and sodded areas as required to establish vigorous growth. Reseed or resod, within the time periods contained in this specification, any eroded or deteriorated areas or where satisfactory growth has not been established.

2.0 MATERIALS

2.1 Topsoil

Obtain topsoil from existing stockpiles within the contract site or import, as required. Imported topsoil shall be fertile, friable, natural loam containing not less than 4% organic matter for clay loams and not less than 2% for sandy loams with an acidity value ranging from ph 6.0 to ph 7.5. Frozen or muddy topsoil will not be acceptable. Topsoil from stockpiles shall be tested for NPK and organic content. Amendments shall be made in accordance with directions by the testing agent or Consultant.

2.2 Seed

Seed shall meet the requirements of The Seeds Act for Canada No. 1. Unless otherwise specified, seed shall be mixed in the following proportions:

- 40% Bluegrass
- 25% Tall Fescue
- 20% Perennial Rye
- 15% Creeping Red Fescue

Seed supplied shall be of the best quality and of such brands as approved by the Consultant. They shall be furnished on the job in their original sealed packages bearing the brand and name of the producer, or distributor. Only seeds harvested the preceding season will be accepted.

2.3 Sod

Unless otherwise specified, sod shall be No. 1 Kentucky Bluegrass Fescue Sod grown and sold in accordance with the latest specifications of the Nursery Sod Growers Association of Ontario (NSGA). Sod shall be permeated with roots; be uniform in texture and free from weeds; be in a good healthy condition with no sign of decay; and contain sufficient moisture to maintain its

vitality during transportation and placement. Each section shall be approximately 450 mm wide, 1.80 m long and at least 20 mm thick.

2.4 Mulch

Mulch shall be "Verdyol Mulch Standard Quality" or approved equal and conform to the manufacturers specification. Alternate mulching materials such as oat or wheat straw with asphalt emulsion must be approved by the Consultant.

2.5 Wooden Pegs

Wooden pegs for staking sod shall be approved hardwood pegs 25 mm x 25 mm square and at least 300 mm long.

2.6 Wire Mesh

Wire mesh, to be installed under sodded areas where specified, shall be #9 gauge galvanized wire-woven farm fencing or approved equal.

2.7 Fertilizer

Where required, fertilizer will be applied to topsoil as required subject to testing.

3.0 CONSTRUCTION

3.1 Site Preparation

Fine grade the sub-grade level to a uniform surface free from all debris. Scarify the sub-grade to a minimum depth of 75 mm to produce a loose textured surface free of weeds, stones, roots and branches. The finished sub-grade shall be approved by the Consultant prior to placing topsoil.

3.2 Topsoil Placing

Spread topsoil to the required minimum depth, but not less than 75 mm, over the prepared sub-grade, pulverize all clods or lumps and rake and roll to produce an even firm surface free from all stones, roots, branches, etc. larger than 50 mm in diameter immediately prior to placing seed or sod. Compact surface firm to footprints.

3.3 Seeding

Seed only those areas free from frost, snow or water and which can be mulched within the same day. Apply seed with a mechanical dry seeder (Method A) in areas having slopes in the 1-25% range or with a hydraulic seeder (Method B) on slopes exceeding 25% during the following time periods:

1. August 15 to September 15 (preferred)
2. Early spring up to May 30th.

Method A - mechanical dry seeder

Apply fertilizers, as specified, in accordance with the rates of application indicated followed by rolling immediately prior to seeding. Supply seed in two (2) intersecting directions by means of an approved mechanical dry seeder at a rate of 160 kg/hectare.

Method B - hydraulic seeder

Charge an approved hydraulic seeder with seed, water and fertilizer as specified and apply at rate recommended by supplier.

Other methods of applying seed may be permitted if approved by the Consultant.

3.4 Mulching

Immediately following seeding, apply mulch by means of an approved mulch blower or to the manufacturers specification at a rate of 1,700 kg/hectare to form a uniform mat.

3.5 Sodding

Apply fertilizers, as specified, in accordance with the rates of application indicated and work well into the topsoil within 48 hours before laying sod.

Lay sod as soon as possible after arrival on site but in any event within 48 hours. Place sod closely together without open joints or overlaps to blend uniformly with adjoining grassed areas, curbs, sidewalks, etc. Stagger joints in adjacent rows.

On slopes greater than 3:1, place sod perpendicular to the slope on wire mesh when specified and stake with wooden pegs at 0.6 m intervals providing a minimum of 1 stake per sod. Drive pegs flush with sod. Wire mesh will be provided beneath sod where intermittent water flows are expected.

Immediately after installation, water to saturate sod and underlying topsoil. When sod has sufficiently dried, roll to ensure a good bond between sod and topsoil and to remove minor depressions and irregularities.

Place sod prior to November 1 unless authorized by the Consultant.

4.0 MEASUREMENT

Unless otherwise specified, the measurement for topsoil, seeding and sodding are in the horizontal plane and are plan quantities. Field measurements will not be made unless drawings are revised.

Mulch, fertilizer, wire mesh and wooden pegs will not be measured, but will be included in the area measurements for sod and seeding.

5.0 ACCEPTANCE

On sites which will be mown in future, acceptance will be granted when:

- in seed area - a green sward has been established at least one time; or

- in sod areas - grass roots have knit to soil and grass has been mown at least one time;
and
- grass is green and exceeds no more than 60 mm in height

On naturalized sites, acceptance will be granted when:

- sod and seed areas are free of non-specified herbaceous plants and free of bare areas

6.0 PAYMENT

Payment will be in accordance with and at the rates shown in the Schedule of Contract Unit Prices and will include the provision and placement of topsoil, whether from on site sources or imported, seed or sod, mulch, wooden pegs, wire mesh and any other items necessary to complete the work. No additional payment will be allowed for watering, mowing, fertilizing, weeding, reseeding or resodding any other maintenance required to establish satisfactory growth.

Where restoration is designated, the seeding or sodding work will be included in the price provided within the Pricing Schedule for sewers, water mains, roads, structures etc. unless otherwise noted in the Schedule of Contract Unit Prices.

SPECIFICATION NO. 12 RIP-RAP

1.0 DESCRIPTION

This Specification covers the construction of a protective covering of approved rock with or without grout as specified, including excavating, trimming, compacting of subgrade, supplying and placing of specified materials and labour and equipment incidental to the construction.

2.0 MATERIALS

2.1 Rock

The quality and source of rock shall be approved by the Consultant. Rock subject to marked deterioration by water or weather will not be accepted.

Fractured rock will not be accepted.

The rock shall be free from earth and clay.

Rock shape shall be as near to cubical as possible, in particular thin slab shapes shall be avoided.

The gradation of the rip-rap rock is specified in the Project Specification.

2.2 Filter Material

The filter material shall be as described in the Project Specifications.

2.3 Grout

The grout shall be as described in the Project Specifications.

3.0 CONSTRUCTION

3.1 Rock

Place material in such a manner that the larger fragments occur at the bottom of the slopes, the rocks fit together tightly and chink the voids with spalls. The surface of the finished rip-rap shall have a uniform appearance conforming to the elevations and sections as detailed on the drawings.

3.2 Grouting

When specified, fill the spaces between thoroughly wetted stones with mortar. All voids shall be filled and the outer faces of the stones left exposed.

Remove excess mortar from the exposed faces of the stones.

Cure and protect mortar grout as specified in Specification No. 8 - Concrete.

3.3 Filter Material

Place filter material in the manner outlined by the manufacturer or as specified in the Project Specification.

4.0 MEASUREMENT

Area measurements will be made in the plane of the surface rip-rapped and payment will be as specified within the Schedule of Contract Unit Prices. Field measurements will not be made unless drawings are revised.

5.0 PAYMENT

The price provided within the Pricing Schedule is payment in full for supplying labour, material and equipment to excavate the foundation, prepare the bedding, dispose of debris, and place rip-rap to the required dimensions indicated.

“Excavate the foundation” includes all excavation to the subgrade of the rip-rap unless otherwise specified.

When specified this price shall include grouting.

SPECIFICATION NO. 15 ENGINEERED FILL

1.0 DESCRIPTION

The work covered by this specification shall include the supply of all labour, material, consumables and equipment to do all the excavation, grading and filling with earth required for the execution of specified engineered fill requirements. This specification does not cover rock fills. "Rock Excavation" as defined in Specification No. 1, General Requirements, is not considered part of this specification and is covered in Specification No. 4, Excavation and Backfill.

2.0 CONSTRUCTION

2.1 Survey and As-built Requirements for Engineered Fill

The Contractor will retain an Ontario Land Surveyor (OLS) or Professional Engineer (P.Eng.) to supervise and where required herein certify all work associated with the survey and as-built requirements for Engineered Fill.

This article is to be read in conjunction with the Engineered Fill Certification requirements of the Company's geotechnical consultant included as an appendix to this document.

The Contractor will layout the limits of the fill envelope as shown on the drawings.

Following stripping, including any necessary subexcavation, the Contractor will take as-built elevations of the stripped ground within the limits of the engineered fill envelope. The ground elevations and the limits of the fill envelope will be certified and dated by the Contractor's OLS or P.Eng. and provided to the Consultant.

The Contractor will provide survey stakes and grade sheets to identify the specified height, by geodetic datum, of the engineered fill (at specified intervals if not all at one level) for each lot within the engineered fill envelope.

The Contractor will provide a copy of the grade sheets, prepared under the direction of the Contractor's OLS or P.Eng., to the Consultant's representative or designate.

Immediately following the completion of the engineered fill within an envelope the Contractor's OLS or P.Eng. will take elevations at the top of the fill line on a 10 metre grid across the envelope and again identify the limits of the fill envelope. The OLS or P.Eng. will reference all property lines, side and rear lot lines to the grid. These elevations and reference locations will be certified and dated by the Contractor's OLS or P.Eng.

A dated plot and digital disc of the top and bottom of the engineered fill and defined envelope, referenced to the property lines of each lot within the fill envelope will be submitted "certified" by the Contractor's OLS or P.Eng.

If required by the Consultant, the Contractor will calculate a volumetric quantity of engineered fill within the envelope, certified by the Contractor's OLS or P.Eng.

3.0 MEASUREMENT

Unless otherwise specified, no measurement of earthworks will be made.

4.0 PAYMENT

The price provided within the Pricing Schedule shall be compensation in full for all labour, material, consumables, and equipment to do all excavation, filling and compaction, control of surface and groundwater to complete the engineered fill requirements.

PROJECT SPECIFICATION NO. 1

GENERAL REQUIREMENTS

This specification is to be read in conjunction with the General Specification No. 1 - General Requirements.

Information provided in this specification supplements the General Specification and in the event of conflict between this specification and the general Specification, this specification shall govern.

4.0 DESCRIPTION

The 470 Tremblay site owned by Canada Lands Company CLC Limited is comprised of the proposed development of mixed-use, residential, park and stormwater management block components as well as the realignment of Tremblay Road.

The proposed work in Contract I includes mass earthworks operations to achieve the required balance line elevations and the installation of temporary erosion and sedimentation control measures. The proposed work in Contract II includes the installation of proposed underground services and their associated appurtenances, R.O.W. fine grading and construction of road structure to base asphalt. The Contractor shall accept the site as it is at the time of completing the Pricing Schedule for this RFP.

Notwithstanding the above, following completion of underground servicing and roads to base course asphalt, the Contractor must provide a topographical survey certified by Ontario Land Surveyor confirming the restored elevations as per SC 28. The Company reserves the right to credit from the payment to the Contractor for any incomplete restoration as substantial work. The deduction will equal the cost for the Company to complete the substantial restoration by another contractor.

The Contractor shall coordinate their work with any other contractors working on site at the time.

3.0 TRAFFIC

Access to the site will be from Existing Tremblay Road and St Laurent Boulevard only. Access points other than those noted on the engineering drawings are prohibited unless otherwise approved by the Consultant. Parking is not permitted on existing City roads (Existing Tremblay Road and St Laurent Boulevard) unless approved by the City.

Where construction occurs on Tremblay Road and St Laurent Boulevard, all lanes of traffic are to be maintained in each direction at all times. The Contractor is to submit a traffic control plan to the satisfaction of the City. The traffic control plan must be approved by the City a minimum of 10 days in advance of any disruption to traffic. The Contractor is responsible for obtaining road occupancy permits and road cut permits as required.

The Contractor is responsible for maintaining access to all dwelling units and businesses at all times. Driveway access is to be restored as quickly as possible.

The Contractor must perform operations, machine and equipment movements, deliveries and removals at times that will minimize disruption to traffic.

Refer also to Special Conditions Article SC6.

3.1 Traffic Control

The cost for all necessary permits, traffic signage, traffic control devices, temporary lane painting, delineators and flag persons shall be included in the prices provided within the Pricing Schedule. The Company will not entertain any claims for extras with regards to traffic control.

4.0 DISPOSAL SITES

The Contractor shall arrange for off-site disposal of any roots garbage, debris, excess excavated material, and/or unsuitable fill material. The cost of this disposal as well as the cost of loading and transporting of material to the disposal site shall be included in the provided within the Pricing Schedule prices.

6.0 CLASSIFICATION OF EXCAVATED MATERIALS

Unless otherwise noted the following will apply for the purpose of this contract:

Structural Fill shall be fill compacted using the necessary equipment and procedures to achieve a minimum of 95% and 100% Standard Proctor dry density for roads and building foundation respectively.

6.1 Rock Excavation

For the purpose of this Contract, neither weathered nor sound shale shall be classified as rock, but as earth. No extra payment for excavation in shale shall be considered.

6.4 Ontario Regulation 347, General Waste

Ontario Regulation 347, General Waste shall be applied to this Contract. Any excavated materials shall be tested and classified per this regulation and segregated into temporary stockpiles for inspection prior to disposal offsite. Only materials which meet the requirements for residential uses shall be reused on site.

10.0 LIMITS OF CONTRACT

On the Company's land, the Contractor shall limit their operations to within limits shown on the Engineering Drawings. The Contractor shall make their own arrangements for working on adjacent private property if required except where directed to do such work by the Company or the Consultant.

11.0 EXISTING STRUCTURES AND UTILITIES

The available information pertaining to existing infrastructure in the project area is reflected on the engineering drawings. The Company and Consultant take no responsibility for the completeness, accuracy or validity of the information provided by the various utilities. The Contractor must satisfy themselves of the location of these existing services.

The Contractor must contact the various utilities, and obtain a field locate at least 5 days prior to the start of construction.

The Contractor should note that some utilities may require that excavations in the vicinity of their existing plant be hand dug when crossing their existing services. All costs for hand digging excavations shall be included in the contract unit prices. The Contractor should note that existing utilities may have to be relocated. The Contractor shall be responsible for coordination of utility relocation with any and all utility companies.

The Contractor is to ensure existing hydro, communications, cable T.V. and gas are supported in accordance with the requirements of the utility during the installation of any and all service connections, sewers and/or watermains.

Contract prices shall include locating, maintaining, supporting and repairing damaged utilities. Refer also to Special Conditions - Article SC3.

13.0 TEMPORARY RELOCATION OR SUPPORT

Temporary relocation or support of an existing buried or overhead utility shall be provided by the Contractor in accordance with the requirements of the City of Ottawa and the respective utilities. The means of support and protection shall be designed to be in conformance with the latest requirements of the Occupational Health and Safety Act of the Province. The Contractor will provide the utility, Company, and the Consultant a copy of the proposed means of support at least 5 working days prior to the start of work. It is the responsibility of the Contractor to contact the respective utilities to confirm their respective requirements based on the Contractor's proposed construction methodology and equipment. Support, backfill and restoration shall be in accordance with the requirements of the utility agency. Clearance from overhead lines is the responsibility of the Contractor. The Company shall not entertain any additional costs for any of the above.

14.0 EXISTING DRAINAGE

The contractor shall maintain adequate site drainage and siltation control for the duration of the Contract including construction and maintenance of swales, temporary ditches, berms, drainage structures and temporary culverts whether they are shown on the drawings or not.

The Company shall not entertain any additional costs related to the siltation of neighbouring natural features or properties.

All costs related to the requirements of this specification shall be included in the provided within the Pricing Schedule unit prices.

Refer to Special Conditions SC5.

23.0 OTHER CONTRACTORS

The Contractor shall make all necessary arrangements and coordination with other contractors and shall not claim extra payment due to the presence of such other contractors. At no time shall Contractors work in the same place and time.

24.0 MEETINGS

A representative of the Contractor (and any Subcontractors) shall attend the pre-construction meeting and periodic site meetings for the duration of the work.

PROJECT SPECIFICATION NO. 2

SITE PREPARATION

This specification is to be read in conjunction with General Specification No. 2 - Site Preparation.

Information presented in this specification supplements the General Specification and in the event of conflict between this specification and the General Specification, this specification shall govern.

5.0 DESCRIPTION

The Proponent must examine the site prior to submitting their Pricing Schedule. The Proponent must satisfy themselves of the existing site conditions and include in the Pricing Schedule prices requested any costs required to complete the works as specified in the contract drawings and specifications. The Contractor shall supply written confirmation that they have undertaken their own documentation of the quantities and satisfied themselves, prior to the submission of the Pricing Schedule. The contractor will accept the site "as is" at the time of the start of work. The submission of a Pricing Schedule shall constitute presumptive evidence that this requirement has been satisfied.

1.1,1.2 Clearing and Grubbing

The Contractor is advised to examine the site at the time of completing the Pricing Schedule. Any remaining clearing, grubbing, or stripping which the contractor determines is required to be completed shall be included in the Pricing Schedule.

1.3 Stripping

All topsoil stripping and earthworks are being carried out under this contract to prepare all roads, lots and blocks to pre-grade elevations. The Contractor will restore all disturbed area grading on lots and blocks to previous condition based on the balance lines specified in the Earthworks Contract, and provide a survey confirming the same.

In the event existing topsoil piles impede the operation of the Contractor in completing the requirements of this contract, he shall identify the area of concern in sufficient advance time, to allow the Company sufficient time to make arrangements to have the necessary portion of the pile relocated.

At no time shall topsoil be used for the purpose of backfilling or in areas which are unacceptable to the Company's Geotechnical Consultant. The definition of topsoil for the purpose of this contract will be equivalent to that of the Company's Geotechnical Consultant.

2.0 CONSTRUCTION

2.6 Existing Structures and Utilities

The Contractor is responsible for the field location and identification of existing utilities overhead and underground prior to the start of work. This includes arranging for non-mechanical type excavations, such as Hydrovac or hand digging to undertake the exposure of the existing utilities or structures within the roadway or boulevard and as required by utility companies.

Those existing services and utilities to be crossed by the Contractor to complete the works shall be supported in accordance with the requirements of the utility, City of Ottawa and the requirements of the Occupational Health and Safety Act.

2.7 Sediment Control Devices

Sedimentation control devices shall be supplied and installed as shown on the drawings. The Contractor shall clean and maintain the sedimentation control devices periodically to the satisfaction of the Consultant and City of Ottawa requirements.

3.0 MEASUREMENT

3.3 Topsoil Stripping

Stripped topsoil will be paid on a cubic metre basis. The volume will be determined by the Consultant based on surveys taken prior to stripping and after stripped and calculated using AutoCAD Civil 3D.

4.0 PAYMENT

There is no additional itemized payment for clearing and grubbing, restoration of area grading, surveys, or topsoil stripping. In the event the Contractor encounters additional topsoil the Company and the Consultant shall be notified in sufficient time to allow for its removal with no delay to the Contractor's schedule.

The requirements of this Specification will be included in the unit prices within the Pricing Schedule.

PROJECT SPECIFICATION NO. 3

GENERAL GRADING AND EARTHWORK

This specification is to be read in conjunction with General Specification No. 3 - General Grading and Earthwork.

Information presented in this specification supplements the General Specification and in the event of conflict between this specification and the General Specification, this specification shall govern.

1.0 DESCRIPTION

The Contractor will accept the site "as is" at the time of the start of work. Submission of the Pricing Schedule will constitute presumptive evidence that the Contractor has undertaken the necessary inspection of the site to satisfy themselves of the site conditions.

The Contractor is responsible to:

- Monitor the status of the sedimentation and erosion controls and maintain as necessary as required by the Consultant and City of Ottawa.
- Proofroll the subgrade of all fill areas prior to filling, and remove, replace or compact any soft or unsuitable areas identified by the geotechnical consultants.
- Provide positive drainage to existing outlets to avoid any ponding.

Provide and maintain positive drainage to approved outlets for all areas during and upon completion of this contract. The same specifications shall apply to completion of rough grading required under this contract. Following completion of underground servicing, the contractor must complete a topographical survey certified by an Ontario Land Surveyor confirming the restored elevations, as per SC 28. The Company reserves the right to credit from the payment to the Contractor for any incomplete restoration as substantial work. The deduction amount will equal the cost for the Company to complete the substantial restoration by another contractor.

2.0 CONSTRUCTION

2.4 Rough Grading

Rough grading shall be carried out to the subgrade elevation provided by the consultant.

Rough grading shall be in accordance with the requirement and procedures noted in the Geotechnical report.

2.2 Fine Grading

Fine grading shall be in accordance with the requirement and procedures noted in the Geotechnical report.

3.0,4.0 MEASUREMENT AND PAYMENT

The Contractor will provide the following surveys under the seal of a licensed Professional Engineer or Ontario Land Surveyor:

- Existing ground will be taken from the survey completed by the Company's O.L.S..
- Subsequent to the topsoil stripping and related operations, a survey of the stripped ground with spot elevations at 5m intervals internally and along boundary areas, indicating the pre-filling sub-grade for reference.
- Surveys of the final topsoil stockpiles (in the event topsoil is kept on site), top of engineered fill, prior to topsoil re-use and burial (top & bottom of trench) within the Company's lands. The survey of the lots will be provided as required by the Consultant and Geotechnical consultant in order to properly complete the determination of the extent and certification of engineered fill as described under this specification. A bulking factor of 0.80 will be used on any stockpile to determine the in-situ volume for payment.
- Subsequent to the completion of the cutting and filling of all roads, a survey of the centreline, both streetlines and easements.

All surveys will be completed and delivered in an Autodesk Civil 3D Version 2018 or newer format in addition to the hard copy under seal, with reference to at least two independent benchmarks, and tied to established boundary monumentation. The works associated with each survey will be deemed incomplete until the surveys are received by the Consultant and the Geotechnical Consultant in an acceptable form.

Substantial Completion will not be approved until the Consultant has received and is satisfied with all the surveys required under this specification.

The Company reserves the right to confirm using independent means the accuracy of the surveys provided by the Contractor. In the event the Contractor's surveys are found to be inaccurate, the costs of the Company's survey and any necessary subsequent surveys, will be deducted from the progress payments to the Contractor.

The Consultant will only review and certify to the Company survey information provided by the Contractor which the Contractor declares complete. One review will be the initial review and comments, and a second review subsequent to rectification of deficiencies if required. Costs of any additional reviews will be undertaken at the cost of the Contractor. These costs will be deducted from the payment by the Company to the Contractor.

The lump sum or unit prices provided within the Pricing Schedule shall apply in this Contract regardless of the final quantity of topsoil, or earth moved or work carried out to achieve the required grades specified in this contract and the approved drawings and in accordance with the requirements of SC7 - Work Schedule. The lump sum prices provided within the Pricing

Schedule for the work done governed under this specification shall be full compensation for all labour, materials, permits, coordination, surveys and plant required to complete the work.

Quantities shall be calculated by the Consultant utilizing Autodesk Civil 3D. The quantities determined by the Consultant will be final.

All costs related to the on-site disposal and burial of boulders shall be included in the prices provided within the Pricing Schedule.

5.0 BENCHMARKS

Elevations are in metres and are derived from Geological Survey of Canada benchmarks. Elevations are geodetic and refer to the Canadian Geodetic Vertical Datum (1928), pre-1978 adjustment.

PROJECT SPECIFICATION NO. 4

EXCAVATION AND BACKFILL

This specification is to be read in conjunction with General Specification No. 4 - Excavation and Backfill.

Information presented in this specification supplements the General Specification and in the event of conflict between this specification and the General Specification, this specification shall govern. In the event of a conflict between this specification and the recommendations of the Geotechnical Study prepared by the Company's geotechnical consultant, the geotechnical recommendations shall govern.

3.0 TRENCH EXCAVATIONS

All trenching to be in accordance with the latest revisions of the Occupational Health and Safety Act and Regulations for construction projects.

3.1 Alignment and Depth

Backfill and compact with granular material in accordance with the requirements of the Company's Geotechnical Consultant reports and recommendations and City of Ottawa current standards.

When for any reason the trench is over-excavated, the Contractor shall, at their own cost, backfill to the correct grade in accordance to the requirements and procedure specified by the Geotechnical consultant.

3.2 Trench Width

1. Maximum and minimum trench widths shall be as details on the drawings for common trench sewers. For separate trench storm and sanitary sewers refer to O.P.S.D. 802.010 for PVC pipes and 802.030 Class B for concrete pipes.
2. The Company's Geotechnical Consultant will be present to monitor the trench slope stability during construction activity.
3. Vertical trench is to be used where required due to existing soil conditions.
4. Sheet piling or other approved vertical trenching techniques to be used as required for sewer construction.

5.0 DEWATERING

All dewatering costs to be included in the unit price for the individual infrastructure (sewers, manholes, watermains etc.) within the contract, including dewatering and sand or granular seams that may be encountered. The Contractor is encouraged to review the available subsurface information related to existing ground conditions.

The Contractor should familiarize themselves with the geotechnical and hydrogeological reports included with this contract. The contractor shall pay particular attention to dewatering requirements. All costs for equipment, material and labour shall be included in the unit prices. There will be no separate payment for dewatering.

5.0 EXISTING PAVEMENTS

5.1 Size of Excavation

For this Contract, the method of trenching shall be chosen by the Contractor.

The Contractor shall be responsible for restoration of existing asphalt pavement, curbs, sidewalks and other surface features disturbed by their operations.

All joints with existing pavement in the municipal rights of way shall be treated and restored in accordance with the municipality's requirements, to the same depths of asphalt, and granular base materials including all necessary compactive effort.

The Contractor shall include all costs related to restoration and joint treatment in their unit prices provided within the Pricing Schedule. The Company will not entertain any extras with respect to restoration of existing surface features.

5.2 Disposal

Any existing asphalt pavement, concrete etc. which has been removed by the Contractor to complete the works outlined in this specification shall be disposed of off-site by the Contractor, at no additional cost to the Company.

7.0 EXISTING UTILITIES AND STRUCTURES

The Contractor shall protect all existing and temporary utilities. It is the Contractor's responsibility to obtain all necessary permits and field locates prior to digging, all in conformance with the utility's or municipal authority requirements.

8.0 FROZEN GROUND MATERIAL

Frozen materials or earth will not be permitted for use as backfill. The determination of frozen materials will lie in the sole discretion of the Company's Geotechnical Consultant.

9.0 PIPE BEDDING

9.1 Materials

Refer to Company's Geotechnical Consultant reports. Also see item 3.1 above

9.2 Placing

Granular bedding materials should be placed as detailed on the contract drawings and should be compacted to 98% Standard Proctor Maximum Dry Density. Refer to Notes drawing NT1 for bedding requirement.

10.0 BACKFILLING

Backfilling shall be carried out in accordance with the Company's Geotechnical Report recommendations. The Contractor is encouraged to review the Geotechnical Reports. Prior to backfilling of any trench the Contractor shall confirm and provide written evidence that the necessary ties, and elevations have been obtained by the Contractor's surveyor.

Also see item 3.1 above.

11.0 PAYMENT

The Contract Price shall be compensation in full for all excavation in any material including dealing with frozen materials, sheeting and shoring and dewatering if necessary, and backfill and compaction as required and as directed by the Consultant.

The unit prices provided within the Pricing Schedule for manholes shall include the cost of granular backfill as specified.

The contract price shall include aerating and/or drying wet material as required and as directed prior to backfilling.

The lump sum and unit prices provided within the Pricing Schedule shall apply to the Contract regardless of the final quantity of the materials or earth moved or work carried out to achieve the required grades specified on the approved drawings and in accordance with this specification.

Upon completion of the backfilling of trenches, the contractor shall carry out the necessary rough grading to allow for the construction of the final surfaces as specified such as roads, lots, walkways or landscaped areas. The unit prices provided within the Pricing Schedule shall include all costs associated with this requirement. The Company will entertain no extras for this requirement.

The unit prices provided within the Pricing Schedule for the work under this specification shall include all necessary arrangements for offsite disposal, including all labour, equipment and materials required for the excavation, haulage and disposal fees.

Any disturb areas must be brought back to preconstruction grade unless otherwise directed by the Consultant.

11.3 Excess Excavation

There shall be no payment for the backfilling of any over-excavation in accordance with specifications of this contract by the Contractor.

Payment for the backfilling of any over-excavation as directed by the Consultant shall be made in accordance with the Schedule of Additional Unit Prices.

PROJECT SPECIFICATION NO. 5

WATER DISTRIBUTION SYSTEM

This specification is to be read in conjunction with General Specification No. 5 - Watermains and Appurtenances.

Information presented in this specification supplements the General Specification and in the event of conflict between this specification and the General Specifications, this specification shall govern.

2.0 MATERIALS

Watermains and appurtenances to be to City of Ottawa Specifications.

3.0 CONSTRUCTION

3.1 General

Watermains shall have 2.40 metre minimum cover at all locations along its length unless otherwise directed by the Engineer. Where the depth of the watermain or appurtenances does not meet the requirements of City of Ottawa, the main or appurtenance will be provided with sufficient insulation to compensate for the lack of cover per City of Ottawa Std. W25.2. All metallic components shall be protected from corrosion by cathodic protection per the latest OPSD or AWWA and City of Ottawa standards.

3.5 Connections to Existing Watermains

All connections to existing watermains must be coordinated by the Contractor with the City of Ottawa officials and the Consultant.

Watermain bedding shall be in accordance with City of Ottawa Standard W17.

3.7 Anchorage of Pipes, Fittings, and Hydrants

Thrust blocks are to be installed as per the City of Ottawa Standard W25.3 and W25.4. Watermains in fill areas are to be installed with restrained joints as per City of Ottawa W25.5 and W25.6.

3.9 Valve Boxes

The price for valve boxes located within boulevards shall include the setting and adjustment of the top to finished grade. The price for valve boxes within roads shall include setting and adjustment of the top to base course asphalt level. The price for valve boxes within roads shall also include adjustment of the top from base course asphalt level to top asphalt level.

3.10 Valve Chambers

Chamber drain may be connected to storm sewers only with agreement of Drinking Water Services provided that an approved backflow prevention device is included per Section 4.4.7.4 of Ottawa Design Guidelines – Water Distribution.

3.11 Hydrants

All hydrants shall be installed as per City of Ottawa Std. W19 and located as per City of Ottawa Std W18.

3.12 Service Connections

Type K soft copper as per City of Ottawa Std. W26 unless otherwise specified.

4.0 HYDROSTATIC TESTS AND FLUSHING

4.3 Allowable Leakage

Leakage tests shall be applied to the mains in suitable sections after the backfilling is completed. The ends of the mains shall be capped or valves closed and the main filled with water under a pressure of 1035 kPa after which all visible leaks shall be stopped. Leakage shall then be measured by a calibrated meter supplied by the Contractor with readings taken at fifteen minute intervals for a period of three hours. The average rate of leakage shall not exceed 115 L/day per 25 mm of diameter per km of pipe, and if the leakage exceeds this figure the Contractor shall locate and correct the leaks. Tests shall be repeated until the leakage is less than the specified amount. The pipe shall be left exposed where directed until the completion of the test, after which backfilling shall be completed. The cost of the labour and the materials required to locate and correct the leaks shall be borne by the Contractor. Leakage tests shall be borne by the Contractor. Leakage tests shall be carried out by the Contractor.

4.3.1. Swabbing

As a requirement to this Contract all watermains shall be swabbed immediately after the leakage test and prior to disinfection. In most cases watermains are usually swabbed using fire hydrants as points for entry and exit. Because of this, the main valve seat must be removed and a blind seat installed to prevent undermining the soil at the hydrant boot. The practice also prevents damage to the original hydrant seat as debris passes through the hydrant. All swabs must be inspected prior to insertion and immediately after they exit the main to ensure that they have remained intact and that pieces of the foam do not stay in the main. The swabs should also be numbered and carefully controlled by the Contractor and Consultant to ensure that all swabs that are introduced to the main are accounted for. Only new swabs will be permitted for use and in no case will used swabs be allowed.

All watermain pipes must be swabbed a minimum of one time plus a minimum of one swab shall be passed through each hydrant lead, stub or blow-off. Additional swabs shall be used as directed by the Consultant if discharge water does not run clear within ten (10) seconds of the swab exiting the discharge point. Swabs shall be forced through the watermain using potable water so that they maintain a velocity of 0.5 to 1 metre per second. Any method of disposal of the discharged water must be approved by the Consultant. The Contractor shall take the necessary precautions to minimize soil erosion and to reinstate the area upon completion. All swabbing must be completed before any services are connected.

The swabs must be an open cell polyurethane foam, having a density of 1.5 pounds per cubic foot (19 grams per cubic metre), and are to be a minimum of 50 mm larger than the nominal pipe diameter with a length of at least one and a half times its diameter. Watermains 300 mm or smaller can be swabbed through hydrants on approval by the Consultant.

4.3.2 Disinfection

After swabbing, the watermains shall be chlorinated. The work of chlorination and sterilization will be performed by the Contractor for a period of 24 hours.

4.4 Flushing

Immediately after sterilizing, swabbing and hydrostatic and leakage tests are completed, the main shall be flushed again according to City of Ottawa Standards and left charged, so that the work of connecting the water services may proceed at once. Care should be exercised to ensure that the flushed wastewater shall be disposed of in such a manner to protect the environment as well as being approved by the Consultant.

5.3 Bacteriological Tests

The Contractor shall collect samples from the disinfected watermains for the performance of bacteriological tests. Should the tests prove unsatisfactory, the watermains in question shall be rechlorinated, flushed and tested until satisfactory results can be obtained. All costs for further disinfection shall be borne by the Contractor.

7.0 PAYMENT

7.1 Watermains

The Unit Price for watermain shall include all labour, materials and equipment required to construct watermains and appurtenances as per the drawings and specifications including all necessary excavation, bedding, backfill, insulation, compaction, restoration, plugs, restrained joints, thrust blocks, testing and other requirements of City of Ottawa, also corrosion prevention as described in General Notes – NT1.

The Unit Prices provided within the Pricing Schedule for works under this specification shall include disposal off-site of any surplus materials at completion of the work per SC1.

The Unit prices shall include all traffic controls and temporary detour provisions for those works in this specification, within existing road allowances or adjoining rights of way where other traffic may travel. This includes both pedestrian and vehicular traffic controls and provisions.

The Unit Price also includes extra depth watermain and crossings under existing utilities where indicated on drawings, and full compaction of backfill in trenches under pavements.

The Unit Prices provided within the Pricing Schedule shall include all necessary layout and preparation of As-Constructed red-line plans in accordance with the requirements of the Special Conditions, and City of Ottawa for the work under this specification.

PROJECT SPECIFICATION NO. 6

SEWERS AND APPURTENANCES

This specification is to be read in conjunction with General Specification No. 6 - Sewers and Appurtenances.

Information presented in this specification supplements the General Specification and in the event of conflict between this specification and the General Specifications, this specification shall govern.

2.0 MATERIALS

2.1 Sewer Pipe

- .1 Concrete pipe up to and including 900 mm dia. shall be supplied by a manufacturer which has obtained prequalification by the Joint OCPA/MEA/MECP Prequalification Committee.
- .2 All sewer joints to be fitted with rubber gaskets.
- .3 PVC sewer pipe shall be equal to CSA 182.2 or latest amendment Class DR-18, SDR-26, SDR-35 as specified on the drawings.

2.3 Manholes

- .1 Sanitary manhole frames and covers to be in accordance with City of Ottawa Std S24 and S25. All adjustment units, frame and grates are to be sealed as per the inflow and infiltration mitigation measures detail.
- .2 Storm manhole frames and covers to be in accordance with City of Ottawa Std S24.1 and S25.
- .3 Manholes to be in accordance with OPSD standards.

2.4 Catchbasins

- .1 Catchbasin and double catchbasins to be in accordance with City of Ottawa Std S1 and O.P.S.D. 705.020 respectively. Frames and grates per City of Ottawa Std. S19.1.
- .2 Curb inlet catchbasin to be in accordance with City of Ottawa Std S3. Frames and grates per City of Ottawa Std. S22 and S23.

2.5 Pipe Bedding

All bedding for sewers is to be installed as per the recommendations of the Geotechnical Consultant and the notes as shown on Drawing No NT1.

3.0 CONSTRUCTION

3.2 Pipe laying

Where a sewer crosses another sewer or watermain with less than 300 mm separation, the pipes shall be encased in 20 MPa concrete from the base of the lower to the springline of the higher. Concrete encasement is to be completed from pipe joint to pipe joint. Concrete encasement is to be included in the price provided within the Pricing Schedule for sewer construction.

Where trenchless methods are used, the Contractor shall submit the necessary shop drawings which include the hydrostatic joint rating being proposed.

3.6 Sewer Laterals

Sewer laterals are to be installed as per notes on Drawing NT1.

3.7 Manholes

Concrete pipe to be supported from maintenance hole to the first pipe joint 1.0 m from outside wall with 20 MPa concrete to undisturbed ground. Maintenance holes shall be backfilled with Granular "B".

Minimum width of manhole benching is to be 230mm except beneath the access where it shall be at least 450mm.

All poured in place manholes are to be founded on compacted Granular 'A' or equivalent approved by the Geotechnical Consultant. A minimum thickness of 300 mm compacted to 100% Standard Proctor Maximum Dry Density (SPMDD) shall be provided unless otherwise noted by the Geotechnical Consultant.

Any soft subgrade sections are to be removed and replaced with 50 mm crusher run limestone or equivalent approved by the Geotechnical Consultant.

All adjustment units, frame and grates are to be sealed as per the inflow and infiltration measures detail.

3.8 Catchbasins and Catchbasin Leads

Subdrains shall be connected to all catchbasins.

4.0 TESTING

4.2 Procedure

1. The Contractor shall carry out T.V. camera inspections of all sewers up to and including 1500 mm diameter installed under this Contract. The camera can be either pulled or self propelled through the pipes, the equipment is to have features to enable closer examination of faults and to view up lateral connections. The equipment is to provide "measured" location of the camera relative to manholes in order to locate faults, laterals, etc. Two copies are to be provided on CD and shall be submitted directly to the Consultant. Three T.V. camera inspections are required; one following base asphalt, second prior to the first occupancy, and a final prior to assumption. The two copies of each video recording shall be delivered by the Contractor to the Consultant along with a written report with photographs of problem areas.
2. The air-test, infiltration test and exfiltration test for the sanitary sewer system is to be completed at three times during the construction of the proposed works. First upon completion of the sanitary sewer system, second upon completion of base asphalt and finally prior to the first occupancy.

3. Prior to assumption the Contractor shall conduct smoke tests of all sanitary sewers to confirm that there are no cross connections. Supplemental dye testing shall also be conducted when directed by the Engineer as described in the City of Ottawa Standards.

4.3 Allowable Limits

The Contractor shall verify the allowable limits for all testing procedures according to the requirements of City of Ottawa.

5.0 MEASUREMENT

No measurement of sewers or maintenance holes for payment purposes will be undertaken in the field.

6.0 PAYMENT

The unit prices provided within the Pricing Schedule for the works under this specification include all necessary work to obtain and prepare the As-Constructed information required under the Special Conditions.

The Unit Prices provided within the Pricing Schedule for works under this specification shall include disposal off-site of any surplus materials at completion of the work per SC1.

The Unit Prices provided within the Pricing Schedule or works within existing road allowances under this specification shall include all necessary traffic controls and detours, both vehicular and pedestrian, in accordance with specifications of this Contract and City of Ottawa requirements; restoration of existing roads including backfill, granular base and subgrade base asphalt and top asphalt to match existing conditions; and restoration of existing boulevards, including backfill, topsoil, and sod.

The Contract Price shall include all costs associated with T.V. inspections. No additional amount shall be paid for this work. Any cost of repairing defective work and subsequent re-inspection shall be at the Contractor's sole expense.

The Contract Price for sewers shall include any temporary pumping required if no outfall is available due to scheduling the work program.

The prices provided within the Pricing Schedule in the pipe and manhole items for storm sewer shall include the cost of all required testing.

All costs associated with the testing of the sanitary sewer is to be included in the prices provided in the contract price.

All costs associated with the inflow and infiltration mitigation measures are to be included in the unit prices for the manholes and manholes adjustment as noted.

6.3 Maintenance Holes

The unit prices provided within the Pricing Schedule for maintenance holes shall include backfill approved by the Geotechnical consultant, the placement of 15 MPa concrete fill under the maintenance holes to undistributed ground in locations where the maintenance hole foundation has been excavated or otherwise substantially disturbed.

The unit prices provided within the Pricing Schedule for maintenance holes shall in all cases include drop connections and safety platforms as required on the drawings, whether or not such specials are highlighted in the Pricing Schedule.

6.4 Catchbasins

The price provided within the Pricing Schedule for single and double catchbasins shall also include the cost of supplying and installing the appropriate lead and any bedding material required in addition to that specified to make up the difference between undisturbed ground and the underside of the catchbasin.

6.9 Testing

The unit prices provided within the Pricing Schedule shall include all costs related to the tests as noted in Section 4.0 which may be requested by the Consultant. This includes the cost of television camera inspection of all sanitary sewers and the provision of the required video tapes and report to City of Ottawa.

7.0 SILTATION CONTROL DEVICES

The Contractor will be responsible for installing siltation control facilities (sediment ponds and hickenbottom drains with outlets or temporary catchbasin sedimentation control devices) at various points within the site. In some cases the Consultant may direct the reconstruction of the ponds or outlets and to connect the outlet pipes as directed with payment to be based on the additional unit prices provided in the Contract, and the review and approval by the Consultant.

PROJECT SPECIFICATION NO. 7

ROADS, CURBS AND SIDEWALKS

This specification is to be read in conjunction with General Specification No. 7 - Roads, Curbs and Sidewalks.

Information presented in this specification supplements the General Specification and in the event of conflict between this specification and the General Specifications, this specification shall govern.

3.0 CONSTRUCTION

Sub-drains to be laid continuously beneath all curbs in accordance with City of Ottawa Standard R1.

3.1 Road Base, Driveways, Parking Areas and Sub-Base

Subgrade

Any topsoil found within the roadway areas should be removed prior to commencement of sub-grade preparation. All sub-grades shall be proof-rolled with a representative of the Geotechnical consultant to identify and remove soft-spots. Contractor to notify the Consultant 48 hours prior to any proof rolls.

The sub-grade shall be compacted in accordance with the procedures as noted in the Geotechnical report.

4. Sub-base

The granular sub-base shall be installed in accordance with the requirement and procedures noted in the Geotechnical report.

3.2 Asphaltic Pavement

Where noted all existing pavement shall be saw cut as necessary to provide the required trench widths and joints to proposed asphalt. Joints will be provided as detailed on the applicable drawings.

The compaction and asphalt mix design shall be in accordance with the Geotechnical consultant report, OPSS and City of Ottawa Standards.

The contractor is to submit proposed asphalt mix design for review by the various authorities and Geotechnical consultant two weeks prior to the proposed start of paving. All mix designs must be provided to the Geotechnical Consultant for review and approval prior to construction.

3.2.1 Joints Between Existing and Proposed Asphalt

A 300 mm wide by 40 mm deep step joint is to be provided between existing and proposed pavement, and filled with a compacted layer of 40 mm HL3. All joints shall be routed and sealed with a hot rubber sealing compound as per OPSS 1212.

Prior to placing the tack coat and if directed by the Consultant, the base asphalt is to be flushed and swept including any minor hand cleaning all at no additional cost.

3.2.3 Joints Between Existing Base Asphalt and Proposed Asphalt

At an interface with existing asphalt roads with only base asphalt, the contractor shall provide a butt joint between the existing asphalt and proposed asphalt. The Contractor shall trim the existing asphalt to provide a straight edge for the butt joint and fill the joint with rubberized asphalt sealant as per OPSD 508.010.

3.2.4 Adjustments to Manholes, Valve Chambers and Catchbasins

The tops and frames of manholes and catchbasins shall be adjusted to the top of base asphalt using modoloc rings.

4.0 MEASUREMENT

All road quantities shall be measured on the Engineering Drawings in square metres at the specified thickness as indicated on the Engineering Drawings.

The measurement of base course asphalt shall not include the fillet laid over the top of the base curb which ultimately is trimmed off to permit top stage curb construction.

Adjustment of maintenance holes and catchbasins will be measured on a unit basis as described in Project Specification No. 6.

5.0 PAYMENT

5.1 Road Base, Sub-Base and Asphaltic Pavement

The Unit Prices provided within the Pricing Schedule for works under this specification shall also include disposal off-site of any surplus materials at completion of the work per SC1.

Payment for base asphalt and top asphalt shall be on a square metre basis of asphalt placed to the minimum specified compacted depth.

Unit prices for base asphalt shall include any immediate rectification of damaged areas or settlements and padding necessary for these settlements.

Unit prices for top asphalt shall include all machine or hand padding or scratchcoats required due to settlements of the base asphalt to provide the correct top asphalt crown. The unit price shall also include all necessary base asphalt repairs and patching required prior to top paving, including alligatored, broken or badly cracked asphalt, including the removal and disposal of broken asphalt offsite. The Contractor will not be responsible for damage by a third party. The Consultant shall determine if the repairs and/or patching is the result of a third party action.

Unit prices for asphalt shall be adjusted according to the rate of asphaltic cement used at the time of construction. The cost of asphaltic cement at the time of submission of the Pricing Schedule shall be specified by the contractor as a basis for adjusting the unit price for asphalt.

5.2, 5.3 Maintenance Hole Adjustments and Ramping

The unit price provided within the Pricing Schedule for the adjustment of manholes, chamber tops, access locations, and catchbasins shall include all the necessary materials, equipment and labour required to complete the works as specified.

5.4 Sidewalks

Payment for sidewalk shall be compensation in full for all labour, equipment and material required including excavation and fine grading, disposal of surplus material, supply of fill material and polyethylene film, expansion joints, edge scoring of both edges, regrading to boulevard level, application of curing compound, cold weather protection and cleaning and brushing of sidewalks and application of sealer.

Schedule 6 Pricing Schedule

The Proponent should use the following charts to set out its pricing. Where an item is irrelevant, indicate "N/A" in the space provided. The information listed below is not a complete description. All Proponents should refer to and review the applicable sections in the RFP before responding. In addition:

- a. all prices shall be provided in Canadian funds and shall include all applicable customs duties, tariffs, overhead, profit, permits, licenses, labour, carriage insurance, and warranties, and further shall not be subject to adjustment for fluctuation in foreign exchange rates. All prices shall be quoted exclusive of the harmonized sales taxes or other similar taxes, each of which, if applicable, should be stated separately;
- b. all prices quoted, unless otherwise instructed in this RFP, shall remain firm for the period set out in the RFP;
- c. in the event of any discrepancy in the pricing, the lowest unit price submitted shall prevail.

Proponent Name _____

Part A - Pricing

THE QUANTITIES THAT HAVE BEEN PROVIDED IN THIS SCHEDULE OF PRICES ARE NOT FINAL AND ARE ESTIMATES THAT MAY BE SUBJECT TO SIGNIFICANT VARIATION.

ACTUAL QUANTITIES WILL BE ADJUSTED UPWARDS OR DOWNWARDS AS THE PROJECT PROGRESSES REFLECTING THE UNIT RATE PROVIDED BY THE SUCCESSFUL PROPONENT FOR EACH LINE ITEM LISTED BELOW. COSTS ASSOCIATED WITH THE UNIT PRICE WORK WILL VARY DEPENDING UPON THE ACTUAL QUANTITIES EXECUTED AND MEASURED, AND AUTHORIZED BY THE COMPANY'S CONSULTANT DURING THE COMPLETION OF THE SCOPE OF WORK AND THE FINAL AGREEMENT AMOUNT WILL BE ADJUSTED ACCORDINGLY, UPWARDS OR DOWNWARDS, BASED UPON THE QUOTED UNIT RATES PROVIDED AS PART OF THIS RFP AND PROPOSAL SUBMISSIONS.

**SUMMARY OF CONTRACT PRICING
FOR
470 TREMBLAY ROAD**

CITY OF OTTAWA

ITEM	AMOUNT
CONTRACT I Earthworks and Remediation Work	\$ <u>-</u>
CONTRACT II Underground Site Servicing to Base Course Asphalt including Stormwater Management Pond	\$ <u>-</u>
SUB-TOTAL (LESS H.S.T.)	\$ <u>-</u>
Harmonized Sales Tax (13%)	\$ <u>-</u>
TOTAL TENDER PRICE	\$ <u>-</u>

**SCHEDULE OF CONTRACT PRICING
FOR
470 TREMBLAY ROAD**

**CONTRACT I:
EARTHWORKS AND REMEDIATION WORKS**

CITY OF OTTAWA

SUMMARY

ITEM	AMOUNT
A. SITE PREPARATION, TOPSOIL STRIPPING AND EARTHWORKS	\$ <u>-</u>
B. SCHEDULE OF ADDITIONAL UNIT PRICES	<u>DO NOT EXTEND</u>
SUB-TOTAL (LESS H.S.T.)	\$ <u>-</u>
Harmonized Sales Tax (13%)	\$ <u>-</u>
TOTAL TENDER PRICE	\$ <u>-</u>

Note: Prices tendered in Contract I shall be valid for the years 2021 and 2022.

A. SITE PREPARATION, TOPSOIL STRIPPING AND EARTHWORKS

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE \$	TOTAL \$
	Supply all necessary materials, equipment, mobilization, demolition, traffic control and labour to perform the following work in accordance with the drawings and specifications and as directed by the Consultant. Unit prices shall include all items specified in the special conditions, specifications, project specifications, and the engineering plans.				
1	Pre-construction structural survey, photo survey, and conditions report for existing building located at 466 Tremblay Road.	1	Lump Sum		
2	Preparation of Construction Schedule, and keeping updated for the duration of the contract. Poor weather conditions and Saturday work to be allowed for in schedule milestones.	1	Lump Sum		
3	All survey works required to complete the works within the contract, as outlined in contract specification and conditions:				
	a) Construction Layout	1	Lump Sum		
	b) Topsoil Stripped grades	1	Lump Sum		
	c) Topsoil Stockpiles	1	Lump Sum		
	d) As-constructed Pregrade	1	Lump Sum		
4	Supply, install, maintain and remove (at the consultant's request) siltation control fence per OPSD 219.110 on drawing ESC4.	1,725	m		
5	Remove existing fence within the construction limit at the consultant's request:				
	a) Existing black chainlink fence.	770	m		
	b) Existing T-Bar and wire fence.	790	m		
6	Decomission and remove offsite all existing monitoring wells in alignment with current MECP standards, including all permitting and coordination with MECP.	3	each		
7	Clear all trees and vegetation as identified on Figure CG1 - Clearing and Grubbing Plan. All material to be disposed of offsite, including grubbing all tree stumps. All vegetation outside of the construction limits are to be protected.	1	Lump Sum		
8	For the duration of the Contract, supply, maintain and install temporary metal mudloc fencing around the adjacent development boundary northeast of the construction zone.	720	m		
9	Construct, maintain and remove (at the consultant's request) temporary mud mat per City standards.	2	each		
10	Construct temporary sedimentation ponds as shown on drawings ESC1 and ESC2 including hickenbottom drain, outlet pipe and spillway. Maintain through the enitre duration of the contract, and ultimately remove and reinstate area to appropriate engineer-filled pregrade at the direction of the Engineer. Removal of sediment off-site.	1	Lump Sum		

A. SITE PREPARATION, TOPSOIL STRIPPING AND EARTHWORKS (CONTINUED)

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	TOTAL
11	Cut temporary diversion swales as per dwg. No ESC1, ESC2 and ESC3.	2,125	m		
12	Supply, place and maintain rock check dams as per OPSD 219.210 on dwg no. ESC4.	34	each		
13	Construct, maintain and remove (at the consultant's request) temporary 20x10m sediment trap ditches per OPSD 219.220 on drawing ESC4, including hickenbottom drains as required.	3	each		
14	Supply install and remove (at the consultant's request) temporary: a) 500mm CSP culvert (Provisional) b) 600mm CSP culvert (Provisional)	21 28	m m		
15	Supply, install, maintain and remove (at the consultant's request) catchbasin sediment trap as per detail on drawing ESC4.	19	each		
16	Construct and maintain 0.3m plunge pool complete with 50mm dia. clearstone fixed on Geotextile 270R.	1	each		
17	Strip topsoil as per the specifications and in alignment with the Pregrade Plan Figure. Stockpile within Block 5 and/or Block 8 with a maximum stockpile height of 3.0m and maximum side slopes of 2:1. Stabilize the stockpiles as required and provide boundary siltation control fence.	11,700	m ³		
18	Strip topsoil as per the specifications within the construction limit and dispose off site. (Provisional)	5,000	m ³		NOT CARRIED
19	Excavate and remove offsite unsuitable material at the direction of the Consultant, including transportation and disposal of material at a suitable landfill location. (Provisional)	13,365	m ³		
20	Cut to fill site including transport and placement to pregrade (balance line) elevations within the limits of the site and compaction to engineered fill standards. Item to include Third Party Geotechnical Compaction Testing as mentioned in the Contract Specifications.	18,300	m ³		
21	Import geotechnically appropriate, suitable material for engineered fill from offsite including a provision for load and haul route restrictions and including a provision for certification of material indicating its suitability. Material to be placed as fill and compacted to the recommendations of the Geotechnical Engineer and to the specified pregrade elevations. Import material to be sourced by the Proponent. Item to include Third Party Geotechnical Compaction Testing as mentioned in the Contract Specifications. (Provisional)	28,400	m ³		
22	Fill and compact topsoil within the park block, all 3:1 sloping areas, and where engineered fill is not required, at the direction of the Consulting Engineer. Item to include Third Party Geotechnical Compaction Testing as mentioned in the Contract Specifications. (Provisional)	4,200	m ³		

A. SITE PREPARATION, TOPSOIL STRIPPING AND EARTHWORKS (CONTINUED)

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	TOTAL
23	Convert temporary sediment pond to ultimate pond design in pond block as shown on drawing ESC2 including hickenbottom drain, outlet pipe and spillway.	1	Lump Sum		
24	Supply and install erosion protection blankets to stabilize temporary swales as directed by the consultant (Provisional) .	2,125	m		DO NOT EXTEND
25	Mud and Dust control for the duration of the Contract.	1	Lump Sum		
26	Topographic survey with tie-in perimeter grades a minimum of 10 m from area of work.	1	Lump Sum		
27	Hydroseed stripped ground to stabilize inactive areas after 30 days of inactivity (Provisional) .	70,000	m ²		DO NOT EXTEND
28	Traffic Control - provide all necessary permits, traffic signage, traffic control devices, temporary line painting, delineators, and flag persons as required in accordance with the requirements of the City of Ottawa at all times during the duration of the Contract.	1	Lump Sum		
29	Remove existing asphalt pavement and curb.	1	Lump Sum		
30	Remove existing catchbasins and dispose off-site.	1	each		
31	Supply, install, and maintain temporary dead-end barricade as per OPSD 973.130 with no dumping signs.	2	each		
32	Remove temporary dead-end barricade as per OPSD 973.130 with no dumping signs.	2	each		NOT CARRIED
33	Supply, install, and maintain temporary concrete jersey barrier as per OPSD 911.180 for use as temporary sidewalk barricade.	2	each		
34	Remove temporary concrete jersey barrier as per OPSD 911.180 for use as temporary sidewalk barricade.	2	each		NOT CARRIED
35	For the duration of the Contract, provide a site trailer exclusively for the Client's use.	1	Lump Sum		

A. SITE PREPARATION, TOPSOIL STRIPPING AND EARTHWORKS (CONTINUED)

36	For the duration of the Contract, maintain and implement Health and Safety Measures in alignment with Provincial Standards throughout the duration of construction, including but not limited to site signage, wash stations, and site check-in protocol measures.	1	Lump Sum
37	Construct a temporary parking lot and construction staging area that measures 50m x 50m:		
	a) Grade and shape subgrade as specified by the Geotechnical Consultant. (Provisional)	2,500	sq.m
	b) Provide, lay, and compact sub-base course of Granular 'B' over the area as specified by the Geotechnical Consultant, to a depth of 300mm. (Provisional)	750	cu.m
	c) Provide, lay, and compact sub-base course of Granular 'A' over the area as specified by the Geotechnical Consultant, to a depth of 200mm. (Provisional)	500	cu.m

SUB-TOTAL CARRIED FORWARD TO SUMMARY

\$ -

B. SCHEDULE OF ADDITIONAL UNIT PRICES						
ITEM	DESCRIPTION			UNIT	UNIT PRICE	TOTAL
					\$	\$
	All items must be priced and requested percentages filled in. Failure to do so may invalidate the Pricing Schedule. Prices shall include all costs in carrying out the work prescribed in accordance with the Specifications and shall include or exclude Provincial and Federal Sales Taxes in accordance with the directions elsewhere.					
	All items in this section are provisional and shall be carried out as directed by the Consultant.					
	Prices submitted shall be valid until the end of 2021 and 2022 unless otherwise noted and shall be applicable regardless of final quantity.					
	This schedule of additional unit prices may be used by the Consultant to evaluate changes in the Work in accordance with items 12.1(b) and 12.1(c) of Article GC 12 of the General Conditions.					
1	Cut and place as fill topsoil from the stock pile			m ³		NOT EXTENDED
2	a)	Excavate soft, unacceptable native ground to any depth and spread to dry at the direction of the Consultant and Geotechnical Consultant and replace with engineered fill from within the construction limit.		m ³		NOT EXTENDED
	b)	Excavate soft, unacceptable native ground to any depth and spread to dry within 150 m at the direction of the Consultant and Geotechnical Consultant and replace with dried material within the construction limit to engineered fill standards.		m ³		NOT EXTENDED
	c)	Excavate soft, unacceptable native ground to any depth and spread to dry at the direction of the Consultant and Geotechnical Consultant and dispose material off-site and replace with engineered fill from within the construction limit.		m ³		NOT EXTENDED
	d)	Excavate soft, unacceptable native ground to any depth and spread to dry at the direction of the Consultant and Geotechnical Consultant and replace with imported engineered fill.		m ³		NOT EXTENDED
	e)	Excavate soft, unacceptable native ground to any depth and spread to dry within 150 m at the direction of the Consultant and Geotechnical Consultant and replace with imported dried material to engineered fill standards.		m ³		NOT EXTENDED
	f)	Excavate soft, unacceptable native ground to any depth and spread to dry at the direction of the Consultant and Geotechnical Consultant and dispose material off-site and replace with imported engineered fill.		m ³		NOT EXTENDED
3	Spread, place and compact suitable material imported by others as engineered fill at the request of the owner to assist completion of regarding in any location.			m ³		NOT EXTENDED
4	Excavate additional material at the direction of the Consultant and stockpile within the construction limit.			m ³		NOT EXTENDED

B. SCHEDULE OF ADDITIONAL UNIT PRICES (CONTINUED)							
5	Supply, place, grade and compact at any location as directed by the Consultant:						
a)	Granular A			tonne		NOT EXTENDED	
b)	Granular B			tonne		NOT EXTENDED	
c)	20mm clear limestone			tonne		NOT EXTENDED	
d)	50mm clear limestone			tonne		NOT EXTENDED	
e)	20 mm crusher run limestone			tonne		NOT EXTENDED	
f)	50 mm crusher run limestone			tonne		NOT EXTENDED	
g)	150 mm Rip-rap stone			tonne		NOT EXTENDED	
h)	300 mm Rip-rap stone			tonne		NOT EXTENDED	
6	Dispose off-site rubble, garbage, debris, fencing and boulders at a location arranged by the contractor			tonne		NOT EXTENDED	
7	Remove and dispose off site any field tile material that is encountered during the earthworks program			m		NOT EXTENDED	
8	Hydroseed areas where requested by the consultant using "Soil Stabilizer" mix by Pickseed (include required topsoil):						
a)	Topsoil stockpiles			m ²		NOT EXTENDED	
b)	Areas of exposed native clay			m ²		NOT EXTENDED	
c)	Areas of exposed fill			m ²		NOT EXTENDED	
9	Additional water for dust control			hr		NOT EXTENDED	
10	Removal and disposal of large boulders offsite			tonne		NOT EXTENDED	
11	Removal of non-contaminated mixed debris			m ³		NOT EXTENDED	
12	Remove and dispose offsite material dumped by others			tonne		NOT EXTENDED	
13	Installation of erosion control measures further to those specified in the contract and drawings:						
a)	Repair and stabilization of eroded slopes			m ²		NOT EXTENDED	
b)	Installation of sod on slopes at the direction of the Consultant			m ²		NOT EXTENDED	
c)	Installation of Terraseed slopes at the direction of the Consultant			m ²		NOT EXTENDED	
d)	Supply, erect and maintain heavy duty siltation control fence			m		NOT EXTENDED	
e)	Supply, erect and maintain double siltation control fence			m		NOT EXTENDED	
f)	Supply, place, maintain, and remove (at the consultant's request) rock check dams			each		NOT EXTENDED	
g)	Supply, place, maintain, and remove (at the consultant's request) straw bale check dams			each		NOT EXTENDED	
14	Repair of erosion and sediment control measures after completion of the contract						
a)	Replacement of sediment fence post			each		NOT EXTENDED	
b)	Removal and replacement of damaged sediment fence			m		NOT EXTENDED	
c)	Repair and stabilization of eroded slopes			m ²		NOT EXTENDED	
d)	Installation of sod on slopes at the direction of the Consultant			m ²		NOT EXTENDED	
e)	Installation of Terraseed slopes at the direction of the Consultant			m ²		NOT EXTENDED	
15	Remove siltation control fencing and dispose offsite.			m		NOT EXTENDED	
16	Repair temporary dead-end barricade as per OPSD 973.130 with no dumping signs.			each		NOT EXTENDED	
17	Remove temporary concrete jersey barrier as per OPSD 911.180 for use as temporary sidewalk barricade.			each		NOT EXTENDED	

**SCHEDULE OF CONTRACT PRICING
FOR
470 TREMBLAY ROAD**

**CONTRACT II:
UNDERGROUND SITE SERVICING TO BASE COURSE ASPHALT
INCLUDING STORMWATER MANAGEMENT POND WORKS**

CITY OF OTTAWA

SUMMARY

ITEM	AMOUNT
A. SITE PREPARATION	\$ -
B. SANITARY SEWERS AND APPURTENANCES	\$ -
C. STORM SEWERS AND APPURTENANCES	\$ -
D. WATERMAINS AND APPURTENANCES	\$ -
E. STORMWATER MANAGEMENT FACILITY	\$ -
F. ROADS TO BASE COURSE ASPHALT	\$ -
G. SCHEDULE OF ADDITIONAL UNIT PRICES	<u>DO NOT EXTEND</u>
SUB-TOTAL (LESS H.S.T.)	<u>\$ -</u>
Harmonized Sales Tax (13%)	<u>\$ -</u>
TOTAL TENDER PRICE	<u>\$ -</u>

Note: Prices tendered in Contract II shall be valid for the year 2021 and 2022.

A. SITE PREPARATION

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE \$	TOTAL \$
	Supply all necessary materials, equipment, mobilization, demolition, traffic control and labour to perform the following work in accordance with the drawings and specifications and as directed by the Consultant. Unit prices shall include all items specified in the special conditions, specifications, project specifications, and the engineering plans. All erosion and sediment measures to be functional and maintained until completion of Contract II.				
1	Traffic Control - provide all necessary permits, traffic signage, traffic control devices, temporary line painting, delineators, and flag persons as required in accordance with the requirements of the City of Ottawa at all times during the duration of the Contract.	1	Lump Sum		
2	Assume, maintain, and repair all siltation within the construction limits as per drawings ESC1 to ESC4 for the duration of the contract and including all warranty periods.	1,725	m		
3	Assume, maintain, and repair all other erosion protection within the construction limit as per drawings ESC1 to ESC4 including mud and dust control for the duration of the contract and including all warranty periods.	1	Lump Sum		
4	Remove and dispose offsite all fencing around perimeter of the site limit when works are completed and at the direction of the Consultant or City.	1,725	m		
5	Preparation of Construction Schedule, and keeping updated for the duration of the contract. Poor weather conditions and Saturday work to be allowed for in schedule milestones.	1	Lump Sum		
6	All survey works required to complete the works within the contract, as outlined in contract specification and conditions:				
	a) Construction Layout	1	Lump Sum		
	b) As-constructed base-course asphalt survey of roads	1	Lump Sum		
	c) Pregrade survey of development blocks following post-servicing lot cleanup restoration to pregrade. Elevations to be provided at all lot corners, changes in grade, on a maximum 15m by 15m grid and as required per the Special Conditions and Specifications.	1	Lump Sum		
7	Complete all as-builts per the City of Ottawa requirements, the Project Specifications, and Special Conditions.	1	Lump Sum		
8	Maintain and remove temporary mud mat per City standards.	2	each		
9	Maintain and remove temporary 20x10m sediment trap ditches per OPSD 219.220 on drawing ESC4, including hickenbottom drains as required.	3	each		

A. SITE PREPARATION (CONTINUED)		ESTIMATED QUANTITY	UNIT	UNIT PRICE	TOTAL
ITEM	DESCRIPTION				
10	Maintain and remove at the Consultant's request temporary: a) 500mm CSP culvert (Provisional) b) 600mm CSP culvert (Provisional)	21 28	m m		
11	Supply, install, maintain and remove catchbasin sediment trap as per detail on dwg no. ESC4.	19	each		
12	Mud and Dust control for the duration of the Contract.	1	Lump Sum		
13	For the duration of the Contract, provide a site trailer exclusively for the Client's use.	1	Lump Sum		
14	For the duration of the Contract, maintain and implement Health and Safety Measures in alignment with Provincial Standards throughout the duration of construction, including but not limited to site signage, wash stations, and site check-in protocol measures.	1	Lump Sum		
15	Supply and install temporary block drain as shown on drawing ESC3.	4	each		
16	Supply, install, maintain and remove (at the Consultant's request) catchbasin sediment traps as per detail on drawing ESC4.	34	each		
17	Construct concrete retaining wall complete with guide rail as specified by the Structural Engineer.	193	m		
SUB-TOTAL CARRIED FORWARD TO SUMMARY				\$	-

B. SANITARY SEWERS AND APPURTENANCES

Supply all necessary materials, equipment and labour to perform the following work as per the drawings and specifications and as directed by the Engineer.

- 1 Construct the following sanitary sewers with storm sewers including all necessary excavation, bedding, backfill, compaction to 98% SPDD, with spacing as shown on the Engineering plans.

Street Name	Manhole No.		Pipe Dia.	Type/Class	Average Depth ⁽¹⁾	Estimated Length	Notes	Unit Price	Total
	From	To.	(mm)		(m)	(m)	(1)	\$	\$
BLOCK 5	114A	113A	200	SDR-35	4.0	13.0	(1)		
STREET '2'	113A	112A	250	SDR-35	4.3	49.9	(1)		
STREET '2'	PLUG	112A	250	SDR-35	4.6	8.5	(1)		
STREET '2'	112A	111A	250	SDR-35	5.0	116.9	(1)		
STREET '2'	111A	110A	250	SDR-35	4.8	107.7	(1)		
STREET '2'	110A	EX MH SAN4	250	SDR-35	4.3	8.9	(1)		
STREET '1'	109A	108A	250	SDR-35	4.4	61.3	(1)		
STREET '1'	108A	107A	250	SDR-35	4.3	118.6	(1)		
STREET '1'	107A	EX MH SAN3	250	SDR-35	4.2	29.6	(1)		
STREET '1'	105A	104A	250	SDR-35	4.2	25.6	(1)		
STREET '1'	104A	103A	250	SDR-35	4.4	99.1	(1)		
STREET '1'	103A	102A	250	SDR-35	4.7	30.2	(1)		
STREET '1'	102A	101A	250	SDR-35	4.0	87.8	(1)		
STREET '1'	101A	100A	250	SDR-35	3.1	17.8	(1)		

(1) Average depth is measured from invert to finished road elevation.

2 Standard Manholes

Supply all necessary materials, equipment and labour to perform the following work in accordance with the drawings specifications, City Standards and as directed by the Consultant.

Construct the following **sanitary** manholes including, frames and covers, steps, benching, safety platforms and bulkheads in accordance with the drawings and specifications and as directed by the Consultant. For backfill and compaction, refer to Geotechnical report. Watertight joints per City standards.

Street Name	Manhole Number	Notes	Detail Drawing No.	Depth to Top ⁽¹⁾ of Concrete (m)	Chamber Size (mm)	Estimated Quantity	Unit	Unit Price	Total
								\$	\$
BLOCK 5	114A	(1)	OPSD 701.010	4.0	1200	1	each		
STREET '2'	113A	(1)	OPSD 701.010	4.1	1200	1	each		
STREET '2'	112A	(1)	OPSD 701.010	4.7	1200	1	each		
STREET '2'	111A	(1) (3)	OPSD 701.010	5.3	1200	1	each		
STREET '2'	110A	(1)	OPSD 701.010	4.2	1200	1	each		
STREET '1'	109A	(1)	OPSD 701.010	4.1	1200	1	each		
STREET '1'	108A	(1) (3)	OPSD 701.010	4.6	1200	1	each		
STREET '1'	107A	(1)	OPSD 701.010	4.1	1200	1	each		
STREET '1'	105A	(1)	OPSD 701.010	4.3	1200	1	each		
STREET '1'	104A	(1)	OPSD 701.010	4.2	1200	1	each		
STREET '1'	103A	(1)	OPSD 701.010	4.6	1200	1	each		
EX. TREMBLAY ROAD	102A	(1)	OPSD 701.010	4.8	1200	1	each		
EX. TREMBLAY ROAD	101A	(1)	OPSD 701.010	3.2	1200	1	each		
EX. TRIOLE STREET	100A	(1)	OPSD 701.010	3.4	1200	1	each		

(1) Depth of manhole is measured from the lowest invert to top course asphalt elevation.

(2) Include drop structure(s) per engineering drawings.

(3) Include safety platform(s) per engineering drawings.

B. SANITARY SEWERS AND APPURTENANCES (CONTINUED)

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE \$	Total \$
3	Connect new sewer into existing sanitary manhole and re-bench to City of Ottawa standards	3	each		
4	Supply and install 250mm dia sanitary plug for future sanitary connection Per City of Ottawa Standards.	1	each		
5	Flushing of all sanitary sewers. Re-flush of all sanitary sewers as necessary until free of debris. CCTV inspection to follow upon flushing. CCTV inspection to be redone once sanitary sewer is free of debris.	775	m		
SUB-TOTAL CARRIED FORWARD TO SUMMARY					\$ -

C. STORM SEWERS AND APPURTENANCES

Supply all necessary materials, equipment and labour to perform the following work in accordance with the drawings and specifications as directed by the Consultant.

- 1 Construct the following **storm** sewers with sanitary sewers including all necessary excavation, bedding, backfill, compaction to 98% SPDD, with spacing as shown on the Engineering plans.

Street Name	Manhole No.		Pipe Dia. (mm)	Type/Class	Average Depth ⁽¹⁾ (m)	Estimated Length (m)	Notes	Unit Price \$	Total \$
	From	To.							
STREET '2'	112	111	375	SDR-35	1.6	10.0	(1)		
STREET '2'	111	110	600	CL-65D	2.6	95.5	(1)		
STREET '2'	110	109	750	CL-65D	3.4	115.9	(1)		
STREET '2'	PLUG	109	525	CL-65D	3.2	6.5	(1)		
STREET '2'	109	107	1,050	CL-65D	3.4	53.9	(1)		
STREET '2'	108	107	300	SDR-35	2.7	12.0	(1)		
STREET '2'	107	105	1,050	CL-65D	3.4	26.7	(1)		
EX. TREMBLAY ROAD	DCB 204	DCB 203	450	SDR-35	1.6	0.3	(1)		
EX. TREMBLAY ROAD	DCB 203	DCB 202	450	SDR-35	1.6	0.3	(1)		
EX. TREMBLAY ROAD	DCB 202	DCBMH 201	450	SDR-35	1.6	1.4	(1)		
EX. TREMBLAY ROAD	DCBMH 201	118	600	CL-65D	1.8	3.2	(1)		
STREET '1'	118	117	1,200	CL-65D	2.6	9.9	(1)		
STREET '1'	117	106	1,350	CL-65D	3.4	107.1	(1)		
STREET '1'	106	105	1,350	CL-65D	3.8	108.7	(1)		
STREET '1'	105	104	1,650	CL-65D	3.8	89.0	(1)		
STREET '1'	104	103	1,650	CL-65D	3.5	81.2	(1)		
STREET '1'	103	102	1,650	CL-65D	3.2	54.4	(1)		
STREET '1'	119	102	300	SDR-35	1.7	49.5	(1)		
BLOCK 7	102	HW1	1,650	CL-65D	2.3	24.1	(1)		
BLOCK 7	HW2	101	525	CL-65D	3.0	6.8	(1)		
BLOCK 7	101	HW3	525	CL-65D	3.3	28.2	(1)		

(1) Average depth is measured from invert to finished road elevation.

- 2 Storm Manholes - Construct the following storm manholes including, frames and covers, steps, benching, safety platforms and half-depth bulkheads in accordance with the drawings and specifications and as directed by the Consultant. For backfill and compaction, refer to Geotechnical report.

Street & Drawing No.	Manhole		Detail Drawing No.	Depth to Top ⁽¹⁾ of Concrete (m)	Chamber Size (mm)	Est. Quantity	Unit Price \$	Total \$
	Number	Notes						
STREET '1'	119	(1)	OPSD 701.010	1.8	1200	1		
EX. TREMBLAY ROAD	118	(1)	OPSD 701.013	2.4	2400	1		
STREET '1'	117	(1)	OPSD 701.013	3.0	2400	1		
STREET '2'	112	(1)	OPSD 701.010	1.5	1200	1		
STREET '2'	111	(1)	OPSD 701.011	2.0	1500	1		
STREET '2'	110	(1)	OPSD 701.012	3.4	1800	1		
STREET '2'	109	(1)	OPSD 701.013	3.5	2400	1		
BLOCK 5	108	(1)	OPSD 701.010	2.7	1200	1		
STREET '2'	107	(1)	OPSD 701.012	3.4	1800	1		
STREET '1'	106	(1)	OPSD 701.014	3.8	3000	1		
STREET '2'	105	(1)	OPSD 701.015	3.9	3600	1		
STREET '1'	104	(1)	OPSD 701.014	3.6	3000	1		
STREET '1'	103	(1)	OPSD 701.014	3.4	3000	1		
BLOCK 7	102	(1)	OPSD 701.015	2.9	3600	1		
BLOCK 7	101	(1)	OPSD 701.011	2.1	1500	1		
EX. TREMBLAY ROAD	DCBMH 201	(1)	OPSD 701.011	1.8	1500	1		

(1) Depth of manhole is measured from the lowest invert to top course asphalt elevation.

(2) Include drop structure(s) per engineering drawings.

(3) Include safety platform(s) per engineering drawings.

C. STORM SEWERS AND APPURTENANCES (CONTINUED)

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE \$	Total \$
3	Supply and install thermal insulation for storm sewers with less than 2m cover per OPSD 1109.030 as shown on dwg no. NT1.	390	m		
4	a) Install single catchbasin per most recent OPSD and OPSS requirements including lead (SDR-28), ICD and risers as required, complete with: Frame and cover per City Std S19.1 (perforated)	9	each		
	b) Install single catchbasin per most recent OPSD and OPSS requirements including lead (SDR-28), ICD and risers as required, complete with: Frame and cover per City Std S22 and S23 (curb inlet)	12	each		
	c) Install double catchbasin per most recent OPSD, and OPSS requirements including lead (SDR-28), ICD and risers as required, complete with: Frame and cover per City Std S19.1 (perforated)	4	each		
	d) Install double catchbasin per most recent OPSD, and OPSS requirements including lead (SDR-28), ICD and risers as required, complete with: Frame and cover per City Std S22 and S23 (curb inlet)	1	each		
5	a) Install DICB per most recent OPSD and OPSS requirements including lead (SDR-28) and risers as required, complete with: Frame and cover per City Std S19.1 (perforated)	5	each		
	b) Install temporary DICB per most recent OPSD and OPSS requirements including lead (SDR-28) and risers as required, complete with: Frame and cover per City Std S19.1 (perforated)	1	each		
6	Supply and install 525mm dia storm plug for future storm connection Per City of Ottawa Standards.	1	each		
7	Cut and cap existing 400mm dia. storm sewer on Ex Tremblay Road. Abandon existing 300mm dia. and 400mm dia. sewers, catchbasins and leads upstream of the cap.	1	Lump Sum		
8	Flushing of all storm sewers. Re-flush of all storm sewers as necessary until free of debris. CCTV inspection to follow upon flushing. CCTV inspection to be redone once storm sewer is free of debris.	885	m		
9	Complete the grading of the bioswale within boulevard, per detail drawing D4. (Provisional)	118	m		
SUB-TOTAL CARRIED FORWARD TO SUMMARY					\$ -

D. WATERMANS AND APPURTENANCES

Supply all necessary materials, equipment and labour to perform the following work in accordance with the drawings and specifications and as directed by the Consultant.

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE \$	TOTAL \$
1	Construct watermain to the current City of Ottawa Standards and Specifications for Watermains, including fittings, blow-offs, reducers, thrust blocks, tracer wire, tie rods, sacrificial anodes, bedding and backfill, mechanical restraints on all joints and temporary plugs: a) 200 mm diameter b) 300mm diameter	228 630	m m		
2	Supply and install main-line water valves per engineering drawings a) 200mm Valve & Box b) 300mm Valve & Box c) 400mm Valve & Box	2 6 1	each each each		
3	Supply and install hydrants complete with 150mm lead, shut-off valve and valve box, per City of Ottawa stds.	8	each		
4	Connect to existing watermain by others including restotation as necessary, per City of Ottawa standards as outlined on the Watermain Comissioning Plan: a) 400mm diameter watermain (St Laurent Boulevard) b) 300mm diameter watermain (Ex Tremblay Road)	1 2	each each		
5	Supply and install 150mm dia. water service connections c/w V&Bs and other appurtenances for Block 5 per City of Ottawa Standard	1	each		
6	Supply and install 300mm dia plug for future watermain connection per City of Ottawa Standards.	1	each		
7	Hydrostatic testing, disinfection, swabbing and flushing of all watermains to City of Ottawa standards and specifications.	1	Lump Sum		
8	Additional hydrostatic testing, disinfection, swabbing and flushing of all watermains to City of Ottawa standards and specifications.	25	m		NOT CARRIED
SUB-TOTAL CARRIED FORWARD TO SUMMARY				\$	-

E. STORMWATER MANAGEMENT POND

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE \$	TOTAL \$
	Supply all necessary materials, equipment, mobilization, demolition, traffic control and labour to perform the following work in accordance with the drawings and specifications and as directed by the Consultant. Unit prices shall include all items specified in the special conditions, specifications, project specifications, and the engineering plans.				
1	Supply and install headwall for 1650mm dia. storm sewer as per OPSD 804.040 with grating as per OPSD 804.050 as shown on dwg no. SWM1.	1	each		
2	Supply and install headwall for 525mm dia. storm sewer as per OPSD 804.030 with grating as per OPSD 804.050 as shown on dwg no. SWM1.	2	each		
3	Construct 6m wide Overland Flow Route c/w 500mm of 300mm dia. riprap on Geotextile Terrafix 270R s per dwg no. SWM1.	22	m		
4	Construct 20m wide emergency spillway with geoweb or approved equivalent as per dwg no. SWM1.	55	m		
5	Construct 5m wide access road c/w cable concrete matting as per dwg no. SWM1 and SWM2.	130	m		
6	Construct and install retaining wall as per dwg no. SWM1 at the direction of the Structural Engineering Consultant.	21	m		
7	Construct 1.0m flat bottom outlet channel as per dwg no. SWM1.	65	m		
8	Install pond liner as per recommendations of Geotechnical Engineer.	3490	m ²		
9	Supply and install bollards as per dwg no. SWM1.	6	each		
10	Supply and install pond warning signage as per dwg no. SWM1.	1	lump sum		
11	Supply and install a double swing gate at the storm facility access road entry way as located on drawing SWM1 and detailed on drawing SWM2.	1	lump sum		
SUB-TOTAL CARRIED FORWARD TO SUMMARY					\$ -

F. ROADS TO BASE COURSE ASPHALT

Supply all necessary materials, equipment and labour to perform the following work in accordance with the drawings and specifications and as directed by the Consultant.

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE \$	TOTAL \$
1	Fine grade to shape subgrade and boulevards over the width of the road allowance, and compact subgrade over the full pavement width plus 0.3 m beyond the back of curb on each side, unless otherwise specified by Geotechnical Consultant.				
	a) 18.0 m R.O.W.	221	m		
	b) 20.0 m R.O.W.	87	m		
	c) 26.0 m R.O.W.	492	m		
2	Provide, lay and compact sub-base course of Granular 'B' over the full pavement width plus 0.3m beyond back of curb as per City/Geotechnical recommendations				
	a) to a final compacted depth of 300mm (18.0 m R.O.W.)	2,130	m ²		
	b) to a final compacted depth of 300mm (20.0 m R.O.W.)	765	m ²		
	c) to a final compacted depth of 500mm (26.0 m R.O.W.)	5,550	m ²		
3	Supply and install 150mm dia. PVC subdrains with filter cloth per OPSD 216.021 & dwg. No. D2 beneath all curbs.	1,635	m		
4	a) Construct the base section of the two stage concrete curbs per OPSD 600.040.	1,725	m		
	b) Construct full concrete barrier curb for median per OPSD 600.110.	70	m		
	c) Construct depressed concrete barrier curb for median per OPSD 600.110.	25	m		
	d) Construct semi-mountable curb at lay-by parking locations per OPSD 600.060	90	m		
5	Regulate sub-base course to proper grade, supply, lay and compact base course of Granular 'A'				
	a) to a final compacted depth of 200mm (18.0 m R.O.W.)	1,865	m ²		
	b) to a final compacted depth of 200mm (20.0 m R.O.W.)	740	m ²		
	c) to a final compacted depth of 150mm (26.0 m R.O.W.)	5,250	m ²		
6	Raise frames and covers to base course asphalt level including step adjustments as required per City standards.				
	a) manholes	27	each		
	b) single catchbasins	21	each		
	c) double catchbasins	2	each		
	d) 200mm Valve and Box	2	each		
	e) 300mm Valve and Box	6	each		
	f) 400mm Valve and Box	1	each		
7	Provide, lay and compact HL8 asphalt base course in accordance with specifications over the full pavement width to a compacted depth as noted or as otherwise specified by the Geotechnical Consultant.				
	a) to a compacted depth of 50mm (18.0 m R.O.W.)	1,865	m ²		
	b) to a compacted depth of 50mm (20.0 m R.O.W.)	740	m ²		
8	Provide, lay and compact SP19 asphalt base course compacted in maximum 50mm layers in accordance with specifications over the full pavement width to a compacted depth as noted or as otherwise specified by the Geotechnical Consultant.				
	a) to a final compacted depth of 100mm (26.0 m R.O.W.)	5,250	m ²		

F. ROADS TO BASE COURSE ASPHALT (CONTINUED)

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	TOTAL
9	Match new asphalt to asphalt by others including saw cutting, grind a 0.30m wide strip to 40 mm depth lap joint and seal.	1	Lump Sum		
11	Permits for road occupancy from the City.	1	Lump Sum		
12	Supply and install all temporary traffic control signage on streest after construction of base asphalt, including removal.				
	a) Stop Signs (Ra-1)	4	each		
	b) Street Name Signs	5	each		
	c) Unassumed Road Signs	3	each		
13	Provide and install 1.5m high black vinyl chain link fence as per the Engineering Drawings.	560	m		
SUB-TOTAL CARRIED FORWARD TO SUMMARY					\$ -

G. MISCELLANEOUS

Supply all necessary materials, equipment and labour to perform the following work in accordance with the drawings and specifications and as directed by the Consultant.

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE \$	TOTAL \$
1	Construct concrete retaining wall c/w guide rail as specified by Structural Engineer. (Provisional)	193	m		
2	Prepare and provide a Traffic Control Plan, including Construction Site Pedestrian Control Plan, in alignment with City of Ottawa specifications F-1010 and F-1013.	1	Lump Sum		
3	Traffic Control - provide all necessary permits, traffic signage, traffic control devices, temporary line painting, delineators, and flag persons as required in accordance with the requirements of the City of Ottawa at all times during the duration of the Contract. This shall include Police Assistance at intersections as per City of Ottawa F-1012 as required.	1	Lump Sum		
4	All survey works required to complete the works within the contract, as outlined in contract specification and conditions: a) Layout Survey b) Post Construction Survey, including roads and blocks.	1	Lump Sum		
5	Complete all as-builts per the City of Ottawa requirements, the Project Specifications, and Special Conditions.	1	Lump Sum		
6	For the duration of the Contract, provide a site trailer exclusively for the Client's use.	1	Lump Sum		
SUB-TOTAL CARRIED FORWARD TO SUMMARY					\$ -

B. SCHEDULE OF ADDITIONAL UNIT PRICES						
ITEM	DESCRIPTION			UNIT	UNIT PRICE	TOTAL
					\$	\$
	All items must be priced and requested percentages filled in. Failure to do so may invalidate the Pricing Schedule. Prices shall include all costs in carrying out the work prescribed in accordance with the Specifications and shall include or exclude Provincial and Federal Sales Taxes in accordance with the directions elsewhere.					
	All items in this section are provisional and shall be carried out as directed by the Consultant.					
	Prices submitted shall be valid until the end of 2021 and 2022 unless otherwise noted and shall be applicable regardless of final quantity.					
	This schedule of additional unit prices may be used by the Consultant to evaluate changes in the Work in accordance with items 12.1(b) and 12.1(c) of Article GC 12 of the General Conditions.					
1	Cut and place as fill topsoil from the stock pile			m ³		NOT EXTENDED
2	a) Excavate soft, unacceptable native ground to any depth and spread to dry at the direction of the Consultant and Geotechnical Consultant and replace with engineered fill from within the construction limit.			m ³		NOT EXTENDED
	b) Excavate soft, unacceptable native ground to any depth and spread to dry within 150 m at the direction of the Consultant and Geotechnical Consultant and replace with dried material within the construction limit to engineered fill standards.			m ³		NOT EXTENDED
	c) Excavate soft, unacceptable native ground to any depth and spread to dry at the direction of the Consultant and Geotechnical Consultant and dispose material off-site and replace with engineered fill from within the construction limit.			m ³		NOT EXTENDED
	d) Excavate soft, unacceptable native ground to any depth and spread to dry at the direction of the Consultant and Geotechnical Consultant and replace with imported engineered fill.			m ³		NOT EXTENDED
	e) Excavate soft, unacceptable native ground to any depth and spread to dry within 150 m at the direction of the Consultant and Geotechnical Consultant and replace with imported dried material to engineered fill standards.			m ³		NOT EXTENDED
	f) Excavate soft, unacceptable native ground to any depth and spread to dry at the direction of the Consultant and Geotechnical Consultant and dispose material off-site and replace with imported engineered fill.			m ³		NOT EXTENDED
3	Spread, place and compact suitable material imported by others as engineered fill at the request of the owner to assist completion of regarding in any location.			m ³		NOT EXTENDED
4	Excavate additional material at the direction of the Consultant and stockpile within the construction limit.			m ³		NOT EXTENDED

B. SCHEDULE OF ADDITIONAL UNIT PRICES (CONTINUED)						
ITEM	DESCRIPTION			UNIT	UNIT PRICE	TOTAL
					\$	\$
a)	Granular A			tonne		NOT EXTENDED
b)	Granular B			tonne		NOT EXTENDED
c)	20mm clear limestone			tonne		NOT EXTENDED
d)	50mm clear limestone			tonne		NOT EXTENDED
e)	20 mm crusher run limestone			tonne		NOT EXTENDED
f)	50 mm crusher run limestone			tonne		NOT EXTENDED
g)	150 mm Rip-rap stone			tonne		NOT EXTENDED
h)	300 mm Rip-rap stone			tonne		NOT EXTENDED
6	Excavate unsuitable native material under sewer bedding and cast on adjacent lots as directed by the Consultant and replace with material as per Geotechnical recommendation, compacted to 98% SPD.			m ³		NOT EXTENDED
7	Excavate unsuitable subgrade material in road area and dispose surplus material on adjacent lots as directed by Consultant.			m ³		NOT EXTENDED
8	Excavate unsuitable subgrade in road area and place on adjacent lots to dry. Load and place dry material back in roadway.			m ³		NOT EXTENDED
9	Install temporary Jersey barriers from streetline to streetline complete with reflective dead end sign. Price to include removal off-site when directed by the Consultant.			each		NOT EXTENDED
10	Dispose off-site rubble, garbage, debris, fencing and boulders at a location arranged by the contractor			tonne		NOT EXTENDED
11	Remove and dispose off site any field tile material that is encountered during the earthworks program			m		NOT EXTENDED
12	Hydroseed areas where requested by the consultant using "Soil Stabilizer" mix by Pickseed (include required topsoil):					
a)	Topsoil stockpiles			m ²		NOT EXTENDED
b)	Areas of exposed native clay			m ²		NOT EXTENDED
c)	Areas of exposed fill			m ²		NOT EXTENDED
13	Additional water for dust control			hr		NOT EXTENDED
14	Removal and disposal of large boulders offsite			tonne		NOT EXTENDED
15	Removal of non-contaminated mixed debris			m ³		NOT EXTENDED
16	Remove and dispose offsite material dumped by others			tonne		NOT EXTENDED

B. SCHEDULE OF ADDITIONAL UNIT PRICES (CONTINUED)						
ITEM	DESCRIPTION			UNIT	UNIT PRICE	TOTAL
					\$	\$
17	Installation of erosion control measures further to those specified in the contract and drawings:					
	a) Repair and stabilization of eroded slopes			m ²		NOT EXTENDED
	b) Installation of sod on slopes at the direction of the Consultant			m ²		NOT EXTENDED
	c) Installation of Terraseed slopes at the direction of the Consultant			m ²		NOT EXTENDED
	d) Supply, erect and maintain heavy duty siltation control fence			m		NOT EXTENDED
	e) Supply, erect and maintain double siltation control fence			m		NOT EXTENDED
	f) Supply, place, maintain, and remove (at the consultant's request) rock check dams			each		NOT EXTENDED
	g) Supply, place, maintain, and remove (at the consultant's request) straw bale check dams			each		NOT EXTENDED
18	Repair of erosion and sediment control measures after completion of the contract					
	a) Replacement of sediment fence post			each		NOT EXTENDED
	b) Removal and replacement of damaged sediment fence			m		NOT EXTENDED
	c) Repair and stabilization of eroded slopes			m ²		NOT EXTENDED
	d) Installation of sod on slopes at the direction of the Consultant			m ²		NOT EXTENDED
	e) Installation of Terraseed slopes at the direction of the Consultant			m ²		NOT EXTENDED
19	Remove siltation control fencing and dispose offsite.			m		NOT EXTENDED
20	Repair temporary dead-end barricade as per OPSD 973.130 with no dumping signs.			each		NOT EXTENDED
21	Remove temporary concrete jersey barrier as per OPSD 911.180 for use as temporary sidewalk barricade.			each		NOT EXTENDED
22	Supply and place concrete sewer bedding including brick support of sewers prior to placement.					
	a) 0.4 MPa unshrinkable fill			m ³		NOT EXTENDED
	b) 20 MPa Concrete			m ³		NOT EXTENDED
23	Supply and place 150 mm to 300 mm thick Rip-Rap including filter fabric (Terrafix 300R or equivalent, maximum EOS 50), including pregrading as directed by Consultant.			m ²		NOT EXTENDED
24	Adjust hydrants as directed by Consultant					
	a) raise 150 mm			each		NOT EXTENDED
	b) raise 300 mm			each		NOT EXTENDED
25	Remove damaged asphalt off-site and supply and place base asphalt, including grinding or planing to match existing roads (where not included in pricing already).			tonne		NOT EXTENDED
26	Remove and replace damaged base from two-stage curb and gutter within development limit, including off-site disposal and restoration of boulevard and pavement.			m		NOT EXTENDED
27	Asphalt grinding to 40mm depth.			m		NOT EXTENDED
28	Flush and clean sewers prior to builder activity.			m		NOT EXTENDED

ANNEXE 10
FORMULAIRE D'ACCORD

[Joindre le formulaire d'accord prévu.]

UNIT PRICE CONTRACT
BETWEEN
CANADA LANDS COMPANY CLC LIMITED
AND
▼
REGARDING

EARTH WORKS AND SITE SERVICING FOR 470, 599, 600, 622, 652 TREMBLAY ROAD

September __, 2021

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	OR! BOOKMARK NOT DEFINED.	
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	OR! BOOKMARK NOT DEFINED.	

SCHEDULE A SPECIFICATIONS

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UNIT PRICE CONTRACT

THIS CONTRACT dated for reference as of __ September 2021 (the “Effective Date”).

BETWEEN:

CANADA LANDS COMPANY CLC LIMITED

(the “Company”)

AND:



(the “Contractor”)

WHEREAS:

- A. The Company has selected the Contractor to perform the Work, as further described in this Contract; and
- B. The Parties wish to enter into this Contract to set out their respective rights and obligations.

NOW THEREFORE in consideration of the premises and the mutual obligations contained in this Contract, the Parties agree as follows:

1. DEFINITIONS AND INTERPRETATION

1.1 Definitions

In this Contract:

“**Applicable Laws**” means Laws in the Jurisdiction of Work that are applicable to the Work, the Parties or any other aspect of this Contract;

“**Application for a Certificate of Substantial Performance**” has the meaning given in Section 13.2;

“**Application for Final Payment**” has the meaning given in Section 11.4(a);

“**Application for Progress Payment**” has the meaning given in Section 11.3(a);

“**Approvals**” has the meaning given in Section 2.2;

“**Builders’ Lien Holdback**” has the meaning given in Section 12.2;

“**Builders’ Lien Legislation**” has the meaning given in Section 12.2;

“**Business Day**” means a day that is not a Saturday, Sunday or statutory holiday in the Jurisdiction of Work;

“**Certificate for Final Payment**” has the meaning given in Section 11.4;

“**Certificate of Substantial Performance**” means a document issued by the Consultant confirming that the Contractor has attained Substantial Performance of the Work;

“**Changes**” means any changes in or to the Work, including any additions, deletions, alterations, revisions or substitutions;

“**Change Directive**” means a written instruction executed by the Company directing the Contractor to proceed with a Change;

“**Change Order**” means a written document executed by the Company and the Contractor setting out a Change and the value or method of valuation of a Change and adjustments, if any, to the Contract Price and Contract Time;

“**Claims**” means any and all claims, actions, suits, proceedings, demands, damages, costs or expenses (including legal fees and disbursements on a full indemnity basis);

“**Confidential Information**” has the meaning given in Section 28.1;

“**Consultant**” means WSP Canada Inc. and includes any representatives appointed by the Consultant to carry out the Consultant’s duties under the Contract;

“**Contaminants**” means any materials, substances or hazardous wastes, the storage, manufacture, disposal, treatment, generation, use, transport, remediation or release into the environment of which is now or hereafter prohibited, controlled or regulated under Applicable Laws relating to the environment;

“**Contract**” means this agreement and all Schedules to this agreement, as amended, supplemented or restated from time to time;

“**Contract Price**” has the meaning given in Section 11.1;

“**Contract Time**” means the time from the Start Date to the Substantial Performance Deadline;

“**Contract I**” means works required for the Earth Works as more particularly described in Schedule A-1;

“**Contract II**” means works required for the construction of Underground Site Servicing to Base Course/Intermediate Asphalt including Stormwater Management Pond and Park grading as more particularly described in Schedule A-2;

“**Contractor IP**” has the meaning given in Section 28.5(a);

“**Defective**” means Work or portions of the Work that is defective, deficient or otherwise does not meet the requirements of this Contract and the meaning of a “**Defect**” will be construed according;

“**Delay**” has the meaning given in Section 15.1;

“**Dispute**” has the meaning given in Section 26.1;

“**Dispute Notice**” has the meaning given in Section 26.2;

“Dispute Resolution Procedure” has the meaning given in Section 26.1;

“Drawings” means any drawings, plans, elevations, sections, details, diagrams, plans, maps, schedules, performance charts, brochures, data, or pictorial information of any kind that illustrate, detail or otherwise relate to the performance, location or characteristics of the Work or portions of the Work, including those set out in Schedule B [Drawings];

“Effective Date” has the meaning set out on the first page of this Contract;

“Governmental Authority” means any domestic or foreign government, including any federal, provincial, state, territorial or municipal government, and any government agency, tribunal, commission or other authority exercising executive, legislative, judicial, regulatory or administrative functions of, or pertaining to, government;

“Holdbacks” means the Builders’ Lien Holdback, the holdback described in Section 12.3, and any additional holdbacks available to the Company under Applicable Laws;

“Indemnified Parties” has the meaning given in Section 21.1;

“Insurance” has the meaning given in Section 20.1(a);

“Intellectual Property” means discoveries, research, developments, designs, improvements, innovations, inventions, blueprints, software, databases, hardware, equipment, machines, manufactures, compositions of matter, industrial designs, formulae, integrated circuit topographies and integrated circuit topography products, mask works, methods, concepts, processes, procedures, practices, works subject to copyright, and other technologies, works, ideas and creations now existing or developed in the future, and all intangible, intellectual, proprietary and industrial property rights in any of the foregoing, whether or not registered or registrable, patentable or non-patentable, or confidential or non-confidential;

“Interim Adjudication” means an adjudication made pursuant to Part II.1 of the *Construction Act* (Ontario);

“Jurisdiction of Work” means the Canadian province or territory where the Site is located;

“Laws” means the common law and any and all laws, statutes, enactments, by-laws, regulations, rules, orders, directives, policies, permits, licences, codes and rulings of any Governmental Authority;

“Liens” means builders’ liens, certificates of lis pendens, construction liens and certificates of action, claims of quantum meruit and any and all similar registrations that may be possible in the Jurisdiction of Work;

“Notice of Adjudication” means the notice required pursuant to Part II.1 of the *Construction Act* (Ontario);

“Parties” means the Company and the Contractor, and any one of them is a **“Party”**;

"Person" means any natural person, sole proprietorship, partnership, corporation, trust, joint venture, any Governmental Authority or any incorporated or unincorporated entity or association of any nature;

"Products" means material, machinery, equipment, and fixtures forming part of the Work, but does not include Work Equipment;

"Project" means Earth Works and Site Servicing for 470, 599, 600, 622, 652 Tremblay Road, as further described in this Contract;

"Schedules" means the documents listed in Section 1.4 and **"Schedule"** refers to any one of them;

"Site" means the location or locations where the Work is to be performed;

"Specifications" means the specifications given in Schedule A-1 and A-2;

"Start Date" has the meaning given in Section 4.1;

"Subcontractor" means a Person having a direct contract or agreement with the Contractor to perform a part or parts of the Work;

"Substantial Performance Date" has the meaning given in Section 13.3;

"Substantial Performance Deadline" means the date stated in Section 4.1;

"Substantial Performance of the Work" has the meaning given in Section 13.1A and 13.1B;

"Supplier" means a Person having a direct contract with the Contractor to supply Products;

"Test" has the meaning given in Section 9.3;

"Total Completion of the Work" means that every aspect of the Work has been performed and completed in accordance with this Contract;

"Uncontrollable Event" means the occurrence of an event or circumstance beyond the reasonable control of a Party, including explosions, fires, flood, earthquakes, pandemics, acts of war, acts of terrorism, insurrection, riots, civil disorders, rebellion, or sabotage, but excludes:

- (a) any event that is the result of breach of this Contract or Law;
- (b) economic hardship or lack of financing;
- (c) equipment failure;
- (d) unavailability of personnel, labour or Subcontractors (including by reason of strikes or lock-outs);
- (e) unavailability of materials;
- (f) adverse weather conditions; and

(g) unsuitable or unanticipated Site conditions, including subsurface conditions.

“Value Added Taxes” means such sum as will be levied upon the Contract Price by the Federal or any Provincial or Territorial Government and is computed as a percentage of the Contract Price and includes the Goods and Services Tax, the Quebec Sales Tax, the Harmonized Sales Tax, and any similar tax, the collection and payment of which have been imposed on the Contractor by the tax legislation;

“Warranty Obligations” has the meaning given in Section 23.2;

“Work” has the meaning given in Section 2.1;

“Work Equipment” means all machinery and equipment, either operated or not operated, that is required for preparing, fabricating, conveying, erecting, or otherwise performing the Work but is not incorporated into the Work;

“Work Schedule” has the meaning given in Section 4.3 and includes any updates or revisions thereto permitted in accordance with this Contract;

“Workers’ Compensation Legislation” has the meaning given in Section 5.2(c); and

“Workplace Safety Legislation” has the meaning given in Section 18.1(d) and includes Workers’ Compensation Legislation.

1.2 Rules of Interpretation

In this Contract, except where expressly stated to the contrary or the context otherwise requires:

- (a) the recitals and headings to Sections and Schedules are for convenience only and will not affect the interpretation of this Contract;
- (b) each reference in this Contract to “Section” and “Schedule” is to a Section of, and a Schedule to, this Contract;
- (c) each reference to a statute is deemed to be a reference to that statute and any successor statute, and to any regulations, rules, policies and criteria made under that statute and any successor statute, each as amended or re-enacted from time to time;
- (d) words importing the singular include the plural and vice versa and words importing gender include all genders;
- (e) all references to amounts of money mean lawful currency of Canada;
- (f) an accounting term has the meaning assigned to it, and all accounting matters will be determined, in accordance with International Financial Reporting Standards consistently applied;
- (g) the word “written” includes printed, typewritten, faxed, e-mailed or otherwise capable of being visibly reproduced at the point of reception and “in writing” has a corresponding meaning; and

- (h) the words “include” and “including” are to be construed as meaning “including, without limitation”.

1.3 Language

If this Contract is prepared in both the English and French languages, in the event of any apparent conflict or discrepancy between the English and French versions, the English language version will prevail.

1.4 Schedules

The following Schedules are attached to and form part of this Contract (the “Schedules”):

<u>Schedule</u>	<u>Description</u>
Schedule A-1	CONTRACT I – Earth Works Specifications
Schedule A-2	CONTRACT II – Site Servicing Specifications
Schedule B-1	CONTRACT I – Earth Works Drawings
Schedule B-2	CONTRACT II – Site Servicing Drawings
Schedule C	Insurance
Schedule D-1	CONTRACT I – Earth Works Schedule of Prices
Schedule D-1	CONTRACT II – Site Servicing Schedule of Prices
Schedule E	EFT Terms and Conditions

2. THE WORK

2.1 The Work

The Contractor will perform everything to be undertaken by the Contractor under this Contract (the “Work”), and includes both Contract I Work and Contract II Work. The Contractor represents and warrants that it has the qualifications, experience, equipment and resources necessary to perform and complete the Work and further covenants that it will in all respects perform and complete the Work:

- (a) in accordance with the Company’s reasonable requirements and standards and to the satisfaction of the Company acting reasonably;
- (b) in accordance with the terms and conditions of this Contract, including the Specifications and the Drawings;
- (c) in accordance with all Applicable Laws (including all Approvals), and any other requirements of Governmental Authorities having jurisdiction in the Jurisdiction of Work; and

- (d) with the degree of care, skill and diligence normally provided by a qualified and experienced contractor performing work similar to the Work in the Jurisdiction of Work.

2.2 Permits and Approvals

Subject to any further directions given in the Specifications, the Contractor will identify, obtain, maintain, pay for, and comply with all permits, licences and approvals required by any Governmental Authority or other Person to complete the Work (the “**Approvals**”) and will deliver to the Company true, complete and accurate copies of all Approvals.

2.3 Document Review

The Contractor will review the Contract, including the Drawings and the Specifications, prior to making its first Application for Progress Payment and will report promptly to the Consultant any error, inconsistency or omission the Contractor may discover. If the Contractor discovers any error, inconsistency or omission, then the Contractor will not proceed with the Work affected until the Contractor has received corrected or missing information from the Company.

3. CONSULTANT

3.1 Appointment of Consultant by Company

The Company will appoint the Consultant to fulfill the obligations of the Consultant described in this Contract. Notwithstanding the previous sentence, the Contractor acknowledges and agrees that:

- (a) the Company may exercise any or all of the Consultant’s powers and functions under this Contract; and
- (b) as between the Company and the Consultant, the Company has the final authority on all matters arising under this Contract.

3.2 Consultant’s Authority

The Contractor acknowledges and agrees that:

- (a) the Consultant will have the authority set out in this Contract, which includes the general authority to reject Work which in the Consultant’s opinion does not conform to the requirements of the Contract;
- (b) the Consultant will not have the authority to make binding decisions regarding the scope of Work or Payments, including the issuance of a Change Order or a Change Directive, without first consulting with the Company and obtaining the Company’s prior approval;
- (c) the Consultant, acting reasonably, may from time to time require the Contractor to remove from the Project any personnel, including project managers, superintendents, Subcontractors or Suppliers;

- (d) the Contractor will be responsible for requesting any additional instructions or clarifications that may be required from the Consultant; and
- (e) neither the authority of the Consultant to act nor any decision either to exercise or not to exercise such authority will relieve the Contractor from any of its obligations under this Contract.

3.3 Change of Consultant

The Company may change the Consultant at any time by notice to the Contractor, in which case the status of the new Consultant under the Contract will be that of the former Consultant.

4. TIME

4.1 Start Date and Substantial Performance Deadline

The Contractor will commence the Work by __ September 2021 (the “**Start Date**”) and, subject to Section 15.3, will attain Substantial Performance of the Work as it pertains to:

- i. Contract I: Earthworks work by no later than March 31, 2022 (the “**Contract I Substantial Performance Deadline**”), and;
- ii. Contract II: Underground Site Servicing to Base course/Intermediate Asphalt including Stormwater Management Pond work by no later than July 31, 2022 (the “**Contract II Substantial Performance Deadline**”).

4.2 Importance of Time

The Contractor acknowledges that in the selection of the Contractor for the Work and the execution of this Contract, the Company has relied and is entitled to rely upon the Contractor’s covenant that it will obtain Substantial Performance of the Work by the Substantial Performance Deadline. The Contractor acknowledges that, subject to Section 15.3, the Contractor will be liable to the Company for any failure to complete the Project on time.

4.3 Work Schedule

Within 7 Business Days of the Effective Date, the Contractor will prepare and submit to the Company a schedule according to the format requirements set out in Section 4.4 that clearly indicates the timing of the activities of the Work and how they are logically linked, providing sufficient detail to demonstrate that the Work will be performed on time and in accordance with the Contract (the “**Work Schedule**”). Additionally, the Contractor will:

- (a) On an ongoing basis, monitor the progress of the Work relative to the Work Schedule; and
- (b) if the Contract Time is longer than one month, update the Work Schedule on a monthly basis or as otherwise required by the Company or the Consultant.

4.4 Format of Work Schedule

The Contractor will provide the Work Schedule and any revised schedules to the Company in an electronic format and in hard copy. If the Specifications require the Contractor to employ scheduling software to generate the Work Schedule, the Contractor will use Microsoft Project and will provide the Work Schedule to the Company in editable format, together with a record version in PDF format.

4.5 Acceptance of Work Schedule

The Company and the Consultant have the right to reject the Work Schedule (and any revisions thereto) for any reason. Once accepted by the Company and the Consultant, the Contractor will perform the Work strictly in accordance with Work Schedule. If the Contractor fails to update the Work Schedule as required under Section 4.3(b), the Company may withhold progress payments until the Contractor submits an updated Work Schedule that is acceptable to the Company and the Consultant.

5. LABOUR AND PRODUCTS

5.1 Contractor's Duty to Provide

Unless the Specifications state otherwise, the Contractor will provide and pay for all labour, Products, tools, Work Equipment, water, heat, electricity, transportation, and other facilities and services necessary for the performance of the Work in accordance with this Contract.

5.2 Labour

The Contractor will:

- (a) provide competent supervision as is necessary to perform the Work in accordance with the terms of this Contract;
- (b) maintain good order and discipline among the Contractor's employees, Subcontractors and Suppliers engaged on the Work; and
- (c) comply with, and will ensure its Subcontractors comply with, any Applicable Laws concerning workers' compensation ("**Workers' Compensation Legislation**") and all other Applicable Laws concerning labour and employment.

5.3 Products

Unless the Specifications state otherwise, all Products will be new, will be of a quality that is sufficient to permit their intended use and will be acceptable to the Consultant. The Contractor will not make substitutions for any Products specified by the Company without the Company's prior written consent.

6. SUBCONTRACTORS AND SUPPLIERS

6.1 Approval of Subcontractors

Before subcontracting any portion of the Work, the Contractor will obtain the Company's written approval of the Subcontractor and the form of subcontract. The Contractor will not change Subcontractors or agree to amend the terms of a subcontract without the Company's prior written approval.

6.2 General Conditions for Using Subcontractors and Suppliers

The Contractor will preserve and protect the rights of the Parties under this Contract with respect to Work to be performed under subcontract, and will, when using Subcontractors and Suppliers:

- (a) enter into written contracts with Subcontractors and Suppliers;
- (b) incorporate the terms and conditions of this Contract into such contracts; and
- (c) be as fully responsible to the Company for acts and omissions of Subcontractors, Suppliers and of persons directly or indirectly employed by them as for acts and omissions of persons directly employed by the Contractor.

6.3 Requirements for Subcontracts

In addition to meeting the requirements set out in Section 6.2, the Contractor will ensure that every subcontract it enters into will, where the context so requires, contain provisions that:

- (a) require that the subcontracted Work be performed in accordance with the requirements of this Contract; and
- (b) permit the Contractor to assign the subcontract to the Company.

7. SITE CONDITIONS

7.1 Acceptance of Site

The Contractor is deemed to have examined the Site prior to entering into this Contract and to have made all investigations necessary to be familiar with all conditions at the Site which might affect the Work, including:

- (a) the form and nature of the Site;
- (b) the nature and condition of the ground, groundwater, subsoil, and sub-strata;
- (c) the location of utilities;
- (d) the quantities, location and nature of the Work, and equipment necessary for performance of the Work;
- (e) the means of access to and parking on or near the Site;

- (f) the accommodation and facilities that may be required to perform the Work;
- (g) the conditions under which the labour force will be employed, and
- (h) all Site risks, contingencies and other circumstances which may influence or affect the Work.

7.2 Unknown Site Conditions

The Contractor will not be entitled to a variation of the Contract Price or Contract Time because of difficulties related to conditions at the Site that were reasonably foreseeable by a contractor qualified to undertake the Work.

8. CLEAN-UP AND REMEDIAL WORK

8.1 Maintenance of Work and Site

The Contractor will maintain the Work and the Site in a safe and tidy condition free from the accumulation of waste products and debris created in the performance of the Work.

8.2 Final Clean-up

A. Contract I – Earth Works

Prior to the Substantial Performance Date as it pertains to Contract I, and in connection with any Contract I Work after the Contract I Substantial Performance Date, the Contractor will:

- (a) remove all surplus products, tools, Work Equipment, and any waste and debris created from the Work; and
- (b) leave the Site and the Work clean and suitable for occupancy (if relevant given the nature of the Work) and use.

B. Contract II – Site Servicing

Prior to the Substantial Performance Date as it pertains to Contract II, and in connection with any Contract II Work after the Contract II Substantial Performance Date, the Contractor will:

- (a) remove all surplus products, tools, Work Equipment, and any waste and debris created from the Work; and
- (b) leave the Site and the Work clean and suitable for occupancy (if relevant given the nature of the Work) and use.

8.3 Remedial Work

The Contractor will:

- (a) do all cutting and remedial work necessary to make the affected parts of the Work come together properly and to comply with the Specifications;
- (b) coordinate the Work Schedule to ensure that the requirement under Section 8.3(a) is kept to a minimum; and
- (c) ensure that cutting and remedial work is performed by specialists familiar with the materials affected and is performed in a manner that neither damages nor endangers any Work.

If the Contractor does not fulfill its obligations under Sections 8.1 and/or 8.3, the Company shall be permitted to correct these defaults, the cost of which the Company may set off from any amount due to the Contractor.

9. INSPECTION AND TESTING OF WORK

9.1 Access to Work

The Contractor will ensure that Consultant and the Company have access to all Work at all times. If parts of the Work are in progress at locations other than the Site, the Contractor will ensure that the Consultant and the Company have access to such Work whenever it is in progress.

9.2 Consultant's Right to Inspect

- (a) The Consultant may inspect any portion of the Work to confirm that such Work was performed or is being performed in accordance with this Contract.

9.3 Consultant's Right to Require Tests

- (a) The Consultant may require the Contractor to arrange a test, analysis, inspection or review of any Work (a "**Test**"), whether or not such Work is fabricated, installed or completed, and in such cases the Contractor will ensure that the Test is carried out by a qualified and independent Person approved by the Consultant.

9.4 Contractor's Obligations When Test Required

If a Test is required under this Contract, or by a Governmental Authority, or pursuant to any Applicable Laws, the Contractor will:

- (a) give the Consultant timely notice of such Test;
- (b) unless provided otherwise in the Specifications, bear all costs associated with such Test; and
- (c) promptly submit to the Consultant two copies of any results, reports or certificates related to such Test.

10. DEFECTIVE WORK

10.1 Contractor's Duty to Correct

If the Consultant determines that any portion of the Work is Defective, the Contractor will, at its cost, promptly correct the Defect, whether or not the Defect was the result of poor workmanship, use of substandard or flawed products or damage by act or omission of the Contractor or any of its Subcontractors or Suppliers. In such circumstances, the Contractor will also, promptly and at its cost, make good any work by Subcontractors or other Persons destroyed or damaged by correcting the Defect.

10.2 When Correction not Expedient

If, in the Consultant's opinion, it is not expedient to correct a Defect, the Company may deduct from any amount owing to the Contractor the difference in value between the work performed and that required by this Contract, the amount of which will be determined by the Company in consultation with the Consultant.

11. CONTRACT PRICE AND PAYMENT

11.1 Contract Price

As payment for the Contract I Work, the Company will pay the Contractor the sum of the products of each unit price stated in Schedule D-1 [Contract I - Schedule Of Prices] multiplied by the appropriate actual quantity of each unit price item that is incorporated in or made necessary by the Work, plus lump sums, if any, stated in Schedule D-1 [Contract I - Schedule Of Prices] (the "**Contract I Price**") plus all applicable Value Added Taxes.

As payment for the Contract II Work, the Company will pay the Contractor the sum of the products of each unit price stated in Schedule D-2 [Contract II - Schedule Of Prices] multiplied by the appropriate actual quantity of each unit price item that is incorporated in or made necessary by the Work, plus lump sums, if any, stated in Schedule D-2 [Contract II - Schedule Of Prices] (the "**Contract II Price**") plus all applicable Value Added Taxes.

11.2 Entire Compensation

The Contract I Price will be the entire compensation owing to the Contractor for the Contract I Work and, unless provided otherwise in the Specifications, includes all costs and expenses incurred by the Contractor whatsoever in performing the Contract I Work. The Contract II Price will be the entire compensation owing to the Contractor for the Contract II Work and, unless provided otherwise in the Specifications, includes all costs and expenses incurred by the Contractor whatsoever in performing the Contract II Work.

11.3 Payment

A. Contract I – Earth Works

Subject to Section 12, the Company will pay the Contractor the Contract Price plus all applicable Value Added Taxes as follows:

- (a) if the Contract Time is greater than one month, the Contractor may request monthly progress payments by submitting an application to the Consultant consisting of the following (an “**Application for Progress Payment**”):
- (1) a proper invoice to the Company, in a form acceptable to the Company and which is compliant with those requirements set out in the *Construction Act* (Ontario), requesting payment in respect of Work performed in the applicable month based on unit prices and lump sums, if any, as described in Section 11.3(d); and;
 - (2) a statutory declaration on an original form of CCDC Document 9A-2001;
- (b) upon receipt of an Application for Progress Payment, the Company will, within 28 calendar days, pay to the Contractor the portion of the invoiced amount which the Consultant determines is payable in accordance with the terms of this Contract, less any applicable Holdback;
- (c) if the Contract Time is less than one month, Sections 11.3(a) and 11.3(b) will not apply and the Contractor will only submit an Application for Final Payment;
- (d) the Contractor will include in each Application for Progress Payment and Application for Final Payment:
- (1) the value of unit price work performed, being the sum of the products of each unit price stated in Schedule D [Schedule Of Prices] multiplied by the appropriate actual quantity of each unit price item that is incorporated in or made necessary by the Work;
 - (2) the value of lump sum work performed, if any, proportionate to the amount of the lump sum item; and
 - (3) for:
 - (A) each unit price item, quantity measurements in a form satisfactory to the Company; and
 - (B) lump sum items, if any, a statement describing the percentage completed for each lump sum item,

and such other evidence requested by the Company relating to unit and lump sum items;
- (e) upon receipt of the Certificate for Final Payment from the Consultant, the Company will, within 28 calendar days, pay to the Contractor the unpaid balance of the Contract Price, if any, together with such Value Added Taxes as may be applicable to such payment;

- (f) Prior to submitting any Application for a Progress Payment or Certificate for Final Payment, the Contractor must submit to the Consultant a draft proper invoice no less than **14 days** before submitting the proper invoice required in this Section 11.3;
- (g) the Company may set off against any payment owing to the Contractor the amount of any payment adjustments or any costs, expenses or damages the Company suffers as a result of any breach of this Contract by the Contractor or any other wrongful or negligent act or omission by the Contractor;
- (h) no payment by the Company under this Contract, nor the partial or entire use or occupancy of the Work by the Company, will constitute acceptance of any portion of the Work which is not in accordance with the requirements of this Contract;
- (i) if the Parties do not agree on the amount of a payment, the Company will pay the amount not in dispute and issue any applicable notice required by the *Construction Act* (Ontario); and
- (j) where the basis of payment for an item is by unit price, quantities in progress payments will be considered approximate until all work required by that unit price is complete.

B. Contract II – Site Servicing

Subject to Section 12, the Company will pay the Contractor the Contract II Price plus all applicable Value Added Taxes as follows:

- (a) if the Contract Time is greater than one month, the Contractor may request monthly progress payments by submitting an application to the Consultant consisting of the following (an “**Application for Progress Payment**”):
 - (1) a proper invoice to the Company, in a form acceptable to the Company and which is compliant with those requirements set out in the *Construction Act* (Ontario), requesting payment in respect of Work performed in the applicable month based on unit prices and lump sums, if any, as described in Section 11.3(d); and;
 - (2) a statutory declaration on an original form of CCDC Document 9A-2001;
- (b) upon receipt of an Application for Progress Payment, the Company will, within 28 calendar days, pay to the Contractor the portion of the invoiced amount which the Consultant determines is payable in accordance with the terms of this Contract, less any applicable Holdback;
- (c) if the Contract Time is less than one month, Sections 11.3(a) and 11.3(b) will not apply and the Contractor will only submit an Application for Final Payment;
- (d) the Contractor will include in each Application for Progress Payment and Application for Final Payment:

- (1) the value of unit price work performed, being the sum of the products of each unit price stated in Schedule D [Schedule Of Prices] multiplied by the appropriate actual quantity of each unit price item that is incorporated in or made necessary by the Work;
- (2) the value of lump sum work performed, if any, proportionate to the amount of the lump sum item; and
- (3) for:
 - (A) each unit price item, quantity measurements in a form satisfactory to the Company; and
 - (B) lump sum items, if any, a statement describing the percentage completed for each lump sum item,

and such other evidence requested by the Company relating to unit and lump sum items;
- (e) upon receipt of the Certificate for Final Payment from the Consultant, the Company will, within 28 calendar days, pay to the Contractor the unpaid balance of the Contract Price, if any, together with such Value Added Taxes as may be applicable to such payment;
- (f) Prior to submitting any Application for a Progress Payment or Certificate for Final Payment, the Contractor must submit to the Consultant a draft proper invoice no less than 14 days before submitting the proper invoice required in this Section 11.3;
- (g) the Company may set off against any payment owing to the Contractor the amount of any payment adjustments or any costs, expenses or damages the Company suffers as a result of any breach of this Contract by the Contractor or any other wrongful or negligent act or omission by the Contractor;
- (h) no payment by the Company under this Contract, nor the partial or entire use or occupancy of the Work by the Company, will constitute acceptance of any portion of the Work which is not in accordance with the requirements of this Contract;
- (i) if the Parties do not agree on the amount of a payment, the Company will pay the amount not in dispute and issue any applicable notice required by the *Construction Act* (Ontario); and
- (j) where the basis of payment for an item is by unit price, quantities in progress payments will be considered approximate until all work required by that unit price is complete.

11.4 Certificate for Final Payment

When the Contractor considers that Total Completion of the Work has been attained, the following rules and process will apply:

- (a) With respect to either the Contract I Work or the Contract II Work the Contractor will submit an application (the “**Application for Final Payment**”) to the Company in a form acceptable to the Company and including at a minimum:
 - (1) a signed statement by the Contractor:
 - (A) declaring that either the Contract I Work or the Contract II Work has been completed in accordance with the Contract; and
 - (B) declaring, as far as the Contractor is aware, no Claims exist in relation to the Contract I Work or the Contract II Work, or if such Claims do exist, providing the details of such Claims;
 - (2) the documents described in Section 18.2; and
 - (3) any materials not yet delivered to the Company pursuant to Section 28.6;
- (b) the Consultant will review the Contract I Work or the Contract II Work and either advise the Contractor in writing that the application is valid or list the steps required to attain completion of the Contract I Work or the Contract II Work;
- (c) if the Contractor is advised by the Consultant that the Application for Final Payment is not valid, the Contractor will take the steps set out by the Consultant and thereafter provide the Company with another Application for Final Payment;
- (d) when the Consultant determines all Contract I Work and all Contract II Work has been completed, then it shall determine the Total Completion of the Work has been attained and it will issue a certificate (the “**Certificate for Final Payment**”) to the Company and the Contractor; and
- (e) the issuance of a Certificate for Final Payment in no way relieves the Contractor from correcting any Defects not readily apparent at the time of issuance.

11.5 Form of Payment

The Contractor agrees that any payments owing to it arising from this Contract shall be paid to the Contractor via Electronic Funds Transfer (“**EFT**”). The Contractor further agrees to the Company’s EFT Terms and Conditions which are attached as Schedule “E” to this Contract.

12. LIENS AND HOLDBACKS

12.1 Contractor’s Obligations with Respect to Liens

The Contractor will:

- (a) keep the Site and the Work free of any Liens arising out of, or attributable to, the Work, Subcontractors, this Contract, or otherwise connected with the Contractor;
- (b) defend and indemnify the Company in the event that any such Liens are filed; and
- (c) pay all costs and expenses (including actual legal costs) incurred by the Company as a result of any such Liens.

12.2 Builders' Lien Holdback

The Company will retain a holdback in accordance with the Applicable Laws in respect of builders' or constructors' liens (the "**Builders' Lien Legislation**"), or if such Laws do not exist in the Jurisdiction of Work or are not applicable in the circumstances, a holdback equal to 10% of the Contract Price (the "**Builders' Lien Holdback**").

12.3 Additional Holdbacks

The Company may retain the following additional holdbacks:

- (a) if there are any Defects, an amount equal to 200% of the Consultant's estimate of the cost to correct the Defect; and
- (b) if any Lien is filed against title to the Site or the Work or a portion thereof, an amount equal to such Lien, plus security for costs, and the Company may, at its election, pay such holdback into court to obtain the discharge of the Lien.

12.4 Payment of the Builder's Lien Holdback

Subject to the Company's set off rights under Section 11.3A(f) and 11.3B(f), the Company will release the Builders' Lien Holdback in accordance with the Builders' Lien Legislation and, subject to the Builders' Lien Legislation and any other Applicable Laws, as follows:

- (a) once the Certificate of Substantial Performance is issued, the Contractor will submit a written request to the Consultant for payment of the Builders' Lien Holdback consisting of:
 - (1) a statutory declaration by the Contractor in the form of CCDC 9A-2001 (or the most recent successor document to CCDC 9A-2001);
 - (2) a statement by the Contractor that it has not received notice of any Liens in connection with the Work; and
 - (3) if required by Workers' Compensation Legislation, a final clearance certificate from the responsible Governmental Authority;
- (b) once the Consultant receives the request described in Section 12.4(a), it will issue a certificate for payment of the Builders' Lien Holdback;
- (c) the Company will pay the Builders' Lien Holdback on the first Business Day following the expiration of the holdback period stipulated in the Builders' Lien Legislation, or

where such legislation does not exist or apply, within 30 calendar days following the issuance of the certificate described in Section 12.4(b); and

- (d) the Company may retain out of the Builders' Lien Holdback any sums required by law to satisfy any Liens against the Work or other third party monetary claims against the Contractor which are enforceable against the Company.

13. SUBSTANTIAL PERFORMANCE OF THE WORK

13.1 A. Substantial Performance of the Contract I Work

For the purposes of this Contract, "**Substantial Performance of the Work**" as it pertains to the Contract I Work means:

- (a) the Contract I Work has been substantially performed within the meaning of Applicable Laws (if relevant);
- (b) the Contract I Work is, in the Consultant's opinion, being used or is ready for use for the purposes intended by the Company;
- (c) all Approvals for which the Contractor is responsible have been issued by the relevant Governmental Authorities;
- (d) there are no outstanding work orders, requirements, deficiency notices or objections of any Governmental Authority or utility company relating to the Contract I Work;
- (e) the Contractor has delivered to the Company:
 - (1) a comprehensive deficiency list, including an estimated value for each item; and
 - (2) a schedule for completion of all remaining Contract I Work,
- (f) agreed to by the Company, acting reasonably;
- (g) if requested by the Company, the Contractor has executed such assignments, authorizations, covenants, and other documents and has taken such measures as the Company may reasonably request in order to assign, transfer and/or set over the Contract I Work to the Company; and
- (h) the Contractor has delivered documents to the Company in accordance with Section 28.6.

13.1 B. Substantial Performance of the Contract II Work

For the purposes of this Contract, "**Substantial Performance of the Work**" as it pertains to the Contract II Work means:

- (a) the Contract II Work has been substantially performed within the meaning of Applicable Laws (if relevant);

- (b) the Contract II Work is, in the Consultant's opinion, being used or is ready for use for the purposes intended by the Company;
- (c) all Approvals for which the Contractor is responsible have been issued by the relevant Governmental Authorities;
- (d) there are no outstanding work orders, requirements, deficiency notices or objections of any Governmental Authority or utility company relating to the Contract II Work;
- (e) the Contractor has delivered to the Company:
 - (1) a comprehensive deficiency list, including an estimated value for each item; and
 - (2) a schedule for completion of all remaining Contract II Work,
 agreed to by the Company, acting reasonably;
- (f) if requested by the Company, the Contractor has executed such assignments, authorizations, covenants, and other documents and has taken such measures as the Company may reasonably request in order to assign, transfer and/or set over the Contract II Work to the Company; and
- (g) the Contractor has delivered documents to the Company in accordance with Section 28.6.

13.2 Application for Certificate of Substantial Performance

When the Contractor believes it has achieved Substantial Performance of the Contract I Work or Contract II according to the criteria set out in Section 13.1, the Contractor will apply in writing to the Consultant for a Certificate of Substantial Performance (the "**Application for a Certificate of Substantial Performance**"), which application will be signed by the Contractor and will include:

- (a) a statement by the Contractor that the Contract I Work or Contract II Work, as the case may be, completed to date has been completed in accordance with this Contract; and
- (b) the documents described in Section 18.2.

13.3 Inspection and Issue of Certificate of Substantial Performance

Within a reasonable amount of time after receiving the Application for a Certificate of Substantial Performance from the Contractor, the Consultant will inspect the Contract I Work or Contract II Work to verify the validity of the application, and following such inspection, will

- (a) if the Consultant determines that Substantial Performance of the Work has been attained, issue a Certificate of Substantial Performance to the Contractor and the Company stating the date on which Substantial Performance of the Contract I Work

or Contract II Work, as the case may be, was attained (the “**Substantial Performance Date**”); or

- (b) if the Consultant determines that Substantial Performance of the Work as it pertains to the Contract I Work or Contract II Work has not been attained, give notice to the Contractor and Company to this effect, setting out in reasonable detail its reasons for disapproval.

13.4 Total Completion of the Work

Notwithstanding the issuance of the Certificate of Substantial Performance as it pertains to the Contract I Work or Contract II Work or anything else in this Section 13, the Contractor will proceed diligently to achieve Total Completion of the Work as it pertains to any remaining Contract I Work or Contract II Work.

14. CHANGES IN THE WORK

14.1 Changes

The Company may, without invalidating this Contract, require Changes by issuing a Change Order or a Change Directive, in which case the Contract Price and Contract Time will, if necessary, be adjusted in accordance with this Contract.

14.2 No Changes without Change Order or Change Directive

The Contractor will not proceed with any Change without a Change Order or a Change Directive, and will not be entitled to any payment for a Change without such Change Order or Change Directive, which will be the final determination of adjustments in the Contract Price and Contract Time for a Change.

14.3 Procedure for Changes

The Parties will follow the following process in respect of Changes:

- (a) when a Change is proposed or required by the Company, the Contractor will promptly, and in any case within 10 Business Days, present to the Company its claims for any adjustment to the Contract Price or the Contract Time due to the Change;
- (b) if the Contractor claims a Change in the Contract Price, the Contractor will provide a full breakdown of labour, material and other cost information;
- (c) if the Company and the Contractor agree to the Change, including any adjustments in the Contract Price and Contract Time, or to the method to be used to determine the adjustments, such Change will be effective when recorded in a Change Order;
- (d) the value of the Work performed as the result of a Change Order will be included in any payment applications; and

- (e) it is intended in all matters involving Changes that both the Company and the Contractor will act promptly and in accordance with the times set out in this Section 14.3.

14.4 Determination of Cost

Whenever it is necessary for the purposes of this Contract to determine the cost of a Change, the following rules will apply:

- (a) subject to Section 14.4(b), the cost will be the amount agreed upon by the Company and the Contractor from time-to-time within a reasonable time after the issue arises in any given instance;
- (b) if the Company and the Contractor cannot agree as contemplated in Section 14.4(a), the sole cost to which the Contractor will be entitled for the Change will be equal to the aggregate of:
 - (1) all reasonable and proper amounts actually expended by or legally payable by the Contractor in respect of the labour, equipment or material (supported by invoices, purchase orders, timesheets and other customary industry documentation) that are directly attributable to the subject matter of the Change and that are within one of the classes of expenditures described in Section 14.4(c); plus
 - (2) subject to Section 14.4(c), to cover other costs and profit, a markup of 10% on the amounts charged pursuant to Section 14.4(b)(1).
- (c) classes of expenditures that are allowable for the purposes of Section 14.4(b) are:
 - (1) wages and salaries of the Contractor's employees while they are actually and properly engaged on the Work;
 - (2) payments to Subcontractors;
 - (3) payments for materials necessary for and incorporated in the Work or necessary for and consumed in the performance of the Work;
 - (4) payment for equipment necessary for and incorporated in the Work;
 - (5) payments for preparation, inspection, delivery, installation, commissioning and removal of equipment and materials necessary for the performance of the Work;
 - (6) assessments payable under any statutory scheme relating to workers compensation, unemployment insurance or holidays with pay;
 - (7) payments for renting equipment (but not tools) and allowances for equipment (but not tools) owned by the Contractor, necessary for the performance of the

Work, provided that such payments or allowances are reasonable or have been agreed to by the Consultant; and

- (8) other payments, made with the Company's prior approval, that are necessary for the performance of the Work, as determined by the Company; and
- (d) the applicable markup set out in this Section 14.4 will apply to the Company's credit for reductions in the costs relating to a Change. Where both increases and reductions in costs relate to a Change, the applicable markup will apply to the net increase or reduction in costs.

14.5 Change Directives

The Company may issue a Change Directive to the Contractor directing the Contractor to proceed with a Change, in which case the Contractor will proceed with the Change and the valuation and any necessary adjustments to the Contract Price and the Contract Time will be made as soon as reasonably possible after the implementation of the Change in the same manner as a Change for which a Change Order would be issued under this Contract. For greater certainty, the Company may issue Change Directive at any time, including prior to commencing the process for a Change Order or if there is a dispute in relation to a Change or Change Order (including a dispute as to whether there is a Change).

14.6 Quantity Variations

The following applies to the estimated quantities identified in Schedule D-1 and D-2 [Schedule Of Prices], or where the estimated quantities have been amended by Change Order, the following applies to the amended estimated quantities:

- (a) the Company or the Contractor may request an adjustment to a unit price contained in Schedule D-1 and D-2 [Schedule Of Prices] provided the actual quantity of the unit price item in Schedule D-1 and D-2 [Schedule Of Prices] exceeds or falls short of the estimated quantity by more than 15%;
- (b) where the actual quantity exceeds the estimate quantity by more than 15%, a unit price adjustment pursuant to Section 14.6(a) will apply only to the quantity that exceeds 115% of the estimated quantity;
- (c) where the actual quantity falls short of the estimated quantity by more than 15%, a unit price adjustment pursuant to Section 14.6(a) will apply to the actual quantity of the unit price item, provided that the adjusted unit price will not exceed a unit price that would cause the payment amount to exceed that derived from the original unit price and estimated quantity;
- (d) the party that intends to request for an adjustment to a unit price will give timely Notice to the other party; and

- (e) the Company will determine, acting reasonably, the validity of any request for an adjustment, provided that if the parties do not agree, the request for an adjustment will be settled in accordance with Section 26.

15. DELAYS

15.1 Notice of Delay

If, for any reason, the progress of the Work falls behind the Work Schedule (a “**Delay**”), the Contractor will immediately give the Company and the Consultant notice of the Delay describing the event causing the Delay and the steps the Contractor is taking to minimize the Delay. In the case of a continuing cause of Delay, only one notice is necessary.

15.2 Continuing Responsibility

- (a) If a Delay results in an interruption or suspension of the Work, the Contractor will remain responsible for the security, care, maintenance and protection of the Site, the Work and all Products and Work Equipment.

15.3 Extension of Substantial Performance Deadline

In the event of a Delay, the Contractor will be entitled to an extension of the Substantial Performance Deadline only if such Delay is a direct result of:

- (a) an action or omission of the Company or the Consultant;
- (b) an order issued by any court or Governmental Authority (providing such order was not issued as the result of any act or omission of the Contractor or any Person employed or engaged by the Contractor); or
- (c) an Uncontrollable Event,

and the Contractor has provided notice of the Delay pursuant to Section 15.1 and taken all reasonable steps in the circumstances to avoid or minimize the Delay.

15.4 Remedying Delays

In the event of a Delay:

- (a) if the Contractor is entitled to an extension under Section 15.3, the Substantial Performance Deadline will be extended for an amount of time recommended by the Consultant in consultation with the Contractor, and the Contractor will prepare and deliver to the Company and the Consultant a revised Work Schedule to the satisfaction of the Company and the Consultant; and
- (b) if the Contractor is not entitled to an extension under Section 15.3, the Contractor will take such steps as required to bring the Work back into conformity with the Work Schedule and will at its cost accelerate the Work to meet the Substantial Performance Deadline.

15.5 Liability for Delays

In the event of a Delay:

- (a) if the Delay is not one to which Section 15.3 applies, and such Delay results in the Company incurring additional costs, the Contractor will be liable to the Company for such additional costs, including any additional or extended services required by the Company from the Consultant as a result of such Delay;
- (b) if the Delay was caused by an action or omission of the Company or Consultant, the Contractor will be entitled to claim compensation from the Company for any reasonable costs directly incurred by it as the result of such Delay, determined in accordance with Section 14.4, provided it has used all reasonable efforts to mitigate such costs; and
- (c) in all other circumstances, the Parties will bear their own costs arising from a Delay.

16. PROTECTION OF WORK AND PROPERTY

16.1 Duty to Protect

The Contractor will protect the Work, the Site, the Company's property and property adjacent to the Site from damage that may arise as the result of the Project and the performance of the Work, except damage that occurs as the result of actions of the Company or its representatives.

16.2 Failure to Protect

Should any damage occur to the Work, the Site, the Company's property or property adjacent to the Site for which the Contractor is responsible as provided in Section 16.1, the Contractor will make good such damage at its own expense or pay all costs incurred by the Company or others in making good such damage.

17. ENVIRONMENTAL MANAGEMENT

17.1 Protection of Environment

The Contractor will:

- (a) comply with any reasonable instructions, policies, practices and procedures established by the Company with respect to the environment that may be provided to the Contractor from time to time;
- (b) be observant for, and immediately notify the Consultant of, any environmental problems or risks that develop at the Site or otherwise in relation to the Work; and
- (c) take all reasonable and necessary measures in the performance of the Work to avoid causing negative impacts to the environment.

17.2 Contaminants

If the Contractor, after commencing the Work, encounters or has reason to believe in the existence of any Contaminant on, in or under the Site, the Contractor will at once take all reasonable steps, including suspension of the Work, as necessary to ensure that no person or property suffers injury, sickness, death, damage or destruction as a result of exposure to, or the presence of, any Contaminant, and the Contractor will immediately report such Contaminant to the relevant Governmental Authorities and to the Company and the Consultant.

17.3 Responsibility for Contaminants

Unless the Contract expressly provides otherwise, the Contractor will be responsible for taking all steps to dispose of, store or otherwise render harmless any Contaminants which were present at the Site prior to the Contractor commencing the Work. The Consultant acknowledges that the Company has made no representation or warranty as to the absence or presence on, in or under the Site of any Contaminant.

18. HEALTH AND SAFETY

18.1 Responsibility and Compliance

The Contractor:

- (a) will be solely responsible for health and safety at the Site with respect to performance of the Work;
- (b) will comply with any reasonable instructions, policies, practices and procedures established by the Company with respect to health and safety that may be provided to the Contractor from time to time;
- (c) will be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Work;
- (d) will comply, and will ensure that each Subcontractor complies with Workers' Compensation Legislation and all other Applicable Laws related to occupational and workplace health and safety ("**Workplace Safety Legislation**"); and
- (e) for greater certainty, agrees to be the "prime contractor" or the "constructor" or such other similar term applicable in the Jurisdiction of the Work, for the purposes of all Workplace Safety Legislation.

18.2 Evidence of Compliance

The Contractor will provide the Company with evidence of compliance with Workplace Safety Legislation, including any filings required and payments due thereunder, by both the Contractor and any Subcontractors, at the following times:

- (a) prior to commencing the Work;

- (b) concurrently with the Application for a Certificate of Substantial Performance and Application for Final Payment; and
- (c) at any time during upon the Company's request.

19. ARTIFACTS AND FOSSILS

Should the Contractor discover any artifacts, fossils, remains, coins, or articles of value or antiquity at the Site, such items will be deemed to be the property of the Company, and the Contractor will:

- (a) immediately notify the Company and the Consultant of such discovery;
- (b) take all steps not to disturb the item and, if necessary, stop Work to the extent required if performing the Work would endanger the object or prevent or impede its excavation;
- (c) take all necessary steps to preserve the item in the same position and condition in which it was found; and
- (d) comply with all Applicable Laws with respect to such discovery.

20. INSURANCE AND CONTRACT SECURITY

20.1 Insurance

The Contractor will:

- (a) obtain from insurers licensed to underwrite insurance in the Jurisdiction of Work, maintain and pay for the insurance coverage described in Schedule C [Insurance] (the "**Insurance**");
- (b) prior to the Start Date and upon the placement, renewal, amendment, or extension of all or any part of the Insurance, provide the Company with certificates of insurance listing the Company as an additional insured ensuring endorsements applicable to the Work are captured in the certificates of insurance; and
- (c) be responsible for payment of all deductibles from insured claims under the Insurance policies.

If the Contractor breaches any of its obligations under Section 20.1, the Company may obtain and maintain such insurance coverage and deduct the cost from any amounts which are due or may become due to the Contractor under this Contract.

20.2 Contract Security

Prior to the Start Date, the Contractor will provide to the Company either:

- (a) A performance bond in the form acceptable to the Company; and

- (b) a labour and material payment in the form acceptable to the Company (such as a CCDC 222-2002 Labour and Material Payment Bond) in accordance with the latest edition of the CCDC approved bond forms, or otherwise in a form and on terms satisfactory to the Company,

(a) and (b) above each in the amount of 50% of the Contract Price and issued by a duly licensed surety company authorized to transact the business of suretyship in the Jurisdiction of Work.

20.3 Letter of Credit

If the Contractor provides a letter of credit pursuant to Section 20.2(a), the Contractor will renew the letter of credit so that it remains valid until a Final Certificate for Payment is issued. The Company may at any time and from time to time draw on the letter of credit in whole or in part to cover any costs incurred by the Company as a result of any breach, or anticipated breach, of this Contract by the Contractor. If the Company draws on the letter of credit before the end of the Contract, then on 10 calendar days' notice from the Company, the Contractor will provide supplementary or substitute letters of credit or additional funds to top up the letter of credit so that, in addition to the amount drawn upon, the Company has available to it the full amount of the letter of credit set out in Section 20.2(a). If, at any time during the term of the Contract, the letter of credit will expire, then no less than 30 calendar days prior to the date of expiry of the letter of credit, the Contractor will renew and deliver to the Company the letter of credit so it is valid, at a minimum for a further four months, failing which the Company may call upon the full amount of the letter of credit and hold and have access to such funds without payment of interest in substitution for the letter of credit.

20.4 Bonding

If the Contractor provides bonds pursuant to Section 20.2(b), the Contractor will maintain the bonds in good standing until a Final Certificate for Payment is issued. If the Contractor initially provides a letter of credit pursuant to Section 20.2(a), the Contractor may request to replace such letter of credit with a bond as described in Section 20.2(b), provided that such request is subject to the Company's approval, which may be unreasonably withheld.

21. INDEMNIFICATION

21.1 Indemnified Parties

- (a) For the purpose of this Contract, "**Indemnified Parties**" means the Company, the Consultant, sub-consultants and other Project consultants, and the directors, officers, employees, agents, representatives and affiliates of any of them, and all persons for whom any of the foregoing entities are legally responsible, and an "**Indemnified Party**" means any one of the Indemnified Parties.

21.2 Indemnification

The Contractor will indemnify, defend (with counsel reasonably acceptable to the Indemnified Party) and hold harmless the Indemnified Parties from and against any and all Claims arising out of, relating to or resulting from:

- (a) the performance of the Work by the Contractor, or a Person for whom the Contractor is responsible in law or under this Contract (including Subcontractors, Suppliers, and their respective representatives, employees, agents, and contractors);
- (b) any failure, breach or non-performance by the Contractor of any term of this Contract;
- (c) any wrongful or negligent act or omission by the Contractor, or Person for whom the Contractor is responsible in law or under this Contract (including Subcontractors, Suppliers, and their respective representatives, employees, agents, and contractors); and
- (d) without limiting the foregoing, the assignment to the Contractor of, and the Contractor's assumption of, the responsibilities, obligations and liabilities of the Contractor under the Workers' Compensation Legislation and Workplace Safety Legislation as contemplated in this Contract.

21.3 Contractor's Obligation Upon a Claim

For greater clarity and without limiting Section 21.2, the Contractor will at its sole expense promptly defend and dispose of all Claims to which Section 21.2 applies, pay all judgments rendered against an Indemnified Party in such Claims, and reimburse each Indemnified Party upon demand for all reasonable expenses incurred by such Indemnified Party in connection with such Claims on a full indemnity basis.

22. WAIVER OF CLAIMS

The Contractor acknowledges and agrees that its submission of an Application for a Certificate of Substantial Performance will constitute a waiver by the Contractor of all claims against the Company, and the Contractor as of and from the Substantial Performance Date waives and releases the Company from all claims that could be advanced by the Contractor against the Company, except for:

- (a) claims in respect of which the Contractor has previously given the Company notice setting out in detail the nature of and grounds for the claim and the remedy sought; and
- (b) claims resulting from acts or omissions which occur after the Substantial Performance Date.

23. WARRANTY

23.1 Contractor's Warranty

The Contractor will, at its sole cost, correct:

- (a) all Defects which appear within 3 years from the Substantial Performance Date (for either Contract I Work or Contract II Work), or within such longer period as may be required by the Specifications for parts of the Work or imposed by Applicable Laws; and

- (b) any damage resulting from corrections undertaken pursuant to Section 23.1(a).

23.2 Assignment of Warranties

The Contractor hereby assigns to the Company all warranties, guarantees or other obligations for work, services or materials performed or supplied by, Subcontractors, Suppliers, materialmen, engineers, consultants, or other persons in or about the Work (“**Warranty Obligations**”). The Contractor will cause the entity giving a Warranty Obligation to assign that Warranty Obligation to the Company. The Contractor will, prior to the issuance of the Final Certificate for Payment, provide such further assurances of this assignment as the Company may require together with the consents of the other parties thereto. Such assignment will be in addition to and without detracting from the other warranty rights of the Company under this Contract. Although this is a present assignment, until expiry of the relevant warranty rights of the Company against the Contractor, the Company will hold the warranties, guarantees and other obligations of third parties referred to herein on behalf of both the Company and the Contractor, and the Company will not directly exercise any rights under any such warranty, guarantee or other obligation without first notifying the Contractor thereof and giving the Contractor the opportunity to correct the relevant Defect, or cause it to be corrected. Notwithstanding any assignment hereunder, the Contractor will have the right to enforce the warranties, guarantees and other obligations of third parties and to this effect and for this purpose the Contractor reserves the right in any such assignment to enforce such third party warranties, guarantees and other obligations.

24. SUSPENSION

24.1 Company’s Right to Suspend Work

The Company may for any reason require the Contractor to suspend performance of the Work by giving notice to the Contractor at least 48 hours in advance of the time the suspension is to take effect, and the suspension will be effective in the manner specified in the notice. However, if the Company determines that there is an emergency, the Contractor will suspend Work immediately according to the Company’s instructions.

24.2 Rules in the Event of a Suspension

If the Company suspends the Work under Section 24.1, the following rules will apply:

- (a) upon receiving notice of suspension from the Company, the Contractor will immediately suspend all operations except those, which, in the Contractor’s reasonable opinion, are necessary to ensure the safety of personnel and the public or for the care and preservation of the Work or Products;
- (b) during the period of suspension, the Contractor will not remove from the Site any Work or Products without the Company’s prior written consent;
- (c) the period of suspension will end upon 5 Business Days’ notice (or such shorter time as the Parties may agree to) from the Company to the Contractor, at which time the Contractor will resume operations and complete the Work in accordance with this Contract;

- (d) the Company will pay the Contractor for all costs reasonably incurred by the Contractor in complying with the suspension, determined in accordance with Section 14.4, provided the Contractor has used all reasonable efforts to mitigate such costs; and
- (e) if the period of suspension is greater than 30 calendar days and the Company and the Contractor do not agree to continue with and complete the Work, this Contract will be deemed to have been terminated and the Company will compensate the Contractor in accordance with Section 25.2(a).

25. TERMINATION

25.1 No-Default Termination

Notwithstanding that the Contractor may not be in breach of this Contract, if conditions arise which, in the Company's sole discretion, make it necessary to do so, the Company may terminate this Contract by giving 5 Business Days' written notice to that effect to the Contractor and termination will be effective in the manner specified in the notice.

25.2 Rules in the Event of No-Default Termination

If this Contract is terminated pursuant to Section 25.1:

- (a) the Company will pay the Contractor for all Work performed in accordance with this Contract up to the date of termination plus reasonable demobilization costs, but the Contractor will not be entitled to payment for any loss of profits or loss of opportunity; and
- (b) the Company will be entitled to take possession of the Work or any part of the Work and finish the Work or any part of the Work by whatever method the Company may consider expedient.

25.3 Termination for Default

In addition to the right provided in Section 25.1, the Company may terminate this Contract for default if:

- (a) in the Company's reasonable opinion, the Contractor has breached or failed to comply with a term of this Contract; or
- (b) the Contractor is adjudged bankrupt, makes a general assignment for the benefit of creditors, or a receiver is appointed on account of its insolvency.

25.4 Notice of Default and Rectification Period

If a default has occurred within the meaning of Section 25.3, prior to exercising its right to terminate the Contract, the Company will give the Contractor notice of the default and allow the Contractor 10 calendar days from the date of delivery of such notice to correct the default or to provide to the Company with a schedule acceptable to the Company for correction of the default.

25.5 Rules in the Event of Default

If a default has occurred within the meaning of Section 25.3 and the Contractor has not remedied the default within the time permitted under Section 25.4, the following will apply:

- (a) the Company may exercise one or both of the following rights:
 - (1) correct the default and deduct the cost thereof from any payment then or thereafter due to the Contractor; and
 - (2) terminate this Contract immediately upon notice to the Contractor;
- (b) if the Company terminates this Contract pursuant to Section 25.5(a)(2), the Company will be entitled to:
 - (1) take possession of the Work or any part of the Work;
 - (2) finish the Work or any part of the Work by whatever method the Company may consider expedient;
 - (3) use the Work Equipment, subject to the rights of third parties;
 - (4) charge and recover from the Contractor the amount by which the full cost of finishing the Work and a reasonable allowance to cover the cost of corrections to Work performed by the Contractor that may be required exceeds the unpaid balance of the Contract Price; and
 - (5) withhold any payments owing to the Contractor for Work completed to the date of termination and deduct any additional costs in completing the Work incurred by the Company as a result of the termination.

25.6 Business Integrity Default

Prior to entering into this Contract, the Contractor provided the Company with a certificate of compliance dated ▼ (the “**Compliance Certificate**”). If the Company, acting reasonably, determines that:

- (a) the Contractor provided a false or misleading Compliance Certificate, or
- (b) the Contractor or an owner (as defined in the Compliance Certificate) of the Contractor has been convicted of any offence under any of the Acts (as defined in the Compliance Certificate), which has been tried on indictment,

the Contractor shall be deemed to have breached the Contract, which breach cannot be remedied, and the Company shall have the right to terminate the Contract in accordance with Sections 25.3 and 25.5.

The Contractor further covenants to proactively disclose to the Company if the Contractor, or an owner of the Contractor (as defined in the Compliance Certificate), is convicted of any offences under

any of the Acts (as defined in the Compliance Certificate), which has been tried on indictment, during the term of this Agreement.

25.7 Termination by the Contractor

If the Company is adjudged bankrupt, or makes a general assignment for the benefit of creditors because of the Company's insolvency, or if a receiver is appointed because of the Company's insolvency, the Contractor may, without prejudice to any other right or remedy the Contractor may have, terminate the Contract by giving the Company or receiver or trustee in bankruptcy notice to that effect.

25.8 Survival

The following provision of this Contract will survive the completion or termination of this Contract;

- (a) all exclusions, waivers of claims or liability, limitations of liability, representations, warranties, and indemnities wherever located in this Agreement;
- (b) without limiting the forgoing, Sections 21, 22, 23, 26, and 28; and
- (c) all rights accrued prior to completion or termination of this Contract.

26. DISPUTE RESOLUTION

26.1 Application

The dispute resolution procedure described in this Section 26 (the “**Dispute Resolution Procedure**”) applies to any disputes between the Parties arising out of or in connection with this Contract, except for those matters which are exclusively subject to an Interim Adjudication (a “**Dispute**”). The Dispute Resolution Procedure does not affect the Consultant’s authority under this Contract, and for greater certainty only applies when the Dispute falls outside of the Consultant’s authority or the Dispute persists despite the Consultant’s initial determination.

26.2 Dispute Notice

A Party may commence the Dispute Resolution Procedure by giving notice to the other Party setting out the pertinent facts regarding the Dispute, the remedy or relief sought and the grounds on which such remedy or relief is sought (the “**Dispute Notice**”).

26.3 Negotiation

Within 5 Business Days following the delivery of a Dispute Notice, or such longer period as the Parties may agree, the Parties will meet and make good faith efforts to resolve the Dispute by without prejudice negotiations.

26.4 Arbitration

If the Dispute is not completely resolved by agreement between the Parties within 10 Business Days of the commencement of negotiations pursuant to Section 26.3, or such longer period as the Parties

may agree, then either Party may commence proceedings to have the Dispute finally settled by arbitration under the National Arbitration Rules of the ADR Institute of Canada, Inc. then in effect (or the most recent version thereof), in which case the place of arbitration will be the capital city of the Jurisdiction of Work unless otherwise agreed between the Parties

26.5 Work Will Continue

Notwithstanding the existence of a Dispute, the Contractor will continue to perform the Work.

26.6 Interim Adjudication

For any matter which may be subject to an Interim Adjudication, the Parties agree that the party commencing the Interim Adjudication shall deliver to the responding party a draft Notice of Adjudication setting out all material particulars of the issues in dispute, the documents upon which it intends to rely, and the name of its proposed adjudicator at least three (3) weeks before serving its Notice of Adjudication.

Unless otherwise agreed to by the responding party, the party commencing the Interim Adjudication will not materially change the draft Notice of Adjudication before it serves the Notice of Adjudication on the responding party.

27. NOTICES

All notices, requests or demands relating to this Contract will be in writing and will only be effective if sent by registered mail or transmitted by electronic transmission as set out below:

if to the Company:

Canada Lands Company CLC Limited
100 Queen Street, Suite 1050
Ottawa, ON K1P 1J9

Attention: **Mary Jarvis**
 Fax No.: **613 564 3016**
 E-mail: mjarvis@clc.ca

with a copy:

Canada Lands Company CLC Limited
 1700 – 1 University Avenue
 Toronto, ON M5J 2P1

Attention: Chief Legal Officer & Corporate Secretary
 Fax No.: 416-214-1120
 E-mail: legalnotice@clc.ca

if to the Contractor:

[Insert Contactor Name and Address]

Attention: **[Insert Name]**

Fax No.: **[Insert Fax Number]**

E-mail: **[Insert E-mail Address]**

if to the Consultant:

WSP Canada Inc.

Attention: Philip de Sousa

E-mail: Philip.deSousa@wsp.com

or to such other coordinates as a Party may designate in the manner set out above.

Any such notice or communication will be deemed to have been delivered:

- (a) if sent by registered mail, on the date of delivery;
- (b) if delivered by facsimile, on the next Business Day following the date of transmission;
or
- (c) if by electronic mail, on the next Business Day following the date the e-mail was sent, provided that:
 - (1) the receiving Party has, by electronic mail or facsimile, acknowledged to the notifying Party that it has received such notice; or
 - (2) within 24 hours after sending the notice, the notifying Party has also dispatched a copy of such notice to the receiving Party by registered mail or facsimile.

28. CONFIDENTIALITY AND INTELLECTUAL PROPERTY

28.1 Confidential Information

For the purposes of this Contract, “**Confidential Information**” means:

- (a) personal information, as defined in the *Personal Information Protection and Electronic Documents Act* (Canada), which is collected, acquired, or obtained by a Party in relation to or in the course of the performance of this Contract; and
- (b) information of a Party that the Party has designated as confidential at the time of disclosure and which is supplied, or to which access is granted, to or on behalf of the other Party, either in writing or in any other form, directly or indirectly pursuant to discussions with the other Party and includes all analyses, compilations, studies and other documents whether prepared by or on behalf of a Party which contain or otherwise reflect or are derived from such designated information.

28.2 Obligations with Respect to Confidential Information

Each Party will hold in confidence any Confidential Information received from the other Party, except that the obligation to maintain the confidentiality of the Confidential Information does not apply to Confidential Information:

- (a) which the Party that disclosed the Confidential Information confirms in writing is not required to be treated as Confidential Information;
- (b) which is or comes into the public domain otherwise than through any disclosure prohibited by this Contract;
- (c) if disclosure of such Confidential Information is required by law, including pursuant to the *Access to Information Act*;
- (d) which may be required to permit a Party to pursue all available remedies for a breach of this Contract by the other Party; or
- (e) which, in the case of the Company, the Company determines is required to be disclosed to
 - (1) any lender or financial institution; or
 - (2) to a third party in connection with the potential acquisition of any of the Company's assets or interests.

28.3 Additional Prohibitions on Disclosure of Information by Contractor

Except as required by law or permitted by the Company's written consent, the Contractor will not disclose to anyone or use for any purpose other than performing the Work any information concerning the Company or the Work, whether such information was disclosed by the Company or obtained by the Contractor through its own investigations and inquiries.

28.4 Public Communications

The Company and the Contractor will consult with each other prior to issuing any public announcement or statement with respect to this Contract or the Work, including any announcement required by an Applicable Law, and the content of any such announcement or statement will be subject to the Company's prior written approval.

28.5 Right to Use

Without limiting any of the Company's rights under this Contract, at law or in equity, the Contractor hereby grants to the Company a perpetual, irrevocable, fully paid-up and royalty-free license to:

- (a) use the Intellectual Property owned or licensed by the Contractor and contained, embedded or disclosed in or otherwise existing in respect of, or used in the production of, the Work ("**Contractor IP**") for the Company's own use in the

completion, installation, operation, maintenance, repair, renovation, upgrade and replacement, of any or all of the Work;

- (b) allow third parties employed or engaged by the Company to access and use the Contractor IP for the completion, installation, operation, maintenance, repair, upgrade and replacement, of any or all of the Work; and
- (c) show the Contractor IP to prospective lenders, appraisers or other Persons and to assign this license to any mortgagee or subsequent owner of the Site with or without any specific assignment document.

The Contractor warrants that it has full right, power and authority to grant the license described in this Section.

28.6 Return of Documents and Ongoing Confidentiality

Unless otherwise permitted by the Company in writing, at any time immediately upon the Company's request and in any event prior to or concurrently with the Application for a Certificate of Substantial Performance, the Contractor will deliver to the Company all Drawings, documents, records, reports, and other information or data relating to the Work, including all copies thereof, which the Contractor obtained from the Company or Consultant or otherwise obtained, and will keep in strict confidence all such information and all discussions between the Company and the Contractor with respect to the Work.

28.7 Remedy for Breach of this Section

Without prejudice to any other rights and remedies that the other Party may have, each of the Parties agrees that damages may not be an adequate remedy for a breach of Section 28 and that the other Party will, in such case, be entitled to the remedies of injunction, specific performance or other equitable relief for any threatened or actual breach of this Section 28.

29. GENERAL

29.1 Governing Law

This Contract and each of the documents contemplated by or delivered under or in connection with this Contract are governed exclusively by, and are to be enforced, construed and interpreted exclusively in accordance with, the laws of the Jurisdiction of Work and the laws of Canada applicable therein which will be deemed to be the proper law of this Contract.

29.2 Access to Information Act and Privacy Act

The Contractor acknowledges that the Company is subject to the *Access to Information Act* (R.S.C., 1985, c. A-1) and the *Privacy Act* (R.S.C., 1985, c. P-21) and that information provided to the Company in connection with this agreement may be subject to the provisions of these acts.

29.3 Nature of Relationship

In entering into this Contract, the Contractor has and will have the status of an independent contractor. Nothing in this Contract will contemplate or constitute the Contractor as an agent, partner or employee of the Company for any purpose. Furthermore, nothing in this Contract will create any contractual relationship between the Company and a Subcontractor, a Supplier, or other person performing any portion of the Work other than the Contractor.

29.4 Entire Agreement

This Contract, the Compliance Certificate and any other documents expressly referred to in this Contract as being a part of this Contract contains the entire agreement of the Parties relating in any manner to the Work and no understandings or agreements, oral or otherwise, exist between the Parties except as expressly set out in this Contract.

29.5 Amendments

Unless otherwise provided herein, this Contract may not be amended except by a further written agreement signed by both Parties.

29.6 Assignment

The Contractor will not assign this Contract or any part of this Contract without the Company's express written consent, and any purported assignment by the Contractor without the required consent will not be binding or enforceable against any party. The Company may assign this Contract without the Contractor's consent, provided that the assignee agrees to be bound by and assume the obligations of the Company pursuant to this Contract.

29.7 Unenforceability

If any provision of this Contract is held to be invalid or unenforceable, it will be severed from the Contract and will not affect the enforceability or validity of the remaining provisions of the Contract.

29.8 Waiver

No waiver of any provision of this Contract is binding unless it is in writing and signed by all the Parties to this Contract except that any provision which does not give rights or benefits to a particular Party may be waived in writing, signed only by that Party who has rights under, or holds the benefit of, the provision being waived if that Party promptly sends a copy of the executed waiver to the other Party. No failure to exercise, and no delay in exercising, any right or remedy under this Contract will be deemed to be a waiver of that right or remedy. No waiver of any breach of any provision of this Contract will be deemed to be a waiver of any subsequent breach of that provision or of any similar provision.

29.9 Remedies

Except where expressly provided otherwise in this Contract, the rights, powers and remedies conferred on the Parties under this Contract are not intended to be exclusive but are cumulative, are

in addition to, do not limit and are not in substitution for any other right, power and remedy existing under any other agreement, at law or in equity.

29.10 Time of Essence

Time is of the essence of this Contract.

29.11 Counterparts

This Contract may be executed in one or more counterparts and delivered by electronic transmission, and each counterpart when so executed constitutes an original and all of which together constitute one and the same agreement.

[The remainder of this page is intentionally left blank.]

IN WITNESS WHEREOF the Company and the Contractor have executed this Contract as of the Effective Date.

CANADA LANDS COMPANY CLC LIMITED

Per: _____

Name:

Title:

Per: _____

Name:

Title:



Per: _____

Authorized Signatory

Name: _____

SCHEDULE A

SPECIFICATIONS

The Specifications are attached to this Schedule A and form part of the Contract.

For the purposes of this Schedule A (including Schedules A-1 and A-2) references to “Owner” and “Tenderer/Contractor” shall be deemed to have the same meaning as “Company” and “Contractor” respectively.

To the extent that any term contained in the Specifications (Schedule A-1 and A-2) is inconsistent with or contradicts a provision of this Contract, the contractual term shall predominate to the extent of the inconsistency, but all effort shall be made to interpret the two contractual provisions to be in harmony with each other.

SCHEDULE A-1

SPECIFICATIONS FOR CONTRACT I

The following are attached to this Schedule A-1:

- a) **Special Conditions**
- b) **General Specifications; and**
- c) **Project Specifications**

SPECIAL CONDITIONS OF THE CONTRACT

ARTICLE SC1 - Acceptance of Site

All Proponents are required to satisfy themselves by personal examination of the site, of the work and of the existing conditions, which may be encountered on the site. The submission of a bid shall be deemed proof that the Proponents have satisfied themselves as to all the provisions of the Contract, of all of the conditions which may be encountered, equipment they will be required to supply, or any other matter which may enter into the carrying out of the Contract to a satisfactory conclusion. No claims will be entertained by the Owner based on the assertion by the Contractors that they were not informed as to any of the provisions of conditions intended to be covered by the Contract. The submission of the price provided within the Pricing Schedule shall be presumptive evidence the Contractor has satisfied himself of the site conditions.

Following completion of underground servicing and roads to base course asphalt, the Contractor **MUST** restore any disturbed lots and blocks to the pre-grade elevations, including removal and disposal of surplus material and provide a topographical survey certified by an Ontario Land Surveyor confirming the same, as per SC28 – As-Built Information. The Owner reserves the right to credit from the payment to the Contractor for any incomplete restoration works. The deduction amount will equal the cost for the Owner to complete the restoration work by another contractor.

The Contractor must submit to the Owner, in writing, that all disturbed lots and blocks are to be restored to the pre-grade elevations by the Contractor as described above prior to contract execution.

The Contractor is to protect all surface features on adjacent roads and adjacent lots. Any damage to any public roads or infrastructure shall be rectified by the Contractor at his own expense to the satisfaction of the City of Ottawa and the Consultant.

The Contractor shall satisfy himself of all geotechnical and hydrogeological information, including boreholes, in-situ conditions, and recommendations identified in the identified reports.

The only access to the site shall be from Tremblay Road and St. Laurent Boulevard at the location noted on the drawings. The Contractor shall not impede or restrict traffic operations on Tremblay Road and St. Laurent Boulevard and shall implement traffic controls to the satisfaction of the City of Ottawa where required. Parking of vehicles is not permitted on City of Ottawa roads, including Tremblay Road and St. Laurent Boulevard. The access points must be secured at the end of the day and over the weekends to prevent unauthorized access.

The topographic survey of existing ground was prepared by the Owner's Surveyor. This topographic survey will be provided to the Contractor in digital format upon contract award. The Contractor is responsible for verifying this topographic survey for their use. This survey will be used as the original ground for the basis of calculation of earthworks quantities.

All costs associated with the above requirements are to be included in the unit prices. The Owner will entertain no claims for extras for these requirements.

ARTICLE SC2 - Limit of the Working Area

On the Owner's land, the Contractor shall limit his operations to the limit of construction shown on the engineering drawings, unless otherwise approved by the Consultant.

At no time is the Contractor to encroach on the following areas:

- 1) Private property without written permission from the landowner; and
- 2) Public property without written permission from the City of Ottawa.

ARTICLE SC3 - Existing Utilities and Services

The position of all existing poles, overhead lines, conduits, watermains, sewers and other

underground or aboveground utilities, structures and appurtenances are not necessarily shown on the drawings, and where shown, the accuracy of the position of such utilities is not guaranteed by the Owner or the Consultant. The Contractor shall have all utilities field located prior to the start of construction.

The Contractor shall be responsible for locating and adequately protecting all existing utilities and services and restoring all disturbed bedding and backfill in accordance with the requirements of the utility, and City of Ottawa. Any damage to any existing service or utility shall be repaired at the Contractor's expense. The cost of all excavations for verification, protection during construction, and support during installation of utilities, and restoration of all surface features damaged or destroyed are to be included in the unit prices provided within the Pricing Schedule. The Contractor should note that some utilities may require excavations in the vicinity of their existing plant be hand dug to locate the existing services. All cost for hand-digging excavations shall be included in the prices provided within the Pricing Schedule .

ARTICLE SC4 - Restoration

The cost of restoration shall include, but is not limited to bedding, backfill, and compaction for existing utilities, pavements, tie-backs, sidewalks, curbs and sodding which must be disturbed to carry out the works required during the execution of this contract. The cost of the restoration of all surface features damaged or destroyed during the construction of the services under this Contract is to be included in the price provided within the Pricing Schedule and will be the responsibility of the Contractor. The Owner reserves the right to withhold from payment the estimated cost of remediation costs which have not been completed.

ARTICLE SC5 - Surface Drainage

The Contractor shall be responsible for maintaining good road and site drainage to catchbasins or other approved outlets for the duration of the Contract. The Contractor shall be responsible for providing temporary drainage swales, ditches, and sedimentation/erosion controls as necessary. This includes road grading such as to avoid creating ponding on the lots by grading temporary ditches across the road to drain such ponding areas.

The Contractor will be held responsible for all damage which may be caused or result from water backing up or flowing over, through, from or along any part of the works, or which any of his operations may cause to flow elsewhere. Siltation control devices shall be installed, and the control of siltation shall be the Contractor's responsibility throughout the undertaking of his Contract. The Contractor will also be responsible for all damage or fines resulting from the improper control of siltation.

The Contractor shall dewater all work sites and excavations as necessary or as directed to enable the works to be constructed in a satisfactory manner. Water produced from any dewatering operations to be treated in a "Wetland Filter Bag" or other means acceptable to the governing authorities and discharge only as approved by the Consultant.

ARTICLE SC6 - Maintenance of Traffic

The Contractor must maintain traffic on adjacent roads, including providing signage and flag persons as required in accordance with the requirements of the City of Ottawa at all times for the duration of the Contract.

The Contractor shall provide all necessary signage and flagmen and shall maintain vehicular traffic on adjacent roads at all times during construction in accordance with MTO's "Manual of Uniform Traffic Control Devices" and/or MTO "Book 7".

The cost for all necessary permits, traffic signage, traffic control devices and flag persons shall be included in the prices provided within the Pricing Schedule.

Prior to the start of any work within an existing road allowance, the Contractor shall obtain the necessary permits from the City of Ottawa to occupy the road allowance.

ARTICLE SC7 - Work Schedule

Contract I *September 2021 – March 2022*

Contract II *April 2022 – July 2022*

Within 7 days of Contract Award or receipt of a "letter of intent", the Contractor shall provide the Consultant with a detailed work schedule. It shall contain sufficient detail for the Consultant to monitor progress of the work. Future delay claims will be rejected if the Contractor fails to provide the original construction schedule.

- a) Completion Dates specified assume the Contractor has received the written permission and notification to commence work on the Start Date specified as being no later than the Start Dates listed above. Any delays in the Start Dates mentioned above will be added to the Completion Dates.
- b) Each calendar day from the project Start Date to the project Completion Date, inclusive, shall be considered work days. If work on Saturday/Sunday or statutory holidays is required to meet the schedule, no additional claims will be accepted.
- c) The construction schedule, insurance certificates, bonds and all other required documents must be provided to the Consultant prior to commencement.

The Owner reserves the right to adjust the schedule to delay the start dates until all approvals are obtained. Any delay in the commencement of the project caused by the Owner, will result in the contract schedule being extended by an equivalent period of time.

The Contractor shall commence work and carry it on at whatever location or locations the Consultant may direct. No work shall be undertaken without the Consultant's approval and no work shall be suspended without his written permission except as described in the Contract Documents.

Siltation controls must be installed prior to demolition and grading.

Prices provided within the Pricing Schedule shall be valid through the 2022 calendar year.

ARTICLE SC8 - Contractor Certification of Imported Fill Material

In the event the Contractor is asked to provide fill, the Contractor shall identify the source of imported fill material. The source must be approved by the Owner and the Owner's Geotechnical Consultant.

The Contractor shall provide written certification to the satisfaction of the Consultant that:

1. Only material from an approved source will be placed on site.
2. The material is free of organics and other unsuitable debris and is suitable for engineered fill as assessed by the Geotechnical Consultant, and accompanied by a stamped, signed and dated report prepared by a licensed professional engineer in the Province of Ontario.
3. The material meets Ministry of Environment Decommissioning Guidelines for residential uses or other applicable regulations noted in the report provided above in item #2.

The Owner reserves the right to undertake independent testing of the material. Any material, deemed unsuitable by the Owner's consultant shall be disposed of off-site at Contractor's expense.

ARTICLE SC9 - Independent Testing

The Contractor shall retain independent specialized testing companies to provide the following services as required by the project.

i) **Compaction Tests**

Provide Proctor and field density tests, certifying adequate bearing capacity and compaction of trench backfill, fill sub-base and granular base as required in accordance with the applicable specifications.

ii) **Gradation Tests**

Provide gradation tests for granular or stone aggregates, backfill material and granular or stone base material as required to verify conformance with the applicable specifications.

iii) **Concrete Tests**

Provide strength tests for concrete in conformity with the applicable specifications.

iv) Asphalt Tests

Provide adequate testing as required to verify conformance with the applicable specifications and to determine the asphalt cement content.

v) Camera Inspection

Carry out camera inspections on all sewers and the Contractor shall provide at no additional cost, such skilled assistance as the Owner may require. Provided that no defective work is indicated by such inspections, the whole of the cost of the inspection shall be borne by the Owner. If, however, defective work is discovered by such inspection, the Contractor shall bear a part of the total cost of the first inspection, in the proportion that the number of defective sections of sewer bears to the total number of sections inspected. For this purpose, a section is defined as a length of pipe between adjacent manholes.

The cost of testing or inspecting any portion of the works which has been previously tested and found to be defective and then subsequently rectified shall be borne by the Contractor.

ARTICLE SC10 - Temporary Facilities

The Contractor shall provide the following at his own expense:

a) Accommodation

Provide and maintain in a suitable position on the site a weatherproof field office, minimum size 10 m × 3 m × 2.5 m high with windows, tables, chairs, two desks and monitors with the ability to connect laptops, a first aid kit, a drawing table, filing cabinet drawing rack and locking doors, including air-conditioning (summer only), heat and light, for the exclusive use of the Consultant and Company.

The accommodations, equipment and furniture shall be subject to acceptance by the Contract Administrator and shall not be removed from the site without the Contract Administrator's permission.

The Contractor shall bear the costs of heating, cooling, and lighting the field office and the installation and rental charges for the telephone. The Contractor shall indemnify the Owner against loss and fire, theft and injury to the building and its contents.

The Accommodations shall be equipped with electric light and propane or electric heat thermostatically controlled (winter) and air conditioning (summer). Where a local hydro service is not readily available, the Contractor shall supply and maintain an electric generator for the provision of electricity within the accommodations. All windows and doors shall be provided with screens and weekly janitorial service shall be provided by the Contractor. This facility shall be for the sole use of the Company and its representatives and must have an exterior padlock with two keys available to the Company staff. The Contractor will be responsible to unlock and lock the accommodations daily. The accommodations shall be erected and serviced prior to delivery of any materials to the site or commencement of any work. The accommodations will include two office areas, one for the Company and one for the Contractor. The accommodations will be large enough to adhere to physical distancing guidelines as set by the Ontario Government.

The accommodations, equipment and furniture shall be subject to acceptance by the Contract Administrator and shall not be removed from the site without the Contract Administrator's permission.

The Contractor shall bear the costs of heating, cooling, and lighting the field office and the installation and rental charges for the telephone. The Contractor will not be required to pay for long distance calls made by the Company or its representative. The Contractor shall indemnify the Company against loss and fire, theft and injury to the building and its contents.

The accommodations will adhere to all Covid-19 legislation. The Contractor will provide disinfecting wipes, glove, masks and other personal protection equipment (PPE).

b) Telephone

Contractor shall arrange and pay for telephone service, answering machine and facsimile transmission machine for the duration of the Work. Long distance calls, except to the Contractor's other offices, made by the Consultant will be paid by the Consultant upon receipt of an invoice by the Contractor.

c) Convenience

Provide and maintain for the duration of the Work such temporary sanitary facilities or other convenience as may be required by local bylaws or ordinances for the use of all personnel employed on the Work. A sanitary facility (portable toilet) or equivalent must be provided by the Contractor and erected and maintained within 10 metres of the accommodations.

d) Storage

Erect any temporary buildings or workshops which may be required for workmen and for weathertight storage of products.

ARTICLE SC11 - Construction Layout

The Contractor will be responsible for providing all construction layout necessary for all aspects of area grading, underground services and surface works.

The Consultant will provide the Contractor, in writing, with bench marks and points of reference to be used by him in setting out the works. From these bench marks and points of reference, the Contractor will do his own construction layout and shall include but shall not be limited to the preparation of grade sheets, the installation of centre line stakes, grade stakes, offsets, site rails and screeds. The Contractor shall provide the Consultant with a copy of all grade sheets as they are prepared.

The Contractor shall review all drawings included in the contract for errors or omissions. The Contractor shall also review the adequacy of layout information provided and shall submit any requests for additional information or clarification to the Engineer at least 36 hours in advance of his need for such information.

The Contractor shall be responsible for the true and proper layout of the works and for the correctness of the position, levels, dimensions and alignment of all parts of the works, and for the provision of all necessary instruments and labour in connection therewith. If at any time during the progress of the

works, any error shall appear or arise in the position, levels, dimensions or alignment of any part of the works, the Contractor shall, at his own expense, rectify such error to the satisfaction of the Consultant, unless such error is based on incorrect data supplied in writing by the Consultant. The checking of the layout of any line or level by the Consultant shall not in any way relieve the Contractor of his responsibility for the correctness thereof and the Contractor shall carefully protect and preserve all bench marks, stakes and other things used in setting out works.

The Contractor is to furnish the Consultant or any of his assistants, with any reasonable help which he or they may require at any time in checking the work. He shall also furnish the said parties, or any of the Inspectors, at all times, with convenient means of access to all parts of the works, and also with all required assistance to facilitate thorough examination of the same, and inspection, separation and removal of doubtful or defective material, and for any other purpose required in connection with the said works or in the discharge of their respective duties, for which services no additional allowance will be made.

The Contractor's layout crews will be required to report to the Consultant as to schedules and progress. The Contractor's layout crews will be required to take direction from the Consultant for work on the project where such work is deemed to be urgent by the Consultant.

The Contractor shall provide to the Consultant certification from an Ontario Land Surveyor or a Licensed Professional Engineer that the final grades are within tolerances specified for rough grading in Specification No. 3 - General Grading and Earthwork.

ARTICLE SC12 - Extra Construction Layout

The Contractor shall be responsible for any extra costs incurred by the Consultant in providing additional layout extra to that provided for in Article SC9 above. Re-staking or additional layout required due to the Contractor's operation will be charged to the Contractor's account in the following manner.

The Consultant will determine the applicable charges for extra construction layout and will invoice the Company. The amount of these invoices will be deducted from the Contractor's monthly payment certificate, and the Company will then reimburse the Consultant.

ARTICLE SC13 - Noise, Vibration, Mud and Dust Control

The Contractor shall establish and maintain site procedures such that noise levels from construction activities are minimized and are in accordance with local by-laws. It is the Contractor's responsibility to obtain a copy of the City of Ottawa noise by-law and maintain on-site for reference, and comply with all local by-laws with regards to restrictions on working hours and construction activities as related to noise. If the Contractor wishes to obtain an exemption from any by-laws the Contractor will include all associated costs in the unit prices provided within the Pricing Schedule. The Company will entertain no claims for extras or delays in the schedule in the future to satisfy this requirement.

In addition, the Contractor must be in compliance with all requirements of the Environmental Protection Act. In particular related to noise, dust and vibration the Contractor must be in compliance with Section 157(1) of the EPA.

The Contractor shall undertake all mud and dust control measures required to prevent dust nuisances caused by construction activities both on-site and on adjacent roads to the satisfaction of the Consultant

and City of Ottawa. The cost of these control measures shall be included in the price provided within the Pricing Schedule.

Mud and sediment controls shall be maintained per ESC1 – 4 notes and details.

The Contractor is responsible for cleanup of mud tracking on existing road surfaces on a daily basis or on a more frequent basis if directed by the Consultant or City of Ottawa. All construction vehicles leaving the site must cross over a rip-rap vibration pad to reduce mud-tracking. The total Contract price shall include cleanup of mud tracking or the reconstruction of the rip-rap vibration pad to the satisfaction of the Consultant.

ARTICLE SC14 - Siltation and Erosion Control

Contractor and engineer shall complete pre-construction site walk to assess condition of existing siltation control fence prior to mobilizing.

Prior to commencing topsoil stripping of the site, erosion and sediment control measures must be installed as shown on the Engineering drawings.

The Contractor is responsible to restore, maintain and remove when directed those sedimentation and erosion control works shown on the plans, either proposed or existing in the field to satisfaction of the Consultant and City of Ottawa.

The Contractor shall inspect the site weekly and before and after every significant rainfall and make repairs as required to conform with the engineering drawings, including removal of sediment. The Contractor will also be responsible for all damage or fines resulting from the improper control of siltation.

All costs associated with this requirement will be included in the unit prices provided within the Pricing Schedule. The Company will entertain no claims for extras for this requirement.

ARTICLE SC15 - Security of the Site

Security of the site will be the responsibility of the Contractor. The Contractor to provide barricades to the construction access outside the hours of construction to prevent access and trespassing onto the lands within the limits of construction. The barricades shall be in accordance with those specified on the Engineering Drawings. Contractor is to post signs adjacent to the site noting that:

- a) It is illegal to dump material onto the site; and
- b) It is illegal to trespass onto private property.

Unit prices provided within the Pricing Schedule shall include the cost of warning signs and barricading the construction access. Any material dumped on the site by others shall be removed and disposed off-site by the Contractor only with the approval of the Consultant, at the Contractor's expense.

ARTICLE SC16 - Coordination with Other Contractors

The Contractor should note that other Contractors may be working on lands adjacent to the site. The Contractor shall co-operate fully with other Contractors at the construction interfaces.

Construction activity in the vicinity of this Contract may be underway during the construction period. The Contractor shall accept the presence of other Contractors within the working area and shall be responsible for all necessary co-ordination.

The unit prices provided within the Pricing Schedule will be compensation in full for this requirement. The Company will entertain no claims for extras for this requirement at a later date. Any delays shall be the responsibility of the Contractor

ARTICLE SC17 - Protection of Trees

The Contractor shall be responsible for the protection of tops, trunks and roots of existing trees designated to be saved on the project site. Trees within the construction area, that are to be saved, shall be fenced around the drip line prior to construction. Interfering branches may be removed under the direction of the Landscape Architect provided there is not injury to the trunk or resultant scars are covered immediately with an approved tree wound dressing. The Contractor shall provide access for the Landscape Architect to all trees to be saved for the purposes of fertilizing and maintaining the trees.

There are no trees within the limits of construction which have been identified for preservation.

The Contractor shall be responsible for any damages and resulting repair or replacement costs for any trees on neighboring properties.

ARTICLE SC18 - Occupational Health and Safety Act

The Contractor is responsible for construction safety for all of the Work done under this contract and shall comply with all of the rules, regulations and practices required under the current Ontario Occupational Health and Safety Act together with all other applicable legislation, regulations and standards as laid out by any other governing body.

For the purpose of this contract the Contractor will direct and control the activities of all suppliers, contractors, and visitors within the site. On that basis the Contractor will be the Constructor for the purposes of the Ontario Occupational Health and Safety Act.

The Contractor shall indemnify to Company and Company's agents by a letter that contractor is solely responsible for OHS and to ensure time and space separation between construction activities of all contractors who may be on-site.

The Contractor shall ensure that its subcontractors also comply with all such construction safety requirements. The Contractor shall indemnify and hold harmless and cause its subcontractors to indemnify and hold harmless, the Company, WSP Canada Inc., the Company's agents and any subconsultants. All costs associated with compliance with the pertinent safety requirements shall be the sole responsibility of the Contractor and included in the unit prices provided within the Pricing Schedule.

ARTICLE SC19 - Harmonized Sales Tax

As per previously mentioned terms of this agreement.

ARTICLE SC20 - Local By-Laws and Regulations

All work must conform with local by-laws and regulations including but not limited to the "Occupational Health and Safety Act and Regulations for Construction Projects" and any applicable regulations and local by-laws for erosion and sediment control.

ARTICLE SC21 - Provisional Items

Where it occurs in this document, the notation "Provisional" shall be understood to mean that the inclusion in the Contract of Items so described shall be at the direction of the Consultant.

No claims for extra payment due to the exclusion of any or all of these items will be accepted by the Company.

ARTICLE SC22 - Superintendence

The Company and the Consultant reserve the right to order the Contractor to replace personnel or subcontractors on the project if performance becomes unsatisfactory.

ARTICLE SC23 - Insurance

All insurance policies to be provided by the Contractor to the Company under this Contract shall include the following as additional insured:

- a) The City of Ottawa
- b) Rideau Valley Conservation Authority
- c) WSP Canada Inc.
- d) Canada Lands Company CLC Limited
- e) Public Services and Procurement Canada (PSPC)

ARTICLE SC24 - Progress Certificates

Payment certificates are to include an updated overall project schedule and detailed topographic surveys of the works are provided, per RFP Information Section 11 and Project Specification #3:

- After topsoil stripping
- After placement of fill to final pre-grades or windrow location as specified by the Consultant and certification by the Geotechnical Consultant
- After placement of topsoil to final pre-grades or windrow location as specified by the Consultant and certification by the Geotechnical Consultant

If requested, the Consultant will provide the Contractor with the Pricing Schedule in digital format Microsoft Excel 2010. It shall be the Contractor's responsibility to modify the date as necessary.

ARTICLE SC25 - Plan Quantities for Payment

Quantities provided in the Pricing Schedule are estimates only. The unit price bid shall be applied to the plan quantities regardless of any change with respect to the estimated quantities.

The Company reserves the right to delete any item. No compensation will be paid to cover claims for overhead cost and lost profit.

ARTICLE SC26 - Frozen Ground Conditions

No extra payment shall be made to the Contractor should he encounter frost difficulties. The cost of such work shall be included in the Contractor's bid price for underground construction.

Frozen ground shall not be opened further in advance of construction than one day's underground service installation. Frozen excavation materials shall be separated from the unfrozen material.

Backfilling, as specified in Specification No.4 – Excavation and Backfill, shall be carried out using unfrozen material. The frozen material may then be mounded over the trench. Particular care shall be taken to prevent frozen materials from being buried around maintenance holes.

ARTICLE SC27 – Winter Heat and Protection

The unit prices provided include all necessary equipment, labour, and materials to provide winter heat and protection required to satisfy the requirements of the Contract. The Company will entertain no claims for extras related to this requirement.

ARTICLE SC28 - As-Built Information

It is the Contractors responsibility to prepare as-built drawings.

The Contractor is to supply the Consultant with as-constructed sewer, watermain and services information as well as centreline of base road, final road, area grading, boulevard elevations and all other surface features in accordance with current City of Ottawa specifications (including a red-line drawing).

Following construction of roads to base course asphalt, the Contractor shall provide to the Consultant a topographic survey of the as-constructed rough grading on the lots and blocks. The topographic survey shall conform to the following requirements.

- date of the field survey following the date of construction to base course asphalt.
- coordinate system to be identical to that utilized for the boundary survey and must include the survey of a minimum of four boundary monuments from the site.
- vertical datum to be geodetic or that supplied by the Consultant for this project. Evidence of acceptable closure into at least two benchmarks is required.
- submission shall include a digital file suitable for use with AutoCAD
- survey to include spot elevations at a maximum spacing of 15 metres, including, but not limited to, elevations at the four (4) corners of each lot and at any change in grade (proposed and/or

actual) along each lot line. Additional points beyond the 15-metre spacing will likely be required to adequately represent all changes in grade.

- survey to be completed by a survey firm approved by the Company and certified by an Ontario Land Surveyor or a Professional Engineer.
- survey to note limits of engineered fill, underside of engineered fill and top of engineered fill.

The Consultant will compare the as-constructed survey with the proposed rough grade elevation and generate on a 5-metre grid elevation differences between the as-constructed and proposed rough grading and also the volume differential.

In areas where tolerances exceed those noted in the earthwork specification, additional grading will be required. Once the rectifications are completed a revised survey will be required.

All costs associated with completing the original survey as well as any follow up surveys shall be borne by the Contractor.

ARTICLE SC29 – Protection of Survey Monuments

Prior to commencing work, the Contractor shall mark all survey bars identified by the Consultant with three (3) 50x50x1200mm brightly painted wooden stakes and shall protect all bars from damage during construction.

Bars damaged by the Contractor's negligence shall be replaced at his expense.

ARTICLE SC30 – Payment Terms

As per previously mentioned terms of this agreement.

ARTICLE SC31 - Bonds

As per previously mentioned terms of this agreement.

ARTICLE SC32 - Warranty Periods

As per previously mentioned terms of this agreement.

ARTICLE SC33 - Extended Warranty Period

N/A

ARTICLE SC34 - Substantial Performance

As per previously mentioned terms of this agreement.

ARTICLE SC35 - Work Standards

All work is to be carried out to the satisfaction of the Consultant and the Municipal Authorities. (City of Ottawa)

ARTICLE SC36 – Acceptance of Work

The Contractor agrees that all work completed will be reviewed for acceptance by WSP Canada Inc. (Consultant) and ultimately the City of Ottawa.

ARTICLE SC37 - Blasting

Blasting is not allowed on this project unless specific applications are made and approvals received from the Company, Consultant and all affected agencies.

ARTICLE SC38 - Deletions

The Company reserves the right to delete any item. No compensation will be paid to cover claims for overhead cost and lost profit.

ARTICLE SC39- Additional Charges

No claim for extras will be considered under the scope of work described in the Contract unless there are design changes made by the Consultant.

ARTICLE SC40 - Permits

The Contractor is responsible to obtain all required permits to complete the works as noted in the contract documents, in accordance with the procedures and requirements of City of Ottawa. This includes but is not limited to all necessary Road Occupancy requirements.

ARTICLE SC41 - Pre-Construction Meeting

A Pre-Construction meeting shall be coordinated by the Consultant prior to construction commencing. Attendees at this meeting shall include, but not be limited to, representatives from the Contractor, Consultant, City of Ottawa, and the Geotechnical Consultant.

At this meeting the limit of the working area will be established and a construction Work Schedule shall be presented by the Contractor that meets the completion date specified in Article SC4 – Work Schedule.

No additional payment shall be made to the Contractor for attendance at this or any other construction meeting.

ARTICLE SC42 – Contractor Reimbursement for Document and Drawing Charges

The Contractor will be provided with 6 sets of the Issued for Construction drawings and specifications. Any additional copies of the drawings requested by the contractor will be provided solely at the cost of the contractor and will be charged at a fixed rate to be confirmed by the consultant. Contractor will reimburse the consultant directly for all reproductions.

ARTICLE SC43 – Dumping

In the event that dumping of materials has occurred due to the Contractor's lack of security or control of the site under this Contract, the Company reserves the right to deduct the costs of the off-site disposal from the Company's payment to the Contractor.

Alternatively, any material dumped on the site by others shall be removed and disposed off-site by the Contractor only with the approval of the Consultant, at the Company's expense.

ARTICLE SC44 – Shop Drawings

The Contractor shall submit for the Consultant's review full primary structural details, designs and shop drawings stamped by a professional engineer licensed to practice in Ontario.

This submission is subject to review, and comments by the Consultant. The Contractor shall provide additional information and details in order to satisfy all concerns of the Consultant. Two unstamped copies of the shop drawings will be returned to the Contractor with the Consultant's comments. Four final (4) copies of Shop drawings shall be submitted to the Consultant for final review and direction to proceed. All final Shop drawings are to be stamped, signed and dated by a professional engineer licensed to practice in the province of Ontario. Direction to proceed from the consultant is required prior to production of any component. The Company will not accept claims for any additional production of materials that proceed prior to receiving direction to proceed from the Consultant.

ARTICLE SC45 – CCTV Inspection

The Contractor will be required to satisfy the City's requirements for CCTV Inspection.

ARTICLE SC46 – Dewatering

The Contractor shall include all necessary costs of dewatering in order to complete the works as proposed under this contract. The Contractor should familiarize themselves with the geotechnical reports and hydrogeological reports available for review from the Consultant's office.

ARTICLE SC47 – Temporary Stockpiling and Testing

The Company reserves the right to have sufficient time to undertake the necessary testing of the temporary stockpiles to determine the nature and classification of the materials.

ARTICLE SC48 – Extras

As per previously mentioned terms of this agreement.

ARTICLE SC249 – Transfer of Electronic Data

Electronic data shall only be provided to the Contractor upon execution of an agreement for the transfer of Electronic Data.

The Contractor understands that the use of the Electronic Data transmitted is intended for conceptual review purposes only. It is expressly not intended for and should not be used as a substitute or replacement for standard construction design or as-built documents, or for any purpose that would customarily rely upon such original hard copy documents.

Electronic data includes, but is not limited to, Building Information Modelling (BIM) files, and Computer-Aided Design (CAD) files, including native 2D and 3D file formats (RVT, RFA, NWC, NWD, NWF, DWF, DWFx, DWG, DGN, IFC, DXF as examples), files produced by word processing, spreadsheet, scheduling, data base, and other software programs. The electronic data may be provided in an original format produced by WSP or an alternate, "translated" format as requested.

ARTICLE SC50 -Documents Required from the Contractor

1. Prior to Commencement

- a) Certified copies of the Contractor's insurance.
- b) WSIB Certificate showing the Contractor is in good standing.
- c) A project schedule.

2. For Progress Payments

- a) The Contractor's Payment Certificate (quantities to be reviewed by Consultant prior to submission).
- b) Certificate of Clearance from the Workers' Compensation Board.
- c) Documentation to substantiate payment of extra work including payroll burden, overhead and profit.
- d) Statutory declaration.
- e) Invoice.
- f) Copy of needed surveys as determined by the Consultant.

3. Prior to Statutory Holdback Release

- a) Certificate of Clearance from the Workers' Compensation Board.
- b) A Statutory Declaration that all financial liabilities incurred by the Contractor have been paid and that there are no liens, garnishees, attachments or potential claims relating to the work.
- c) A copy of the Certificate of Substantial Performance advertised in a construction trade newspaper.
- d) A letter stating that the Contractor is in agreement with all final contract quantities paid to date and that no further claims will be made.
- e) All outstanding surveys and as-built information as determined by the Consultant.

4. Prior to Final Acceptance of Work

- a) A Statutory Declaration as in (3b).
- b) A Letter of Release from Contractor as in (3d).

ARTICLE SC51 - Noise, Mud and Dust Control

The Contractor shall establish and maintain site procedures such that noise levels from construction activities are in accordance with local bylaws.

The Contractor shall undertake all dust control measures required to prevent dust nuisances caused by construction activities both on site and on adjacent roads. The cost of these control measures shall be included in the price provided within the Pricing Schedule.

ARTICLE SC55 - Measurement of Quantities

Payment for all items shown as PQM (Plan Quantity Measurement) will be based on Pricing Schedule Plan Quantities and will not be measured in the field unless design drawings for that item are altered.

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Not used

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3.3	Filter Material
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Not used

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Not used

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SPECIFICATION NO. 1 GENERAL REQUIREMENTS

1.0 DESCRIPTION

The requirements of this specification shall apply to the Contract as a whole and pertain to all of the Work as specified by the Contract Documents.

2.0 ACCEPTANCE OF SITE

It will be the Contractor's responsibility to visit and examine the site of the Work prior to submitting their RFP response.

Execution of the Contract Documents by the Contractor will imply acceptance of the surfaces and conditions and no claim for damages or extras resulting from such conditions or defects will be allowed thereafter.

3.0 TRAFFIC

Traffic may be restricted on roads, only with the written permission of the appropriate municipal authority. Unless otherwise directed, obtain all required permits. Copies of the permits to be delivered to the Consultant at least 48 hours in advance of occupying the road.

Communicate the details of any traffic restrictions to the local police department, fire department and transit authority.

Provide flagpersons, barricades and road signs in accordance with the requirements of the appropriate authority and to the satisfaction of the Consultant. Flagpersons to be in constant communication visually or by radio.

Maintain safe access for the public. Should any unsafe condition occur, take immediate steps to rectify the situation. If work is not commenced within 24 hours of notification, the Company reserves the right to perform remedial work at the expense of the Contractor.

Construct temporary detours as specified. The details to be as specified by the Consultant and the road authority.

4.0 DISPOSAL SITES

Unless otherwise specified, where the Contractor is required to dispose of timber, trash, debris, boulders, surplus or unsuitable earth etc. off-site, he shall arrange a disposal site at his own expense.

Supply to the Consultant written permission from the owner of the property upon which the material is to be placed and save the Company and Consultant harmless for any claims that may arise from such disposal.

5.0 WEATHER CONDITIONS

Provide adequate means of heating materials and protect the work from damage by frost in freezing weather.

Provide all labour, materials and equipment to remove frozen ground to permit continuation of the work during freezing weather conditions.

Protect existing utilities from freezing and ensure continuity of service when water mains, sewers and service connections are encountered in excavations or when ground cover is removed or reduced during grading operations.

Remove all ice and snow from access, work and storage areas and do not perform any ditching, stripping, excavation or grading before the removal of ice and snow.

6.0 CLASSIFICATION OF EXCAVATED MATERIALS

Excavated material shall be classified as "Rock" or "Earth".

6.1 Rock Excavation

-Material excavated from solid masses of igneous, sedimentary or metamorphic rock which, prior to removal, was integral with the parent mass; and

-Buried boulders, rock fragments or broken concrete refuse which measure, in volume, 1 cubic metre or more.

The removal of pavements, curb and gutter, surface boulders, concrete structures, masonry walls and stone fences shall not be classified as Rock Excavation and shall be removed as specified in Specification No. 2 - Site Preparation.

6.2 Earth Excavation

All materials not described under Item 6.1 above and including dense tills, hard pan and other similar materials.

7.0 BLASTING

Blasting will not be permitted under this Contract without the written approval of the Consultant and other governing authorities.

If the Work under the Contract requires the Contractor to excavate rock by means of blasting the following shall apply:

The Contractor shall comply with all the statutes, regulations, by-laws and orders relating to the supply, hauling, handling, use of, and storing of explosives.

The Contractor shall provide the necessary notices including notification of the Consultant in all cases and Police & Fire Departments when blasting is done within 100 metres from existing

buildings or public roads. Notification shall be at least 24 hours in advance of blasting operations.

Immediately prior to a blast, the Contractor shall clear the blasting area of all vehicular and pedestrian traffic and shall post flagmen on each road or trail entering the blasting area who shall stop all traffic and shall prevent such traffic from entering the area until the blast has taken place. The Contractor shall provide and use a siren to warn the public and the workmen that a blast is to be set off and to indicate the "All Clear" after the blast has taken place. Four short soundings of the siren two minutes before detonation of a blast shall be used for warning and protection, and one long 10 to 15 second sounding of the siren shall be used to give the "All Clear" signal.

The type of explosives, drilling and method of blasting to be used must be authorized by the Consultant. The use of explosives in large blasts, as in seams, drifts, shafts, pits or coyote holes, or in similar devices, is prohibited, unless done on the written authority of the Consultant.

Protective measures shall be used where blasting may damage adjoining property or public utilities.

The Contractor shall be responsible for all damages.

Notwithstanding any direction by the Consultant in regard to explosives, drilling or methods of blasting used, the Contractor shall take all precautions necessary to ensure the safety of persons and adjoining property and structures, including public utilities and shall be responsible for all claims, whatsoever, arising from the hauling, handling, use of, and storing of explosives, and all affects, direct or indirect, of the blasting operations.

No extra payment will be made for protection measures; nor for damages to persons, properties or structures; nor for damages or repairs to public utilities; nor for any claim whatsoever arising from blasting operations. All such costs, shall be included in the Contract Unit Prices for "Rock Excavation".

If specified with Special Conditions under "Independent Testing", the Contractor shall arrange for a "Pre-blasting Survey" of adjacent buildings and structures. This survey shall be carried out by an independent organization, satisfactory to the Consultant.

8.0 MATERIALS AND QUALITY CONTROL

The Company will pay the costs of quality control tests except as noted. The Consultant may approve or reject any materials supplied for the Work in accordance with the Specifications herein. He may request the name and address of the manufacturers supplying materials as well as samples of materials for testing purposes. These shall be supplied at no cost to the Consultant or the Company.

When requested by the Consultant, provide an affidavit from the Manufacturer that materials are in accordance with the specifications before delivery of the materials.

When a specific item or material is required, the manufacturer and catalogue number will be specified in the Contract documents.

Replace materials that do not satisfy the specification, at no cost to the Company.

Pay for additional testing required due to failure to meet specifications.

9.0 INDEPENDENT TESTING AND INSPECTION

9.1 Testing Companies

Testing companies commissioned for the performance of tests shall be independent of the Contractor or Suppliers of products or materials to be tested and/or inspected. The selection of testing companies will be subject to approval the Consultant.

9.2 Reports

Testing and inspection reports shall be submitted directly to the Consultant with copies to the Contractor and the Company.

9.3 Payment

The cost of repeat tests, until satisfactory results are obtained will be at the expense of the Contractor.

9.4 Required Tests

Tests and/or inspections to be carried out by independent testing companies are listed elsewhere in the contract and may include: Compaction; Gradation; Concrete and Asphalt.

10.0 LIMITS OF CONTRACT

Confine work to the limits or boundaries shown on the Contract Drawings or as otherwise specified. The Contractor shall protect all existing trees where possible and shall make his own arrangements for working on private property.

11.0 EXISTING STRUCTURES AND UTILITIES

Examine the location of the Work and make such enquiries necessary to determine the existence and location of structures and utilities, both above and below ground which may be in the line of the Work or affected by construction operations.

Existing structures and utilities shown on the drawings are for information only and the Consultant will assume no responsibility for completeness or accuracy.

The Contractor shall be responsible for adequately protecting all existing utilities and services and for permanently supporting utilities which are affected by work to be done under this Contract. The Contractor shall be responsible for any damages caused to existing utilities during construction. The Contractor shall arrange for all field stakeouts of existing utilities and will expose any utility deemed necessary by the Consultant.

Satisfy the requirements of the utility authorities including the railways, regarding location, stakeouts and construction activities in the proximity of the utility or railway.

12.0 RELOCATION OF EXISTING STRUCTURES AND UTILITIES

Existing structures and utilities which are known to require permanent realignment or relocation will be completed at no cost to the Contractor except when specified otherwise.

Do not interfere with the work of utility or railway companies, their Contractor or agents and provide reasonable co-operation and schedule the work accordingly.

Other structures or utilities encountered during the progress of the work which require permanent relocation shall be relocated by the Owner of the structure or utility, or if agreed, the Contractor shall carry out the work. The Contractor shall not be entitled to claim any damages or extra compensation for any delay due to such removal or rearrangement.

13.0 TEMPORARY RELOCATION OR SUPPORT

Temporary relocation of structures or utilities will be completed by the Contractor or arranged by him with the Utility at the contractors expense.

Provide temporary support for utilities crossing the excavation. Construct supports as detailed on the Drawings.

14.0 EXISTING DRAINAGE

Maintain the flow in existing pipes, conduits, ditches and watercourses. Where this is not feasible, alternative arrangements must be approved by the Consultant.

15.0 MUNICIPAL REQUIREMENTS

Without altering the intent of the Contract Documents all work is to be done to the satisfaction of the Local Authorities for the Municipality where the Work is performed. Acceptance of the Work will be subject to receipt of approval by the aforementioned Municipal Authorities.

16.0 ONTARIO MINISTRY OF TRANSPORTATION (M.T.O.) STANDARDS

When specified that work shall be completed in accordance with M.T.O. standards, the words "the Consultant" shall be substituted for "the Ministry". Payment information in M.T.O. forms shall not apply to this Contract.

17.0 SURVEY MONUMENTS

The Contractor shall protect and maintain all monuments, bars, pins, stakes, markers and such survey points as may be placed by the Consultant or Land Surveyors and they shall be at all times made accessible to the Consultant. The Company shall have the right to charge the Contractor for the reinstatement of any such survey points if they have been removed, damaged, buried or otherwise rendered unusable by the Contractor or his agents. No charge shall be made for any survey points which, in the opinion of the Consultant, have to be moved or reinstated in order to construct the works.

Prior to commencing work, the Contractor shall mark all survey bars identified by the Consultant with a minimum of two 50 mm x 50mm x 1200 mm brightly, painted wooden stakes.

18.0 TEMPORARY FACILITIES

The Contractor shall provide, at his own expense, such temporary facilities as outlined and specified in the Special Conditions of the Contract.

19.0 FINAL MEASUREMENTS AND ADJUSTMENTS

19.1 Unit Price Items

When a unit price is submitted, the Contract quantity will be adjusted in accordance with the final measurements, unless otherwise specified. Final prices will not be adjusted for measurements under 1.0 m. Supplier's weigh tickets shall be provided when requested by the Consultant.

19.2 Lump Sum Price

When a lump sum price is submitted, it shall be payment in full for the items as detailed. Additions, deletions and design changes will be negotiated at the time of installation.

19.3 Claims for Anticipated Profit

As per previously mentioned terms of this agreement.

19.4 Claims for Interest

The Contractor shall not be entitled to claim, demand or receive any interest upon any invoice for work done on account of delay in the approval of the Work by the Consultant.

20.0 PAYMENT

Except where specifically noted, payment for work under this section shall be included in the Contract Price and no extra compensation will be made for any labour, materials, consumables or equipment necessary to fulfill the requirements of this specification in completing the Work of the Contract.

21.0 EQUIPMENT RENTAL

If the Consultant directs or otherwise authorizes the Contractor in writing to undertake additional work consisting of rental of equipment at the rates set out in the Schedule of Additional Unit Prices and if "standby time" is authorized by the Consultant the following shall apply:

- a) "Standby Time" means any period of time which is not considered working time and which together with the working time does not exceed 10 hours in any one working day and during which time a unit of equipment cannot practically be used on other work but must remain on the site in order to continue with its assigned task and during which time the unit is in fully operable condition.
- b) The contractor shall be reimbursed for the standby time of owned and rented equipment at one-third the O.P.S.S. 127 rate, less any discount rate agreed upon in the contract.

- c) In addition, the cost of labour, the wages, salary and payroll burden of the operator or operating crew who cannot be otherwise employed during the standby period, will be paid.
- d) "The 127 Rate" means the rate for a unit of equipment as listed in O.P.S.S. 127 (Schedule of Rental Rates for Construction Equipment) which is current at the time the extra work is carried out or for equipment which is not so listed, the rate which has been calculated by the Consultant, using the same principles as used in determining the O.P.S.S. 127 rates.

22.0 WORK SCHEDULE

The Contractor shall:

- a) Prepare and submit to the Company and the Consultant prior to the first application for payment, a construction schedule that indicates the timing of the major activities of the Work and provides sufficient detail of the critical events and their inter-relationship to demonstrate the Work will be performed in conformity with the Contract Time;
- b) Monitor the progress of the Work relative to the construction schedule and update the schedule on a monthly basis or as stipulated by the Contract Documents; and
- c) Advise the Consultant of any revisions required to the schedule as the result of extensions of the Contract Time as provided in Part 6 of the General Conditions - Changes in the Work.

SPECIFICATION NO. 2

SITE PREPARATION

1.0 DESCRIPTION

The work covered by this specification shall include the supply of all labour, materials, consumables and equipment, excavation, control of ground and surface water, backfill and compaction to complete the clearing of vegetation, grubbing, stripping of topsoil and the removal of existing structures as specified.

The Contractor shall include everything required and necessary to complete the work notwithstanding that every item may not be specifically mentioned.

1.1 Clearing

Clearing shall consist of cutting off at the specified height all saplings, trees, brush and other vegetation within the designated area and the disposal of timber, brush, windfalls and other surface litter.

1.2 Grubbing

Grubbing shall consist of the removal and disposal of all stumps, roots, embedded logs, wood chips, surface boulders and all debris from the designated areas.

A surface boulder is defined as a boulder, rock fragment or rubble less than 1 m³ in volume which can be removed without requiring excavation to facilitate such removal.

Surface boulders, boulders in piles and stone fence rows shall be considered as debris and grubbing shall include their removal and disposal.

1.3 Stripping

Stripping shall consist of the removal of existing surface topsoil from the designated areas. Topsoil is that soil which in the opinion of the Consultant is suitable for the growth of future vegetation.

1.4 Structures

Removal of existing structures shall consist of items such as pavement, curbs, sidewalks, buildings, concrete structures, masonry walls, tanks, pipes, etc., which are designated to be removed or partially removed.

2.0 CONSTRUCTION

2.1 Clearing

Remove trees, shrubs and vegetation as specified on the Drawings. Protect from injury all trees, shrubs and vegetation designated to be preserved during construction operations in the manner specified.

Cut trees to a height of 0.5 metres above the surrounding ground and fell toward the centre of the area to be cleared. Where trees cannot be felled without danger to traffic or injury to other trees, structures, or property, they shall be cut in sections from the top down.

Disposal of tree products shall be the responsibility of the Contractor unless otherwise specified.

2.2 Grubbing

Disposal offsite, of grubbed material shall be the responsibility of the Contractor, unless otherwise specified.

Obtain permits and satisfy all requirements of the authorities having jurisdiction prior to any burning operations.

Level all areas where clearing and grubbing has been completed. Topsoil or seeding will not be required unless otherwise specified.

2.3 Stripping

Remove topsoil from the designated area. When constructing roads remove topsoil for the full width of the road allowance less 600 mm.

Remove topsoil and all organic material for its full depth and retain in designated stockpile areas after clearing and grubbing and before any other construction activity to prevent contamination with subsoil.

Locate and construct stockpiles to prevent ponding of water.

2.4 Removal and Disposal of Existing Structures

Carry out demolition in such a manner so as not to disturb adjacent pavement, utilities or other works to be left in place and to protect materials designated to be salvaged.

Material other than salvage shall become the property of the Contractor and shall be removed from the site unless otherwise specified.

Deliver salvage material, and stockpile without undue damage in the location designated by the Consultant.

Backfill excavations with native material and compact to a minimum density of 95% Standard Proctor density.

Square off broken edges of pavements sidewalks, curbs, etc. in a manner satisfactory to the Consultant.

2.5 Approval

Contractor shall provide the Consultant with a letter from the Owner of the property upon which the excavated material shall be disposed giving written permission for the disposal of the noted material.

3.0 MEASUREMENT

Area measurements will be made in horizontal planes.

3.1 Clearing

Unless otherwise specified, measurement will be by general area.

3.2 Grubbing

Unless otherwise specified measurement will be by general area. Depth of material to be removed by grubbing operation will be as specified and will not be measured.

3.3 Topsoil Stripping

Unless otherwise specified topsoil stripping will not be measured but will be based on a volume calculated by area times average topsoil thickness to be agreed by the Contractor after reviewing soils data.

3.4 Existing Structures and Utilities

Measurement as specified in the Schedule of Contract Unit Prices.

4.0 PAYMENT

Payment at the contract price(s) for clearing, grubbing, stripping topsoil and the removal of existing structures shall be compensation in full for supplying all labour, equipment, excavation, backfill, materials and everything necessary to complete the works as specified.

4.1 Clearing and Grubbing

Clearing and grubbing may be issued for pricing as separate items or may be combined into a single item including both operations as specified in the Schedule of Contract Unit Prices.

The prices provided shall include:

- (a) disposal off the project site of all timber, brush, stumps, logs, surface boulders and debris.
- (b) backfill and grading as specified.

4.2 Topsoil Stripping

The price provided shall be compensation in full for stripping and stockpiling topsoil in the designated areas.

4.3 Existing Structures and Utilities

Payment at the specified price as listed in the pricing schedule for removal of existing structures and utilities shall include delivery of the salvage to the specified location, disposal off the contract site of all other material, backfilling and grading as specified.

Payment will be made only for those existing structures and utilities itemized in the Schedule of Contract Unit Prices. All other existing structures and utilities shall be considered debris and removed and disposed of as part of the grubbing operation and no separate payment allowed.

SPECIFICATION NO. 3 GENERAL GRADING AND EARTHWORK

1.0 DESCRIPTION

The work covered by this specification shall include the supply of all labour, material, consumables and equipment to do all the excavation, grading and filling with earth required for the execution of specified grading and earthworks. This specification does not cover rock fills. "Rock Excavation" as defined in Specification No. 1, General Requirements, is not considered part of this Specification and is covered in Specification No. 4, Excavation and Backfill.

Unless otherwise specified, prior to commencing work the Contractor shall verify the rough grading earthwork quantities either by taking their own cross-sections or by reviewing the Consultants cross-sections. Claims for discrepancies in earthwork quantities will not be considered.

All cutting and filling shall be performed in such a manner to avoid flooding or ponding of water on the site or any adjacent properties. Surface drainage shall be provided during all stages of the work and fill materials placed as soon as possible to prevent ponding in sub-excavated areas.

Provide temporary support for any existing structures and utilities affected by the work as specified in Specification No. 1 - General Requirements.

2.0 CONSTRUCTION

2.1 Rough Grading

Excavate, fill and compact to the specified subgrade elevations and cross-sections over all road allowances and areas designated for area grading. Fill material shall be approved by the Consultant and contain no frozen lumps, topsoil, organic materials or other objectionable matter.

Fill material on lots designated for area grading will not require compaction other than that resulting from normal filling, spreading and earthwork operations. Compact all other areas designated to 95% Standard Proctor Density, unless otherwise specified.

If the subgrade soil conditions are unsuitable, additional excavation may be required. Any excavated material not suitable, or not required for the purpose of filling or grading shall be spread or stockpiled in designated areas within the site or hauled away from the site as directed by the Consultant.

Place and compact material obtained from areas to be excavated or imported material in low areas and fill to required subgrade elevations. Transport material from the specified borrow area when insufficient cut material is available.

Should the Contractor erroneously excavate below the subgrade elevations he shall backfill such excavation with approved material and compact to 95% Standard Proctor Density at no cost to the Company.

Where specified, cut roadside and other drainage ditches including culverts during rough grading operations so as to provide satisfactory drainage of the subgrade at all times.

Place culverts of the sizes and gauges shown in the Schedule of Contract Unit Prices where indicated on the Drawings. Unless otherwise specified, culverts shall be carefully bedded on a minimum thickness of 150 mm of well-compacted granular material, and backfilled with well-tamped granular material for a width of 150 mm on each side of the culvert and to a minimum depth of 150 mm above the culvert. Backfill and compact the remainder of the trench with material containing no stones larger than 150 mm in diameter and in layers not exceeding 300 mm in depth.

Rough grading elevations shall be achieved within a tolerance of 50 mm. In addition, deviations from specified grades within the required tolerance shall be random so that no surplus or deficit of material results on any individual lot.

2.2 Fine Grading

Fine grade, shape and compact the rough subgrade to the specified grade and cross-section. Unless otherwise specified, compact to 95% Standard Proctor Density.

Finished surfaces shall not deviate more than 25 mm from the specified grades and cross-sections. The deviation, within the specified tolerance, shall be random.

Maintain the specified grade, cross-sections, tolerances and compacted density until the work is accepted or until the construction of the granular base, when this work is a part of the Contract.

No ruts or depressions shall be allowed to form in the compacted subgrade and all traffic must be kept off the subgrade where possible until the sub-base is applied.

3.0 MEASUREMENT

3.1 Rough Grading

Unless otherwise specified, no measurement of earthworks will be made.

Culverts and drainage ditches, where specified for payment, will be measured on a linear metre basis.

3.2 Fine Grading

No measurement of areas requiring fine grading will be made.

4.0 PAYMENT

4.1 Rough Grading

The stipulated sum provided within the Pricing Schedule for Earthwork and Grading shall be compensation in full for all labour, material, consumables and equipment to do all excavation, transportation, filling and compaction, control of surface and ground water to complete rough grading.

The stipulated sum provided within the Pricing Schedule for Earthwork and Grading shall also be compensation in full for stripping and stockpiling topsoil as outlined in Specification No. 2.

The stipulated sum provided within the Pricing Schedule for Earthwork and Grading shall also include the cost of locating an offsite dump area for excess material and/or locating an offsite burrow area should imported fill be required.

Where specified, payment for drainage ditches and culverts shall be at the price provided within the Pricing Schedule in the Schedule of Contract Unit Prices.

4.2 Fine Grading

The price provided within the Pricing Schedule shall be compensation in full for all labour, material, consumables, and equipment to do all excavation, filling and compaction, control of surface and ground water to complete the fine grading.

SPECIFICATION NO. 4 EXCAVATION AND BACKFILL

1.0 DESCRIPTION

The work covered by this specification includes the supply of all labour, materials, consumables and equipment for excavating and backfilling of trenches for pipes, conduits and appurtenances.

The work includes but is not limited to the following; sheet piling, sheathing, shoring and bracing; installation and operation of all equipment required for dewatering excavations and control of ground and surface water; protection and supporting of existing structures and utilities; removal of all debris and surplus material; compaction of the backfill, rough grading and restoration of surfaces; maintenance of existing travel on streets and roads and access to private and public property and each and everything required to complete the work as specified. Comply with safety requirements of the Federal and Provincial Governments and of the local municipal authority.

2.0 EXCAVATION FOR STRUCTURES

2.1 Depth

The excavation to the bottom of the foundation or the underside of the working mat when a working mat is permitted.

Remove material deemed unsuitable at the bottom of an excavation to a depth determined by the Consultant, and backfill with approved material.

Backfill and compact excessive depth with approved material at no additional cost to the Company unless the removal is authorized by the Consultant.

2.2 Length and Width

Provide sufficient horizontal dimensions to permit adequate space to safely complete the structure, place and remove any formwork required.

3.0 TRENCH EXCAVATIONS

3.1 Alignment and Depth

Excavate trenches to the alignment and depths specified on the contract drawings for the class of pipe bedding specified and only so far in advance of pipe laying as permitted by the Consultant.

Where, in the opinion of the Consultant, the material at the bottom of the trench is unsuitable to receive the pipe bedding, excavate to a depth as deemed necessary by the Consultant and backfill with an approved material.

In the event that the trench is over excavated without the authorization of the Consultant, fill and compact the excavation to the correct grade with an approved material without compensation.

3.2 Trench Width

The trench width shall be measured at a height of 300 mm above the top of the pipe.

For parallel pipe installations the trench width shall be measured in a horizontal plane 300 mm above the top of the higher pipe.

When sheathing is required the trench width shall be the inside face to inside face of the sheathing.

Refer to the Project Specifications or drawings for maximum and minimum trench widths.

Should the Contractor excavate wider than specified, the Consultant may require the use of stronger pipe, a higher class of bedding, or both, supplied and installed without compensation.

4.0 DEWATERING

4.1 Equipment

Supply all necessary equipment required to keep excavations and trenches free from both ground and surface water.

4.2 Disposal

Dispose of water removed from excavations and trenches in such a manner so as to prevent injury to public health, damage to private or public property, or to any work under construction. Obtain all required permits for dewatering.

When deemed necessary by the Consultant, construct sedimentation ponds of sufficient size to remove sand and silts from the water before directing it to adjacent lands or watercourses. Outfall pipes shall be installed in such a manner as to prevent erosion of dykes, stream banks or slopes.

5.0 EXISTING PAVEMENTS

5.1 Size of Excavation

When the excavation is adjacent to existing pavements, structures or utilities employ sheathing and shoring or any other means as deemed necessary by the Consultant to keep the disturbed area to a minimum.

Road crossing shall be by vertical trenching unless permitted otherwise by the Consultant and the Governing road authority.

Employ methods to assure breaking of pavement along straight lines having a vertical face.

6.0 SUPPORTING OF EXCAVATIONS

6.1 Installation

Provide, install and maintain in good condition sheet piling, sheathing, shoring and bracing in accordance with Safety Regulations as may be required, due to ground conditions, limited working areas, adjacent utilities and structures, road crossings, methods of operation or when directed by the Consultant.

Fill and compact voids behind sheathing with an approved granular material or native material when permitted by the Consultant.

6.2 Removal

Construct sheathing and shoring in such a manner as to permit the removal without injury to the work, adjacent structures, utilities or pavements.

Remove sheathing, shoring and bracing as the excavation is backfilled except when the Consultant orders it left in place or when the Contractor requests to leave the same in place and the request is approved by the Consultant.

Remove sheathing and shoring in such a manner as to prevent the "caving in" of the excavation during backfilling operations.

Fill and compact cavities caused when sheathing is removed.

Cut off shoring left in place at least 1 m below the final ground surface unless instructed otherwise by the Consultant.

6.3 Responsibility

The right of the Consultant to order sheet piling, sheeting, shores, bracing, etc., left in place in the Work, or to order the use of same or to order a better quality or larger size of material does not relieve the Contractor of any of their obligations under this Contract, or relieve him of liability for damage to persons or property resulting from their failure to use or to leave in place sufficient sheeting, shoring, etc., to prevent any caving or moving of the ground, or resulting from any other negligence in the carrying out and final completion of the Work.

7.0 EXISTING UTILITIES AND STRUCTURES

Existing utilities and structures which are to remain in place shall be protected, supported or relocated as specified in Specification No. 1 - "General Requirements".

8.0 FROZEN GROUND MATERIAL

The replacement of frozen material with suitable material is the Contractor's responsibility under the Contractor's bid price.

Frozen ground shall not be opened further in advance of construction than one day's underground installation. Wherever possible, frozen excavated materials shall be separated from unfrozen material.

Backfilling shall be carried out using unfrozen material. The frozen material may then be mounded over the trench. Particular care shall be taken to prevent frozen materials from being buried around manholes.

9.0 PIPE BEDDING

9.1 Materials

Pipe bedding shall be supplied as specified on the contract drawings.

Materials used for bedding shall conform to Specification No. 8 - "Concrete" and Specification No. 9 - "Granular Materials".

9.2 Placing

Granular bedding shall be compacted underneath, beside and over the pipe to 98% Optimum Dry Density.

In the event that concrete bedding is specified the Contractor must use solid concrete blocks to support the pipe prior to placing the concrete. The compressive strength of the blocks shall be at least equivalent to that of the concrete bedding. Sufficient blocks shall be supplied and placed in such a manner to prevent movement of the pipe while placing the concrete bedding.

Concrete used for bedding shall be placed in two lifts if necessary. The level of the first lift shall not exceed 80 mm above the bottom of the pipe. The second lift shall be placed immediately after the initial wet of the first lift.

When concrete bedding is specified in rock trenches, separate the concrete from the rock by a compacted cushion of approved granular material, of at least 75 mm thickness, under the concrete bedding as well as both sides. As an alternate, 50 mm of rock deteriorating styrofoam may be placed on the sides.

When concrete bedding is placed against sheathing, a bond breaking material shall be placed between the sheathing and the concrete to permit removal of the sheathing.

10.0 BACKFILLING

10.1 Materials

Native material can be used for backfilling excavations and trenches except when otherwise specified or when the excavated material is deemed unsuitable by the Consultant.

Native material used for backfill shall consist of earth which is free of topsoil, trash, debris, boulders exceeding 300 mm or any other deleterious materials. No boulders exceeding 150 mm shall be placed in the top 300 mm of the backfill.

Stones over 50 mm will not be permitted to be placed within 300 mm of the pipe structure.

When rock is permitted as a backfill material, protect the pipe by a minimum of 450 mm of compacted material above the top of the pipe. This material shall be native material or granular as specified and free from stones exceeding 50 mm in diameter.

When granular material is specified as backfill or when ordered by the Consultant, it shall conform to the requirements of Specification No. 9 - "Granular Materials".

Do not backfill with frozen material without permission from the Consultant.

10.2 Placing

Place backfill against the pipe in such a manner so as to prevent any damage or movement.

Place backfill in uniform layers not exceeding 300 mm in thickness loose measurement. Compact each layer to 95% standard proctor maximum dry density.

Maintain backfill at uniform layers on each side of pipes and around structures.

Surplus excavated material may be disposed of in fill areas within the contract limits as directed by the Consultant and subject to the requirements of Specification No. 3 - "General Grading and Earthwork".

Any deficiency of backfill material shall be supplied by the Contractor and must meet the approval of the Consultant.

Correct any settlement occurring after backfilling without compensation.

No stub connections shall be backfilled until the Consultant has verified the locations and elevations at both ends and has given their written authorization to backfill.

10.3 Restoration of Surfaces

Surface areas disturbed during the construction operations are to be restored as specified.

11.0 PAYMENT

11.1 General

Unless otherwise specified, with the exception of rock, the payment for excavation of all materials encountered, dewatering, sheathing and shoring, for supplying, placing and compacting bedding and backfill, for supporting existing structures and utilities, maintaining traffic and access during construction, removing excess excavated material, restoring surfaces, shall be included in the price provided within the Pricing Schedule for supply and installation of pipes and structures.

11.2 Rock Excavation

Additional payment will be made for "Rock Excavation" as defined in Specification No. 1 - "General Requirements". The price provided within the Pricing Schedule shall include disposal outside the contract limits. Measurement will be made as follows:

- a) Maximum trench width or actual width of trench whichever is the smaller.
- b) Outside dimensions of structures plus a 300 mm envelope around the structure.
- c) Actual volume of boulders as determined by the product of the three maximum dimensions.
- d) No payment will be made for rock removed outside of the specified limits. No duplicate payments will be made for rock excavation.
- e) If blasting precedes the stripping of overburden, the Contractor shall accept the Consultant's estimate as to the elevation of top of rock.

11.3 Excess Excavation

When the Consultant instructs the Contractor to carry excavations below the specified depth to obtain a satisfactory foundation the volume of material excavated will be determined by the Consultant and payment made according to the Schedule of Contract Unit Prices.

The Price for excavation shall include the disposal of the material.

The Contractor shall provide material as specified by the Consultant to backfill the sub-excavation. Price provided within the Pricing Schedule will be full compensation for supplying, placing and compacting the material.

11.4 Sheathing and Shoring

Sheathing and shoring which is left in place on the instructions of the Consultant will be paid for at the provided within the Pricing Schedule price.

Payment will be made only for the actual length left in the ground, except where the cut-off is less than 1.3 metres when this length will be included for payment.

11.5 Backfilling

When granular material is specified for backfill, the supply, placing, compacting and removal of native material shall be included in the price provided within the Pricing Schedule for the installation of pipes and structures.

When the Consultant deems the native material unsuitable for backfill the Contractor shall supply, place and compact imported material at the price provided within the Pricing Schedule. The price provided within the Pricing Schedule shall include disposal of the unsuitable material outside the Contract limits.

Any shortage of backfill material due to the Contractor's method of operation shall be supplied and placed by the Contractor at no additional cost to the Company.

11.6 Frozen Ground Conditions

No extra payment shall be made to the Contractor should he encounter frost difficulties. The cost of such work shall be included in the Contractor's bid price for underground construction.

SPECIFICATIONS NO. 5 WATER DISTRIBUTION SYSTEM

1.0 DESCRIPTION

The work consists of the supply of all labour, materials, consumables, and equipment for the installation of watermains, fittings, valves, valve boxes, valve chambers, service connections, blowoffs, hydrants and appurtenances necessary for the complete construction, flushing and testing of the water distribution system as detailed on the Contract Drawings and as specified. Include everything requisite and necessary to properly complete the entire system, notwithstanding that every item may not be specifically mentioned.

When required in the Project Specifications disinfect the system as specified.

2.0 MATERIALS

Materials shall meet the requirements as specified herein.

Materials shall be of the kind, type, size and class as specified on the engineering drawings.

All fittings such as tees and elbows to be supplied in classes compatible with the pipe.

2.1 Ductile Iron Pipe

Ductile Iron Pipe to conform to AWWA C151 (ANSI A21.51) (CSA B131.13) standard lengths.

Push-on or mechanical joints to conform to AWWA C111 (ANSI A21.11) (CSA B31.10).

Cement Mortar lining to be standard thickness in accordance with AWWA C-104 (ANSI A21.4).

Electrical conductivity □ a low resistance electrical connection to be provided at each joint.

2.2 Concrete Pressure Pipe

Pipe and joints for prestressed concrete, steel cylinder type pipe to conform to AWWA C301.

Pipe and joints for non-cylindrical reinforced concrete pressure pipe to be in accordance with AWWA C302.

Pipe and joints for reinforced concrete pressure pipe, steel cylinder type, pretensioned to meet the AWWA C303 requirements.

Suitable flanged or threaded connections for mounting of valves or for branch lines to be as specified.

Welding/grouting sequence for welded joints to be submitted to the Consultant for review.

2.3 Polyethylene (P.E.) Pipe

Polyethylene pipe material to be in accordance with ASTM D1248.

Polyethylene pipe to be manufactured in accordance with CSA B137.

Joining of pipe to be accomplished by the butt fusion method.

Where required, flanged connection will be as specified.

2.4 Polyvinyl Chloride (PVC) Pipe

P.V.C. pipe in sizes 100 mm through 300 mm to conform to AWWA C900.

Unless specified otherwise, PVC 1120 pipe with a DR=18, pressure class of 1035 kPa at 23°C to be used. Wall thickness to conform to cast iron (CI) outside diameter (OD).

Pipes to have integral wall-thickened bell ends. Joining to be accomplished by using rubber rings conforming to ASTM D3139.

2.5 Fittings

Ductile iron fittings to conform to AWWA C110 (ANSI A21.10) with 1724 kPa pressure rating.

Joints to conform to AWWA C111 (ANSI A21.11) - push on or mechanical joint.

Where fittings are used with ductile iron pipe electrical conductivity must be provided.

2.6 Gate Valves

Gate valves to be iron body, bronze mounted, double-disc type, double faced and sealed, non-rising stem, conforming to AWWA C500.

Valve ends to be mechanical joint □ AWWA C111 (ANSI A21.11).

Minimum safe working pressure 1035 kPa.

Direction of opening - as specified in Project Specifications.

Operating nut - as specified in Project Specifications.

2.7 Butterfly Valves

Butterfly valves - as specified in Project Specifications.

2.8 Valve Boxes

Round, cast iron, 2 piece adjustable slide or auger type with lift out cover.

Upper section - minimum diameter 110 mm.

Adjustment - minimum ± 150 mm - overlap at full extensions shall be at least 150 mm.

Lower section - completely enclose bonnet of valve with guide plate attached to valve.

Markings - as specified.

2.9 Valve Chambers

- Covers
- grey cast iron - ASTM A48 (Class 30)
 - machined bearing surfaces
 - centre lift-out plug, minimum dia. 110 mm.
 - pattern as specified.

Ladder rungs, aluminum type 6061 T4 alloy - CSA HA.5

Valve Chamber adjuster rings (Moduloc) ASTM C478.

Mortar as per Specification No. 8 - Concrete.

Precast Sections - ASTM C478

Gaskets - ASTM C443

2.10 Hydrants

- Hydrants
- AWWA C502
 - two piece barrel
 - compression type valve
 - break away flange placed 50 mm above finished grade.
 - mechanical joint inlet connection
 - self draining barrels.

Valves -as specified in Section 2.7

Valve box - as specified in Section 2.9

Nozzles and Threads - as specified.

Colour - as specified.

2.11 Service Connections

This specification applies to services 19 mm to 51 mm in diameter.

Diameter - as shown on drawings.

Pipe - seamless copper tubing ASTM B \square 88, Type "K"

Main stops - AWWA C800 - copper flange outlet

Curb stops and fittings - AWWA C800 copper flange joints

Curb boxes

- curb box extension limits as specified
- threaded cover, bronze centre plug
- "water" cast into top of cover
- curb boxes in sidewalks shall be supplied with frost rings.

Extension rods

- fasten to top of curb stop with corrosion resistant pin
- top of rod - 150 mm to 450 mm below grade.

2.12 Pipe Bedding

Pipe bedding shall be as specified.

3.0 CONSTRUCTION

3.1 General

Excavation and backfill shall be in accordance with Specification No. 4 - Excavation and Backfill.

Place watermains and service connections at elevations which will ensure depth of cover specified.

The depth of cover is defined as the height from the top of the watermain to the finished grade shown on the drawings.

3.2 Pipe Laying

Lay pipes with bell ends facing in the direction of laying.

Lay and join pipes and fittings in accordance with manufacturer's instructions and as specified herein.

Lower material into the trench so that the material, protective coatings and linings are not damaged. Pipes and fittings shall not be dropped or dumped into the trench.

Watermains shall be laid true to line and grade within the following tolerances:

Plan dimensions	-	± 150 mm
Elevations	-	± 80 mm

When pipe laying is not in progress the open ends of pipes shall be protected to prevent foreign material and water from entering pipe.

3.3 Pipe Deflection

Pipes may be deflected from a straight line to form a smooth, long radius curve when permitted by the Consultant.

Lay and join pipes and fittings in accordance with manufacturer's instructions and as specified herein.

MAXIMUM PERMISSIBLE APPROX. RADIUS OF CURVE PRODUCED

DEFLECTION PER LENGTH BY SUCCESSION OF JOINTS

Size of Pipe mm	Mechanical	Push□On	Mechanical	Push□On
	Joint mm	Joint mm	Joint m	Joint m
75	787	457	38	62
100	787	457	38	62
150	686	457	44	62
200	508	457	54	62
250	508	457	59	62
300	508	457	59	62
350	343	457	87	79
400	343	381	87	79

For larger sizes of pipe the deflections shall not exceed the manufacturer's recommendations.

Provide bends to ensure that maximum deflections are not exceeded.

3.4 Cutting Pipe

Cut pipes without damaging the pipe, coating or cement lining and provide a smooth end at right angles to the axis of the pipe.

3.5 Connections to Existing Watermains

Obtain permission from the operating authority before making any connections to an existing water main.

Valves on existing water mains shall not be operated by the Contractor unless approved by the Consultant and the operating authority.

All affected water users shall be notified at least 24 hours in advance of any planned interruption of service.

Swab fittings and pipes placed into the existing line with a solution of chlorine having a minimum strength of 50 ppm.

Take precautions to prevent contamination of the existing system and follow all instructions of the operating authority.

3.6 Assembly of Mechanical Joints

Seat spigot of the pipe in the bell before pressing the gasket into place.

Tighten nuts spaced 180 degrees apart alternately in order to provide equal pressure on all parts of the gland.

Tighten nuts with a "torque-limiting" wrench to the following range:

Size	Torque Range
mm	N.m.
15	54 - 81
20	81 - 122
25	95 - 136
30	122 - 163

3.7 Anchorage of Pipes, Fittings and Hydrants

Anchor pipes, fittings and hydrants to prevent movement.

Place concrete reaction backing or "thrust blocks" between the fitting and undisturbed soil.

Thrust blocks shall transfer the full thrust at test pressure without exceeding the bearing capacity of the soil.

Supply and place concrete in accordance with Specification No. 8 - Concrete. Unless otherwise specified concrete shall be Class "C".

Joints shall be accessible for repair.

Straps, rods or clamps shall be used for bends in the vertical plane and when the soil conditions do not provide adequate bearing.

3.8 Valves

Install valves with the stem vertical at the locations shown on the drawings.

3.9 Valve Boxes

Install valve boxes on all valves where valve chambers are not required.

Centre the valve box over the operating nut with the top at finished grade and the shaft placed vertical.

3.10 Valve Chambers

Construct valve chambers as detailed on the drawings at the locations shown.

Place covers flush with the finished grade so that the centre lift-out plug is plumb over the operating nut.

Construct chambers so that no loads from the structure are transferred to the pipes passing through the walls.

When detailed on the drawings install a drain.

3.11 Hydrants

Install hydrants as detailed on the drawings with the barrel vertical, hose connections parallel with the curb, pumper nozzle, (if specified) facing the curb, and bottom of flange 50 mm above the finished grade.

Connect hydrant to the main by means of a mechanical or push-on joint tee and ductile-iron pipe lead with a valve located as shown on the drawing.

Place clear limestone around the barrel and cover with 6 mil polyethylene to minimize contamination when backfilling.

Limestone - as per Specification No. 9 - "Granular Materials".

3.12 Service Connections

Install service connections as detailed.

Thread main stops 19 mm and 25 mm diameter directly into ductile iron pipe.

Install main stops with the water main under pressure using cutting and tapping equipment recommended by the manufacturer.

Leave main stops in the full open position before backfilling.

Install curb stops at the location specified, being placed vertical with the base resting on a wood block. Leave curb stop in the "off" position.

Place wood marker 5 cm - 10 cm, 1.5 m long at the end of each connection extending to a height of 600 mm above ground. Paint the top 300 mm blue.

3.13 Air Blow-Offs

Install blow-offs at the locations shown on the drawings.

Install fittings, meeting the requirements for service connections as shown on the drawings.

4.0 HYDROSTATIC TESTS AND FLUSHING

4.1 General

Perform tests only in the presence of the Consultant.

Notify the Consultant 48 hours in advance of performing any tests.

Install and backfill service connections, hydrants, thrust blocks, and appurtenances before testing.

Provide all apparatus, material and labour necessary to conduct the tests.

Use only potable water for testing and flushing. Provide potable water if not available from an existing municipal source.

When water is provided by the Contractor it shall be tested by the Consultant and shall not be introduced into the system until chlorine and bacteriological tests are satisfactory.

4.2 Procedure

Slowly fill each section of pipe to be tested with water to the specified test pressure by means of pumping, based on the elevation of the lowest point of the section under test and corrected to the elevation of the test gauge. Monitor, in a manner acceptable to the Consultant, the pressure for the duration of the test and measure the leakage as defined in Section 4.3.

Expell all air from the system before the test pressure is applied.

If hydrants, service connections or blow-offs are not available at high points for the release of air, provide main stops and insert brass plugs after testing has been completed.

Unless otherwise specified, the duration of each test shall be at least 2 hours and the initial hydrostatic test pressure 1035 kPa or one and one-half (1-1/2) the operating pressure for the district, whichever is greater. (1 metre head = 9.81 kPa).

4.3 Allowable Leakage

Leakage is defined as the quantity of water that must be introduced into a section of pipe to maintain the specified test pressure for the duration of the test.

The maximum leakage shall be determined by the formula:

$$L = \frac{ND(P^2)}{64,670}$$

Where

- N = number of joints
- D = nominal diameter (mm)
- P = test pressure kPa
- L = allowable leakage (P/hr)

Allowable leakage for service connections 19 mm to 51 mm shall be 8.2 litres per 100 services per 2 hour test.

4.4 Flushing

Flush the system after a successful pressure/leakage test has been performed.

Provide means to discharge the water into storm or sanitary sewers, ditches or water courses without causing erosion, deposition of silt, ponding of water or damage to the environment.

5.0 CHLORINATION

5.1 General

Supply all material, labour and equipment necessary to perform the work to obtain the required standards for Chlorine Residual and Bacteriological Tests.

Disinfect the system after flushing by introducing a solution of chlorine (minimum strength 55 ppm) and ensuring that it is evenly distributed throughout the system.

A residual of chlorine of not less than 10 ppm will be required in the water after 24 hours.

The Consultant will test the initial and residual chlorine concentrations. The Contractor will provide all assistance required to obtain samples at the hydrants selected by the Consultant. All test equipment shall be supplied by the Contractor.

5.2 Flushing After Chlorination

When the required chlorine residual is obtained, flush the system as in Section 4.4 until all excess chlorine is removed. Chlorinated water to be neutralized before flushing.

Continue flushing until the chlorine content is equal to that of the water being used for flushing.

Discharge water containing high concentrations of chlorine to the sanitary sewers when possible.

5.3 Bacteriological Tests

Before the main is put into service, assist the Consultant to obtain water samples for bacteriological testing.

The Consultant will submit these samples to a recognized laboratory for testing.

The main shall not be put into service until the results are acceptable to the public health authority having jurisdiction.

6.0 MEASUREMENT

All linear measurements are made in the horizontal plane and are plan quantities. Field measurements will not be made unless drawings are revised.

6.1 Watermains

Length of watermains shall be as scaled from the Engineering drawings.

6.2 Appurtenances

Unless otherwise specified, no separate measurement will be made for valves and boxes, valves and chambers, hydrants, service connections and blow-offs.

Hydrant extensions will be measured in the vertical plane.

7.0 PAYMENT

7.1 Watermains

The price for watermain shall be considered full compensation for all pipe, fittings, thrust blocks and appurtenances, trench excavation, the control of ground and surface water; the preparation of subgrade; pipe bedding as specified; placing and joining the pipe, backfilling and compacting the trench; testing and flushing, reinstatement of surfaces and clean-up; and all the work necessary to install the main complete in place.

7.2 Valve and Valve Box

The lump sum price shall include supply of the valve and valve box and the complete installation, including adjusting to finished grade.

7.3 Valve and Valve Chamber

The lump sum price shall include the supply of the valve and all materials and the complete installation as detailed including adjusting the cover to final grade.

7.4 Hydrants

The price provided within the Pricing Schedule for hydrants shall include the supply of all materials and the complete installation of the hydrant, gate valve and valve box (if required), tee on main, lead, stone fill and blocking, tie rods, and setting to final grade.

7.5 Service Connections

The price provided within the Pricing Schedule shall include the supply and installation of the pipe, the main stop, curb stop, curb box, wood marker, saddle and all other materials required.

7.6 Blow-Offs

The lump sum price shall include the complete supply and installation of blow-offs at the locations shown on the drawings including adjusting to final grade.

7.7 Connection to Existing Mains

The lump sum price provided within the Pricing Schedule shall include the locating of existing mains and the complete supply and installation of all materials required to complete the connection.

7.8 Chlorination and Flushing After Chlorination

The price provided within the Pricing Schedule shall be compensation in full for the supply of all equipment, labour and materials to chlorinate and flush the main as specified.

The price shall include additional chlorination and flushing when:

- a) chlorine residual is less than specified,
- b) bacteriological tests are not acceptable to the public health authority having jurisdiction.

SPECIFICATION NO. 6 SEWERS AND APPURTENANCES

1.0 DESCRIPTION

The work shall include the supply of all labour, materials, consumables and equipment necessary for the installation of sewers, fittings, drain connections, manholes, frame and covers, safety grates, catchbasins and appurtenances required for the complete construction, flushing as directed by the Consultant of the sewage system(s). The Contractor shall include everything requisite and necessary to properly complete the entire system(s) notwithstanding that every item may not be specifically mentioned.

2.0 MATERIALS

Diameter, length, class and type of pipe is, as specified, on the engineering drawings and shall meet the following requirements. In all cases, the most current specification in effect shall govern.

2.1 Sewer Pipe

A. Concrete Pipe

- (i) Non-reinforced pipe and fittings - CSA A257.1
- (ii) Reinforced pipe and fittings - CSA A257.2
- (iii) Rubber gasket joints - CSA A257.3

B. Vitrified Clay (VC) Pipe

- (i) Pipe and fittings - CSA A60.1M
- (ii) Joint - Flex-lox - CSA A60.3M

C. Polyvinylchloride (PVC) Pipe (Non Pressure)

- (i) Pipe and fittings - ASTM D3034
- (ii) Joints - rubber Ring Bell Joint - rubber ring - ASTM D-1869

D. Polyethylene (PE) Pipe

- (i) Pipe and fittings - ASTM D1248
- (ii) Joints - Butt fusion - CGSB Std. No. 41-GP-25

E. Corrugated Steel Pipe

- (i) Corrugated steel pipe and pipe arches shall be as specified.
- (ii) Corrugated steel pipe shall meet the requirements of "Specification for Corrugated Steel Pipe Products - Number 501" issued by the Corrugated Steel Pipe Institute.

2.2 Sewer Laterals

A. Concrete Pipe

- (i) Pipe and fittings - CSA A257.1 or A257.2
- (ii) Rubber gasket joints - CSA A257.3

B. Vitrified Clay Pipe

- (i) Pipe - Plain End - CSA A60.1M
Joints - Flexible External Sleeves, CSA A60.3M

C. Polyvinylchloride Pipe

- (i) Pipe and fittings - CSA B182.1
- (ii) Joints - rubber ring bell Joint, rubber ring ASTM D3212

D. Polyethylene Pipe

- (i) Pipe and fittings - ASTM D1248
- (ii) Joints - butt fusion - CGSB Std. No. 41-GP 25.

E. Service Saddles

Not to be used on sewers smaller than 500 mm.

- (i) cast iron with flange curbed to fit the sewer pipe with rubber gasket to ensure a positive leak-free seal.
- (ii) Strap-on saddles, steel band with steel spade bolts, nuts and washers.
- (iii) Mortar-on-saddles, slots provided around flange to provide a Key for the cement mortar.

2.3 Manholes - (Precast or Cast-in-place as specified)

A. Precast Sections - ASTM C478

Gaskets - ASTM C443

B. Covers, grey cast iron, ASTM A48 (Class 30), pattern as specified.

C. Ladder Rungs, aluminum type 6061 T4 alloy CSA HA.5 - width 400 mm.

D. Safety Gratings - aluminum type 6061 T4 alloy CSA HA.5

E. Manhole Adjuster Rings (Moduloc) - ASTM C478.

2.4 Catchbasins - (Precast or Cast-in-place as specified)

- A. Frame and grate, gray cast iron - ASTM A48 (Class 30) pattern as specified.
- B. Catchbasin Adjuster Rings (Moduloc) - ASTM C478.

2.5 Pipe Bedding

Pipe bedding materials shall be concrete, granular material or crushed limestone, as required, and in accordance with Specification No. 8 - Concrete or No. 9 -Granular Materials.

3.0 CONSTRUCTION

3.1 General

Excavation and backfill in accordance with Specification No. 4, Excavation and Backfill.

Sewer and catchbasin leads shall be installed to the line and grade specified on the drawings.

Drain connections shall be placed at elevations as specified.

Clean by flushing sewer lines, manholes, catchbasins and leads prior to inspection by the Consultant.

3.2 Pipe Laying

Lay pipes with bell ends facing upstream with respect to the direction of flow in the pipe.

Lay and join pipes and fittings in accordance with manufacturer's instructions and as specified herein.

Lower material into the trench so that the material is not damaged. Pipes and fittings shall not be dropped or dumped into the trench.

Sewers shall be laid true to line and grade within the following tolerances unless otherwise noted on the drawings:

$$\text{Plan Dimensions - } \frac{\text{Diameter (mm)} \times \% \text{ Slope} \times 10}{100} =$$

$$\text{Elevations - } \frac{\text{Diameter (mm)} \times \% \text{ Slope} \times 5}{100} =$$

When pipe laying is not in progress the open ends of pipes shall be protected to prevent foreign material and water from entering the pipe

On sewers 500 mm diameter and less, provide a prefabricated tee or "Y" branch for each private drain connection.

Pipes are to be supported by compacted bedding which has filled all voids to the original ground unless otherwise specified.

3.3 Radius Pipe

Where radius pipe is specified, prepare and submit to the Consultant an appropriate detail drawing indicating sections of pipe and configuration of installation.

3.4 Cutting Pipe

Pipes shall be cut in accordance with the manufacturer's recommendations, without damaging the pipe and provide a smooth end at the required angle to the axis of the pipe.

Asbestos cement pipe shall be supplied in standard lengths with short lengths to install fittings in specified locations. Both ends of all pieces shall be machined.

3.5 Connections To Existing Sewers

Obtain permission from the operating authority before making any connections to an existing sewer.

Prevent foreign material from entering the existing system and follow instructions of the operating authority.

Provide approved adaptors and make connections to existing sewers in an approved manner including benching.

3.6 Sewer Laterals

Provide connections at the locations shown on the drawings.

Strap-on-saddles may be used only when the main sewer line is greater than 500 mm in diameter or when connecting to an existing sewer of diameter greater than 500 mm and approved by the operating authority.

Proper tools must be used to cut the pipe - breaking the main with hammer, chisel etc. will not be permitted.

Lay connections at right angles to the main in a straight line with a grade of not less than two percent unless otherwise specified.

Terminate connections complete with fittings as specified. Supply cover plates stamped with the word "Storm" or "Sanitary". Paint cover plates for sanitary cleanouts red.

Block plugs to undisturbed soil to prevent movement during testing.

Place wood markers 5 cm × 20 cm, 1.5 m long at the end of each connection and extended to a height of 600 mm above ground. Paint the top 300 mm green for storm connections and red for sanitary connections.

3.7 Manholes

Construct manholes as detailed on the drawings and provide drop connections where indicated.

Grout pipes into the walls and cut flush with the inside face of the wall.

Provide a joint on each sewer line and service connection within one metre of the outside wall of the manhole. The pipe must be supported by specified bedding to undisturbed ground.

Bench manholes with concrete as specified to provide an invert conforming to the sewer.

Unless otherwise specified, grout-in-place manhole covers flush with final grades except for manholes located in pavement where road construction follows the installation of undergrounds. In such cases finish top of concrete flush with road subgrade.

Unless otherwise specified, and where approved by the operating authority, adjust manhole covers using steel "lift rings" and using "manhole adjuster rings" (moduloc).

Install safety gratings as detailed on the drawings.

3.8 Catchbasins and Catchbasin Leads

Cut off pipes flush with the inside face of the catchbasin and grout into place.

Connect catchbasin leads to the main storm sewer by means of a prefabricated tee or 'Y' fitting installed at the time of laying the main sewer for pipes 500 mm diameter and less, unless otherwise specified.

Support catchbasin leads on specified bedding to original ground. Unless otherwise specified, in disturbed ground, bed catchbasin leads on concrete to undisturbed ground.

Place grates so that no ponding will occur in the area drained by the catchbasin. Unless otherwise specified, grout-in-place catchbasin frames so that grates are flush with final grades except for catchbasins located in pavement where road construction follows the installation of undergrounds. In such cases finish top of concrete flush with road subgrade.

Unless otherwise specified, and where approved by the operating authority, adjust catchbasin frames and grates using Catchbasin Adjuster Rings (Moduloc).

3.9 Concrete Headwalls

Concrete headwalls shall be constructed as specified. The structure shall be founded on undisturbed soil.

3.10 Corrugated Steel Pipe

Lay corrugated steel pipe on specified bedding. Join pipes with approved couplers conforming to the gauge and diameter of the pipe.

4.0 TESTING

4.1 General

Check the alignment of sewers between manholes as each section is laid.

Provide a strong light to be shone through the pipe from manhole to manhole. If the required tolerances are exceeded, realign the pipe until the tolerances are met.

Perform tests in the presence of the Consultant.

Notify the Consultant 48 hours in advance of performing any tests.

Complete and backfill sewer laterals, manholes and appurtenances on the section under consideration before testing.

Provide the apparatus, material and labour necessary to conduct any and all tests and re-tests as directed by the Consultant.

Provide water for flushing and testing at no expense to the Company, unless otherwise specified.

4.2 Procedure

Clean sewers of all foreign material, and correct all visible deficiencies before beginning the test.

Exfiltration

- Isolate the section to be tested by temporarily blocking the inlets of two manholes with expandable plugs or bulkheads.
- Fill the pipe and manhole with water to a depth of 600 mm above the crown of the pipe in the upstream manhole. Do not exceed 7.5 m maximum head at the downstream manhole.
- Allow 24 hours for absorption of water and escape of air from the line.
- The duration of a test shall be two hours. The actual exfiltration shall be determined by measuring the change of elevation of the water in the manhole.

Infiltration

- Isolate the upstream end of the section to be tested with a plug or bulkhead.
- Place a V notch weir or other approved measuring device in the pipe at the lower end.
- The duration of the test shall be two hours. The actual infiltration shall be the average of at least 8 readings taken at even intervals during the test.

Air Test

Low pressure air test may be requested by the Consultant, for all but concrete sewers, due to:

- A. Lack of water
- B. Steep grades - greater than 8 m head differential in adjacent manhole invert elevations.
- C. Freezing temperatures during the test period, etc.
- D. The test section shall be plugged at each end.
- E. All service laterals, stubs and fittings into the sewer test section shall be properly capped or plugged.
- F. Air shall be supplied to the test section slowly, until a constant pressure of 25 kPa is maintained. If the ground water is above the sewer line being tested, the air pressure shall be increased by 3.0 kPa for each foot the ground water level is above the invert of the pipe.
- G. A stabilization period of at least 5 minutes shall be allowed during which time the pressure shall be regulated to prevent it from fluctuating more than 10 kPa above or more than 3.5 kPa below the required pressure.

4.3 Allowable Limits

The Consultant will determine whether an infiltration and/or exfiltration test or air test will be performed.

In the case that both an infiltration and an exfiltration test are ordered for a particular line the requirements of each test must be met.

A test section shall not exceed the length between any two manholes or as directed by the Consultant.

Storm Sewers

A. Infiltration

0.28 litres per hour per millimetre of pipe diameter per 100 metres of sewer (0.28 l/hr/mm dia/100 m).

B. Exfiltration

0.35 litres per hour per millimetre of pipe diameter per 100 metres of sewer (0.35 l/hr/mm dia/100 m).

Sanitary Sewers

A. Infiltration

0.09 litres per hour per millimetre of pipe diameter per 100 metres of sewer (0.09 l/hr/mm dia/100 m).

B. Exfiltration

0.11 litres per hour per millimetre of pipe diameter per 100 metres of sewer (0.11 l/hr/mm dia/100 m).

C. Air Test

The test pressure shall be 3.5 kPa less than the above required pressure. The time required for a pressure loss of 3.5 kPa shall not be less than that shown in the following table.

Time Required for Air Testing

Pipe Size (mm)	Time	
	Min	Sec
100	2	32
150	3	50
200	5	06
250	6	22
300	7	39
350	8	56
375	9	35
400	10	12
450	11	34
500	12	45
525	13	30

For larger diameter pipe, use the following: (minimum time in seconds = $1.52 \times$ pipe diameter in mm).

Manholes

A. Infiltration

All visible leaks into manholes shall be repaired and no allowance permitted when an infiltration test is performed.

B. Exfiltration

3.0 litres per hour per metre of head above the invert of the sewer for each manhole in the test section. (3 l/hr/m/head).

Pipes Larger Than 900 mm Diameter

Pipes greater than 900 mm will not be subjected to air testing. A visual inspection will be made after backfilling and all deficiencies corrected.

5.0 MEASUREMENT

All linear measurements are made in the horizontal plane and are plan quantities. Field measurements will not be made unless drawings are revised.

5.1 Sewers

Linearly from centre of manhole to centre of manhole (or end of pipe). Where the pipe connects to an existing pipe, measurement shall be to the inside wall of the existing pipe.

5.2 Catchbasin Leads

Linearly from centre of catchbasin to centreline of sewer. Where the pipe connects to an existing pipe, measurement shall be to the inside wall of the existing pipe.

5.3 Sewer Laterals

Unless otherwise specified, no measurement for drain connections will be made.

5.4 Manholes and Catchbasins

Unless otherwise specified, no measurement for manholes or catchbasins will be made.

6.0 PAYMENT

6.1 Sewers and Catchbasin Leads

The price provided within the Pricing Schedule for sewers shall include all pipe and fittings; excavation of the trench; control of ground and surface waters; preparation of subgrade; pipe bedding as specified; placing and joining the pipe; permanent supports where detailed; placing and compacting backfill; reinstatement of surfaces as specified and clean-up; all required flushing and testing; and all the work necessary to install the sewer complete in place.

6.2 Sewer Laterals

The price provided within the Pricing Schedule shall include the supply and installation of the pipe and fittings, connection to the main sewer, riser (if required), test fitting, plug, blocking, wood marker, reinstatement of surfaces, as specified and all other material required.

6.3 Manholes

The price provided within the Pricing Schedule shall include the excavation, complete supply and installation of the manhole including benching, ladder rungs, dragging hooks, safety grating and drop structure as specified, manhole adjusters, cover, backfilling with the specified granular material and adjusting to grades specified in Clause 3.7.

6.4 Catchbasins

The price provided within the Pricing Schedule shall include the excavation, bedding, backfill and complete installation including concrete, catchbasin adjusters, reinforcing steel, goss trap (if required), frame and grate and adjusting to grades as specified in item 3.8. Where perforated sub-drains are specified at catchbasin locations they shall be included in the price for the catchbasin.

6.5 Plumbing Permits

Where permits are required for work on private property the Contractor shall obtain the permits and will be reimbursed at cost.

6.6 Corrugated Steel Pipe

The price provided within the Pricing Schedule shall include the supply and placing of the specified bedding, backfill and compaction as specified, couplers and corrugated steel sections.

6.7 Connection to Existing Sewers

The provided within the Pricing Schedule price shall include inspection and other permits where required, the locating of existing sewers and the complete supply and installation of all materials required to complete the connection to existing sewers where shown on the drawings, including the confirmation of existing inverts prior to starting any sewer installation.

6.8 Concrete Headwalls

Payment will be at the provided within the Pricing Schedule lump sum price and shall include all excavation, backfilling and grading.

SPECIFICATION NO. 7 ROADS, CURBS AND SIDEWALKS

1.0 DESCRIPTION

Supply all labour, materials and equipment for the complete installation of granular road base, asphaltic road surface, curbs and sidewalks to the dimensions, lines, grades and cross sections as detailed on the Contract Drawings and as specified in the General and Project Specifications.

2.0 MATERIAL

2.1 Granular Material

Granular material shall be supplied in accordance with General Specification No. 9 unless otherwise noted in the Project Specifications.

2.2 Asphaltic Material

The production, placing and compaction of hot mix, hot laid asphaltic material for pavement construction shall conform to MTO Form 310 or latest revision thereof and relevant City of Ottawa Standards.

Joint painting and tack coating material shall be SS-1 Emulsion and shall comply with MTO Form 1103 and relevant City of Ottawa Standards.

2.3 Concrete

The supply, forming, placing, finishing and curing of concrete shall conform to General Specification No. 8 - Concrete, unless otherwise noted.

Unless otherwise noted and as a minimum, concrete used for curb and gutter shall be Class C-3, 30 MPa concrete with 4% to 7% entrained air.

Unless otherwise noted and as a minimum, concrete used for sidewalk shall be Class C-3, 30 MPa concrete with 4% to 7% entrained air.

2.4 Expansion Joint Material

Expansion joint material shall be premoulded, non-extruding bituminous impregnated fibreboard, 15 mm thick conforming to ASTM designated D-544-49, Type V, unless specified otherwise on the construction details and shall be cut exactly to fit the sidewalk cross section.

2.5 Joint Sealing Compound

Joint sealing compound shall be hot poured rubbery bituminous type, conforming to U.S. Federal Specification 55-5-164.

3.0 CONSTRUCTION

3.1 Road Base and Sub-base

Construct granular road base in uniform layers not exceeding 100 mm for crusher-run limestone or Granular "A" and not exceeding 150 mm for Granular "B", "C" or "D". Compact each layer to a minimum of 100 percent optimum dry density using water if required.

Soft spots in the subgrade or sub-base shall be excavated, backfilled and compacted as directed by the Consultant.

Maximum deviation allowed from the specified grade and cross section is 10 mm in 3 metres.

Maintain the required grade, cross-section, tolerances and compacted density until the work is accepted or paved.

3.2 Asphaltic Pavement

Adjustments to Manholes, Valve Chambers and Catchbasins

- (i) Raise the tops and frames of manholes, catchbasins, meter and valve chambers with approved precast concrete adjustment rings.
- (ii) Raise valve and service boxes by appropriate means, to the required grades as shown on the Drawings or as supplied by the Consultant.

Prior to paving, reshape and compact the granular materials to achieve the cross- sections and elevations as shown on the drawings adding such materials as necessary to achieve this. Where the granular materials have been contaminated, replace and rework as directed by the Consultant.

Joints Between Existing and Proposed Asphalt

Unless otherwise specified, a 0.35 m long cold planed lap joint is to be provided at the connections with the proposed asphalt.

Manhole Ramping

When the final surface asphalt is not scheduled to immediately follow base course paving, ramp all manholes, valve chambers and catchbasins from the exposed top edge of the casting for a distance of 600 mm from the casting for protection until the surface course is laid.

Tack Coat

If paving operations are interrupted and extensive use is made of the lower binder courses prior to the laying of the wearing course, apply a tack coat prior to carrying on with the final course. Where such interruptions are occasioned by instruction of the Company or by the Consultant on behalf of the Company, the Contractor will be reimbursed for the cost of the necessary tack coat in accordance with the Schedule of Contract Unit Prices. Traffic must be kept off the tack coat until the wearing course is applied.

Clean Base Asphalt

Prior to placing the tack coat and if directed by the Consultant, the base asphalt is to be flushed and swept including any minor hand cleaning all at no additional cost.

Tolerance of Finished Asphalt Surface

Maximum tolerance transversely or longitudinally to be less than 10 mm in 3 metres for gradients of 1% or more. For gradients of less than 1% the maximum tolerance shall be 5 mm in 3 metres.

3.3 Concrete Curbs, Curb and Gutter and Sidewalks

Ensure that all curbs, curb and gutter, and sidewalks connect smoothly as to line, grade and form with existing installations.

Curbs and sidewalks shall be stamped with the Contractor's name and year of construction at spacings not exceeding 150 metres.

Place compacted backfill and complete all grading adjacent to the concrete installations to prevent erosion within 24 hours of the removal of the forms.

The maximum tolerance on any exposed surface of curb or sidewalk shall be less than 10 mm in 3 metres measured longitudinally.

Expansion joints shall be placed where new concrete structures abut other concrete structures and otherwise at regularly spaced intervals as specified. Expansion joints shall be formed in a rectangle around solid objects such as service frames and covers, water service boxes, hydrants, poles, etc. with the sides a minimum of 150 mm from the edge of the solid object.

Prior to the construction of the sidewalk, provide a sand bed 25 mm in thickness compacted to a minimum of 100% modified Proctor maximum dry density.

Place a 4 mil black polyethylene film for the full width of the sand bed. Lap joints at least 300 mm.

For sidewalks draw tool contraction joints across the sidewalk, one-third of the concrete thickness every 2 metres.

For curbs and curb and gutter draw tool a contraction joint every 5 metres with a depth of at least 50 mm, and at other locations specified on the detail drawings. When the joints are saw cut, they must be completed immediately after the initial concrete set.

Finish all edges and joints with an edging tool having a radius of 13 mm.

3.4 Rectification of Concrete Curbs, Curb and Gutter and Sidewalks

In addition to the items mentioned in Section 3.3:

- Break-out damaged concrete works as directed by the Consultant and dispose of concrete off-site.
- Repair all asphalt and sod disturbed during rectification of concrete work.
- Stamp with name of firm and year of construction at each end of the replaced concrete work.
- Sawcut ends of concrete work to provide a neat joint.
- Sawcut and caulk cracks with an approved caulking compound where specified by the Consultant.

4.0 MEASUREMENT

All linear and area measurements are in the horizontal plane and are plan quantities. Field measurements will not be made unless drawings are revised.

4.1 Road Base, Sub-base and Asphaltic Pavement

Unless otherwise specified measurement shall be as follows:

- Granular "A", "B", "C" and "D" by area in square metres to the specified thickness.
- Crusher-run limestone by area in square metres to the specified thickness.
- Base course asphaltic pavement by area in square metres to the specified thickness. The plan measurement for base asphalt shall not include the fillet laid over the top of the base curb which ultimately is trimmed off to permit top stage construction.
- Finish course asphaltic pavement by area in square metres to the specified thickness.
- Tack coat by area in square metres.

Area measurements shall be calculated from the Engineering Drawings.

4.2 Manhole Adjustments

Adjustment of manholes, catchbasins and valve chambers will be on a per unit basis.

The adjustment of catchbasins will include the restoration of curb and gutter adjacent to each catchbasin.

4.3 Manhole Ramping

Ramping of asphalt around manholes, catchbasins and valve chambers will be on a per unit basis.

4.4 Sidewalks

Sidewalks will be measured on a linear metre basis for the specified width and thickness.

4.5 Concrete Curbs, Curb and Gutter

Curbs or curbs and gutter will be measured on a linear metre basis.

5.0 PAYMENT

5.1 Road Base, Sub-base and Asphaltic Pavement

Payment for granular materials, crusher-run limestone, and asphalt shall be compensation in full for all labour, equipment and material required to supply, lay, grade and compact in accordance with the Drawings and Specifications.

5.2 Manhole Adjustments

Payment for adjusting manholes, catchbasins and valve chambers shall be compensation in full for all labour, equipment and material required including concrete adjusting rings, modoloc steps if required and sealing component, and regrading and recompaction of the disturbed subgrade.

5.3 Manhole Ramping

Payments for ramping of asphalt around manholes, catchbasins and valve chambers shall be compensation in full for all labour, equipment and material required including cleaning and brushing of the base course, applying tack coat, and compaction of asphalt.

5.4 Sidewalks

Payment for sidewalk shall be compensation in full for all labour, equipment and material required including excavation and fine grading, disposal of surplus material, supply of fill material and polyethylene film, expansion joints, edge scoring of both edges, regrading to boulevard level, application of curing compound, cold weather protection and cleaning and brushing of sidewalks and application of sealer.

5.5 Concrete Curb, Curb and Gutter

Payment for curb or curb and gutter shall be compensation in full for all labour, equipment and material required including Granular "B" bedding, reinforcing bars, stirrups, expansion joints, temporary asphalt filler around catchbasins, application of bonding and curing agents, contraction joints caulking compound and filling behind curb with approved material.

Payment shall also include cleaning base curb, trimming and replacing base course asphalt, removal of asphalt filler behind catchbasin and any required asphalt patching prior to placing the top section of a two-stage curb.

5.6 Rectification of Concrete Curbs, Curb and Gutter and Sidewalks

Payment for rectification of curbs, curb and gutter, and sidewalks will be on a linear metre basis for those damages which are not deemed the responsibility of the contractor.

SPECIFICATION NO. 8 CONCRETE

1.0 GENERAL

This specification covers materials to be used and methods to be followed for the proportioning, manufacture, transporting and placement of plain and reinforced concrete, either site-mixed or ready-mixed.

Materials and workmanship shall conform to the Canadian Standards Association CSA Standard CAN/CSA-A23.1 (Concrete Materials and Methods of Concrete Construction) and methods of test for concrete shall conform to CSA Standard CAN/CSA-A23.2 (Methods of Test for Concrete). All standards referred to are the latest editions thereof. This specification is intended to supplement and amplify CSA Standard Specification and the most stringent requirements of these standards and the specifications shall apply. The Contractor shall have on site a copy of the CSA Standards A23.1 and A23.2.

2.0 DESCRIPTION

Portland Cement shall be Normal Portland Cement conforming to the requirements of CSA Standard CAN/CSA-A5, Portland Cements.

3.0 WATER

Water for use in Portland cement concrete shall be clear and free from injurious amounts of oil, acid, alkali, organic matter, sediment or any other deleterious substances.

4.0 AGGREGATES - GENERAL

Fine and course aggregates shall meet the requirements of CSA Standard CAN/CSA-A23.1 for general characteristics, grading, limits of deleterious substances, cement-aggregate reactivity, soundness and organic impurities. Maximum size of course aggregate to be 20 mm unless otherwise specified.

Representative samples of all aggregates proposed for use shall be submitted to the Consultant not less than three weeks in advance of the commencement of operations to permit the carrying out of required tests. Sampling of aggregates shall be done in accordance with CSA Standard CAN/CSA-A23.2.

5.0 ADMIXTURES

When admixtures are specified or used they shall conform to the requirements of CSA Standards CAN3-A266.1, Air-Entraining Admixtures for Concrete, CAN3-A266.2, Chemical Admixtures for Concrete, and CAN3-A266.4, Guidelines for the Use of Admixtures in Concrete. Any materials not

included in CSA Standard CAN/CSA-A23.1, and proposed as admixtures for use in Portland cement concrete may only be used upon the written authority of the Consultant.

6.0 REINFORCING STEEL

Reinforcing steel shall meet the requirements of CSA Standards G30.5, Welded Steel Wire Fabric for Concrete Reinforcement, CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction, CAN/CSA-G30.18, Billet Steel Bars for Concrete Reinforcement and A.C.1-315 Detail and Detailing of Concrete Reinforcement. Reinforcing steel yield strength shall be 400 MPa unless otherwise noted on the drawings.

7.0 STORAGE OF MATERIALS

Store all materials in a manner that will prevent contamination or deterioration. Any material that has deteriorated or that has been contaminated shall not be used in the concrete and shall be removed from the site.

Store cement in a suitable bin or building which will provide protection against dampness and inclement weather conditions. Access to the storage facilities shall be provided to allow proper inspection. If cement becomes lumpy due to partial hydration, it shall be removed from the site unless it can be proven by testing to the satisfaction of the Consultant that, with corrective measures, the hydration does not have a detrimental effect on the quality and strength of the concrete.

Store each size of aggregate separately in a free draining stockpile in a manner that will prevent contamination, intermixing and segregation. The equipment and methods of handling aggregate shall be such as to prevent deterioration, breakage and contamination of the stockpiles and breakage of the aggregates.

All other materials such as admixtures and curing compounds shall be stored in accordance with manufacturers instructions.

Store reinforcing steel on racks or sills that will permit easy access for identification and handling.

8.0 PROPORTIONING

Concrete shall be proportioned in accordance with CSA Standard CAN/CSA-A23.1.

Class*	Minimum Specified 28 day Strength (MPa)	Max. W/C Ratio	Maximum Size of Coarse Aggregates (mm)	Air Content (%)
C-1	35	0.40	20	5-8
C-2	32	0.45	20	5-8
C-3	30	0.50	20	4-7
C-4	25	0.55	20	4-7
F-1	30	0.50	20	5-8
F-2	25	0.55	20	4-7
N-1	15			
N-2	10			
S-1	35	0.40		Type 50 Cement
S-2	32	0.45		Type 50 Cement
S-3	30	0.50		Type 20 Cement

* By strength

Slump for concrete to be consolidated with the use of high frequency vibrators shall be 75 mm maximum and 25 mm minimum, except as follows:

	Maximum	Minimum
Pavements, curbs, sidewalks	50 mm	25 mm
Heavy mass construction	50 mm	25 mm

9.0 TESTING

Field tests for concrete quality shall be carried out by an independent testing agency acceptable to the Consultant. The cost of tests shall be paid for in accordance with the Special Conditions and the applicable cash allowance. Provide unhindered access to the work for the purposes of inspection and selection of samples, and provide, without charge, the concrete and constituent materials required for quality control tests and such assistance, tools, equipment and sampling containers as is required to prepare and ship the test samples.

Sampling and testing of concrete shall be in accordance with the requirements of CSA Standard CAN/CSA-A23.1/A23.2.

Concrete strength testing is to be performed for every 50 m³ of concrete placed and in no case shall there be less than one test for each class of concrete or each separate type of structural component, as designated by Consultant, placed on any one day. Deviations from this requirement can be made only as deemed necessary by the Consultant. Four standard test specimens shall comprise a strength test. The specimens shall be tested at the age of 24 hours, 7 days, 28 days and 56 days if required. Additional tests of autogenously cured specimens by an accelerated testing method may be required by the Consultant. Additional tests of specimens cured entirely under field conditions may also be required by the Consultant to check the strength gain under field conditions.

For concrete work failing to meet the test requirements, the Consultant has the right to require one or more of the procedures outlined in CSA Standard CAN/CSA-A23.1 to determine acceptability of the work or where the work fails to meet the specified quality after carrying out these procedures, the Consultant may demand strengthening or replacement of those portions which failed to develop the required strength.

Air content tests done in accordance with CSA Standard CAN/CSA-A23.2 shall be performed to measure the air-entrainment. For concrete which will be subjected to severe exposure, the minimum number of air tests to be made shall be as follows:

Ready-mixed concrete	-	1 test per load
Site-mixed concrete	-	1 test per 10 m ³

Where exposure is less severe, the frequency of testing may be reduced at the discretion of the Consultant.

Slump tests shall be made frequently to ensure uniform consistency of concrete. In addition a slump test shall be made with every strength test. Tests shall be made in accordance with CSA Standard CAN/CSA-A23.2.

10.0 MEASUREMENT OF MATERIALS

Weigh cement on a scale separate from those used for other materials. Cement in standard sacks need not be weighed but the use of fractional sacks shall not be permitted unless weighed.

Weigh fine and coarse aggregate separately with batched weights based on dry materials and shall be the required weights of dry materials plus the total weight of moisture (both absorbed and surface) contained in the aggregates.

Measure water either by weight or by volume. Water as weighed or measured shall be within approximately 1% of required amount.

The weighing equipment shall be capable of being operated to control delivery of materials so that any inaccuracies in feeding and measuring do not exceed the following limits:

- i) Cement - Approximately 1%
- ii) Aggregates - Approximately 2% on each individual aggregate
- Approximately 1% of the total weight of the aggregates
- iii) Admixtures - Powdered admixtures shall be measured by weight and paste or liquid admixtures by weight or volume within a limit of accuracy of 3%.

Shovel and volume methods of measurement are not permitted.

11.0 MECHANICAL BATCH MIXING

Mix concrete in a mechanical batch mixer of a type approved by the Consultant.

Do not load mixer beyond its rated capacity which shall be shown on a manufacturer's rating plate on the equipment.

The drum, blades and discharging device shall be such that a concrete of uniform consistency will be produced.

The entire contents of the mixer shall be discharged before recharging.

The mixer shall be cleaned after each period of continuous use and shall be maintained in such condition that the mixing action will not be impaired.

Until acceptable performance tests have been made, mixers with a capacity of one cubic metre (1 m³) or less shall mix for a minimum of one and one-half (1.5) minute after all materials, including the mixing water, are in the drum. For larger capacities, the minimum time shall be increased by twenty (20) seconds for each additional one cubic metre (1 m³) capacity or fraction thereof. The batch shall be charged into the mixer so that some water will enter in advance of the cement and aggregate and all water shall be in the drum by the end of the first one-fourth of the specified mixing time.

The rated capacity of the mixer shall not be less than one-half cubic metre (0.5 m³).

Retempering (remixing with additional water) of concrete or mortar that has stiffened shall not be permitted.

12.0 READY-MIXED CONCRETE

Ready mixed concrete shall be mixed and transported in accordance with CSA Standard CAN/CSA-A23.1.

13.0 HAND MIXED CONCRETE

Concrete shall be mixed by hand only in special circumstances and with prior consent of the Consultant. The cement and fine aggregate shall be mixed dry on a properly constructed platform until it has obtained an even and uniform colour throughout. The mixture shall then be spread to make a bed of uniform thickness on which the coarse aggregate shall be spread and whole wetted with the required amount of water and turned with shovels until a uniform mixture is obtained. Materials shall be proportioned as specified above.

14.0 PLACING - GENERAL

All concrete placing methods shall be in accordance with CSA Standard CAN/CSA-A23.1 and shall be subject to the approval of the Consultant.

To prevent damage to fresh concrete during placing, suitable measures shall be taken to protect the plastic concrete.

Concrete placing shall not be started until the Consultant has inspected and approved all preparations including forms, foundations, reinforcing steel, construction joints, and all mixing, conveying, spreading, compacting, finishing, curing and protection equipment.

15.0 CONVEYING

Concrete handling methods shall be in accordance with CSA Standard CAN/CSA-A23.1. Concrete shall be conveyed from the mixer to the point of deposit as rapidly as practicable, using means and equipment which will prevent segregation or loss of materials.

Equipment for conveying concrete such as buckets, cars and trucks, belt conveyors, and pumps shall be of such design, size and condition to ensure a continuous supply of concrete as practicable to the point of delivery, without segregation.

Conveying equipment, if supported by formwork, shall not impart harmful vibration to the freshly placed concrete nor cause misalignment of forms.

The conveying equipment shall be kept free from hardened concrete and foreign materials, and shall be cleaned at frequent intervals. Wash water shall not be permitted to enter the forms of fresh concrete.

16.0 DEPOSITING

Concrete deposition methods shall be in accordance with CSA Standard CAN/CSA-A23.1. Deposit concrete in the forms as close as practicable to its final position and in layers that are approximately horizontal. Concrete shall be confined in a suitable vertical drop pipe to within 1.50 metre or less of the concrete in place in order to prevent segregation by ricocheting off tie rods, spacers, reinforcement and forms and to protect these items from displacement. Concrete which has partially hardened shall not be subjected to injurious vibration or shock, except for controlled revibration where specified. The size of section to be placed in one continuous operation shall be as shown on the drawings or as directed by the Consultant.

Mixing and placing equipment shall be such that when concreting has once started, the depositing of concrete shall be carried on as a continuous operation until the placing of the panel or section is completed. Concreting shall be carried out at such a rate that the concrete is at all times sufficiently plastic to ensure proper bonding of successive layers. The maximum permissible time interval between placing successive layers of concrete shall be established by the Consultant.

17.0 BONDING TO EXISTING CONCRETE

When fresh concrete is to be bonded to hardened concrete, the surface of the set concrete shall be thoroughly cleaned of foreign matter and laitance and saturated with water for the period 24 hours immediately prior to concreting. Immediately before depositing fresh concrete on hardened concrete, all free water shall be removed from the surface. The first layer of concrete to be placed on the surface of set concrete shall be of the quality specified but shall contain an excess of mortar and shall be vibrated to achieve maximum bond.

18.0 COMPACTING

All methods of compacting shall be subject to the approval of the Consultant. As concrete is being placed it shall be compacted thoroughly and uniformly by means of tamping, hand tools, vibrators or finishing machines to secure a dense homogeneous structure.

For compacting the concrete, internal vibrators shall be used whenever practicable. Vibrators shall be approved by the Consultant and they shall be operated at a frequency of not less than 7 000 impulses per minute when fully immersed. Application of vibrators shall be made systematically and at such intervals that the zones of influence of the vibrator overlap.

The vibrator shall be applied, at any one point, only until the concrete is compacted and not for such a time that will cause segregation. Extreme care shall be taken to ensure that the vibrators do not disturb the reinforcing steel or its bond to the partially hardened concrete will be impaired. Vibrators shall not be used so close to the forms that they drive the coarse aggregate away from the face.

The vibrator shall be used only for consolidation purposes and shall not be used to move concrete more than a short distance.

19.0 FINISHING

Rough or board form surfaces shall be reasonably true to line and plane. Tie holes and defects shall be patched and fins exceeding 6 mm in height shall be rubbed down with wooden bows.

Plywood or metal formed surfaces shall be true to line and plane. Tie holes and defects shall be patched and all fins completely removed.

Related unformed surface shall be struck smooth after concrete is placed and shall be floated to a texture consistent with that of the formed surfaces.

The top or final surface of concrete slabs and other flat work shall be finished by screeding, floating and trowelling to a smooth, dense finish, free from defects and blemishes. All concrete surfaces exposed to view shall have sack rubbed finish.

20.0 CURING AND PROTECTION

Refer to CSA Standard CAN/CSA-A23.1 for complete curing and protection requirements. Key items are highlighted below. Freshly deposited concrete shall be protected from premature drying and excessively hot or cold temperatures, and shall be maintained with minimal moisture loss at a relatively constant temperature for the period of time necessary for the hydration of the cement and proper hardening of the concrete.

After the concrete has set sufficiently, the exposed surfaces shall be kept continuously moist for at least three consecutive days after placing, when normal Portland cement is used and for at least one day when high early strength Portland cement is used. During the curing period the temperature of the air in contact with the concrete shall be maintained at not less than 10EC.

Where the use of curing compound is authorized by the Consultant it shall meet the requirements of ASTM Standard C309, Liquid Membrane Forming Compounds for Curing Concrete.

Steel forms heated by the sun and all wood forms in contact with the concrete during the final curing period shall be kept wet. If forms are to be removed during the curing period, one of the above curing materials or methods shall be employed immediately. Such curing shall be continued for the remainder of the curing period.

(a) Cold Weather Protection

When the air temperature is at or below 4.5EC or when there is a possibility of it falling to that limit within 24 hours of placing, cold weather protection measures shall be used. When necessary, arrangement for heating, covering, insulating, or housing the concrete

work shall be made in advance of placement and shall be adequate to maintain the required temperature and moisture conditions without injury due to concentration of heat. Refer to CSA Standard CAN/CSA-A23.1 for additional information.

(b) Hot Weather Protection

When necessary, arrangements for installation of windbreaks, shading, fog spraying, sprinkling, poinding, or wet covering of a light color shall be made in advance of placement and such protective measures shall be taken as quickly as concrete hardening and finishing operations will allow.

(c) Protection from Mechanical Injury

During the curing period, the concrete shall be protected from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration. All finished concrete surfaces shall be protected from damage caused by construction equipment, materials, or methods and by rain or running water. Selfsupporting structures shall not be loaded in such a way as to overstress the concrete.

21.0 FORMS

Form design shall be established prior to the start of framing. The proposed method of construction shall be submitted to the Consultant for their review. Form design and its adequacy remains the responsibility of the Contractor. Refer to CSA Standards CSA-S269.1, Falsework for Concrete Purpose; CSA-S269.3, Concrete Formwork; and CSA-0151, Canadian Softwood Plywood, and CSA-0121, Douglas Fir Plywood.

Forms shall be built with sufficient strength and rigidity to carry the weight or fluid pressure of the concrete and of any equipment or runways which might be placed upon them.

Lumber used in forms shall be free from warp, and shall be sawn straight so that lines and shapes will be accurately maintained.

For exposed concrete surfaces, plywood or steel panel forms shall be used. Forms shall be free from defects that would be reproduced as concrete blemishes.

For concealed concrete surfaces, boards may be used where authorized by the Consultant, provided the edge contacts are made sufficiently tight to hold mortar.

For plywood or similar finished forms or for steel-panel forms, where stripped concrete is to be exposed, the panel assembly shall be established and makeup or patching strips between panels held to a minimum. The panel arrangement shall be wedged, and have means for bolting the edges to maintain accurate face alignment.

Internal form ties shall be of metal and of a type approved by the Consultant.

Forms shall be so constructed that the finished concrete will conform to the shape and dimensions specified.

Immediately before concrete is placed, all forms shall be carefully inspected to ensure that they are properly placed, sufficiently rigid and tight, thoroughly clean, properly surface treated, and free from snow, ice or other foreign materials.

Temporary ports or openings shall be provided at the bottom of all deep units, such as columns and walls, to facilitate cleaning and inspection. In restricted units they shall be located so that water can be used to wash out debris. They shall be closed with patches flush on the inside.

A non-staining mineral oil shall be used as a parting agent for forms, applied to the forms prior to placing of the reinforcing steel. The amount of oil used shall be kept to a minimum and any which contacts reinforcing shall be removed with solvents.

Untreated forms shall be kept wetted down to prevent shrinkage prior to the placing of the concrete and shall be surface wetted at the time of placing.

Prior to placing concrete, suitable means for checking the alignment and elevations of forms during placing shall be provided. These checks shall be made frequently during placement of the concrete. Checking and corrective wedging or shoring shall be carried out both horizontally and vertically as required, until all concrete is in place. Forms shall not be disturbed until the concrete has hardened adequately.

22.0 REINFORCING

Shop drawings, showing all dimensions necessary for fabrication and placing of the reinforcing steel and accessories shall be submitted for review by the Consultant prior to fabrication. Detailing of reinforcing steel shall be in strict accordance with the latest issue of ACI-315, "Manual of Standard Practice for Detailing Reinforced Concrete Structures". All bars shall be bent cold.

Reinforcement, at the time concrete is placed, shall be free from scale or other coatings that will destroy or reduce the bond.

Where there is a delay in depositing concrete, reinforcement shall be reinspected and cleaned when necessary.

Metal reinforcement shall be adequately placed and adequately secured in position by concrete or metal chairs or spacers.

Exposed reinforcing bars intended for bonding with future extensions shall be protected from corrosion by concrete or other adequate covering.

23.0 JOINTS AND EMBEDDED ITEMS

The locations and details of construction joints not indicated on the drawings shall be subject to the approval of the Consultant.

Construction joints shall be located and designed so as to least impair the strength and appearance of the structure.

Reinforcement shall continue in its normal position through the joint.

Shear keys shall be formed with bevelled strips.

Where construction joints are planned or permitted by the Consultant in watertight concrete construction, there shall be reinforcing steel on both sides of the wall or slab and shear keys provided.

A waterstop of a type, size, and material approved by the Consultant shall be carefully installed. Where waterstops cross or lap they shall be vulcanized to ensure that a continuous watertight diaphragm is formed.

Where a horizontal construction joint is permitted in a wall, the top of the first lift shall be carefully cleaned off and the procedure in Clause 17 - Bonding to Existing Concrete of this Section 8 - Concrete, shall be followed.

All sleeves, inserts, anchors, and embedded items required for adjoining work or for its support shall be placed prior to concreting.

Expansion joint material, waterstops, and embedded items shall be positioned accurately and supported against displacement. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.

24.0 MORTAR

All mortar shall be prepared from the specified materials in accordance with the following latest CSA Standard edition codes:

CAN/CSA-A5	-	"Portland Cement"
CAN/CSA-A8	-	"Masonry Cement"
CSA A82.43	-	"Hydrated lime for Masonry Purposes"
CSA A82.56	-	"Aggregates for Masonry Mortar"

It shall be thoroughly mixed dry in the proportions specified. The required amount of water as per CSA Standard CAN/CSA-A23.1 shall be added to produce a paste of satisfactory consistency. The mortar shall be freshly mixed by hand in boxes made for the purpose. No

mortar shall be used that has become stiff or that has stood more than 12 hours after mixing. Sand shall be measured by loose volume as shovelled into the measuring box.

The proportions by volume for different classes of work, unless otherwise specified, shall be as follows:

	Hydrated		
	Cement	Lime	Sand
Brick Masonry	1	1	6
Pointing or Grouting of Pipe Jointing	1	-	1
Parging	1	1	6

SPECIFICATION NO. 9 GRANULAR MATERIALS

1.0 DESCRIPTION

This specification covers the requirements for aggregates for use as granular subbase, base and surface course; shouldering; pipe bedding; and backfill to pipes, manholes and other structures.

2.0 MATERIALS

Aggregates for the above uses shall meet the requirements for MTO Form 1010 - "Material Specifications for Aggregates, Granular A, B, C, D and 16 mm crushed Types A and B".

2.1 MTO Form 1010 - Granular A

Granular A - MTO Form 1010, Section 1010.04 shall be modified to specify crushed gravel and thereby eliminate the use of crushed rock or crushed slag.

Crusher-Run Limestone - MTO Form 1010, Section 1010.04 shall be modified to specify crushed rock and thereby eliminate the use of crushed gravel and crushed slag.

2.2 Crusher-Run Limestone

51.0 mm and 19.0 mm crusher-run limestone shall conform within the following gradation envelope:

Sieve Series	51.0 mm	19.0 mm
	Canadian Standard Crusher Run Limestone % Passing	Crusher Run Limestone % Passing
51.00 mm	100%	-
38.00 mm	75 - 100	-
19.00 mm	45 - 75	100%
12.70 mm	-	70 - 90
4.75 mm	20 - 47	35 - 60
1.18 mm	11 - 32	15 - 37
0.30 mm	4 - 18	6 - 20
0.075 mm	2 - 8	3 - 10

51.0 mm and 19.0 mm clear stone shall conform within the following gradation envelope:

Canadian Standard Sieve Series	51.0 mm	19.0 mm
	Clear Limestone % Passing	Clear Limestone % Passing
64 mm	100%	-
51 mm	90 - 100	-
38 mm	35 - 70	-
25 mm	15 - 40	100%
22 mm	-	-
19 mm	0 - 10	85 - 100
16 mm	-	55 - 90
13 mm	-	30 - 70
10 mm	-	15 - 40
#4	-	0 - 10

3.0 MEASUREMENT AND PAYMENT

Unless otherwise specified, Granular Materials will be measured and paid for in accordance with the specification covering the application or as described in the Schedule of Contract Unit Prices.

SPECIFICATION NO. 10 TOPSOIL, SEEDING AND SODDING

1.0 DESCRIPTION

The work covered by this specification shall include the supply of all labour, materials, consumables, and equipment to apply topsoil, seed or sod areas as shown on the drawings and as specified herein.

1.1 Maintenance

Maintain seeded and sodded areas as required to establish vigorous growth. Reseed or resod, within the time periods contained in this specification, any eroded or deteriorated areas or where satisfactory growth has not been established.

2.0 MATERIALS

2.1 Topsoil

Obtain topsoil from existing stockpiles within the contract site or import, as required. Imported topsoil shall be fertile, friable, natural loam containing not less than 4% organic matter for clay loams and not less than 2% for sandy loams with an acidity value ranging from ph 6.0 to ph 7.5. Frozen or muddy topsoil will not be acceptable. Topsoil from stockpiles shall be tested for NPK and organic content. Amendments shall be made in accordance with directions by the testing agent or Consultant.

2.2 Seed

Seed shall meet the requirements of The Seeds Act for Canada No. 1. Unless otherwise specified, seed shall be mixed in the following proportions:

- 40% Bluegrass
- 25% Tall Fescue
- 20% Perennial Rye
- 15% Creeping Red Fescue

Seed supplied shall be of the best quality and of such brands as approved by the Consultant. They shall be furnished on the job in their original sealed packages bearing the brand and name of the producer, or distributor. Only seeds harvested the preceding season will be accepted.

2.3 Sod

Unless otherwise specified, sod shall be No. 1 Kentucky Bluegrass Fescue Sod grown and sold in accordance with the latest specifications of the Nursery Sod Growers Association of Ontario (NSGA). Sod shall be permeated with roots; be uniform in texture and free from weeds; be in a good healthy condition with no sign of decay; and contain sufficient moisture to maintain its vitality during transportation and placement. Each section shall be approximately 450 mm wide, 1.80 m long and at least 20 mm thick.

2.4 Mulch

Mulch shall be "Verdyol Mulch Standard Quality" or approved equal and conform to the manufacturers specification. Alternate mulching materials such as oat or wheat straw with asphalt emulsion must be approved by the Consultant.

2.5 Wooden Pegs

Wooden pegs for staking sod shall be approved hardwood pegs 25 mm x 25 mm square and at least 300 mm long.

2.6 Wire Mesh

Wire mesh, to be installed under sodded areas where specified, shall be #9 gauge galvanized wire-woven farm fencing or approved equal.

2.7 Fertilizer

Where required, fertilizer will be applied to topsoil as required subject to testing.

3.0 CONSTRUCTION

3.1 Site Preparation

Fine grade the sub-grade level to a uniform surface free from all debris. Scarify the sub-grade to a minimum depth of 75 mm to produce a loose textured surface free of weeds, stones, roots and branches. The finished sub-grade shall be approved by the Consultant prior to placing topsoil.

3.2 Topsoil Placing

Spread topsoil to the required minimum depth, but not less than 75 mm, over the prepared sub-grade, pulverize all clods or lumps and rake and roll to produce an even firm surface free from all stones, roots, branches, etc. larger than 50 mm in diameter immediately prior to placing seed or sod. Compact surface firm to footprints.

3.3 Seeding

Seed only those areas free from frost, snow or water and which can be mulched within the same day. Apply seed with a mechanical dry seeder (Method A) in areas having slopes in the 1-25% range or with a hydraulic seeder (Method B) on slopes exceeding 25% during the following time periods:

1. August 15 to September 15 (preferred)
2. Early spring up to May 30th.

Method A - mechanical dry seeder

Apply fertilizers, as specified, in accordance with the rates of application indicated followed by rolling immediately prior to seeding. Supply seed in two (2) intersecting directions by means of an approved mechanical dry seeder at a rate of 160 kg/hectare.

Method B - hydraulic seeder

Charge an approved hydraulic seeder with seed, water and fertilizer as specified and apply at rate recommended by supplier.

Other methods of applying seed may be permitted if approved by the Consultant.

3.4 Mulching

Immediately following seeding, apply mulch by means of an approved mulch blower or to the manufacturers specification at a rate of 1,700 kg/hectare to form a uniform mat.

3.5 Sodding

Apply fertilizers, as specified, in accordance with the rates of application indicated and work well into the topsoil within 48 hours before laying sod.

Lay sod as soon as possible after arrival on site but in any event within 48 hours. Place sod closely together without open joints or overlaps to blend uniformly with adjoining grassed areas, curbs, sidewalks, etc. Stagger joints in adjacent rows.

On slopes greater than 3:1, place sod perpendicular to the slope on wire mesh when specified and stake with wooden pegs at 0.6 m intervals providing a minimum of 1 stake per sod. Drive pegs flush with sod. Wire mesh will be provided beneath sod where intermittent water flows are expected.

Immediately after installation, water to saturate sod and underlying topsoil. When sod has sufficiently dried, roll to ensure a good bond between sod and topsoil and to remove minor depressions and irregularities.

Place sod prior to November 1 unless authorized by the Consultant.

4.0 MEASUREMENT

Unless otherwise specified, the measurement for topsoil, seeding and sodding are in the horizontal plane and are plan quantities. Field measurements will not be made unless drawings are revised.

Mulch, fertilizer, wire mesh and wooden pegs will not be measured, but will be included in the area measurements for sod and seeding.

5.0 ACCEPTANCE

On sites which will be mown in future, acceptance will be granted when:

- in seed area - a green sward has been established at least one time; or
- in sod areas - grass roots have knit to soil and grass has been mown at least one time;
and
- grass is green and exceeds no more than 60 mm in height

On naturalized sites, acceptance will be granted when:

- sod and seed areas are free of non-specified herbaceous plants and free of bare areas

6.0 PAYMENT

Payment will be in accordance with and at the rates shown in the Schedule of Contract Unit Prices and will include the provision and placement of topsoil, whether from on site sources or imported, seed or sod, mulch, wooden pegs, wire mesh and any other items necessary to complete the work. No additional payment will be allowed for watering, mowing, fertilizing, weeding, reseeding or resodding any other maintenance required to establish satisfactory growth.

Where restoration is designated, the seeding or sodding work will be included in the price provided within the Pricing Schedule for sewers, water mains, roads, structures etc. unless otherwise noted in the Schedule of Contract Unit Prices.

SPECIFICATION NO. 12

RIP-RAP

1.0 DESCRIPTION

This Specification covers the construction of a protective covering of approved rock with or without grout as specified, including excavating, trimming, compacting of subgrade, supplying and placing of specified materials and labour and equipment incidental to the construction.

2.0 MATERIALS

2.1 Rock

The quality and source of rock shall be approved by the Consultant. Rock subject to marked deterioration by water or weather will not be accepted.

Fractured rock will not be accepted.

The rock shall be free from earth and clay.

Rock shape shall be as near to cubical as possible, in particular thin slab shapes shall be avoided.

The gradation of the rip-rap rock is specified in the Project Specification.

2.2 Filter Material

The filter material shall be as described in the Project Specifications.

2.3 Grout

The grout shall be as described in the Project Specifications.

3.0 CONSTRUCTION

3.1 Rock

Place material in such a manner that the larger fragments occur at the bottom of the slopes, the rocks fit together tightly and chink the voids with spalls. The surface of the finished rip-rap shall have a uniform appearance conforming to the elevations and sections as detailed on the drawings.

3.2 Grouting

When specified, fill the spaces between thoroughly wetted stones with mortar. All voids shall be filled and the outer faces of the stones left exposed.

Remove excess mortar from the exposed faces of the stones.

Cure and protect mortar grout as specified in Specification No. 8 - Concrete.

3.3 Filter Material

Place filter material in the manner outlined by the manufacturer or as specified in the Project Specification.

4.0 MEASUREMENT

Area measurements will be made in the plane of the surface rip-rapped and payment will be as specified within the Schedule of Contract Unit Prices. Field measurements will not be made unless drawings are revised.

5.0 PAYMENT

The price provided within the Pricing Schedule is payment in full for supplying labour, material and equipment to excavate the foundation, prepare the bedding, dispose of debris, and place rip-rap to the required dimensions indicated.

“Excavate the foundation” includes all excavation to the subgrade of the rip-rap unless otherwise specified.

When specified this price shall include grouting.

SPECIFICATION NO. 15 ENGINEERED FILL

1.0 DESCRIPTION

The work covered by this specification shall include the supply of all labour, material, consumables and equipment to do all the excavation, grading and filling with earth required for the execution of specified engineered fill requirements. This specification does not cover rock fills. "Rock Excavation" as defined in Specification No. 1, General Requirements, is not considered part of this specification and is covered in Specification No. 4, Excavation and Backfill.

2.0 CONSTRUCTION

2.1 Survey and As-built Requirements for Engineered Fill

The Contractor will retain an Ontario Land Surveyor (OLS) or Professional Engineer (P.Eng.) to supervise and where required herein certify all work associated with the survey and as-built requirements for Engineered Fill.

This article is to be read in conjunction with the Engineered Fill Certification requirements of the Company's geotechnical consultant included as an appendix to this document.

The Contractor will layout the limits of the fill envelope as shown on the drawings.

Following stripping, including any necessary subexcavation, the Contractor will take as-built elevations of the stripped ground within the limits of the engineered fill envelope. The ground elevations and the limits of the fill envelope will be certified and dated by the Contractor's OLS or P.Eng. and provided to the Consultant.

The Contractor will provide survey stakes and grade sheets to identify the specified height, by geodetic datum, of the engineered fill (at specified intervals if not all at one level) for each lot within the engineered fill envelope.

The Contractor will provide a copy of the grade sheets, prepared under the direction of the Contractor's OLS or P.Eng., to the Consultant's representative or designate.

Immediately following the completion of the engineered fill within an envelope the Contractor's OLS or P.Eng. will take elevations at the top of the fill line on a 10 metre grid across the envelope and again identify the limits of the fill envelope. The OLS or P.Eng. will reference all property lines, side and rear lot lines to the grid. These elevations and reference locations will be certified and dated by the Contractor's OLS or P.Eng.

A dated plot and digital disc of the top and bottom of the engineered fill and defined envelope, referenced to the property lines of each lot within the fill envelope will be submitted "certified" by the Contractor's OLS or P.Eng.

If required by the Consultant, the Contractor will calculate a volumetric quantity of engineered fill within the envelope, certified by the Contractor's OLS or P.Eng.

3.0 MEASUREMENT

Unless otherwise specified, no measurement of earthworks will be made.

4.0 PAYMENT

The price provided within the Pricing Schedule shall be compensation in full for all labour, material, consumables, and equipment to do all excavation, filling and compaction, control of surface and groundwater to complete the engineered fill requirements.

PROJECT SPECIFICATION NO. 1

GENERAL REQUIREMENTS

This specification is to be read in conjunction with the General Specification No. 1 - General Requirements.

Information provided in this specification supplements the General Specification and in the event of conflict between this specification and the general Specification, this specification shall govern.

2.0 DESCRIPTION

The 470 Tremblay site owned by Canada Lands Company CLC Limited is comprised of the proposed development of mixed-use, residential, park and stormwater management block components as well as the realignment of Tremblay Road.

The proposed work in Contract I includes mass earthworks operations to achieve the required balance line elevations and the installation of temporary erosion and sedimentation control measures. The proposed work in Contract II includes the installation of proposed underground services and their associated appurtenances, R.O.W. fine grading and construction of road structure to base asphalt. The Contractor shall accept the site as it is at the time of completing the Pricing Schedule for this RFP.

Notwithstanding the above, following completion of underground servicing and roads to base course asphalt, the Contractor must provide a topographical survey certified by Ontario Land Surveyor confirming the restored elevations as per SC 28. The Company reserves the right to credit from the payment to the Contractor for any incomplete restoration as substantial work. The deduction will equal the cost for the Company to complete the substantial restoration by another contractor.

The Contractor shall coordinate their work with any other contractors working on site at the time.

3.0 TRAFFIC

Access to the site will be from Existing Tremblay Road and St Laurent Boulevard only. Access points other than those noted on the engineering drawings are prohibited unless otherwise approved by the Consultant. Parking is not permitted on existing City roads (Existing Tremblay Road and St Laurent Boulevard) unless approved by the City.

Where construction occurs on Tremblay Road and St Laurent Boulevard, all lanes of traffic are to be maintained in each direction at all times. The Contractor is to submit a traffic control plan to the satisfaction of the City. The traffic control plan must be approved by the

City a minimum of 10 days in advance of any disruption to traffic. The Contractor is responsible for obtaining road occupancy permits and road cut permits as required.

The Contractor is responsible for maintaining access to all dwelling units and businesses at all times. Driveway access is to be restored as quickly as possible.

The Contractor must perform operations, machine and equipment movements, deliveries and removals at times that will minimize disruption to traffic.

Refer also to Special Conditions Article SC6.

3.1 Traffic Control

The cost for all necessary permits, traffic signage, traffic control devices, temporary lane painting, delineators and flag persons shall be included in the prices provided within the Pricing Schedule. The Company will not entertain any claims for extras with regards to traffic control.

4.0 DISPOSAL SITES

The Contractor shall arrange for off-site disposal of any roots garbage, debris, excess excavated material, and/or unsuitable fill material. The cost of this disposal as well as the cost of loading and transporting of material to the disposal site shall be included in the provided within the Pricing Schedule prices.

6.0 CLASSIFICATION OF EXCAVATED MATERIALS

Unless otherwise noted the following will apply for the purpose of this contract:

Structural Fill shall be fill compacted using the necessary equipment and procedures to achieve a minimum of 95% and 100% Standard Proctor dry density for roads and building foundation respectively.

6.1 Rock Excavation

For the purpose of this Contract, neither weathered nor sound shale shall be classified as rock, but as earth. No extra payment for excavation in shale shall be considered.

6.4 Ontario Regulation 347, General Waste

Ontario Regulation 347, General Waste shall be applied to this Contract. Any excavated materials shall be tested and classified per this regulation and segregated into temporary stockpiles for inspection prior to disposal offsite. Only materials which meet the requirements for residential uses shall be reused on site.

10.0 LIMITS OF CONTRACT

On the Company's land, the Contractor shall limit their operations to within limits shown on the Engineering Drawings. The Contractor shall make their own arrangements for working on adjacent private property if required except where directed to do such work by the Company or the Consultant.

11.0 EXISTING STRUCTURES AND UTILITIES

The available information pertaining to existing infrastructure in the project area is reflected on the engineering drawings. The Company and Consultant take no responsibility for the completeness, accuracy or validity of the information provided by the various utilities. The Contractor must satisfy themselves of the location of these existing services.

The Contractor must contact the various utilities, and obtain a field locate at least 5 days prior to the start of construction.

The Contractor should note that some utilities may require that excavations in the vicinity of their existing plant be hand dug when crossing their existing services. All costs for hand digging excavations shall be included in the contract unit prices. The Contractor should note that existing utilities may have to be relocated. The Contractor shall be responsible for coordination of utility relocation with any and all utility companies.

The Contractor is to ensure existing hydro, communications, cable T.V. and gas are supported in accordance with the requirements of the utility during the installation of any and all service connections, sewers and/or watermains.

Contract prices shall include locating, maintaining, supporting and repairing damaged utilities. Refer also to Special Conditions - Article SC3.

13.0 TEMPORARY RELOCATION OR SUPPORT

Temporary relocation or support of an existing buried or overhead utility shall be provided by the Contractor in accordance with the requirements of the City of Ottawa and the respective utilities. The means of support and protection shall be designed to be in conformance with the latest requirements of the Occupational Health and Safety Act of the Province. The Contractor will provide the utility, Company, and the Consultant a copy of the proposed means of support at least 5 working days prior to the start of work. It is the responsibility of the Contractor to contact the respective utilities to confirm their respective requirements based on the Contractor's proposed construction methodology and equipment. Support, backfill and

restoration shall be in accordance with the requirements of the utility agency. Clearance from overhead lines is the responsibility of the Contractor. The Company shall not entertain any additional costs for any of the above.

14.0 EXISTING DRAINAGE

The contractor shall maintain adequate site drainage and siltation control for the duration of the Contract including construction and maintenance of swales, temporary ditches, berms, drainage structures and temporary culverts whether they are shown on the drawings or not.

The Company shall not entertain any additional costs related to the siltation of neighbouring natural features or properties.

All costs related to the requirements of this specification shall be included in the provided within the Pricing Schedule unit prices.

Refer to Special Conditions SC5.

23.0 OTHER CONTRACTORS

The Contractor shall make all necessary arrangements and coordination with other contractors and shall not claim extra payment due to the presence of such other contractors. At no time shall Contractors work in the same place and time.

24.0 MEETINGS

A representative of the Contractor (and any Subcontractors) shall attend the pre-construction meeting and periodic site meetings for the duration of the work.

PROJECT SPECIFICATION NO. 2

SITE PREPARATION

This specification is to be read in conjunction with General Specification No. 2 - Site Preparation.

Information presented in this specification supplements the General Specification and in the event of conflict between this specification and the General Specification, this specification shall govern.

2.0 DESCRIPTION

The Proponent must examine the site prior to submitting their Pricing Schedule. The Proponent must satisfy themselves of the existing site conditions and include in the Pricing Schedule prices requested any costs required to complete the works as specified in the contract drawings and specifications. The Contractor shall supply written confirmation that they have undertaken their own documentation of the quantities and satisfied themselves, prior to the submission of the Pricing Schedule. The contractor will accept the site "as is" at the time of the start of work. The submission of a Pricing Schedule shall constitute presumptive evidence that this requirement has been satisfied.

1.1,1.2 Clearing and Grubbing

The Contractor is advised to examine the site at the time of completing the Pricing Schedule. Any remaining clearing, grubbing, or stripping which the contractor determines is required to be completed shall be included in the Pricing Schedule.

1.3 Stripping

All topsoil stripping and earthworks are being carried out under this contract to prepare all roads, lots and blocks to pre-grade elevations. The Contractor will restore all disturbed area grading on lots and blocks to previous condition based on the balance lines specified in the Earthworks Contract, and provide a survey confirming the same.

In the event existing topsoil piles impede the operation of the Contractor in completing the requirements of this contract, he shall identify the area of concern in sufficient advance time, to allow the Company sufficient time to make arrangements to have the necessary portion of the pile relocated.

At no time shall topsoil be used for the purpose of backfilling or in areas which are unacceptable to the Company's Geotechnical Consultant. The definition of topsoil for the purpose of this contract will be equivalent to that of the Company's Geotechnical Consultant.

2.0 CONSTRUCTION

2.6 Existing Structures and Utilities

The Contractor is responsible for the field location and identification of existing utilities overhead and underground prior to the start of work. This includes arranging for non-mechanical type excavations, such as Hydrovac or hand digging to undertake the exposure of the existing utilities or structures within the roadway or boulevard and as required by utility companies.

Those existing services and utilities to be crossed by the Contractor to complete the works shall be supported in accordance with the requirements of the utility, City of Ottawa and the requirements of the Occupational Health and Safety Act.

2.7 Sediment Control Devices

Sedimentation control devices shall be supplied and installed as shown on the drawings. The Contractor shall clean and maintain the sedimentation control devices periodically to the satisfaction of the Consultant and City of Ottawa requirements.

3.0 MEASUREMENT

3.3 Topsoil Stripping

Stripped topsoil will be paid on a cubic metre basis. The volume will be determined by the Consultant based on surveys taken prior to stripping and after stripped and calculated using AutoCAD Civil 3D.

4.0 PAYMENT

There is no additional itemized payment for clearing and grubbing, restoration of area grading, surveys, or topsoil stripping. In the event the Contractor encounters additional topsoil the Company and the Consultant shall be notified in sufficient time to allow for its removal with no delay to the Contractor's schedule.

The requirements of this Specification will be included in the unit prices within the Pricing Schedule.

PROJECT SPECIFICATION NO. 3

GENERAL GRADING AND EARTHWORK

This specification is to be read in conjunction with General Specification No. 3 - General Grading and Earthwork.

Information presented in this specification supplements the General Specification and in the event of conflict between this specification and the General Specification, this specification shall govern.

1.0 DESCRIPTION

The Contractor will accept the site "as is" at the time of the start of work. Submission of the Pricing Schedule will constitute presumptive evidence that the Contractor has undertaken the necessary inspection of the site to satisfy themselves of the site conditions.

The Contractor is responsible to:

- Monitor the status of the sedimentation and erosion controls and maintain as necessary as required by the Consultant and City of Ottawa.
- Proofroll the subgrade of all fill areas prior to filling, and remove, replace or compact any soft or unsuitable areas identified by the geotechnical consultants.
- Provide positive drainage to existing outlets to avoid any ponding.

Provide and maintain positive drainage to approved outlets for all areas during and upon completion of this contract. The same specifications shall apply to completion of rough grading required under this contract. Following completion of underground servicing, the contractor must complete a topographical survey certified by an Ontario Land Surveyor confirming the restored elevations, as per SC 28. The Company reserves the right to credit from the payment to the Contractor for any incomplete restoration as substantial work. The deduction amount will equal the cost for the Company to complete the substantial restoration by another contractor.

2.0 CONSTRUCTION

2.2 Rough Grading

Rough grading shall be carried out to the subgrade elevation provided by the consultant.

Rough grading shall be in accordance with the requirement and procedures noted in the Geotechnical report.

2.2 Fine Grading

Fine grading shall be in accordance with the requirement and procedures noted in the Geotechnical report.

3.0,4.0 MEASUREMENT AND PAYMENT

The Contractor will provide the following surveys under the seal of a licensed Professional Engineer or Ontario Land Surveyor:

- Existing ground will be taken from the survey completed by the Company's O.L.S..
- Subsequent to the topsoil stripping and related operations, a survey of the stripped ground with spot elevations at 5m intervals internally and along boundary areas, indicating the pre-filling sub-grade for reference.
- Surveys of the final topsoil stockpiles (in the event topsoil is kept on site), top of engineered fill, prior to topsoil re-use and burial (top & bottom of trench) within the Company's lands. The survey of the lots will be provided as required by the Consultant and Geotechnical consultant in order to properly complete the determination of the extent and certification of engineered fill as described under this specification. A bulking factor of 0.80 will be used on any stockpile to determine the in-situ volume for payment.
- Subsequent to the completion of the cutting and filling of all roads, a survey of the centreline, both streetlines and easements.

All surveys will be completed and delivered in an Autodesk Civil 3D Version 2018 or newer format in addition to the hard copy under seal, with reference to at least two independent benchmarks, and tied to established boundary monumentation. The works associated with each survey will be deemed incomplete until the surveys are received by the Consultant and the Geotechnical Consultant in an acceptable form.

Substantial Completion will not be approved until the Consultant has received and is satisfied with all the surveys required under this specification.

The Company reserves the right to confirm using independent means the accuracy of the surveys provided by the Contractor. In the event the Contractor's surveys are found to be inaccurate, the costs of the Company's survey and any necessary subsequent surveys, will be deducted from the progress payments to the Contractor.

The Consultant will only review and certify to the Company survey information provided by the Contractor which the Contractor declares complete. One review will be the initial review and comments, and a second review subsequent to rectification of deficiencies if required. Costs of any additional reviews will be undertaken at the cost of the Contractor. These costs will be deducted from the payment by the Company to the Contractor.

The lump sum or unit prices provided within the Pricing Schedule shall apply in this Contract regardless of the final quantity of topsoil, or earth moved or work carried out to achieve the required grades specified in this contract and the approved drawings and in accordance with the requirements of SC7 - Work Schedule. The lump sum prices provided within the Pricing Schedule for the work done governed under this specification shall be full compensation for all labour, materials, permits, coordination, surveys and plant required to complete the work.

Quantities shall be calculated by the Consultant utilizing Autodesk Civil 3D. The quantities determined by the Consultant will be final.

All costs related to the on-site disposal and burial of boulders shall be included in the prices provided within the Pricing Schedule.

5.0 BENCHMARKS

Elevations are in metres and are derived from Geological Survey of Canada benchmarks. Elevations are geodetic and refer to the Canadian Geodetic Vertical Datum (1928), pre-1978 adjustment.

PROJECT SPECIFICATION NO. 4

EXCAVATION AND BACKFILL

This specification is to be read in conjunction with General Specification No. 4 - Excavation and Backfill.

Information presented in this specification supplements the General Specification and in the event of conflict between this specification and the General Specification, this specification shall govern. In the event of a conflict between this specification and the recommendations of the Geotechnical Study prepared by the Company's geotechnical consultant, the geotechnical recommendations shall govern.

3.0 TRENCH EXCAVATIONS

All trenching to be in accordance with the latest revisions of the Occupational Health and Safety Act and Regulations for construction projects.

3.1 Alignment and Depth

Backfill and compact with granular material in accordance with the requirements of the Company's Geotechnical Consultant reports and recommendations and City of Ottawa current standards.

When for any reason the trench is over-excavated, the Contractor shall, at their own cost, backfill to the correct grade in accordance to the requirements and procedure specified by the Geotechnical consultant.

3.2 Trench Width

1. Maximum and minimum trench widths shall be as details on the drawings for common trench sewers. For separate trench storm and sanitary sewers refer to O.P.S.D. 802.010 for PVC pipes and 802.030 Class B for concrete pipes.
2. The Company's Geotechnical Consultant will be present to monitor the trench slope stability during construction activity.
3. Vertical trench is to be used where required due to existing soil conditions.
4. Sheet piling or other approved vertical trenching techniques to be used as required for sewer construction.

4.0 DEWATERING

All dewatering costs to be included in the unit price for the individual infrastructure (sewers, manholes, watermain etc.) within the contract, including dewatering and sand or granular seams that may be encountered. The Contractor is encouraged to review the available subsurface information related to existing ground conditions.

The Contractor should familiarize themselves with the geotechnical and hydrogeological reports included with this contract. The contractor shall pay particular attention to dewatering requirements. All costs for equipment, material and labour shall be included in the unit prices. There will be no separate payment for dewatering.

5.0 EXISTING PAVEMENTS

5.1 Size of Excavation

For this Contract, the method of trenching shall be chosen by the Contractor.

The Contractor shall be responsible for restoration of existing asphalt pavement, curbs, sidewalks and other surface features disturbed by their operations.

All joints with existing pavement in the municipal rights of way shall be treated and restored in accordance with the municipality's requirements, to the same depths of asphalt, and granular base materials including all necessary compactive effort.

The Contractor shall include all costs related to restoration and joint treatment in their unit prices provided within the Pricing Schedule. The Company will not entertain any extras with respect to restoration of existing surface features.

5.2 Disposal

Any existing asphalt pavement, concrete etc. which has been removed by the Contractor to complete the works outlined in this specification shall be disposed of off-site by the Contractor, at no additional cost to the Company.

7.0 EXISTING UTILITIES AND STRUCTURES

The Contractor shall protect all existing and temporary utilities. It is the Contractor's responsibility to obtain all necessary permits and field locates prior to digging, all in conformance with the utility's or municipal authority requirements.

8.0 FROZEN GROUND MATERIAL

Frozen materials or earth will not be permitted for use as backfill. The determination of frozen materials will lie in the sole discretion of the Company's Geotechnical Consultant.

9.0 PIPE BEDDING

9.1 Materials

Refer to Company's Geotechnical Consultant reports. Also see item 3.1 above

9.2 Placing

Granular bedding materials should be placed as detailed on the contract drawings and should be compacted to 98% Standard Proctor Maximum Dry Density. Refer to Notes drawing NT1 for bedding requirement.

10.0 BACKFILLING

Backfilling shall be carried out in accordance with the Company's Geotechnical Report recommendations. The Contractor is encouraged to review the Geotechnical Reports.

Prior to backfilling of any trench the Contractor shall confirm and provide written evidence that the necessary ties, and elevations have been obtained by the Contractor's surveyor.

Also see item 3.1 above.

11.0 PAYMENT

The Contract Price shall be compensation in full for all excavation in any material including dealing with frozen materials, sheeting and shoring and dewatering if necessary, and backfill and compaction as required and as directed by the Consultant.

The unit prices provided within the Pricing Schedule for manholes shall include the cost of granular backfill as specified.

The contract price shall include aerating and/or drying wet material as required and as directed prior to backfilling.

The lump sum and unit prices provided within the Pricing Schedule shall apply to the Contract regardless of the final quantity of the materials or earth moved or work carried out to achieve the required grades specified on the approved drawings and in accordance with this specification.

Upon completion of the backfilling of trenches, the contractor shall carry out the necessary rough grading to allow for the construction of the final surfaces as specified such as roads, lots, walkways or landscaped areas. The unit prices provided within the Pricing Schedule shall include all costs associated with this requirement. The Company will entertain no extras for this requirement.

The unit prices provided within the Pricing Schedule for the work under this specification shall include all necessary arrangements for offsite disposal, including all labour, equipment and materials required for the excavation, haulage and disposal fees.

Any disturb areas must be brought back to preconstruction grade unless otherwise directed by the Consultant.

11.3 Excess Excavation

There shall be no payment for the backfilling of any over-excavation in accordance with specifications of this contract by the Contractor.

Payment for the backfilling of any over-excavation as directed by the Consultant shall be made in accordance with the Schedule of Additional Unit Prices.

PROJECT SPECIFICATION NO. 5

WATER DISTRIBUTION SYSTEM

This specification is to be read in conjunction with General Specification No. 5 - Watermains and Appurtenances.

Information presented in this specification supplements the General Specification and in the event of conflict between this specification and the General Specifications, this specification shall govern.

2.0 MATERIALS

Watermains and appurtenances to be to City of Ottawa Specifications.

3.0 CONSTRUCTION

3.1 General

Watermains shall have 2.40 metre minimum cover at all locations along its length unless otherwise directed by the Engineer. Where the depth of the watermain or appurtenances does not meet the requirements of City of Ottawa, the main or appurtenance will be provided with sufficient insulation to compensate for the lack of cover per City of Ottawa Std. W25.2. All metallic components shall be protected from corrosion by cathodic protection per the latest OPSD or AWWA and City of Ottawa standards.

3.5 Connections to Existing Watermains

All connections to existing watermains must be coordinated by the Contractor with the City of Ottawa officials and the Consultant.

Watermain bedding shall be in accordance with City of Ottawa Standard W17.

3.7 Anchorage of Pipes, Fittings, and Hydrants

Thrust blocks are to be installed as per the City of Ottawa Standard W25.3 and W25.4. Watermains in fill areas are to be installed with restrained joints as per City of Ottawa W25.5 and W25.6.

3.9 Valve Boxes

The price for valve boxes located within boulevards shall include the setting and adjustment of the top to finished grade. The price for valve boxes within roads shall include setting and adjustment of the top to base course asphalt level. The price for valve boxes within roads shall also include adjustment of the top from base course asphalt level to top asphalt level.

3.10 Valve Chambers

Chamber drain may be connected to storm sewers only with agreement of Drinking Water Services provided that an approved backflow prevention device is included per Section 4.4.7.4 of Ottawa Design Guidelines – Water Distribution.

3.11 Hydrants

All hydrants shall be installed as per City of Ottawa Std. W19 and located as per City of Ottawa Std W18.

3.12 Service Connections

Type K soft copper as per City of Ottawa Std. W26 unless otherwise specified.

4.0 HYDROSTATIC TESTS AND FLUSHING

4.3 Allowable Leakage

Leakage tests shall be applied to the mains in suitable sections after the backfilling is completed. The ends of the mains shall be capped or valves closed and the main filled with water under a pressure of 1035 kPa after which all visible leaks shall be stopped. Leakage shall then be measured by a calibrated meter supplied by the Contractor with readings taken at fifteen minute intervals for a period of three hours. The average rate of leakage shall not exceed 115 L/day per 25 mm of diameter per km of pipe, and if the leakage exceeds this figure the Contractor shall locate and correct the leaks. Tests shall be repeated until the leakage is less than the specified amount. The pipe shall be left exposed where directed until the completion of the test, after which backfilling shall be completed. The cost of the labour and the materials required to locate and correct the leaks shall be borne by the Contractor. Leakage tests shall be borne by the Contractor. Leakage tests shall be carried out by the Contractor.

4.3.1. Swabbing

As a requirement to this Contract all watermains shall be swabbed immediately after the leakage test and prior to disinfection. In most cases watermains are usually swabbed using fire hydrants as points for entry and exit. Because of this, the main valve seat must be removed and a blind seat installed to prevent undermining the soil at the hydrant boot. The practice also prevents damage to the original hydrant seat as debris passes through the hydrant. All swabs must be inspected prior to insertion and immediately after they exit the main to ensure that they have remained intact and that pieces of the foam do not stay in the main. The swabs should also be numbered and carefully controlled by the Contractor and Consultant to ensure that all swabs that are introduced to the main are accounted for. Only new swabs will be permitted for use and in no case will used swabs be allowed.

All watermain pipes must be swabbed a minimum of one time plus a minimum of one swab shall be passed through each hydrant lead, stub or blow-off. Additional swabs shall be used as directed by the Consultant if discharge water does not run clear within ten (10) seconds of the swab exiting the discharge point. Swabs shall be forced through the watermain using potable water so that they maintain a velocity of 0.5 to 1 metre per second. Any method of disposal of the discharged water must be approved by the Consultant. The Contractor shall take the necessary precautions to minimize soil erosion and to reinstate the area upon completion. All swabbing must be completed before any services are connected.

The swabs must be an open cell polyurethane foam, having a density of 1.5 pounds per cubic foot (19 grams per cubic metre), and are to be a minimum of 50 mm larger than the nominal pipe diameter with a length of at least one and a half times its diameter. Watermains 300 mm or smaller can be swabbed through hydrants on approval by the Consultant.

4.3.2 Disinfection

After swabbing, the watermains shall be chlorinated. The work of chlorination and sterilization will be performed by the Contractor for a period of 24 hours.

4.4 Flushing

Immediately after sterilizing, swabbing and hydrostatic and leakage tests are completed, the main shall be flushed again according to City of Ottawa Standards and left charged, so that the work of connecting the water services may proceed at once. Care should be exercised to ensure that the flushed wastewater shall be disposed of in such a manner to protect the environment as well as being approved by the Consultant.

5.3 Bacteriological Tests

The Contractor shall collect samples from the disinfected watermains for the performance of bacteriological tests. Should the tests prove unsatisfactory, the watermains in question shall be rechlorinated, flushed and tested until satisfactory results can be obtained. All costs for further disinfection shall be borne by the Contractor.

7.0 PAYMENT

7.1 Watermains

The Unit Price for watermain shall include all labour, materials and equipment required to construct watermains and appurtenances as per the drawings and specifications including all necessary excavation, bedding, backfill, insulation, compaction, restoration, plugs, restrained joints, thrust blocks, testing and other requirements of City of Ottawa, also corrosion prevention as described in General Notes – NT1.

The Unit Prices provided within the Pricing Schedule for works under this specification shall include disposal off-site of any surplus materials at completion of the work per SC1.

The Unit prices shall include all traffic controls and temporary detour provisions for those works in this specification, within existing road allowances or adjoining rights of way where other traffic may travel. This includes both pedestrian and vehicular traffic controls and provisions.

The Unit Price also includes extra depth watermain and crossings under existing utilities where indicated on drawings, and full compaction of backfill in trenches under pavements.

The Unit Prices provided within the Pricing Schedule shall include all necessary layout and preparation of As-Constructed red-line plans in accordance with the requirements of the Special Conditions, and City of Ottawa for the work under this specification.

PROJECT SPECIFICATION NO. 6

SEWERS AND APPURTENANCES

This specification is to be read in conjunction with General Specification No. 6 - Sewers and Appurtenances.

Information presented in this specification supplements the General Specification and in the event of conflict between this specification and the General Specifications, this specification shall govern.

2.0 MATERIALS

2.1 Sewer Pipe

- .1 Concrete pipe up to and including 900 mm dia. shall be supplied by a manufacturer which has obtained prequalification by the Joint OCPA/MEA/MECP Prequalification Committee.
- .2 All sewer joints to be fitted with rubber gaskets.
- .3 PVC sewer pipe shall be equal to CSA 182.2 or latest amendment Class DR-18, SDR-26, SDR-35 as specified on the drawings.

2.3 Manholes

- .1 Sanitary manhole frames and covers to be in accordance with City of Ottawa Std S24 and S25. All adjustment units, frame and grates are to be sealed as per the inflow and infiltration mitigation measures detail.
- .2 Storm manhole frames and covers to be in accordance with City of Ottawa Std S24.1 and S25.
- .3 Manholes to be in accordance with OPSD standards.

2.4 Catchbasins

- .1 Catchbasin and double catchbasins to be in accordance with City of Ottawa Std S1 and O.P.S.D. 705.020 respectively. Frames and grates per City of Ottawa Std. S19.1.

- .2 Curb inlet catchbasin to be in accordance with City of Ottawa Std S3. Frames and grates per City of Ottawa Std. S22 and S23.

2.5 Pipe Bedding

All bedding for sewers is to be installed as per the recommendations of the Geotechnical Consultant and the notes as shown on Drawing No NT1.

3.0 CONSTRUCTION

3.2 Pipe laying

Where a sewer crosses another sewer or watermain with less than 300 mm separation, the pipes shall be encased in 20 MPa concrete from the base of the lower to the springline of the higher. Concrete encasement is to be completed from pipe joint to pipe joint. Concrete encasement is to be included in the price provided within the Pricing Schedule for sewer construction.

Where trenchless methods are used, the Contractor shall submit the necessary shop drawings which include the hydrostatic joint rating being proposed.

3.6 Sewer Laterals

Sewer laterals are to be installed as per notes on Drawing NT1.

3.7 Manholes

Concrete pipe to be supported from maintenance hole to the first pipe joint 1.0 m from outside wall with 20 MPa concrete to undisturbed ground. Maintenance holes shall be backfilled with Granular "B".

Minimum width of manhole benching is to be 230mm except beneath the access where it shall be at least 450mm.

All poured in place manholes are to be founded on compacted Granular 'A' or equivalent approved by the Geotechnical Consultant. A minimum thickness of 300 mm compacted to 100% Standard Proctor Maximum Dry Density (SPMDD) shall be provided unless otherwise noted by the Geotechnical Consultant.

Any soft subgrade sections are to be removed and replaced with 50 mm crusher run limestone or equivalent approved by the Geotechnical Consultant.

All adjustment units, frame and grates are to be sealed as per the inflow and infiltration measures detail.

3.8 Catchbasins and Catchbasin Leads

Subdrains shall be connected to all catchbasins.

4.0 TESTING

4.2 Procedure

1. The Contractor shall carry out T.V. camera inspections of all sewers up to and including 1500 mm diameter installed under this Contract. The camera can be either pulled or self propelled through the pipes, the equipment is to have features to enable closer examination of faults and to view up lateral connections. The equipment is to provide "measured" location of the camera relative to manholes in order to locate faults, laterals, etc. Two copies are to be provided on CD and shall be submitted directly to the Consultant. Three T.V. camera inspections are required; one following base asphalt, second prior to the first occupancy, and a final prior to assumption. The two copies of each video recording shall be delivered by the Contractor to the Consultant along with a written report with photographs of problem areas.
2. The air-test, infiltration test and exfiltration test for the sanitary sewer system is to be completed at three times during the construction of the proposed works. First upon completion of the sanitary sewer system, second upon completion of base asphalt and finally prior to the first occupancy.
3. Prior to assumption the Contractor shall conduct smoke tests of all sanitary sewers to confirm that there are no cross connections. Supplemental dye testing shall also be conducted when directed by the Engineer as described in the City of Ottawa Standards.

4.3 Allowable Limits

The Contractor shall verify the allowable limits for all testing procedures according to the requirements of City of Ottawa.

5.0 MEASUREMENT

No measurement of sewers or maintenance holes for payment purposes will be undertaken in the field.

6.0 PAYMENT

The unit prices provided within the Pricing Schedule for the works under this specification include all necessary work to obtain and prepare the As-Constructed information required under the Special Conditions.

The Unit Prices provided within the Pricing Schedule for works under this specification shall include disposal off-site of any surplus materials at completion of the work per SC1.

The Unit Prices provided within the Pricing Schedule or works within existing road allowances under this specification shall include all necessary traffic controls and detours, both vehicular and pedestrian, in accordance with specifications of this Contract and City of Ottawa requirements; restoration of existing roads including backfill, granular base and subgrade base asphalt and top asphalt to match existing conditions; and restoration of existing boulevards, including backfill, topsoil, and sod.

The Contract Price shall include all costs associated with T.V. inspections. No additional amount shall be paid for this work. Any cost of repairing defective work and subsequent re-inspection shall be at the Contractor's sole expense.

The Contract Price for sewers shall include any temporary pumping required if no outfall is available due to scheduling the work program.

The prices provided within the Pricing Schedule in the pipe and manhole items for storm sewer shall include the cost of all required testing.

All costs associated with the testing of the sanitary sewer is to be included in the prices provided in the contract price.

All costs associated with the inflow and infiltration mitigation measures are to be included in the unit prices for the manholes and manholes adjustment as noted.

6.3 Maintenance Holes

The unit prices provided within the Pricing Schedule for maintenance holes shall include backfill approved by the Geotechnical consultant, the placement of 15 MPa concrete fill under the maintenance holes to undistributed ground in locations where the maintenance hole foundation has been excavated or otherwise substantially disturbed.

The unit prices provided within the Pricing Schedule for maintenance holes shall in all cases include drop connections and safety platforms as required on the drawings, whether or not such specials are highlighted in the Pricing Schedule.

6.4 Catchbasins

The price provided within the Pricing Schedule for single and double catchbasins shall also include the cost of supplying and installing the appropriate lead and any bedding material required in addition to that specified to make up the difference between undisturbed ground and the underside of the catchbasin.

6.9 Testing

The unit prices provided within the Pricing Schedule shall include all costs related to the tests as noted in Section 4.0 which may be requested by the Consultant. This includes the cost of

television camera inspection of all sanitary sewers and the provision of the required video tapes and report to City of Ottawa.

7.0 SILTATION CONTROL DEVICES

The Contractor will be responsible for installing siltation control facilities (sediment ponds and hickenbottom drains with outlets or temporary catchbasin sedimentation control devices) at various points within the site. In some cases the Consultant may direct the reconstruction of the ponds or outlets and to connect the outlet pipes as directed with payment to be based on the additional unit prices provided in the Contract, and the review and approval by the Consultant.

PROJECT SPECIFICATION NO. 7

ROADS, CURBS AND SIDEWALKS

This specification is to be read in conjunction with General Specification No. 7 - Roads, Curbs and Sidewalks.

Information presented in this specification supplements the General Specification and in the event of conflict between this specification and the General Specifications, this specification shall govern.

3.0 CONSTRUCTION

Sub-drains to be laid continuously beneath all curbs in accordance with City of Ottawa Standard R1.

3.1 Road Base, Driveways, Parking Areas and Sub-Base

Subgrade

Any topsoil found within the roadway areas should be removed prior to commencement of sub-grade preparation. All sub-grades shall be proof-rolled with a representative of the Geotechnical consultant to identify and remove soft-spots. Contractor to notify the Consultant 48 hours prior to any proof rolls.

The sub-grade shall be compacted in accordance with the procedures as noted in the Geotechnical report.

3.1 SUB-BASE

The granular sub-base shall be installed in accordance with the requirement and procedures noted in the Geotechnical report.

3.2 Asphaltic Pavement

Where noted all existing pavement shall be saw cut as necessary to provide the required trench widths and joints to proposed asphalt. Joints will be provided as detailed on the applicable drawings.

The compaction and asphalt mix design shall be in accordance with the Geotechnical consultant report, OPSS and City of Ottawa Standards.

The contractor is to submit proposed asphalt mix design for review by the various authorities and Geotechnical consultant two weeks prior to the proposed start of paving. All mix designs must be provided to the Geotechnical Consultant for review and approval prior to construction.

3.2.1 Joints Between Existing and Proposed Asphalt

A 300 mm wide by 40 mm deep step joint is to be provided between existing and proposed pavement, and filled with a compacted layer of 40 mm HL3. All joints shall be routed and sealed with a hot rubber sealing compound as per OPSS 1212.

Prior to placing the tack coat and if directed by the Consultant, the base asphalt is to be flushed and swept including any minor hand cleaning all at no additional cost.

3.2.3 Joints Between Existing Base Asphalt and Proposed Asphalt

At an interface with existing asphalt roads with only base asphalt, the contractor shall provide a butt joint between the existing asphalt and proposed asphalt. The Contractor shall trim the existing asphalt to provide a straight edge for the butt joint and fill the joint with rubberized asphalt sealant as per OPSD 508.010.

3.2.4 Adjustments to Manholes, Valve Chambers and Catchbasins

The tops and frames of manholes and catchbasins shall be adjusted to the top of base asphalt using modoloc rings.

4.0 MEASUREMENT

All road quantities shall be measured on the Engineering Drawings in square metres at the specified thickness as indicated on the Engineering Drawings.

The measurement of base course asphalt shall not include the fillet laid over the top of the base curb which ultimately is trimmed off to permit top stage curb construction.

Adjustment of maintenance holes and catchbasins will be measured on a unit basis as described in Project Specification No. 6.

5.0 PAYMENT

5.1 Road Base, Sub-Base and Asphaltic Pavement

The Unit Prices provided within the Pricing Schedule for works under this specification shall also include disposal off-site of any surplus materials at completion of the work per SC1.

Payment for base asphalt and top asphalt shall be on a square metre basis of asphalt placed to the minimum specified compacted depth.

Unit prices for base asphalt shall include any immediate rectification of damaged areas or settlements and padding necessary for these settlements.

Unit prices for top asphalt shall include all machine or hand padding or scratchcoats required due to settlements of the base asphalt to provide the correct top asphalt crown. The unit price shall also include all necessary base asphalt repairs and patching required prior to top paving, including alligatored, broken or badly cracked asphalt, including the removal and disposal of broken asphalt offsite. The Contractor will not be responsible for damage by a third party. The Consultant shall determine if the repairs and/or patching is the result of a third party action.

Unit prices for asphalt shall be adjusted according to the rate of asphaltic cement used at the time of construction. The cost of asphaltic cement at the time of submission of the Pricing Schedule shall be specified by the contractor as a basis for adjusting the unit price for asphalt.

5,2, 5.3 Maintenance Hole Adjustments and Ramping

The unit price provided within the Pricing Schedule for the adjustment of manholes, chamber tops, access locations, and catchbasins shall include all the necessary materials, equipment and labour required to complete the works as specified.

5.4 Sidewalks

Payment for sidewalk shall be compensation in full for all labour, equipment and material required including excavation and fine grading, disposal of surplus material, supply of fill material and polyethylene film, expansion joints, edge scoring of both edges, regrading to boulevard level, application of curing compound, cold weather protection and cleaning and brushing of sidewalks and application of sealer.

SCHEDULE A-2

SPECIFICATIONS FOR CONTRACT II

The following are attached to this Schedule A-2 and form part of the Contract:

- a) **Special Conditions**
- b) **General Specifications; and**
- c) **Project Specifications**

SPECIAL CONDITIONS OF THE CONTRACT

ARTICLE SC1 - Acceptance of Site

All Proponents are required to satisfy themselves by personal examination of the site, of the work and of the existing conditions, which may be encountered on the site. The submission of a bid shall be deemed proof that the Proponents have satisfied themselves as to all the provisions of the Contract, of all of the conditions which may be encountered, equipment they will be required to supply, or any other matter which may enter into the carrying out of the Contract to a satisfactory conclusion. No claims will be entertained by the Company based on the assertion by the Contractors that they were not informed as to any of the provisions of conditions intended to be covered by the Contract. The submission of the price provided within the Pricing Schedule shall be presumptive evidence the Contractor has satisfied himself of the site conditions.

Following completion of underground servicing and roads to base course asphalt, the Contractor MUST restore any disturbed lots and blocks to the pre-grade elevations, including removal and disposal of surplus material and provide a topographical survey certified by an Ontario Land Surveyor confirming the same, as per SC28 - As-Built Information. The Company reserves the right to credit from the payment to the Contractor for any incomplete restoration works. The deduction amount will equal the cost for the Company to complete the restoration work by another contractor.

The Contractor must submit to the Company, in writing, that all disturbed lots and blocks are to be restored to the pre-grade elevations by the Contractor as described above prior to contract execution.

The Contractor is to protect all surface features on adjacent roads and adjacent lots. Any damage to any public roads or infrastructure shall be rectified by the Contractor at his own expense to the satisfaction of the City of Ottawa and the Consultant.

The Contractor shall satisfy himself of all geotechnical and hydrogeological information, including boreholes, in-situ conditions, and recommendations identified in the identified reports.

The only access to the site shall be from Tremblay Road and St. Laurent Boulevard at the location noted on the drawings. The Contractor shall not impede or restrict traffic operations on Tremblay Road and St. Laurent Boulevard and shall implement traffic controls to the satisfaction of the City of Ottawa where required. Parking of vehicles is not permitted on City of Ottawa roads, including Tremblay Road and St. Laurent Boulevard. The access points must be secured at the end of the day and over the weekends to prevent unauthorized access.

The topographic survey of existing ground was prepared by the Company's Surveyor. This topographic survey will be provided to the Contractor in digital format upon contract award. The Contractor is responsible for verifying this topographic survey for their use. This survey will be used as the original ground for the basis of calculation of earthworks quantities.

All costs associated with the above requirements are to be included in the unit prices. The O Company wner will entertain no claims for extras for these requirements.

ARTICLE SC2 - Limit of the Working Area

On the Company's land, the Contractor shall limit his operations to the limit of construction shown on the engineering drawings, unless otherwise approved by the Consultant.

At no time is the Contractor to encroach on the following areas:

- 1) Private property without written permission from the landowner; and
- 2) Public property without written permission from the City of Ottawa.

ARTICLE SC3 - Existing Utilities and Services

The position of all existing poles, overhead lines, conduits, watermains, sewers and other

underground or aboveground utilities, structures and appurtenances are not necessarily shown on the drawings, and where shown, the accuracy of the position of such utilities is not guaranteed by the Company or the Consultant. The Contractor shall have all utilities field located prior to the start of construction.

The Contractor shall be responsible for locating and adequately protecting all existing utilities and services and restoring all disturbed bedding and backfill in accordance with the requirements of the utility, and City of Ottawa. Any damage to any existing service or utility shall be repaired at the Contractor's expense. The cost of all excavations for verification, protection during construction, and support during installation of utilities, and restoration of all surface features damaged or destroyed are to be included in the unit prices provided within the Pricing Schedule. The Contractor should note that some utilities may require excavations in the vicinity of their existing plant be hand dug to locate the existing services. All cost for hand-digging excavations shall be included in the prices provided within the Pricing Schedule .

ARTICLE SC4 - Restoration

The cost of restoration shall include, but is not limited to bedding, backfill, and compaction for existing utilities, pavements, tie-backs, sidewalks, curbs and sodding which must be disturbed to carry out the works required during the execution of this contract. The cost of the restoration of all surface features damaged or destroyed during the construction of the services under this Contract is to be included in the price provided within the Pricing Schedule and will be the responsibility of the Contractor. The Company reserves the right to withhold from payment the estimated cost of remediation costs which have not been completed.

ARTICLE SC5 - Surface Drainage

The Contractor shall be responsible for maintaining good road and site drainage to catchbasins or other approved outlets for the duration of the Contract. The Contractor shall be responsible for providing temporary drainage swales, ditches, and sedimentation/erosion controls as necessary. This includes road grading such as to avoid creating ponding on the lots by grading temporary ditches across the road to drain such ponding areas.

The Contractor will be held responsible for all damage which may be caused or result from water backing up or flowing over, though, from or along any part of the works, or which any of his operations may cause to flow elsewhere. Siltation control devices shall be installed, and the control of siltation shall be the Contractor's responsibility throughout the undertaking of his Contract. The Contractor will also be responsible for all damage or fines resulting from the improper control of siltation.

The Contractor shall dewater all work sites and excavations as necessary or as directed to enable the works to be constructed in a satisfactory manner. Water produced from any dewatering operations to be treated in a "Wetland Filter Bag" or other means acceptable to the governing authorities and discharge only as approved by the Consultant.

ARTICLE SC6 - Maintenance of Traffic

The Contractor must maintain traffic on adjacent roads, including providing signage and flag persons as required in accordance with the requirements of the City of Ottawa at all times for the duration of the Contract.

The Contractor shall provide all necessary signage and flagmen and shall maintain vehicular traffic on adjacent roads at all times during construction in accordance with MTO's "Manual of Uniform Traffic Control Devices" and/or MTO "Book 7".

The cost for all necessary permits, traffic signage, traffic control devices and flag persons shall be included in the prices provided within the Pricing Schedule.

Prior to the start of any work within an existing road allowance, the Contractor shall obtain the necessary permits from the City of Ottawa to occupy the road allowance.

ARTICLE SC7 - Work Schedule

Contract I *September 2021 – March 2022*

Contract II *April 2022 – July 2022*

Within 7 days of Contract Award or receipt of a "letter of intent", the Contractor shall provide the Consultant with a detailed work schedule. It shall contain sufficient detail for the Consultant to monitor progress of the work. Future delay claims will be rejected if the Contractor fails to provide the original construction schedule.

- a) Completion Dates specified assume the Contractor has received the written permission and notification to commence work on the Start Date specified as being no later than the Start Dates listed above. Any delays in the Start Dates mentioned above will be added to the Completion Dates.
- b) Each calendar day from the project Start Date to the project Completion Date, inclusive, shall be considered work days. If work on Saturday/Sunday or statutory holidays is required to meet the schedule, no additional claims will be accepted.
- c) The construction schedule, insurance certificates, bonds and all other required documents must be provided to the Consultant prior to commencement.

The Company reserves the right to adjust the schedule to delay the start dates until all approvals are obtained. Any delay in the commencement of the project caused by the Company, will result in the contract schedule being extended by an equivalent period of time.

The Contractor shall commence work and carry it on at whatever location or locations the Consultant may direct. No work shall be undertaken without the Consultant's approval and no work shall be suspended without his written permission except as described in the Contract Documents.

Siltation controls must be installed prior to demolition and grading.

Prices provided within the Pricing Schedule shall be valid through the 2022 calendar year.

ARTICLE SC8 - Contractor Certification of Imported Fill Material

In the event the Contractor is asked to provide fill, the Contractor shall identify the source of imported fill material. The source must be approved by the Company and the Company's Geotechnical Consultant.

The Contractor shall provide written certification to the satisfaction of the Consultant that:

4. Only material from an approved source will be placed on site.

5. The material is free of organics and other unsuitable debris and is suitable for engineered fill as assessed by the Geotechnical Consultant, and accompanied by a stamped, signed and dated report prepared by a licensed professional engineer in the Province of Ontario.

6. The material meets Ministry of Environment Decommissioning Guidelines for residential uses or other applicable regulations noted in the report provided above in item #2.

The Company reserves the right to undertake independent testing of the material. Any material, deemed unsuitable by the Company's consultant shall be disposed of off-site at Contractor's expense.

ARTICLE SC9 - Independent Testing

The Contractor shall retain independent specialized testing companies to provide the following services as required by the project.

ii) **Compaction Tests**

Provide Proctor and field density tests, certifying adequate bearing capacity and compaction of trench backfill, fill sub-base and granular base as required in accordance with the applicable specifications.

ii) Gradation Tests

Provide gradation tests for granular or stone aggregates, backfill material and granular or stone base material as required to verify conformance with the applicable specifications.

iii) Concrete Tests

Provide strength tests for concrete in conformity with the applicable specifications.

iv) Asphalt Tests

Provide adequate testing as required to verify conformance with the applicable specifications and to determine the asphalt cement content.

v) Camera Inspection

Carry out camera inspections on all sewers and the Contractor shall provide at no additional cost, such skilled assistance as the Company may require. Provided that no defective work is indicated by such inspections, the whole of the cost of the inspection shall be borne by the Company. If, however, defective work is discovered by such inspection, the Contractor shall bear a part of the total cost of the first inspection, in the proportion that the number of defective sections of sewer bears to the total number of sections inspected. For this purpose, a section is defined as a length of pipe between adjacent manholes.

The cost of testing or inspecting any portion of the works which has been previously tested and found to be defective and then subsequently rectified shall be borne by the Contractor.

ARTICLE SC10 - Temporary Facilities

The Contractor shall provide the following at his own expense:

c) Accommodation

Provide and maintain in a suitable position on the site a weatherproof field office, minimum size 10 m × 3 m × 2.5 m high with windows, tables, chairs, two desks and monitors with the ability to connect laptops, a first aid kit, a drawing table, filing cabinet drawing rack and locking doors, including air-conditioning (summer only), heat and light, for the exclusive use of the Consultant and Company.

The accommodations, equipment and furniture shall be subject to acceptance by the Contract Administrator and shall not be removed from the site without the Contract Administrator's permission.

The Contractor shall bear the costs of heating, cooling, and lighting the field office and the installation and rental charges for the telephone. The Contractor shall indemnify the Company against loss and fire, theft and injury to the building and its contents.

The Accommodations shall be equipped with electric light and propane or electric heat thermostatically controlled (winter) and air conditioning (summer). Where a local hydro service is not readily available, the Contractor shall supply and maintain an electric generator for the

provision of electricity within the accommodations. All windows and doors shall be provided with screens and weekly janitorial service shall be provided by the Contractor. This facility shall be for the sole use of the Company and its representatives and must have an exterior padlock with two keys available to the Company staff. The Contractor will be responsible to unlock and lock the accommodations daily. The accommodations shall be erected and serviced prior to delivery of any materials to the site or commencement of any work. The accommodations will include two office areas, one for the Company and one for the Contractor. The accommodations will be large enough to adhere to physical distancing guidelines as set by the Ontario Government.

The accommodations, equipment and furniture shall be subject to acceptance by the Contract Administrator and shall not be removed from the site without the Contract Administrator's permission.

The Contractor shall bear the costs of heating, cooling, and lighting the field office and the installation and rental charges for the telephone. The Contractor will not be required to pay for long distance calls made by the Company or its representative. The Contractor shall indemnify the Company against loss and fire, theft and injury to the building and its contents.

The accommodations will adhere to all Covid-19 legislation. The Contractor will provide disinfecting wipes, glove, masks and other personal protection equipment (PPE).

d) Telephone

Contractor shall arrange and pay for telephone service, answering machine and facsimile transmission machine for the duration of the Work. Long distance calls, except to the Contractor's other offices, made by the Consultant will be paid by the Consultant upon receipt of an invoice by the Contractor.

c) Convenience

Provide and maintain for the duration of the Work such temporary sanitary facilities or other convenience as may be required by local bylaws or ordinances for the use of all personnel employed on the Work. . A sanitary facility (portable toilet) or equivalent must be provided by the Contractor and erected and maintained within 10 metres of the accommodations.

e) Storage

Erect any temporary buildings or workshops which may be required for workmen and for weathertight storage of products.

ARTICLE SC11 - Construction Layout

The Contractor will be responsible for providing all construction layout necessary for all aspects of area grading, underground services and surface works.

The Consultant will provide the Contractor, in writing, with bench marks and points of reference to be used by him in setting out the works. From these bench marks and points of reference, the Contractor will do his own construction layout and shall include but shall not be limited to the preparation of grade

sheets, the installation of centre line stakes, grade stakes, offsets, site rails and screeds. The Contractor shall provide the Consultant with a copy of all grade sheets as they are prepared.

The Contractor shall review all drawings included in the contract for errors or omissions. The Contractor shall also review the adequacy of layout information provided and shall submit any requests for additional information or clarification to the Engineer at least 36 hours in advance of his need for such information.

The Contractor shall be responsible for the true and proper layout of the works and for the correctness of the position, levels, dimensions and alignment of all parts of the works, and for the provision of all necessary instruments and labour in connection therewith. If at any time during the progress of the works, any error shall appear or arise in the position, levels, dimensions or alignment of any part of the works, the Contractor shall, at his own expense, rectify such error to the satisfaction of the Consultant, unless such error is based on incorrect data supplied in writing by the Consultant. The checking of the layout of any line or level by the Consultant shall not in any way relieve the Contractor of his responsibility for the correctness thereof and the Contractor shall carefully protect and preserve all bench marks, stakes and other things used in setting out works.

The Contractor is to furnish the Consultant or any of his assistants, with any reasonable help which he or they may require at any time in checking the work. He shall also furnish the said parties, or any of the Inspectors, at all times, with convenient means of access to all parts of the works, and also with all required assistance to facilitate thorough examination of the same, and inspection, separation and removal of doubtful or defective material, and for any other purpose required in connection with the said works or in the discharge of their respective duties, for which services no additional allowance will be made.

The Contractor's layout crews will be required to report to the Consultant as to schedules and progress. The Contractor's layout crews will be required to take direction from the Consultant for work on the project where such work is deemed to be urgent by the Consultant.

The Contractor shall provide to the Consultant certification from an Ontario Land Surveyor or a Licensed Professional Engineer that the final grades are within tolerances specified for rough grading in Specification No. 3 - General Grading and Earthwork.

ARTICLE SC12 - Extra Construction Layout

The Contractor shall be responsible for any extra costs incurred by the Consultant in providing additional layout extra to that provided for in Article SC9 above. Re-staking or additional layout required due to the Contractor's operation will be charged to the Contractor's account in the following manner.

The Consultant will determine the applicable charges for extra construction layout and will invoice the Company. The amount of these invoices will be deducted from the Contractor's monthly payment certificate, and the Company will then reimburse the Consultant.

ARTICLE SC13 - Noise, Vibration, Mud and Dust Control

The Contractor shall establish and maintain site procedures such that noise levels from construction activities are minimized and are in accordance with local by-laws. It is the Contractor's responsibility to obtain a copy of the City of Ottawa noise by-law and maintain on-site for reference, and comply with all local by-laws with regards to restrictions on working hours and construction activities as related to noise.

If the Contractor wishes to obtain an exemption from any by-laws the Contractor will include all associated costs in the unit prices provided within the Pricing Schedule. The Company will entertain no claims for extras or delays in the schedule in the future to satisfy this requirement.

In addition, the Contractor must be in compliance with all requirements of the Environmental Protection Act. In particular related to noise, dust and vibration the Contractor must be in compliance with Section 157(1) of the EPA.

The Contractor shall undertake all mud and dust control measures required to prevent dust nuisances caused by construction activities both on-site and on adjacent roads to the satisfaction of the Consultant and City of Ottawa. The cost of these control measures shall be included in the price provided within the Pricing Schedule.

Mud and sediment controls shall be maintained per ESC1 – 4 notes and details.

The Contractor is responsible for cleanup of mud tracking on existing road surfaces on a daily basis or on a more frequent basis if directed by the Consultant or City of Ottawa. All construction vehicles leaving the site must cross over a rip-rap vibration pad to reduce mud-tracking. The total Contract price shall include cleanup of mud tracking or the reconstruction of the rip-rap vibration pad to the satisfaction of the Consultant.

ARTICLE SC14 - Siltation and Erosion Control

Contractor and engineer shall complete pre-construction site walk to assess condition of existing siltation control fence prior to mobilizing.

Prior to commencing topsoil stripping of the site, erosion and sediment control measures must be installed as shown on the Engineering drawings.

The Contractor is responsible to restore, maintain and remove when directed those sedimentation and erosion control works shown on the plans, either proposed or existing in the field to satisfaction of the Consultant and City of Ottawa.

The Contractor shall inspect the site weekly and before and after every significant rainfall and make repairs as required to conform with the engineering drawings, including removal of sediment. The Contractor will also be responsible for all damage or fines resulting from the improper control of siltation.

All costs associated with this requirement will be included in the unit prices provided within the Pricing Schedule. The Company will entertain no claims for extras for this requirement.

ARTICLE SC15 - Security of the Site

Security of the site will be the responsibility of the Contractor. The Contractor to provide barricades to the construction access outside the hours of construction to prevent access and trespassing onto the lands within the limits of construction. The barricades shall be in accordance with those specified on the Engineering Drawings. Contractor is to post signs adjacent to the site noting that:

- c) It is illegal to dump material onto the site; and

d) It is illegal to trespass onto private property.

Unit prices provided within the Pricing Schedule shall include the cost of warning signs and barricading the construction access. Any material dumped on the site by others shall be removed and disposed off-site by the Contractor only with the approval of the Consultant, at the Contractor's expense.

ARTICLE SC16 - Coordination with Other Contractors

The Contractor should note that other Contractors may be working on lands adjacent to the site. The Contractor shall co-operate fully with other Contractors at the construction interfaces.

Construction activity in the vicinity of this Contract may be underway during the construction period. The Contractor shall accept the presence of other Contractors within the working area and shall be responsible for all necessary co-ordination.

The unit prices provided within the Pricing Schedule will be compensation in full for this requirement. The Company will entertain no claims for extras for this requirement at a later date. Any delays shall be the responsibility of the Contractor

ARTICLE SC17 - Protection of Trees

The Contractor shall be responsible for the protection of tops, trunks and roots of existing trees designated to be saved on the project site. Trees within the construction area, that are to be saved, shall be fenced around the drip line prior to construction. Interfering branches may be removed under the direction of the Landscape Architect provided there is not injury to the trunk or resultant scars are covered immediately with an approved tree wound dressing. The Contractor shall provide access for the Landscape Architect to all trees to be saved for the purposes of fertilizing and maintaining the trees.

There are no trees within the limits of construction which have been identified for preservation.

The Contractor shall be responsible for any damages and resulting repair or replacement costs for any trees on neighboring properties.

ARTICLE SC18 - Occupational Health and Safety Act

The Contractor is responsible for construction safety for all of the Work done under this contract and shall comply with all of the rules, regulations and practices required under the current Ontario Occupational Health and Safety Act together with all other applicable legislation, regulations and standards as laid out by any other governing body.

For the purpose of this contract the Contractor will direct and control the activities of all suppliers, contractors, and visitors within the site. On that basis the Contractor will be the Constructor for the purposes of the Ontario Occupational Health and Safety Act.

The Contractor shall indemnify to Company and Company's agents by a letter that contractor is solely responsible for OHS and to ensure time and space separation between construction activities of all contractors who may be on-site.

The Contractor shall ensure that its subcontractors also comply with all such construction safety requirements. The Contractor shall indemnify and hold harmless and cause its subcontractors to indemnify and hold harmless, the Company, WSP Canada Inc., the Company's agents and any subconsultants. All costs associated with compliance with the pertinent safety requirements shall be the sole responsibility of the Contractor and included in the unit prices provided within the Pricing Schedule.

ARTICLE SC19 - Harmonized Sales Tax

As per previously mentioned terms of this agreement.

ARTICLE SC20 - Local By-Laws and Regulations

All work must conform with local by-laws and regulations including but not limited to the "Occupational Health and Safety Act and Regulations for Construction Projects" and any applicable regulations and local by-laws for erosion and sediment control.

ARTICLE SC21 - Provisional Items

Where it occurs in this document, the notation "Provisional" shall be understood to mean that the inclusion in the Contract of Items so described shall be at the direction of the Consultant.

No claims for extra payment due to the exclusion of any or all of these items will be accepted by the Company.

ARTICLE SC22 - Superintendence

The Company and the Consultant reserve the right to order the Contractor to replace personnel or subcontractors on the project if performance becomes unsatisfactory.

ARTICLE SC23 - Insurance

All insurance policies to be provided by the Contractor to the Company under this Contract shall include the following as additional insured:

- f) The City of Ottawa
- g) Rideau Valley Conservation Authority
- h) WSP Canada Inc.
- i) Canada Lands Company CLC Limited
- j) Public Services and Procurement Canada (PSPC)

ARTICLE SC24 - Progress Certificates

Payment certificates are to include an updated overall project schedule and detailed topographic surveys of the works are provided, per RFP Information Section 11 and Project Specification #3:

- After topsoil stripping

- After placement of fill to final pre-grades or windrow location as specified by the Consultant and certification by the Geotechnical Consultant
- After placement of topsoil to final pre-grades or windrow location as specified by the Consultant and certification by the Geotechnical Consultant

If requested, the Consultant will provide the Contractor with the Pricing Schedule in digital format Microsoft Excel 2010. It shall be the Contractor's responsibility to modify the date as necessary.

ARTICLE SC25 - Plan Quantities for Payment

Quantities provided in the Pricing Schedule are estimates only. The unit price bid shall be applied to the plan quantities regardless of any change with respect to the estimated quantities.

The Company reserves the right to delete any item. No compensation will be paid to cover claims for overhead cost and lost profit.

ARTICLE SC26 - Frozen Ground Conditions

No extra payment shall be made to the Contractor should he encounter frost difficulties. The cost of such work shall be included in the Contractor's bid price for underground construction.

Frozen ground shall not be opened further in advance of construction than one day's underground service installation. Frozen excavation materials shall be separated from the unfrozen material.

Backfilling, as specified in Specification No.4 – Excavation and Backfill, shall be carried out using unfrozen material. The frozen material may then be mounded over the trench. Particular care shall be taken to prevent frozen materials from being buried around maintenance holes.

ARTICLE SC27 – Winter Heat and Protection

The unit prices provided include all necessary equipment, labour, and materials to provide winter heat and protection required to satisfy the requirements of the Contract. The Company will entertain no claims for extras related to this requirement.

ARTICLE SC28 - As-Built Information

It is the Contractors responsibility to prepare as-built drawings.

The Contractor is to supply the Consultant with as-constructed sewer, watermain and services information as well as centreline of base road, final road, area grading, boulevard elevations and all other surface features in accordance with current City of Ottawa specifications (including a red-line drawing).

Following construction of roads to base course asphalt, the Contractor shall provide to the Consultant a topographic survey of the as-constructed rough grading on the lots and blocks. The topographic survey shall conform to the following requirements.

- date of the field survey following the date of construction to base course asphalt.
- coordinate system to be identical to that utilized for the boundary survey and must include the survey of a minimum of four boundary monuments from the site.

- vertical datum to be geodetic or that supplied by the Consultant for this project. Evidence of acceptable closure into at least two benchmarks is required.
- submission shall include a digital file suitable for use with AutoCAD
- survey to include spot elevations at a maximum spacing of 15 metres, including, but not limited to, elevations at the four (4) corners of each lot and at any change in grade (proposed and/or actual) along each lot line. Additional points beyond the 15-metre spacing will likely be required to adequately represent all changes in grade.
- survey to be completed by a survey firm approved by the Company and certified by an Ontario Land Surveyor or a Professional Engineer.
- survey to note limits of engineered fill, underside of engineered fill and top of engineered fill.

The Consultant will compare the as-constructed survey with the proposed rough grade elevation and generate on a 5-metre grid elevation differences between the as-constructed and proposed rough grading and also the volume differential.

In areas where tolerances exceed those noted in the earthwork specification, additional grading will be required. Once the rectifications are completed a revised survey will be required.

All costs associated with completing the original survey as well as any follow up surveys shall be borne by the Contractor.

ARTICLE SC29 – Protection of Survey Monuments

Prior to commencing work, the Contractor shall mark all survey bars identified by the Consultant with three (3) 50x50x1200mm brightly painted wooden stakes and shall protect all bars from damage during construction.

Bars damaged by the Contractor's negligence shall be replaced at his expense.

ARTICLE SC30 – Payment Terms

As per previously mentioned terms of this agreement.

ARTICLE SC31 - Bonds

As per previously mentioned terms of this agreement.

ARTICLE SC32 - Warranty Periods

As per previously mentioned terms of this agreement.

ARTICLE SC33 - Extended Warranty Period

N/A

ARTICLE SC34 - Substantial Performance

As per previously mentioned terms of this agreement.

ARTICLE SC35 - Work Standards

All work is to be carried out to the satisfaction of the Consultant and the Municipal Authorities. (City of Ottawa)

ARTICLE SC36 – Acceptance of Work

The Contractor agrees that all work completed will be reviewed for acceptance by WSP Canada Inc. (Consultant) and ultimately the City of Ottawa.

ARTICLE SC37 - Blasting

Blasting is not allowed on this project unless specific applications are made and approvals received from the Company, Consultant and all affected agencies.

ARTICLE SC38 - Deletions

The Company reserves the right to delete any item. No compensation will be paid to cover claims for overhead cost and lost profit.

ARTICLE SC39- Additional Charges

No claim for extras will be considered under the scope of work described in the Contract unless there are design changes made by the Consultant.

ARTICLE SC40 - Permits

The Contractor is responsible to obtain all required permits to complete the works as noted in the contract documents, in accordance with the procedures and requirements of City of Ottawa. This includes but is not limited to all necessary Road Occupancy requirements.

ARTICLE SC41 - Pre-Construction Meeting

A Pre-Construction meeting shall be coordinated by the Consultant prior to construction commencing. Attendees at this meeting shall include, but not be limited to, representatives from the Contractor, Consultant, City of Ottawa, and the Geotechnical Consultant.

At this meeting the limit of the working area will be established and a construction Work Schedule shall be presented by the Contractor that meets the completion date specified in Article SC4 – Work Schedule.

No additional payment shall be made to the Contractor for attendance at this or any other construction meeting.

ARTICLE SC42 – Contractor Reimbursement for Document and Drawing Charges

The Contractor will be provided with 6 sets of the Issued for Construction drawings and specifications. Any additional copies of the drawings requested by the contractor will be provided solely at the cost of the contractor and will be charged at a fixed rate to be confirmed by the consultant. Contractor will reimburse the consultant directly for all reproductions.

ARTICLE SC43 – Dumping

In the event that dumping of materials has occurred due to the Contractor's lack of security or control of the site under this Contract, the Company reserves the right to deduct the costs of the off-site disposal from the Company's payment to the Contractor.

Alternatively, any material dumped on the site by others shall be removed and disposed off-site by the Contractor only with the approval of the Consultant, at the Company's expense.

ARTICLE SC44 – Shop Drawings

The Contractor shall submit for the Consultant's review full primary structural details, designs and shop drawings stamped by a professional engineer licensed to practice in Ontario.

This submission is subject to review, and comments by the Consultant. The Contractor shall provide additional information and details in order to satisfy all concerns of the Consultant. Two unstamped copies of the shop drawings will be returned to the Contractor with the Consultant's comments. Four final (4) copies of Shop drawings shall be submitted to the Consultant for final review and direction to proceed. All final Shop drawings are to be stamped, signed and dated by a professional engineer licensed to practice in the province of Ontario. Direction to proceed from the consultant is required prior to production of any component. The Company will not accept claims for any additional production of materials that proceed prior to receiving direction to proceed from the Consultant.

ARTICLE SC45 – CCTV Inspection

The Contractor will be required to satisfy the City's requirements for CCTV Inspection.

ARTICLE SC46 – Dewatering

The Contractor shall include all necessary costs of dewatering in order to complete the works as proposed under this contract. The Contractor should familiarize themselves with the geotechnical reports and hydrogeological reports available for review from the Consultant's office.

ARTICLE SC47 – Temporary Stockpiling and Testing

The Company reserves the right to have sufficient time to undertake the necessary testing of the temporary stockpiles to determine the nature and classification of the materials.

ARTICLE SC48 – Extras

As per previously mentioned terms of this agreement.

ARTICLE SC249 – Transfer of Electronic Data

Electronic data shall only be provided to the Contractor upon execution of an agreement for the transfer of Electronic Data.

The Contractor understands that the use of the Electronic Data transmitted is intended for conceptual review purposes only. It is expressly not intended for and should not be used as a substitute or replacement for standard construction design or as-built documents, or for any purpose that would customarily rely upon such original hard copy documents.

Electronic data includes, but is not limited to, Building Information Modelling (BIM) files, and Computer-Aided Design (CAD) files, including native 2D and 3D file formats (RVT, RFA, NWC, NWD, NWF, DWF, DWFx, DWG, DGN, IFC, DXF as examples), files produced by word processing, spreadsheet, scheduling, data base, and other software programs. The electronic data may be provided in an original format produced by WSP or an alternate, “translated” format as requested.

ARTICLE SC50 -Documents Required from the Contractor

1. Prior to Commencement

- d) Certified copies of the Contractor's insurance.
- e) WSIB Certificate showing the Contractor is in good standing.
- f) A project schedule.

2. For Progress Payments

- g) The Contractor's Payment Certificate (quantities to be reviewed by Consultant prior to submission).
- h) Certificate of Clearance from the Workers' Compensation Board.
- i) Documentation to substantiate payment of extra work including payroll burden, overhead and profit.
- j) Statutory declaration.
- k) Invoice.
- l) Copy of needed surveys as determined by the Consultant.

3. Prior to Statutory Holdback Release

- f) Certificate of Clearance from the Workers' Compensation Board.
- g) A Statutory Declaration that all financial liabilities incurred by the Contractor have been paid and that there are no liens, garnishees, attachments or potential claims relating to the work.
- h) A copy of the Certificate of Substantial Performance advertised in a construction trade newspaper.
- i) A letter stating that the Contractor is in agreement with all final contract quantities paid to date and that no further claims will be made.
- j) All outstanding surveys and as-built information as determined by the Consultant.

4. Prior to Final Acceptance of Work

- c) A Statutory Declaration as in (3b).
- d) A Letter of Release from Contractor as in (3d).

ARTICLE SC51 - Noise, Mud and Dust Control

The Contractor shall establish and maintain site procedures such that noise levels from construction activities are in accordance with local bylaws.

The Contractor shall undertake all dust control measures required to prevent dust nuisances caused by construction activities both on site and on adjacent roads. The cost of these control measures shall be included in the price provided within the Pricing Schedule.

ARTICLE SC55 - Measurement of Quantities

Payment for all items shown as PQM (Plan Quantity Measurement) will be based on Pricing Schedule Plan Quantities and will not be measured in the field unless design drawings for that item are altered.

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Not used

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9.0 PIPE BEDDING

9.1 Materials

9.2 Placing

10.0 BACKFILLING

11.0 PAYMENT

11.3 Excess Excavation

PROJECT SPECIFICATION NO. 5 - WATER DISTRIBUTION SYSTEM

2.0 MATERIALS

3.0 CONSTRUCTION

3.1 General

- 3.5 Connections to Existing Watermains
- 3.7 Anchorage of Pipes, Fittings, and Hydrants
- 3.9 Valve Boxes
- 3.10 Valve Chambers
- 3.11 Hydrants
- 3.12 Service Connections
- 4.0 HYDROSTATIC TESTS AND FLUSHING
- 4.3 Allowable Leakage
 - 4.3.1. Swabbing
 - 4.3.2 Disinfection
- 4.4 Flushing
- 5.3 Bacteriological Tests
- 7.0 PAYMENT
- 7.1 Watermains

PROJECT SPECIFICATION NO. 6 - SEWERS AND APPURTENANCES

- 2.0 *MATERIALS*
- 2.1 Sewer Pipe
- 2.3 Manholes
- 2.4 Catchbasins
- 2.5 Pipe Bedding
- 3.0 CONSTRUCTION
- 3.2 Pipe laying

- 3.6 Sewer Laterals
- 3.7 Manholes
- 3.8 Catchbasins and Catchbasin Leads
- 4.0 TESTING
- 4.2 Procedure
- 4.3 Allowable Limits
- 5.0 MEASUREMENT
- 6.0 PAYMENT
- 6.3 Maintenance Holes
- 6.4 Catchbasins
- 6.9 Testing
- 7.0 SILTATION CONTROL DEVICES

PROJECT SPECIFICATION NO. 7 - ROADS, CURBS AND SIDEWALKS

- 3.0 CONSTRUCTION
- 3.1 Road Base, Driveways, Parking Areas and Sub-Base
- 32. SUB-BASE**
- 3.2 Asphaltic Pavement
 - 3.2.1 Joints Between Existing and Proposed Asphalt
 - 3.2.3 Joints Between Existing Base Asphalt and Proposed Asphalt
 - 3.2.4 Adjustments to Manholes, Valve Chambers and Catchbasins
- 4.0 MEASUREMENT
- 5.0 PAYMENT
- 5.1 Road Base, Sub-Base and Asphaltic Pavement
- 5.2, 5.3 Maintenance Hole Adjustments and Ramping

5.4 Sidewalks

SPECIFICATION NO. 1 GENERAL REQUIREMENTS

1.0 DESCRIPTION

The requirements of this specification shall apply to the Contract as a whole and pertain to all of the Work as specified by the Contract Documents.

2.0 ACCEPTANCE OF SITE

It will be the Contractor's responsibility to visit and examine the site of the Work prior to submitting their RFP response.

Execution of the Contract Documents by the Contractor will imply acceptance of the surfaces and conditions and no claim for damages or extras resulting from such conditions or defects will be allowed thereafter.

3.0 TRAFFIC

Traffic may be restricted on roads, only with the written permission of the appropriate municipal authority. Unless otherwise directed, obtain all required permits. Copies of the permits to be delivered to the Consultant at least 48 hours in advance of occupying the road.

Communicate the details of any traffic restrictions to the local police department, fire department and transit authority.

Provide flagpersons, barricades and road signs in accordance with the requirements of the appropriate authority and to the satisfaction of the Consultant. Flagpersons to be in constant communication visually or by radio.

Maintain safe access for the public. Should any unsafe condition occur, take immediate steps to rectify the situation. If work is not commenced within 24 hours of notification, the Company reserves the right to perform remedial work at the expense of the Contractor.

Construct temporary detours as specified. The details to be as specified by the Consultant and the road authority.

4.0 DISPOSAL SITES

Unless otherwise specified, where the Contractor is required to dispose of timber, trash, debris, boulders, surplus or unsuitable earth etc. off-site, he shall arrange a disposal site at his own expense.

Supply to the Consultant written permission from the Company of the property upon which the material is to be placed and save the Company and Consultant harmless for any claims that may arise from such disposal.

5.0 WEATHER CONDITIONS

Provide adequate means of heating materials and protect the work from damage by frost in freezing weather.

Provide all labour, materials and equipment to remove frozen ground to permit continuation of the work during freezing weather conditions.

Protect existing utilities from freezing and ensure continuity of service when water mains, sewers and service connections are encountered in excavations or when ground cover is removed or reduced during grading operations.

Remove all ice and snow from access, work and storage areas and do not perform any ditching, stripping, excavation or grading before the removal of ice and snow.

6.0 CLASSIFICATION OF EXCAVATED MATERIALS

Excavated material shall be classified as "Rock" or "Earth".

6.1 Rock Excavation

-Material excavated from solid masses of igneous, sedimentary or metamorphic rock which, prior to removal, was integral with the parent mass; and

-Buried boulders, rock fragments or broken concrete refuse which measure, in volume, 1 cubic metre or more.

The removal of pavements, curb and gutter, surface boulders, concrete structures, masonry walls and stone fences shall not be classified as Rock Excavation and shall be removed as specified in Specification No. 2 - Site Preparation.

6.2 Earth Excavation

All materials not described under Item 6.1 above and including dense tills, hard pan and other similar materials.

7.0 BLASTING

Blasting will not be permitted under this Contract without the written approval of the Consultant and other governing authorities.

If the Work under the Contract requires the Contractor to excavate rock by means of blasting the following shall apply:

The Contractor shall comply with all the statutes, regulations, by-laws and orders relating to the supply, hauling, handling, use of, and storing of explosives.

The Contractor shall provide the necessary notices including notification of the Consultant in all cases and Police & Fire Departments when blasting is done within 100 metres from existing

buildings or public roads. Notification shall be at least 24 hours in advance of blasting operations.

Immediately prior to a blast, the Contractor shall clear the blasting area of all vehicular and pedestrian traffic and shall post flagmen on each road or trail entering the blasting area who shall stop all traffic and shall prevent such traffic from entering the area until the blast has taken place. The Contractor shall provide and use a siren to warn the public and the workmen that a blast is to be set off and to indicate the "All Clear" after the blast has taken place. Four short soundings of the siren two minutes before detonation of a blast shall be used for warning and protection, and one long 10 to 15 second sounding of the siren shall be used to give the "All Clear" signal.

The type of explosives, drilling and method of blasting to be used must be authorized by the Consultant. The use of explosives in large blasts, as in seams, drifts, shafts, pits or coyote holes, or in similar devices, is prohibited, unless done on the written authority of the Consultant.

Protective measures shall be used where blasting may damage adjoining property or public utilities.

The Contractor shall be responsible for all damages.

Notwithstanding any direction by the Consultant in regard to explosives, drilling or methods of blasting used, the Contractor shall take all precautions necessary to ensure the safety of persons and adjoining property and structures, including public utilities and shall be responsible for all claims, whatsoever, arising from the hauling, handling, use of, and storing of explosives, and all affects, direct or indirect, of the blasting operations.

No extra payment will be made for protection measures; nor for damages to persons, properties or structures; nor for damages or repairs to public utilities; nor for any claim whatsoever arising from blasting operations. All such costs, shall be included in the Contract Unit Prices for "Rock Excavation".

If specified with Special Conditions under "Independent Testing", the Contractor shall arrange for a "Pre-blasting Survey" of adjacent buildings and structures. This survey shall be carried out by an independent organization, satisfactory to the Consultant.

8.0 MATERIALS AND QUALITY CONTROL

The Company will pay the costs of quality control tests except as noted. The Consultant may approve or reject any materials supplied for the Work in accordance with the Specifications herein. He may request the name and address of the manufacturers supplying materials as well as samples of materials for testing purposes. These shall be supplied at no cost to the Consultant or the Company.

When requested by the Consultant, provide an affidavit from the Manufacturer that materials are in accordance with the specifications before delivery of the materials.

When a specific item or material is required, the manufacturer and catalogue number will be specified in the Contract documents.

Replace materials that do not satisfy the specification, at no cost to the Company.

Pay for additional testing required due to failure to meet specifications.

9.0 INDEPENDENT TESTING AND INSPECTION

9.1 Testing Companies

Testing companies commissioned for the performance of tests shall be independent of the Contractor or Suppliers of products or materials to be tested and/or inspected. The selection of testing companies will be subject to approval the Consultant.

9.2 Reports

Testing and inspection reports shall be submitted directly to the Consultant with copies to the Contractor and the Company.

9.3 Payment

The cost of repeat tests, until satisfactory results are obtained will be at the expense of the Contractor.

9.4 Required Tests

Tests and/or inspections to be carried out by independent testing companies are listed elsewhere in the contract and may include: Compaction; Gradation; Concrete and Asphalt.

10.0 LIMITS OF CONTRACT

Confine work to the limits or boundaries shown on the Contract Drawings or as otherwise specified. The Contractor shall protect all existing trees where possible and shall make his own arrangements for working on private property.

11.0 EXISTING STRUCTURES AND UTILITIES

Examine the location of the Work and make such enquiries necessary to determine the existence and location of structures and utilities, both above and below ground which may be in the line of the Work or affected by construction operations.

Existing structures and utilities shown on the drawings are for information only and the Consultant will assume no responsibility for completeness or accuracy.

The Contractor shall be responsible for adequately protecting all existing utilities and services and for permanently supporting utilities which are affected by work to be done under this Contract. The Contractor shall be responsible for any damages caused to existing utilities during construction. The Contractor shall arrange for all field stakeouts of existing utilities and will expose any utility deemed necessary by the Consultant.

Satisfy the requirements of the utility authorities including the railways, regarding location, stakeouts and construction activities in the proximity of the utility or railway.

12.0 RELOCATION OF EXISTING STRUCTURES AND UTILITIES

Existing structures and utilities which are known to require permanent realignment or relocation will be completed at no cost to the Contractor except when specified otherwise.

Do not interfere with the work of utility or railway companies, their Contractor or agents and provide reasonable co-operation and schedule the work accordingly.

Other structures or utilities encountered during the progress of the work which require permanent relocation shall be relocated by the Owner of the structure or utility, or if agreed, the Contractor shall carry out the work. The Contractor shall not be entitled to claim any damages or extra compensation for any delay due to such removal or rearrangement.

13.0 TEMPORARY RELOCATION OR SUPPORT

Temporary relocation of structures or utilities will be completed by the Contractor or arranged by him with the Utility at the contractors expense.

Provide temporary support for utilities crossing the excavation. Construct supports as detailed on the Drawings.

14.0 EXISTING DRAINAGE

Maintain the flow in existing pipes, conduits, ditches and watercourses. Where this is not feasible, alternative arrangements must be approved by the Consultant.

15.0 MUNICIPAL REQUIREMENTS

Without altering the intent of the Contract Documents all work is to be done to the satisfaction of the Local Authorities for the Municipality where the Work is performed. Acceptance of the Work will be subject to receipt of approval by the aforementioned Municipal Authorities.

16.0 ONTARIO MINISTRY OF TRANSPORTATION (M.T.O.) STANDARDS

When specified that work shall be completed in accordance with M.T.O. standards, the words "the Consultant" shall be substituted for "the Ministry". Payment information in M.T.O. forms shall not apply to this Contract.

17.0 SURVEY MONUMENTS

The Contractor shall protect and maintain all monuments, bars, pins, stakes, markers and such survey points as may be placed by the Consultant or Land Surveyors and they shall be at all times made accessible to the Consultant. The Company shall have the right to charge the Contractor for the reinstatement of any such survey points if they have been removed, damaged, buried or otherwise rendered unusable by the Contractor or his agents. No charge shall be made for any survey points which, in the opinion of the Consultant, have to be moved or reinstated in order to construct the works.

Prior to commencing work, the Contractor shall mark all survey bars identified by the Consultant with a minimum of two 50 mm x 50mm x 1200 mm brightly, painted wooden stakes.

18.0 TEMPORARY FACILITIES

The Contractor shall provide, at his own expense, such temporary facilities as outlined and specified in the Special Conditions of the Contract.

19.0 FINAL MEASUREMENTS AND ADJUSTMENTS

19.1 Unit Price Items

When a unit price is submitted, the Contract quantity will be adjusted in accordance with the final measurements, unless otherwise specified. Final prices will not be adjusted for measurements under 1.0 m. Supplier's weigh tickets shall be provided when requested by the Consultant.

19.2 Lump Sum Price

When a lump sum price is submitted, it shall be payment in full for the items as detailed. Additions, deletions and design changes will be negotiated at the time of installation.

19.3 Claims for Anticipated Profit

As per previously mentioned terms of this agreement.

19.4 Claims for Interest

The Contractor shall not be entitled to claim, demand or receive any interest upon any invoice for work done on account of delay in the approval of the Work by the Consultant.

20.0 PAYMENT

Except where specifically noted, payment for work under this section shall be included in the Contract Price and no extra compensation will be made for any labour, materials, consumables or equipment necessary to fulfill the requirements of this specification in completing the Work of the Contract.

21.0 EQUIPMENT RENTAL

If the Consultant directs or otherwise authorizes the Contractor in writing to undertake additional work consisting of rental of equipment at the rates set out in the Schedule of Additional Unit Prices and if "standby time" is authorized by the Consultant the following shall apply:

- a) "Standby Time" means any period of time which is not considered working time and which together with the working time does not exceed 10 hours in any one working day and during which time a unit of equipment cannot practically be used on other work but must remain on the site in order to continue with its assigned task and during which time the unit is in fully operable condition.
- b) The contractor shall be reimbursed for the standby time of owned and rented equipment at one-third the O.P.S.S. 127 rate, less any discount rate agreed upon in the contract.

- c) In addition, the cost of labour, the wages, salary and payroll burden of the operator or operating crew who cannot be otherwise employed during the standby period, will be paid.
- d) "The 127 Rate" means the rate for a unit of equipment as listed in O.P.S.S. 127 (Schedule of Rental Rates for Construction Equipment) which is current at the time the extra work is carried out or for equipment which is not so listed, the rate which has been calculated by the Consultant, using the same principles as used in determining the O.P.S.S. 127 rates.

22.0 WORK SCHEDULE

The Contractor shall:

- a) Prepare and submit to the Company and the Consultant prior to the first application for payment, a construction schedule that indicates the timing of the major activities of the Work and provides sufficient detail of the critical events and their inter-relationship to demonstrate the Work will be performed in conformity with the Contract Time;
- b) Monitor the progress of the Work relative to the construction schedule and update the schedule on a monthly basis or as stipulated by the Contract Documents; and
- c) Advise the Consultant of any revisions required to the schedule as the result of extensions of the Contract Time as provided in Part 6 of the General Conditions - Changes in the Work.

SPECIFICATION NO. 2

SITE PREPARATION

1.0 DESCRIPTION

The work covered by this specification shall include the supply of all labour, materials, consumables and equipment, excavation, control of ground and surface water, backfill and compaction to complete the clearing of vegetation, grubbing, stripping of topsoil and the removal of existing structures as specified.

The Contractor shall include everything required and necessary to complete the work notwithstanding that every item may not be specifically mentioned.

1.1 Clearing

Clearing shall consist of cutting off at the specified height all saplings, trees, brush and other vegetation within the designated area and the disposal of timber, brush, windfalls and other surface litter.

1.2 Grubbing

Grubbing shall consist of the removal and disposal of all stumps, roots, embedded logs, wood chips, surface boulders and all debris from the designated areas.

A surface boulder is defined as a boulder, rock fragment or rubble less than 1 m³ in volume which can be removed without requiring excavation to facilitate such removal.

Surface boulders, boulders in piles and stone fence rows shall be considered as debris and grubbing shall include their removal and disposal.

1.3 Stripping

Stripping shall consist of the removal of existing surface topsoil from the designated areas. Topsoil is that soil which in the opinion of the Consultant is suitable for the growth of future vegetation.

1.4 Structures

Removal of existing structures shall consist of items such as pavement, curbs, sidewalks, buildings, concrete structures, masonry walls, tanks, pipes, etc., which are designated to be removed or partially removed.

2.0 CONSTRUCTION

2.1 Clearing

Remove trees, shrubs and vegetation as specified on the Drawings. Protect from injury all trees, shrubs and vegetation designated to be preserved during construction operations in the manner specified.

Cut trees to a height of 0.5 metres above the surrounding ground and fell toward the centre of the area to be cleared. Where trees cannot be felled without danger to traffic or injury to other trees, structures, or property, they shall be cut in sections from the top down.

Disposal of tree products shall be the responsibility of the Contractor unless otherwise specified.

2.2 Grubbing

Disposal offsite, of grubbed material shall be the responsibility of the Contractor, unless otherwise specified.

Obtain permits and satisfy all requirements of the authorities having jurisdiction prior to any burning operations.

Level all areas where clearing and grubbing has been completed. Topsoil or seeding will not be required unless otherwise specified.

2.3 Stripping

Remove topsoil from the designated area. When constructing roads remove topsoil for the full width of the road allowance less 600 mm.

Remove topsoil and all organic material for its full depth and retain in designated stockpile areas after clearing and grubbing and before any other construction activity to prevent contamination with subsoil.

Locate and construct stockpiles to prevent ponding of water.

2.4 Removal and Disposal of Existing Structures

Carry out demolition in such a manner so as not to disturb adjacent pavement, utilities or other works to be left in place and to protect materials designated to be salvaged.

Material other than salvage shall become the property of the Contractor and shall be removed from the site unless otherwise specified.

Deliver salvage material, and stockpile without undue damage in the location designated by the Consultant.

Backfill excavations with native material and compact to a minimum density of 95% Standard Proctor density.

Square off broken edges of pavements sidewalks, curbs, etc. in a manner satisfactory to the Consultant.

2.5 Approval

Contractor shall provide the Consultant with a letter from the Company of the property upon which the excavated material shall be disposed giving written permission for the disposal of the noted material.

3.0 MEASUREMENT

Area measurements will be made in horizontal planes.

3.1 Clearing

Unless otherwise specified, measurement will be by general area.

3.2 Grubbing

Unless otherwise specified measurement will be by general area. Depth of material to be removed by grubbing operation will be as specified and will not be measured.

3.3 Topsoil Stripping

Unless otherwise specified topsoil stripping will not be measured but will be based on a volume calculated by area times average topsoil thickness to be agreed by the Contractor after reviewing soils data.

3.4 Existing Structures and Utilities

Measurement as specified in the Schedule of Contract Unit Prices.

4.0 PAYMENT

Payment at the contract price(s) for clearing, grubbing, stripping topsoil and the removal of existing structures shall be compensation in full for supplying all labour, equipment, excavation, backfill, materials and everything necessary to complete the works as specified.

4.1 Clearing and Grubbing

Clearing and grubbing may be issued for pricing as separate items or may be combined into a single item including both operations as specified in the Schedule of Contract Unit Prices.

The prices provided shall include:

- (a) disposal off the project site of all timber, brush, stumps, logs, surface boulders and debris.
- (b) backfill and grading as specified.

4.2 Topsoil Stripping

The price provided shall be compensation in full for stripping and stockpiling topsoil in the designated areas.

4.3 Existing Structures and Utilities

Payment at the specified price as listed in the pricing schedule for removal of existing structures and utilities shall include delivery of the salvage to the specified location, disposal off the contract site of all other material, backfilling and grading as specified.

Payment will be made only for those existing structures and utilities itemized in the Schedule of Contract Unit Prices. All other existing structures and utilities shall be considered debris and removed and disposed of as part of the grubbing operation and no separate payment allowed.

SPECIFICATION NO. 3 GENERAL GRADING AND EARTHWORK

1.0 DESCRIPTION

The work covered by this specification shall include the supply of all labour, material, consumables and equipment to do all the excavation, grading and filling with earth required for the execution of specified grading and earthworks. This specification does not cover rock fills. "Rock Excavation" as defined in Specification No. 1, General Requirements, is not considered part of this Specification and is covered in Specification No. 4, Excavation and Backfill.

Unless otherwise specified, prior to commencing work the Contractor shall verify the rough grading earthwork quantities either by taking their own cross-sections or by reviewing the Consultants cross-sections. Claims for discrepancies in earthwork quantities will not be considered.

All cutting and filling shall be performed in such a manner to avoid flooding or ponding of water on the site or any adjacent properties. Surface drainage shall be provided during all stages of the work and fill materials placed as soon as possible to prevent ponding in sub-excavated areas.

Provide temporary support for any existing structures and utilities affected by the work as specified in Specification No. 1 - General Requirements.

2.0 CONSTRUCTION

2.1 Rough Grading

Excavate, fill and compact to the specified subgrade elevations and cross-sections over all road allowances and areas designated for area grading. Fill material shall be approved by the Consultant and contain no frozen lumps, topsoil, organic materials or other objectionable matter.

Fill material on lots designated for area grading will not require compaction other than that resulting from normal filling, spreading and earthwork operations. Compact all other areas designated to 95% Standard Proctor Density, unless otherwise specified.

If the subgrade soil conditions are unsuitable, additional excavation may be required. Any excavated material not suitable, or not required for the purpose of filling or grading shall be spread or stockpiled in designated areas within the site or hauled away from the site as directed by the Consultant.

Place and compact material obtained from areas to be excavated or imported material in low areas and fill to required subgrade elevations. Transport material from the specified borrow area when insufficient cut material is available.

Should the Contractor erroneously excavate below the subgrade elevations he shall backfill such excavation with approved material and compact to 95% Standard Proctor Density at no cost to the Company.

Where specified, cut roadside and other drainage ditches including culverts during rough grading operations so as to provide satisfactory drainage of the subgrade at all times.

Place culverts of the sizes and gauges shown in the Schedule of Contract Unit Prices where indicated on the Drawings. Unless otherwise specified, culverts shall be carefully bedded on a minimum thickness of 150 mm of well-compacted granular material, and backfilled with well-tamped granular material for a width of 150 mm on each side of the culvert and to a minimum depth of 150 mm above the culvert. Backfill and compact the remainder of the trench with material containing no stones larger than 150 mm in diameter and in layers not exceeding 300 mm in depth.

Rough grading elevations shall be achieved within a tolerance of 50 mm. In addition, deviations from specified grades within the required tolerance shall be random so that no surplus or deficit of material results on any individual lot.

2.2 Fine Grading

Fine grade, shape and compact the rough subgrade to the specified grade and cross-section. Unless otherwise specified, compact to 95% Standard Proctor Density.

Finished surfaces shall not deviate more than 25 mm from the specified grades and cross-sections. The deviation, within the specified tolerance, shall be random.

Maintain the specified grade, cross-sections, tolerances and compacted density until the work is accepted or until the construction of the granular base, when this work is a part of the Contract.

No ruts or depressions shall be allowed to form in the compacted subgrade and all traffic must be kept off the subgrade where possible until the sub-base is applied.

3.0 MEASUREMENT

3.1 Rough Grading

Unless otherwise specified, no measurement of earthworks will be made.

Culverts and drainage ditches, where specified for payment, will be measured on a linear metre basis.

3.2 Fine Grading

No measurement of areas requiring fine grading will be made.

4.0 PAYMENT

4.1 Rough Grading

The stipulated sum provided within the Pricing Schedule for Earthwork and Grading shall be compensation in full for all labour, material, consumables and equipment to do all excavation, transportation, filling and compaction, control of surface and ground water to complete rough grading.

The stipulated sum provided within the Pricing Schedule for Earthwork and Grading shall also be compensation in full for stripping and stockpiling topsoil as outlined in Specification No. 2.

The stipulated sum provided within the Pricing Schedule for Earthwork and Grading shall also include the cost of locating an offsite dump area for excess material and/or locating an offsite burrow area should imported fill be required.

Where specified, payment for drainage ditches and culverts shall be at the price provided within the Pricing Schedule in the Schedule of Contract Unit Prices.

4.2 Fine Grading

The price provided within the Pricing Schedule shall be compensation in full for all labour, material, consumables, and equipment to do all excavation, filling and compaction, control of surface and ground water to complete the fine grading.

SPECIFICATION NO. 4 EXCAVATION AND BACKFILL

1.0 DESCRIPTION

The work covered by this specification includes the supply of all labour, materials, consumables and equipment for excavating and backfilling of trenches for pipes, conduits and appurtenances.

The work includes but is not limited to the following; sheet piling, sheathing, shoring and bracing; installation and operation of all equipment required for dewatering excavations and control of ground and surface water; protection and supporting of existing structures and utilities; removal of all debris and surplus material; compaction of the backfill, rough grading and restoration of surfaces; maintenance of existing travel on streets and roads and access to private and public property and each and everything required to complete the work as specified. Comply with safety requirements of the Federal and Provincial Governments and of the local municipal authority.

2.0 EXCAVATION FOR STRUCTURES

2.1 Depth

The excavation to the bottom of the foundation or the underside of the working mat when a working mat is permitted.

Remove material deemed unsuitable at the bottom of an excavation to a depth determined by the Consultant, and backfill with approved material.

Backfill and compact excessive depth with approved material at no additional cost to the Company unless the removal is authorized by the Consultant.

2.2 Length and Width

Provide sufficient horizontal dimensions to permit adequate space to safely complete the structure, place and remove any formwork required.

3.0 TRENCH EXCAVATIONS

3.1 Alignment and Depth

Excavate trenches to the alignment and depths specified on the contract drawings for the class of pipe bedding specified and only so far in advance of pipe laying as permitted by the Consultant.

Where, in the opinion of the Consultant, the material at the bottom of the trench is unsuitable to receive the pipe bedding, excavate to a depth as deemed necessary by the Consultant and backfill with an approved material.

In the event that the trench is over excavated without the authorization of the Consultant, fill and compact the excavation to the correct grade with an approved material without compensation.

3.2 Trench Width

The trench width shall be measured at a height of 300 mm above the top of the pipe.

For parallel pipe installations the trench width shall be measured in a horizontal plane 300 mm above the top of the higher pipe.

When sheathing is required the trench width shall be the inside face to inside face of the sheathing.

Refer to the Project Specifications or drawings for maximum and minimum trench widths.

Should the Contractor excavate wider than specified, the Consultant may require the use of stronger pipe, a higher class of bedding, or both, supplied and installed without compensation.

4.0 DEWATERING

4.1 Equipment

Supply all necessary equipment required to keep excavations and trenches free from both ground and surface water.

4.2 Disposal

Dispose of water removed from excavations and trenches in such a manner so as to prevent injury to public health, damage to private or public property, or to any work under construction. Obtain all required permits for dewatering.

When deemed necessary by the Consultant, construct sedimentation ponds of sufficient size to remove sand and silts from the water before directing it to adjacent lands or watercourses. Outfall pipes shall be installed in such a manner as to prevent erosion of dykes, stream banks or slopes.

5.0 EXISTING PAVEMENTS

5.1 Size of Excavation

When the excavation is adjacent to existing pavements, structures or utilities employ sheathing and shoring or any other means as deemed necessary by the Consultant to keep the disturbed area to a minimum.

Road crossing shall be by vertical trenching unless permitted otherwise by the Consultant and the Governing road authority.

Employ methods to assure breaking of pavement along straight lines having a vertical face.

6.0 SUPPORTING OF EXCAVATIONS

6.1 Installation

Provide, install and maintain in good condition sheet piling, sheathing, shoring and bracing in accordance with Safety Regulations as may be required, due to ground conditions, limited working areas, adjacent utilities and structures, road crossings, methods of operation or when directed by the Consultant.

Fill and compact voids behind sheathing with an approved granular material or native material when permitted by the Consultant.

6.2 Removal

Construct sheathing and shoring in such a manner as to permit the removal without injury to the work, adjacent structures, utilities or pavements.

Remove sheathing, shoring and bracing as the excavation is backfilled except when the Consultant orders it left in place or when the Contractor requests to leave the same in place and the request is approved by the Consultant.

Remove sheathing and shoring in such a manner as to prevent the "caving in" of the excavation during backfilling operations.

Fill and compact cavities caused when sheathing is removed.

Cut off shoring left in place at least 1 m below the final ground surface unless instructed otherwise by the Consultant.

6.3 Responsibility

The right of the Consultant to order sheet piling, sheeting, shores, bracing, etc., left in place in the Work, or to order the use of same or to order a better quality or larger size of material does not relieve the Contractor of any of their obligations under this Contract, or relieve him of liability for damage to persons or property resulting from their failure to use or to leave in place sufficient sheeting, shoring, etc., to prevent any caving or moving of the ground, or resulting from any other negligence in the carrying out and final completion of the Work.

7.0 EXISTING UTILITIES AND STRUCTURES

Existing utilities and structures which are to remain in place shall be protected, supported or relocated as specified in Specification No. 1 - "General Requirements".

8.0 FROZEN GROUND MATERIAL

The replacement of frozen material with suitable material is the Contractor's responsibility under the Contractor's bid price.

Frozen ground shall not be opened further in advance of construction than one day's underground installation. Wherever possible, frozen excavated materials shall be separated from unfrozen material.

Backfilling shall be carried out using unfrozen material. The frozen material may then be mounded over the trench. Particular care shall be taken to prevent frozen materials from being buried around manholes.

9.0 PIPE BEDDING

9.1 Materials

Pipe bedding shall be supplied as specified on the contract drawings.

Materials used for bedding shall conform to Specification No. 8 - "Concrete" and Specification No. 9 - "Granular Materials".

9.2 Placing

Granular bedding shall be compacted underneath, beside and over the pipe to 98% Optimum Dry Density.

In the event that concrete bedding is specified the Contractor must use solid concrete blocks to support the pipe prior to placing the concrete. The compressive strength of the blocks shall be at least equivalent to that of the concrete bedding. Sufficient blocks shall be supplied and placed in such a manner to prevent movement of the pipe while placing the concrete bedding.

Concrete used for bedding shall be placed in two lifts if necessary. The level of the first lift shall not exceed 80 mm above the bottom of the pipe. The second lift shall be placed immediately after the initial wet of the first lift.

When concrete bedding is specified in rock trenches, separate the concrete from the rock by a compacted cushion of approved granular material, of at least 75 mm thickness, under the concrete bedding as well as both sides. As an alternate, 50 mm of rock deteriorating styrofoam may be placed on the sides.

When concrete bedding is placed against sheathing, a bond breaking material shall be placed between the sheathing and the concrete to permit removal of the sheathing.

10.0 BACKFILLING

10.1 Materials

Native material can be used for backfilling excavations and trenches except when otherwise specified or when the excavated material is deemed unsuitable by the Consultant.

Native material used for backfill shall consist of earth which is free of topsoil, trash, debris, boulders exceeding 300 mm or any other deleterious materials. No boulders exceeding 150 mm shall be placed in the top 300 mm of the backfill.

Stones over 50 mm will not be permitted to be placed within 300 mm of the pipe structure.

When rock is permitted as a backfill material, protect the pipe by a minimum of 450 mm of compacted material above the top of the pipe. This material shall be native material or granular as specified and free from stones exceeding 50 mm in diameter.

When granular material is specified as backfill or when ordered by the Consultant, it shall conform to the requirements of Specification No. 9 - "Granular Materials".

Do not backfill with frozen material without permission from the Consultant.

10.2 Placing

Place backfill against the pipe in such a manner so as to prevent any damage or movement.

Place backfill in uniform layers not exceeding 300 mm in thickness loose measurement. Compact each layer to 95% standard proctor maximum dry density.

Maintain backfill at uniform layers on each side of pipes and around structures.

Surplus excavated material may be disposed of in fill areas within the contract limits as directed by the Consultant and subject to the requirements of Specification No. 3 - "General Grading and Earthwork".

Any deficiency of backfill material shall be supplied by the Contractor and must meet the approval of the Consultant.

Correct any settlement occurring after backfilling without compensation.

No stub connections shall be backfilled until the Consultant has verified the locations and elevations at both ends and has given their written authorization to backfill.

10.3 Restoration of Surfaces

Surface areas disturbed during the construction operations are to be restored as specified.

11.0 PAYMENT

11.1 General

Unless otherwise specified, with the exception of rock, the payment for excavation of all materials encountered, dewatering, sheathing and shoring, for supplying, placing and compacting bedding and backfill, for supporting existing structures and utilities, maintaining traffic and access during construction, removing excess excavated material, restoring surfaces, shall be included in the price provided within the Pricing Schedule for supply and installation of pipes and structures.

11.2 Rock Excavation

Additional payment will be made for "Rock Excavation" as defined in Specification No. 1 - "General Requirements". The price provided within the Pricing Schedule shall include disposal outside the contract limits. Measurement will be made as follows:

- a) Maximum trench width or actual width of trench whichever is the smaller.
- b) Outside dimensions of structures plus a 300 mm envelope around the structure.
- c) Actual volume of boulders as determined by the product of the three maximum dimensions.
- d) No payment will be made for rock removed outside of the specified limits. No duplicate payments will be made for rock excavation.
- e) If blasting precedes the stripping of overburden, the Contractor shall accept the Consultant's estimate as to the elevation of top of rock.

11.3 Excess Excavation

When the Consultant instructs the Contractor to carry excavations below the specified depth to obtain a satisfactory foundation the volume of material excavated will be determined by the Consultant and payment made according to the Schedule of Contract Unit Prices.

The Price for excavation shall include the disposal of the material.

The Contractor shall provide material as specified by the Consultant to backfill the sub-excavation. Price provided within the Pricing Schedule will be full compensation for supplying, placing and compacting the material.

11.4 Sheathing and Shoring

Sheathing and shoring which is left in place on the instructions of the Consultant will be paid for at the provided within the Pricing Schedule price.

Payment will be made only for the actual length left in the ground, except where the cut-off is less than 1.3 metres when this length will be included for payment.

11.5 Backfilling

When granular material is specified for backfill, the supply, placing, compacting and removal of native material shall be included in the price provided within the Pricing Schedule for the installation of pipes and structures.

When the Consultant deems the native material unsuitable for backfill the Contractor shall supply, place and compact imported material at the price provided within the Pricing Schedule. The price provided within the Pricing Schedule shall include disposal of the unsuitable material outside the Contract limits.

Any shortage of backfill material due to the Contractor's method of operation shall be supplied and placed by the Contractor at no additional cost to the Company.

11.6 Frozen Ground Conditions

No extra payment shall be made to the Contractor should he encounter frost difficulties. The cost of such work shall be included in the Contractor's bid price for underground construction.

SPECIFICATIONS NO. 5 WATER DISTRIBUTION SYSTEM

1.0 DESCRIPTION

The work consists of the supply of all labour, materials, consumables, and equipment for the installation of watermains, fittings, valves, valve boxes, valve chambers, service connections, blowoffs, hydrants and appurtenances necessary for the complete construction, flushing and testing of the water distribution system as detailed on the Contract Drawings and as specified. Include everything requisite and necessary to properly complete the entire system, notwithstanding that every item may not be specifically mentioned.

When required in the Project Specifications disinfect the system as specified.

2.0 MATERIALS

Materials shall meet the requirements as specified herein.

Materials shall be of the kind, type, size and class as specified on the engineering drawings.

All fittings such as tees and elbows to be supplied in classes compatible with the pipe.

2.1 Ductile Iron Pipe

Ductile Iron Pipe to conform to AWWA C151 (ANSI A21.51) (CSA B131.13) standard lengths.

Push-on or mechanical joints to conform to AWWA C111 (ANSI A21.11) (CSA B31.10).

Cement Mortar lining to be standard thickness in accordance with AWWA C-104 (ANSI A21.4).

Electrical conductivity □ a low resistance electrical connection to be provided at each joint.

2.2 Concrete Pressure Pipe

Pipe and joints for prestressed concrete, steel cylinder type pipe to conform to AWWA C301.

Pipe and joints for non-cylindrical reinforced concrete pressure pipe to be in accordance with AWWA C302.

Pipe and joints for reinforced concrete pressure pipe, steel cylinder type, pretensioned to meet the AWWA C303 requirements.

Suitable flanged or threaded connections for mounting of valves or for branch lines to be as specified.

Welding/grouting sequence for welded joints to be submitted to the Consultant for review.

2.3 Polyethylene (P.E.) Pipe

Polyethylene pipe material to be in accordance with ASTM D1248.

Polyethylene pipe to be manufactured in accordance with CSA B137.

Joining of pipe to be accomplished by the butt fusion method.

Where required, flanged connection will be as specified.

2.4 Polyvinyl Chloride (PVC) Pipe

P.V.C. pipe in sizes 100 mm through 300 mm to conform to AWWA C900.

Unless specified otherwise, PVC 1120 pipe with a DR=18, pressure class of 1035 kPa at 23°C to be used. Wall thickness to conform to cast iron (CI) outside diameter (OD).

Pipes to have integral wall-thickened bell ends. Joining to be accomplished by using rubber rings conforming to ASTM D3139.

2.5 Fittings

Ductile iron fittings to conform to AWWA C110 (ANSI A21.10) with 1724 kPa pressure rating.

Joints to conform to AWWA C111 (ANSI A21.11) - push on or mechanical joint.

Where fittings are used with ductile iron pipe electrical conductivity must be provided.

2.6 Gate Valves

Gate valves to be iron body, bronze mounted, double-disc type, double faced and sealed, non-rising stem, conforming to AWWA C500.

Valve ends to be mechanical joint □ AWWA C111 (ANSI A21.11).

Minimum safe working pressure 1035 kPa.

Direction of opening - as specified in Project Specifications.

Operating nut - as specified in Project Specifications.

2.7 Butterfly Valves

Butterfly valves - as specified in Project Specifications.

2.8 Valve Boxes

Round, cast iron, 2 piece adjustable slide or auger type with lift out cover.

Upper section - minimum diameter 110 mm.

Adjustment - minimum ± 150 mm - overlap at full extensions shall be at least 150 mm.

Lower section - completely enclose bonnet of valve with guide plate attached to valve.

Markings - as specified.

2.9 Valve Chambers

- Covers
- grey cast iron - ASTM A48 (Class 30)
 - machined bearing surfaces
 - centre lift-out plug, minimum dia. 110 mm.
 - pattern as specified.

Ladder rungs, aluminum type 6061 T4 alloy - CSA HA.5

Valve Chamber adjuster rings (Moduloc) ASTM C478.

Mortar as per Specification No. 8 - Concrete.

Precast Sections - ASTM C478

Gaskets - ASTM C443

2.10 Hydrants

- Hydrants
- AWWA C502
 - two piece barrel
 - compression type valve
 - break away flange placed 50 mm above finished grade.
 - mechanical joint inlet connection
 - self draining barrels.

Valves -as specified in Section 2.7

Valve box - as specified in Section 2.9

Nozzles and Threads - as specified.

Colour - as specified.

2.11 Service Connections

This specification applies to services 19 mm to 51 mm in diameter.

Diameter - as shown on drawings.

Pipe - seamless copper tubing ASTM B \square 88, Type "K"

Main stops - AWWA C800 - copper flange outlet

Curb stops and fittings - AWWA C800 copper flange joints

Curb boxes

- curb box extension limits as specified
- threaded cover, bronze centre plug
- "water" cast into top of cover
- curb boxes in sidewalks shall be supplied with frost rings.

Extension rods

- fasten to top of curb stop with corrosion resistant pin
- top of rod - 150 mm to 450 mm below grade.

2.12 Pipe Bedding

Pipe bedding shall be as specified.

3.0 CONSTRUCTION

3.1 General

Excavation and backfill shall be in accordance with Specification No. 4 - Excavation and Backfill.

Place watermains and service connections at elevations which will ensure depth of cover specified.

The depth of cover is defined as the height from the top of the watermain to the finished grade shown on the drawings.

3.2 Pipe Laying

Lay pipes with bell ends facing in the direction of laying.

Lay and join pipes and fittings in accordance with manufacturer's instructions and as specified herein.

Lower material into the trench so that the material, protective coatings and linings are not damaged. Pipes and fittings shall not be dropped or dumped into the trench.

Watermains shall be laid true to line and grade within the following tolerances:

Plan dimensions	-	± 150 mm
Elevations	-	± 80 mm

When pipe laying is not in progress the open ends of pipes shall be protected to prevent foreign material and water from entering pipe.

3.3 Pipe Deflection

Pipes may be deflected from a straight line to form a smooth, long radius curve when permitted by the Consultant.

Lay and join pipes and fittings in accordance with manufacturer's instructions and as specified herein.

MAXIMUM PERMISSIBLE APPROX. RADIUS OF CURVE PRODUCED

DEFLECTION PER LENGTH BY SUCCESSION OF JOINTS

Size of Pipe mm	Mechanical Joint mm	Push-On Joint mm	Mechanical Joint m	Push-On Joint m
75	787	457	38	62
100	787	457	38	62
150	686	457	44	62
200	508	457	54	62
250	508	457	59	62
300	508	457	59	62
350	343	457	87	79
400	343	381	87	79

For larger sizes of pipe the deflections shall not exceed the manufacturer's recommendations.

Provide bends to ensure that maximum deflections are not exceeded.

3.4 Cutting Pipe

Cut pipes without damaging the pipe, coating or cement lining and provide a smooth end at right angles to the axis of the pipe.

3.5 Connections to Existing Watermains

Obtain permission from the operating authority before making any connections to an existing water main.

Valves on existing water mains shall not be operated by the Contractor unless approved by the Consultant and the operating authority.

All affected water users shall be notified at least 24 hours in advance of any planned interruption of service.

Swab fittings and pipes placed into the existing line with a solution of chlorine having a minimum strength of 50 ppm.

Take precautions to prevent contamination of the existing system and follow all instructions of the operating authority.

3.6 Assembly of Mechanical Joints

Seat spigot of the pipe in the bell before pressing the gasket into place.

Tighten nuts spaced 180 degrees apart alternately in order to provide equal pressure on all parts of the gland.

Tighten nuts with a "torque-limiting" wrench to the following range:

Size	Torque Range
mm	N.m.
15	54 - 81
20	81 - 122
25	95 - 136
30	122 - 163

3.7 Anchorage of Pipes, Fittings and Hydrants

Anchor pipes, fittings and hydrants to prevent movement.

Place concrete reaction backing or "thrust blocks" between the fitting and undisturbed soil.

Thrust blocks shall transfer the full thrust at test pressure without exceeding the bearing capacity of the soil.

Supply and place concrete in accordance with Specification No. 8 - Concrete. Unless otherwise specified concrete shall be Class "C".

Joints shall be accessible for repair.

Straps, rods or clamps shall be used for bends in the vertical plane and when the soil conditions do not provide adequate bearing.

3.8 Valves

Install valves with the stem vertical at the locations shown on the drawings.

3.9 Valve Boxes

Install valve boxes on all valves where valve chambers are not required.

Centre the valve box over the operating nut with the top at finished grade and the shaft placed vertical.

3.10 Valve Chambers

Construct valve chambers as detailed on the drawings at the locations shown.

Place covers flush with the finished grade so that the centre lift-out plug is plumb over the operating nut.

Construct chambers so that no loads from the structure are transferred to the pipes passing through the walls.

When detailed on the drawings install a drain.

3.11 Hydrants

Install hydrants as detailed on the drawings with the barrel vertical, hose connections parallel with the curb, pumper nozzle, (if specified) facing the curb, and bottom of flange 50 mm above the finished grade.

Connect hydrant to the main by means of a mechanical or push-on joint tee and ductile-iron pipe lead with a valve located as shown on the drawing.

Place clear limestone around the barrel and cover with 6 mil polyethylene to minimize contamination when backfilling.

Limestone - as per Specification No. 9 - "Granular Materials".

3.12 Service Connections

Install service connections as detailed.

Thread main stops 19 mm and 25 mm diameter directly into ductile iron pipe.

Install main stops with the water main under pressure using cutting and tapping equipment recommended by the manufacturer.

Leave main stops in the full open position before backfilling.

Install curb stops at the location specified, being placed vertical with the base resting on a wood block. Leave curb stop in the "off" position.

Place wood marker 5 cm - 10 cm, 1.5 m long at the end of each connection extending to a height of 600 mm above ground. Paint the top 300 mm blue.

3.13 Air Blow-Offs

Install blow-offs at the locations shown on the drawings.

Install fittings, meeting the requirements for service connections as shown on the drawings.

4.0 HYDROSTATIC TESTS AND FLUSHING

4.1 General

Perform tests only in the presence of the Consultant.

Notify the Consultant 48 hours in advance of performing any tests.

Install and backfill service connections, hydrants, thrust blocks, and appurtenances before testing.

Provide all apparatus, material and labour necessary to conduct the tests.

Use only potable water for testing and flushing. Provide potable water if not available from an existing municipal source.

When water is provided by the Contractor it shall be tested by the Consultant and shall not be introduced into the system until chlorine and bacteriological tests are satisfactory.

4.2 Procedure

Slowly fill each section of pipe to be tested with water to the specified test pressure by means of pumping, based on the elevation of the lowest point of the section under test and corrected to the elevation of the test gauge. Monitor, in a manner acceptable to the Consultant, the pressure for the duration of the test and measure the leakage as defined in Section 4.3.

Expell all air from the system before the test pressure is applied.

If hydrants, service connections or blow-offs are not available at high points for the release of air, provide main stops and insert brass plugs after testing has been completed.

Unless otherwise specified, the duration of each test shall be at least 2 hours and the initial hydrostatic test pressure 1035 kPa or one and one-half (1-1/2) the operating pressure for the district, whichever is greater. (1 metre head = 9.81 kPa).

4.3 Allowable Leakage

Leakage is defined as the quantity of water that must be introduced into a section of pipe to maintain the specified test pressure for the duration of the test.

The maximum leakage shall be determined by the formula:

$$L = \frac{ND(P^2)}{64,670}$$

Where

- N = number of joints
- D = nominal diameter (mm)
- P = test pressure kPa
- L = allowable leakage (P/hr)

Allowable leakage for service connections 19 mm to 51 mm shall be 8.2 litres per 100 services per 2 hour test.

4.4 Flushing

Flush the system after a successful pressure/leakage test has been performed.

Provide means to discharge the water into storm or sanitary sewers, ditches or water courses without causing erosion, deposition of silt, ponding of water or damage to the environment.

5.0 CHLORINATION

5.1 General

Supply all material, labour and equipment necessary to perform the work to obtain the required standards for Chlorine Residual and Bacteriological Tests.

Disinfect the system after flushing by introducing a solution of chlorine (minimum strength 55 ppm) and ensuring that it is evenly distributed throughout the system.

A residual of chlorine of not less than 10 ppm will be required in the water after 24 hours.

The Consultant will test the initial and residual chlorine concentrations. The Contractor will provide all assistance required to obtain samples at the hydrants selected by the Consultant. All test equipment shall be supplied by the Contractor.

5.2 Flushing After Chlorination

When the required chlorine residual is obtained, flush the system as in Section 4.4 until all excess chlorine is removed. Chlorinated water to be neutralized before flushing.

Continue flushing until the chlorine content is equal to that of the water being used for flushing.

Discharge water containing high concentrations of chlorine to the sanitary sewers when possible.

5.3 Bacteriological Tests

Before the main is put into service, assist the Consultant to obtain water samples for bacteriological testing.

The Consultant will submit these samples to a recognized laboratory for testing.

The main shall not be put into service until the results are acceptable to the public health authority having jurisdiction.

6.0 MEASUREMENT

All linear measurements are made in the horizontal plane and are plan quantities. Field measurements will not be made unless drawings are revised.

6.1 Watermains

Length of watermains shall be as scaled from the Engineering drawings.

6.2 Appurtenances

Unless otherwise specified, no separate measurement will be made for valves and boxes, valves and chambers, hydrants, service connections and blow-offs.

Hydrant extensions will be measured in the vertical plane.

7.0 PAYMENT

7.1 Watermains

The price for watermain shall be considered full compensation for all pipe, fittings, thrust blocks and appurtenances, trench excavation, the control of ground and surface water; the preparation of subgrade; pipe bedding as specified; placing and joining the pipe, backfilling and compacting the trench; testing and flushing, reinstatement of surfaces and clean-up; and all the work necessary to install the main complete in place.

7.2 Valve and Valve Box

The lump sum price shall include supply of the valve and valve box and the complete installation, including adjusting to finished grade.

7.3 Valve and Valve Chamber

The lump sum price shall include the supply of the valve and all materials and the complete installation as detailed including adjusting the cover to final grade.

7.4 Hydrants

The price provided within the Pricing Schedule for hydrants shall include the supply of all materials and the complete installation of the hydrant, gate valve and valve box (if required), tee on main, lead, stone fill and blocking, tie rods, and setting to final grade.

7.5 Service Connections

The price provided within the Pricing Schedule shall include the supply and installation of the pipe, the main stop, curb stop, curb box, wood marker, saddle and all other materials required.

7.6 Blow-Offs

The lump sum price shall include the complete supply and installation of blow-offs at the locations shown on the drawings including adjusting to final grade.

7.7 Connection to Existing Mains

The lump sum price provided within the Pricing Schedule shall include the locating of existing mains and the complete supply and installation of all materials required to complete the connection.

7.8 Chlorination and Flushing After Chlorination

The price provided within the Pricing Schedule shall be compensation in full for the supply of all equipment, labour and materials to chlorinate and flush the main as specified.

The price shall include additional chlorination and flushing when:

- a) chlorine residual is less than specified,
- b) bacteriological tests are not acceptable to the public health authority having jurisdiction.

SPECIFICATION NO. 6 SEWERS AND APPURTENANCES

1.0 DESCRIPTION

The work shall include the supply of all labour, materials, consumables and equipment necessary for the installation of sewers, fittings, drain connections, manholes, frame and covers, safety grates, catchbasins and appurtenances required for the complete construction, flushing as directed by the Consultant of the sewage system(s). The Contractor shall include everything requisite and necessary to properly complete the entire system(s) notwithstanding that every item may not be specifically mentioned.

2.0 MATERIALS

Diameter, length, class and type of pipe is, as specified, on the engineering drawings and shall meet the following requirements. In all cases, the most current specification in effect shall govern.

2.1 Sewer Pipe

A. Concrete Pipe

- (i) Non-reinforced pipe and fittings - CSA A257.1
- (ii) Reinforced pipe and fittings - CSA A257.2
- (iii) Rubber gasket joints - CSA A257.3

B. Vitrified Clay (VC) Pipe

- (i) Pipe and fittings - CSA A60.1M
- (ii) Joint - Flex-lox - CSA A60.3M

C. Polyvinylchloride (PVC) Pipe (Non Pressure)

- (i) Pipe and fittings - ASTM D3034
- (ii) Joints - rubber Ring Bell Joint - rubber ring - ASTM D-1869

D. Polyethylene (PE) Pipe

- (i) Pipe and fittings - ASTM D1248
- (ii) Joints - Butt fusion - CGSB Std. No. 41-GP-25

E. Corrugated Steel Pipe

- (i) Corrugated steel pipe and pipe arches shall be as specified.
- (ii) Corrugated steel pipe shall meet the requirements of "Specification for Corrugated Steel Pipe Products - Number 501" issued by the Corrugated Steel Pipe Institute.

2.2 Sewer Laterals

A. Concrete Pipe

- (i) Pipe and fittings - CSA A257.1 or A257.2
- (ii) Rubber gasket joints - CSA A257.3

B. Vitrified Clay Pipe

- (i) Pipe - Plain End - CSA A60.1M
Joints - Flexible External Sleeves, CSA A60.3M

C. Polyvinylchloride Pipe

- (i) Pipe and fittings - CSA B182.1
- (ii) Joints - rubber ring bell Joint, rubber ring ASTM D3212

D. Polyethylene Pipe

- (i) Pipe and fittings - ASTM D1248
- (ii) Joints - butt fusion - CGSB Std. No. 41-GP 25.

E. Service Saddles

Not to be used on sewers smaller than 500 mm.

- (i) cast iron with flange curbed to fit the sewer pipe with rubber gasket to ensure a positive leak-free seal.
- (ii) Strap-on saddles, steel band with steel spade bolts, nuts and washers.
- (iii) Mortar-on-saddles, slots provided around flange to provide a Key for the cement mortar.

2.3 Manholes - (Precast or Cast-in-place as specified)

A. Precast Sections - ASTM C478

Gaskets - ASTM C443

B. Covers, grey cast iron, ASTM A48 (Class 30), pattern as specified.

C. Ladder Rungs, aluminum type 6061 T4 alloy CSA HA.5 - width 400 mm.

D. Safety Gratings - aluminum type 6061 T4 alloy CSA HA.5

E. Manhole Adjuster Rings (Moduloc) - ASTM C478.

2.4 Catchbasins - (Precast or Cast-in-place as specified)

- A. Frame and grate, gray cast iron - ASTM A48 (Class 30) pattern as specified.
- B. Catchbasin Adjuster Rings (Moduloc) - ASTM C478.

2.5 Pipe Bedding

Pipe bedding materials shall be concrete, granular material or crushed limestone, as required, and in accordance with Specification No. 8 - Concrete or No. 9 -Granular Materials.

3.0 CONSTRUCTION

3.1 General

Excavation and backfill in accordance with Specification No. 4, Excavation and Backfill.

Sewer and catchbasin leads shall be installed to the line and grade specified on the drawings.

Drain connections shall be placed at elevations as specified.

Clean by flushing sewer lines, manholes, catchbasins and leads prior to inspection by the Consultant.

3.2 Pipe Laying

Lay pipes with bell ends facing upstream with respect to the direction of flow in the pipe.

Lay and join pipes and fittings in accordance with manufacturer's instructions and as specified herein.

Lower material into the trench so that the material is not damaged. Pipes and fittings shall not be dropped or dumped into the trench.

Sewers shall be laid true to line and grade within the following tolerances unless otherwise noted on the drawings:

$$\text{Plan Dimensions - } \frac{\text{Diameter (mm)} \times \% \text{ Slope} \times 10}{100} =$$

$$\text{Elevations - } \frac{\text{Diameter (mm)} \times \% \text{ Slope} \times 5}{100} =$$

When pipe laying is not in progress the open ends of pipes shall be protected to prevent foreign material and water from entering the pipe

On sewers 500 mm diameter and less, provide a prefabricated tee or "Y" branch for each private drain connection.

Pipes are to be supported by compacted bedding which has filled all voids to the original ground unless otherwise specified.

3.3 Radius Pipe

Where radius pipe is specified, prepare and submit to the Consultant an appropriate detail drawing indicating sections of pipe and configuration of installation.

3.4 Cutting Pipe

Pipes shall be cut in accordance with the manufacturer's recommendations, without damaging the pipe and provide a smooth end at the required angle to the axis of the pipe.

Asbestos cement pipe shall be supplied in standard lengths with short lengths to install fittings in specified locations. Both ends of all pieces shall be machined.

3.5 Connections To Existing Sewers

Obtain permission from the operating authority before making any connections to an existing sewer.

Prevent foreign material from entering the existing system and follow instructions of the operating authority.

Provide approved adaptors and make connections to existing sewers in an approved manner including benching.

3.6 Sewer Laterals

Provide connections at the locations shown on the drawings.

Strap-on-saddles may be used only when the main sewer line is greater than 500 mm in diameter or when connecting to an existing sewer of diameter greater than 500 mm and approved by the operating authority.

Proper tools must be used to cut the pipe - breaking the main with hammer, chisel etc. will not be permitted.

Lay connections at right angles to the main in a straight line with a grade of not less than two percent unless otherwise specified.

Terminate connections complete with fittings as specified. Supply cover plates stamped with the word "Storm" or "Sanitary". Paint cover plates for sanitary cleanouts red.

Block plugs to undisturbed soil to prevent movement during testing.

Place wood markers 5 cm × 20 cm, 1.5 m long at the end of each connection and extended to a height of 600 mm above ground. Paint the top 300 mm green for storm connections and red for sanitary connections.

3.7 Manholes

Construct manholes as detailed on the drawings and provide drop connections where indicated.

Grout pipes into the walls and cut flush with the inside face of the wall.

Provide a joint on each sewer line and service connection within one metre of the outside wall of the manhole. The pipe must be supported by specified bedding to undisturbed ground.

Bench manholes with concrete as specified to provide an invert conforming to the sewer.

Unless otherwise specified, grout-in-place manhole covers flush with final grades except for manholes located in pavement where road construction follows the installation of undergrounds. In such cases finish top of concrete flush with road subgrade.

Unless otherwise specified, and where approved by the operating authority, adjust manhole covers using steel "lift rings" and using "manhole adjuster rings" (moduloc).

Install safety gratings as detailed on the drawings.

3.8 Catchbasins and Catchbasin Leads

Cut off pipes flush with the inside face of the catchbasin and grout into place.

Connect catchbasin leads to the main storm sewer by means of a prefabricated tee or 'Y' fitting installed at the time of laying the main sewer for pipes 500 mm diameter and less, unless otherwise specified.

Support catchbasin leads on specified bedding to original ground. Unless otherwise specified, in disturbed ground, bed catchbasin leads on concrete to undisturbed ground.

Place grates so that no ponding will occur in the area drained by the catchbasin. Unless otherwise specified, grout-in-place catchbasin frames so that grates are flush with final grades except for catchbasins located in pavement where road construction follows the installation of undergrounds. In such cases finish top of concrete flush with road subgrade.

Unless otherwise specified, and where approved by the operating authority, adjust catchbasin frames and gratings using Catchbasin Adjuster Rings (Moduloc).

3.9 Concrete Headwalls

Concrete headwalls shall be constructed as specified. The structure shall be founded on undisturbed soil.

3.10 Corrugated Steel Pipe

Lay corrugated steel pipe on specified bedding. Join pipes with approved couplers conforming to the gauge and diameter of the pipe.

4.0 TESTING

4.1 General

Check the alignment of sewers between manholes as each section is laid.

Provide a strong light to be shone through the pipe from manhole to manhole. If the required tolerances are exceeded, realign the pipe until the tolerances are met.

Perform tests in the presence of the Consultant.

Notify the Consultant 48 hours in advance of performing any tests.

Complete and backfill sewer laterals, manholes and appurtenances on the section under consideration before testing.

Provide the apparatus, material and labour necessary to conduct any and all tests and re-tests as directed by the Consultant.

Provide water for flushing and testing at no expense to the Company, unless otherwise specified.

4.2 Procedure

Clean sewers of all foreign material, and correct all visible deficiencies before beginning the test.

Exfiltration

- Isolate the section to be tested by temporarily blocking the inlets of two manholes with expandable plugs or bulkheads.
- Fill the pipe and manhole with water to a depth of 600 mm above the crown of the pipe in the upstream manhole. Do not exceed 7.5 m maximum head at the downstream manhole.
- Allow 24 hours for absorption of water and escape of air from the line.
- The duration of a test shall be two hours. The actual exfiltration shall be determined by measuring the change of elevation of the water in the manhole.

Infiltration

- Isolate the upstream end of the section to be tested with a plug or bulkhead.
- Place a V notch weir or other approved measuring device in the pipe at the lower end.
- The duration of the test shall be two hours. The actual infiltration shall be the average of at least 8 readings taken at even intervals during the test.

Air Test

Low pressure air test may be requested by the Consultant, for all but concrete sewers, due to:

- A. Lack of water
- B. Steep grades - greater than 8 m head differential in adjacent manhole invert elevations.
- C. Freezing temperatures during the test period, etc.
- D. The test section shall be plugged at each end.
- E. All service laterals, stubs and fittings into the sewer test section shall be properly capped or plugged.
- F. Air shall be supplied to the test section slowly, until a constant pressure of 25 kPa is maintained. If the ground water is above the sewer line being tested, the air pressure shall be increased by 3.0 kPa for each foot the ground water level is above the invert of the pipe.
- G. A stabilization period of at least 5 minutes shall be allowed during which time the pressure shall be regulated to prevent it from fluctuating more than 10 kPa above or more than 3.5 kPa below the required pressure.

4.3 Allowable Limits

The Consultant will determine whether an infiltration and/or exfiltration test or air test will be performed.

In the case that both an infiltration and an exfiltration test are ordered for a particular line the requirements of each test must be met.

A test section shall not exceed the length between any two manholes or as directed by the Consultant.

Storm Sewers

A. Infiltration

0.28 litres per hour per millimetre of pipe diameter per 100 metres of sewer (0.28 l/hr/mm dia/100 m).

B. Exfiltration

0.35 litres per hour per millimetre of pipe diameter per 100 metres of sewer (0.35 l/hr/mm dia/100 m).

Sanitary Sewers

A. Infiltration

0.09 litres per hour per millimetre of pipe diameter per 100 metres of sewer (0.09 l/hr/mm dia/100 m).

B. Exfiltration

0.11 litres per hour per millimetre of pipe diameter per 100 metres of sewer (0.11 l/hr/mm dia/100 m).

C. Air Test

The test pressure shall be 3.5 kPa less than the above required pressure. The time required for a pressure loss of 3.5 kPa shall not be less than that shown in the following table.

Time Required for Air Testing

Pipe Size (mm)	Time	
	Min	Sec
100	2	32
150	3	50
200	5	06
250	6	22
300	7	39
350	8	56
375	9	35
400	10	12
450	11	34
500	12	45
525	13	30

For larger diameter pipe, use the following: (minimum time in seconds = $1.52 \times$ pipe diameter in mm).

Manholes

A. Infiltration

All visible leaks into manholes shall be repaired and no allowance permitted when an infiltration test is performed.

B. Exfiltration

3.0 litres per hour per metre of head above the invert of the sewer for each manhole in the test section. (3 l/hr/m/head).

Pipes Larger Than 900 mm Diameter

Pipes greater than 900 mm will not be subjected to air testing. A visual inspection will be made after backfilling and all deficiencies corrected.

5.0 MEASUREMENT

All linear measurements are made in the horizontal plane and are plan quantities. Field measurements will not be made unless drawings are revised.

5.1 Sewers

Linearly from centre of manhole to centre of manhole (or end of pipe). Where the pipe connects to an existing pipe, measurement shall be to the inside wall of the existing pipe.

5.2 Catchbasin Leads

Linearly from centre of catchbasin to centreline of sewer. Where the pipe connects to an existing pipe, measurement shall be to the inside wall of the existing pipe.

5.3 Sewer Laterals

Unless otherwise specified, no measurement for drain connections will be made.

5.4 Manholes and Catchbasins

Unless otherwise specified, no measurement for manholes or catchbasins will be made.

6.0 PAYMENT

6.1 Sewers and Catchbasin Leads

The price provided within the Pricing Schedule for sewers shall include all pipe and fittings; excavation of the trench; control of ground and surface waters; preparation of subgrade; pipe bedding as specified; placing and joining the pipe; permanent supports where detailed; placing and compacting backfill; reinstatement of surfaces as specified and clean-up; all required flushing and testing; and all the work necessary to install the sewer complete in place.

6.2 Sewer Laterals

The price provided within the Pricing Schedule shall include the supply and installation of the pipe and fittings, connection to the main sewer, riser (if required), test fitting, plug, blocking, wood marker, reinstatement of surfaces, as specified and all other material required.

6.3 Manholes

The price provided within the Pricing Schedule shall include the excavation, complete supply and installation of the manhole including benching, ladder rungs, dragging hooks, safety grating and drop structure as specified, manhole adjusters, cover, backfilling with the specified granular material and adjusting to grades specified in Clause 3.7.

6.4 Catchbasins

The price provided within the Pricing Schedule shall include the excavation, bedding, backfill and complete installation including concrete, catchbasin adjusters, reinforcing steel, goss trap (if required), frame and grate and adjusting to grades as specified in item 3.8. Where perforated sub-drains are specified at catchbasin locations they shall be included in the price for the catchbasin.

6.5 Plumbing Permits

Where permits are required for work on private property the Contractor shall obtain the permits and will be reimbursed at cost.

6.6 Corrugated Steel Pipe

The price provided within the Pricing Schedule shall include the supply and placing of the specified bedding, backfill and compaction as specified, couplers and corrugated steel sections.

6.7 Connection to Existing Sewers

The provided within the Pricing Schedule price shall include inspection and other permits where required, the locating of existing sewers and the complete supply and installation of all materials required to complete the connection to existing sewers where shown on the drawings, including the confirmation of existing inverts prior to starting any sewer installation.

6.8 Concrete Headwalls

Payment will be at the provided within the Pricing Schedule lump sum price and shall include all excavation, backfilling and grading.

SPECIFICATION NO. 7 ROADS, CURBS AND SIDEWALKS

1.0 DESCRIPTION

Supply all labour, materials and equipment for the complete installation of granular road base, asphaltic road surface, curbs and sidewalks to the dimensions, lines, grades and cross sections as detailed on the Contract Drawings and as specified in the General and Project Specifications.

2.0 MATERIAL

2.1 Granular Material

Granular material shall be supplied in accordance with General Specification No. 9 unless otherwise noted in the Project Specifications.

2.2 Asphaltic Material

The production, placing and compaction of hot mix, hot laid asphaltic material for pavement construction shall conform to MTO Form 310 or latest revision thereof and relevant City of Ottawa Standards.

Joint painting and tack coating material shall be SS-1 Emulsion and shall comply with MTO Form 1103 and relevant City of Ottawa Standards.

2.3 Concrete

The supply, forming, placing, finishing and curing of concrete shall conform to General Specification No. 8 - Concrete, unless otherwise noted.

Unless otherwise noted and as a minimum, concrete used for curb and gutter shall be Class C-3, 30 MPa concrete with 4% to 7% entrained air.

Unless otherwise noted and as a minimum, concrete used for sidewalk shall be Class C-3, 30 MPa concrete with 4% to 7% entrained air.

2.4 Expansion Joint Material

Expansion joint material shall be premoulded, non-extruding bituminous impregnated fibreboard, 15 mm thick conforming to ASTM designated D-544-49, Type V, unless specified otherwise on the construction details and shall be cut exactly to fit the sidewalk cross section.

2.5 Joint Sealing Compound

Joint sealing compound shall be hot poured rubbery bituminous type, conforming to U.S. Federal Specification 55-5-164.

3.0 CONSTRUCTION

3.1 Road Base and Sub-base

Construct granular road base in uniform layers not exceeding 100 mm for crusher-run limestone or Granular "A" and not exceeding 150 mm for Granular "B", "C" or "D". Compact each layer to a minimum of 100 percent optimum dry density using water if required.

Soft spots in the subgrade or sub-base shall be excavated, backfilled and compacted as directed by the Consultant.

Maximum deviation allowed from the specified grade and cross section is 10 mm in 3 metres.

Maintain the required grade, cross-section, tolerances and compacted density until the work is accepted or paved.

3.2 Asphaltic Pavement

Adjustments to Manholes, Valve Chambers and Catchbasins

- (i) Raise the tops and frames of manholes, catchbasins, meter and valve chambers with approved precast concrete adjustment rings.
- (ii) Raise valve and service boxes by appropriate means, to the required grades as shown on the Drawings or as supplied by the Consultant.

Prior to paving, reshape and compact the granular materials to achieve the cross-sections and elevations as shown on the drawings adding such materials as necessary to achieve this. Where the granular materials have been contaminated, replace and rework as directed by the Consultant.

Joints Between Existing and Proposed Asphalt

Unless otherwise specified, a 0.35 m long cold planed lap joint is to be provided at the connections with the proposed asphalt.

Manhole Ramping

When the final surface asphalt is not scheduled to immediately follow base course paving, ramp all manholes, valve chambers and catchbasins from the exposed top edge of the casting for a distance of 600 mm from the casting for protection until the surface course is laid.

Tack Coat

If paving operations are interrupted and extensive use is made of the lower binder courses prior to the laying of the wearing course, apply a tack coat prior to carrying on with the final course. Where such interruptions are occasioned by instruction of the Company or by the Consultant on behalf of the Company, the Contractor will be reimbursed for the cost of the necessary tack coat in accordance with the Schedule of Contract Unit Prices. Traffic must be kept off the tack coat until the wearing course is applied.

Clean Base Asphalt

Prior to placing the tack coat and if directed by the Consultant, the base asphalt is to be flushed and swept including any minor hand cleaning all at no additional cost.

Tolerance of Finished Asphalt Surface

Maximum tolerance transversely or longitudinally to be less than 10 mm in 3 metres for gradients of 1% or more. For gradients of less than 1% the maximum tolerance shall be 5 mm in 3 metres.

3.3 Concrete Curbs, Curb and Gutter and Sidewalks

Ensure that all curbs, curb and gutter, and sidewalks connect smoothly as to line, grade and form with existing installations.

Curbs and sidewalks shall be stamped with the Contractor's name and year of construction at spacings not exceeding 150 metres.

Place compacted backfill and complete all grading adjacent to the concrete installations to prevent erosion within 24 hours of the removal of the forms.

The maximum tolerance on any exposed surface of curb or sidewalk shall be less than 10 mm in 3 metres measured longitudinally.

Expansion joints shall be placed where new concrete structures abut other concrete structures and otherwise at regularly spaced intervals as specified. Expansion joints shall be formed in a rectangle around solid objects such as service frames and covers, water service boxes, hydrants, poles, etc. with the sides a minimum of 150 mm from the edge of the solid object.

Prior to the construction of the sidewalk, provide a sand bed 25 mm in thickness compacted to a minimum of 100% modified Proctor maximum dry density.

Place a 4 mil black polyethylene film for the full width of the sand bed. Lap joints at least 300 mm.

For sidewalks draw tool contraction joints across the sidewalk, one-third of the concrete thickness every 2 metres.

For curbs and curb and gutter draw tool a contraction joint every 5 metres with a depth of at least 50 mm, and at other locations specified on the detail drawings. When the joints are saw cut, they must be completed immediately after the initial concrete set.

Finish all edges and joints with an edging tool having a radius of 13 mm.

3.4 Rectification of Concrete Curbs, Curb and Gutter and Sidewalks

In addition to the items mentioned in Section 3.3:

- Break-out damaged concrete works as directed by the Consultant and dispose of concrete off-site.
- Repair all asphalt and sod disturbed during rectification of concrete work.
- Stamp with name of firm and year of construction at each end of the replaced concrete work.
- Sawcut ends of concrete work to provide a neat joint.
- Sawcut and caulk cracks with an approved caulking compound where specified by the Consultant.

4.0 MEASUREMENT

All linear and area measurements are in the horizontal plane and are plan quantities. Field measurements will not be made unless drawings are revised.

4.1 Road Base, Sub-base and Asphaltic Pavement

Unless otherwise specified measurement shall be as follows:

- Granular "A", "B", "C" and "D" by area in square metres to the specified thickness.
- Crusher-run limestone by area in square metres to the specified thickness.
- Base course asphaltic pavement by area in square metres to the specified thickness. The plan measurement for base asphalt shall not include the fillet laid over the top of the base curb which ultimately is trimmed off to permit top stage construction.
- Finish course asphaltic pavement by area in square metres to the specified thickness.
- Tack coat by area in square metres.

Area measurements shall be calculated from the Engineering Drawings.

4.2 Manhole Adjustments

Adjustment of manholes, catchbasins and valve chambers will be on a per unit basis.

The adjustment of catchbasins will include the restoration of curb and gutter adjacent to each catchbasin.

4.3 Manhole Ramping

Ramping of asphalt around manholes, catchbasins and valve chambers will be on a per unit basis.

4.4 Sidewalks

Sidewalks will be measured on a linear metre basis for the specified width and thickness.

4.5 Concrete Curbs, Curb and Gutter

Curbs or curbs and gutter will be measured on a linear metre basis.

5.0 PAYMENT

5.1 Road Base, Sub-base and Asphaltic Pavement

Payment for granular materials, crusher-run limestone, and asphalt shall be compensation in full for all labour, equipment and material required to supply, lay, grade and compact in accordance with the Drawings and Specifications.

5.2 Manhole Adjustments

Payment for adjusting manholes, catchbasins and valve chambers shall be compensation in full for all labour, equipment and material required including concrete adjusting rings, modoloc steps if required and sealing component, and regrading and recompaction of the disturbed subgrade.

5.3 Manhole Ramping

Payments for ramping of asphalt around manholes, catchbasins and valve chambers shall be compensation in full for all labour, equipment and material required including cleaning and brushing of the base course, applying tack coat, and compaction of asphalt.

5.4 Sidewalks

Payment for sidewalk shall be compensation in full for all labour, equipment and material required including excavation and fine grading, disposal of surplus material, supply of fill material and polyethylene film, expansion joints, edge scoring of both edges, regrading to boulevard level, application of curing compound, cold weather protection and cleaning and brushing of sidewalks and application of sealer.

5.5 Concrete Curb, Curb and Gutter

Payment for curb or curb and gutter shall be compensation in full for all labour, equipment and material required including Granular "B" bedding, reinforcing bars, stirrups, expansion joints, temporary asphalt filler around catchbasins, application of bonding and curing agents, contraction joints caulking compound and filling behind curb with approved material.

Payment shall also include cleaning base curb, trimming and replacing base course asphalt, removal of asphalt filler behind catchbasin and any required asphalt patching prior to placing the top section of a two-stage curb.

5.6 Rectification of Concrete Curbs, Curb and Gutter and Sidewalks

Payment for rectification of curbs, curb and gutter, and sidewalks will be on a linear metre basis for those damages which are not deemed the responsibility of the contractor.

SPECIFICATION NO. 8 CONCRETE

1.0 GENERAL

This specification covers materials to be used and methods to be followed for the proportioning, manufacture, transporting and placement of plain and reinforced concrete, either site-mixed or ready-mixed.

Materials and workmanship shall conform to the Canadian Standards Association CSA Standard CAN/CSA-A23.1 (Concrete Materials and Methods of Concrete Construction) and methods of test for concrete shall conform to CSA Standard CAN/CSA-A23.2 (Methods of Test for Concrete). All standards referred to are the latest editions thereof. This specification is intended to supplement and amplify CSA Standard Specification and the most stringent requirements of these standards and the specifications shall apply. The Contractor shall have on site a copy of the CSA Standards A23.1 and A23.2.

2.0 DESCRIPTION

Portland Cement shall be Normal Portland Cement conforming to the requirements of CSA Standard CAN/CSA-A5, Portland Cements.

3.0 WATER

Water for use in Portland cement concrete shall be clear and free from injurious amounts of oil, acid, alkali, organic matter, sediment or any other deleterious substances.

4.0 AGGREGATES - GENERAL

Fine and course aggregates shall meet the requirements of CSA Standard CAN/CSA-A23.1 for general characteristics, grading, limits of deleterious substances, cement-aggregate reactivity, soundness and organic impurities. Maximum size of course aggregate to be 20 mm unless otherwise specified.

Representative samples of all aggregates proposed for use shall be submitted to the Consultant not less than three weeks in advance of the commencement of operations to permit the carrying out of required tests. Sampling of aggregates shall be done in accordance with CSA Standard CAN/CSA-A23.2.

5.0 ADMIXTURES

When admixtures are specified or used they shall conform to the requirements of CSA Standards CAN3-A266.1, Air-Entraining Admixtures for Concrete, CAN3-A266.2, Chemical Admixtures for Concrete, and CAN3-A266.4, Guidelines for the Use of Admixtures in Concrete. Any materials not

included in CSA Standard CAN/CSA-A23.1, and proposed as admixtures for use in Portland cement concrete may only be used upon the written authority of the Consultant.

6.0 REINFORCING STEEL

Reinforcing steel shall meet the requirements of CSA Standards G30.5, Welded Steel Wire Fabric for Concrete Reinforcement, CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction, CAN/CSA-G30.18, Billet Steel Bars for Concrete Reinforcement and A.C.1-315 Detail and Detailing of Concrete Reinforcement. Reinforcing steel yield strength shall be 400 MPa unless otherwise noted on the drawings.

7.0 STORAGE OF MATERIALS

Store all materials in a manner that will prevent contamination or deterioration. Any material that has deteriorated or that has been contaminated shall not be used in the concrete and shall be removed from the site.

Store cement in a suitable bin or building which will provide protection against dampness and inclement weather conditions. Access to the storage facilities shall be provided to allow proper inspection. If cement becomes lumpy due to partial hydration, it shall be removed from the site unless it can be proven by testing to the satisfaction of the Consultant that, with corrective measures, the hydration does not have a detrimental effect on the quality and strength of the concrete.

Store each size of aggregate separately in a free draining stockpile in a manner that will prevent contamination, intermixing and segregation. The equipment and methods of handling aggregate shall be such as to prevent deterioration, breakage and contamination of the stockpiles and breakage of the aggregates.

All other materials such as admixtures and curing compounds shall be stored in accordance with manufacturers instructions.

Store reinforcing steel on racks or sills that will permit easy access for identification and handling.

8.0 PROPORTIONING

Concrete shall be proportioned in accordance with CSA Standard CAN/CSA-A23.1.

Class*	Minimum Specified 28 day Strength (MPa)	Max. W/C Ratio	Maximum Size of Coarse Aggregates (mm)	Air Content (%)
C-1	35	0.40	20	5-8
C-2	32	0.45	20	5-8
C-3	30	0.50	20	4-7
C-4	25	0.55	20	4-7
F-1	30	0.50	20	5-8
F-2	25	0.55	20	4-7
N-1	15			
N-2	10			
S-1	35	0.40		Type 50 Cement
S-2	32	0.45		Type 50 Cement
S-3	30	0.50		Type 20 Cement

* By strength

Slump for concrete to be consolidated with the use of high frequency vibrators shall be 75 mm maximum and 25 mm minimum, except as follows:

	Maximum	Minimum
Pavements, curbs, sidewalks	50 mm	25 mm
Heavy mass construction	50 mm	25 mm

9.0 TESTING

Field tests for concrete quality shall be carried out by an independent testing agency acceptable to the Consultant. The cost of tests shall be paid for in accordance with the Special Conditions and the applicable cash allowance. Provide unhindered access to the work for the purposes of inspection and selection of samples, and provide, without charge, the concrete and constituent materials required for quality control tests and such assistance, tools, equipment and sampling containers as is required to prepare and ship the test samples.

Sampling and testing of concrete shall be in accordance with the requirements of CSA Standard CAN/CSA-A23.1/A23.2.

Concrete strength testing is to be performed for every 50 m³ of concrete placed and in no case shall there be less than one test for each class of concrete or each separate type of structural component, as designated by Consultant, placed on any one day. Deviations from this requirement can be made only as deemed necessary by the Consultant. Four standard test specimens shall comprise a strength test. The specimens shall be tested at the age of 24 hours, 7 days, 28 days and 56 days if required. Additional tests of autogenously cured specimens by an accelerated testing method may be required by the Consultant. Additional tests of specimens cured entirely under field conditions may also be required by the Consultant to check the strength gain under field conditions.

For concrete work failing to meet the test requirements, the Consultant has the right to require one or more of the procedures outlined in CSA Standard CAN/CSA-A23.1 to determine acceptability of the work or where the work fails to meet the specified quality after carrying out these procedures, the Consultant may demand strengthening or replacement of those portions which failed to develop the required strength.

Air content tests done in accordance with CSA Standard CAN/CSA-A23.2 shall be performed to measure the air-entrainment. For concrete which will be subjected to severe exposure, the minimum number of air tests to be made shall be as follows:

Ready-mixed concrete	-	1 test per load
Site-mixed concrete	-	1 test per 10 m ³

Where exposure is less severe, the frequency of testing may be reduced at the discretion of the Consultant.

Slump tests shall be made frequently to ensure uniform consistency of concrete. In addition a slump test shall be made with every strength test. Tests shall be made in accordance with CSA Standard CAN/CSA-A23.2.

10.0 MEASUREMENT OF MATERIALS

Weigh cement on a scale separate from those used for other materials. Cement in standard sacks need not be weighed but the use of fractional sacks shall not be permitted unless weighed.

Weigh fine and coarse aggregate separately with batched weights based on dry materials and shall be the required weights of dry materials plus the total weight of moisture (both absorbed and surface) contained in the aggregates.

Measure water either by weight or by volume. Water as weighed or measured shall be within approximately 1% of required amount.

The weighing equipment shall be capable of being operated to control delivery of materials so that any inaccuracies in feeding and measuring do not exceed the following limits:

- i) Cement - Approximately 1%
- ii) Aggregates - Approximately 2% on each individual aggregate
- Approximately 1% of the total weight of the aggregates
- iii) Admixtures - Powdered admixtures shall be measured by weight and paste or liquid admixtures by weight or volume within a limit of accuracy of 3%.

Shovel and volume methods of measurement are not permitted.

11.0 MECHANICAL BATCH MIXING

Mix concrete in a mechanical batch mixer of a type approved by the Consultant.

Do not load mixer beyond its rated capacity which shall be shown on a manufacturer's rating plate on the equipment.

The drum, blades and discharging device shall be such that a concrete of uniform consistency will be produced.

The entire contents of the mixer shall be discharged before recharging.

The mixer shall be cleaned after each period of continuous use and shall be maintained in such condition that the mixing action will not be impaired.

Until acceptable performance tests have been made, mixers with a capacity of one cubic metre (1 m³) or less shall mix for a minimum of one and one-half (1.5) minute after all materials, including the mixing water, are in the drum. For larger capacities, the minimum time shall be increased by twenty (20) seconds for each additional one cubic metre (1 m³) capacity or fraction thereof. The batch shall be charged into the mixer so that some water will enter in advance of the cement and aggregate and all water shall be in the drum by the end of the first one-fourth of the specified mixing time.

The rated capacity of the mixer shall not be less than one-half cubic metre (0.5 m³).

Retempering (remixing with additional water) of concrete or mortar that has stiffened shall not be permitted.

12.0 READY-MIXED CONCRETE

Ready mixed concrete shall be mixed and transported in accordance with CSA Standard CAN/CSA-A23.1.

13.0 HAND MIXED CONCRETE

Concrete shall be mixed by hand only in special circumstances and with prior consent of the Consultant. The cement and fine aggregate shall be mixed dry on a properly constructed platform until it has obtained an even and uniform colour throughout. The mixture shall then be spread to make a bed of uniform thickness on which the coarse aggregate shall be spread and whole wetted with the required amount of water and turned with shovels until a uniform mixture is obtained. Materials shall be proportioned as specified above.

14.0 PLACING - GENERAL

All concrete placing methods shall be in accordance with CSA Standard CAN/CSA-A23.1 and shall be subject to the approval of the Consultant.

To prevent damage to fresh concrete during placing, suitable measures shall be taken to protect the plastic concrete.

Concrete placing shall not be started until the Consultant has inspected and approved all preparations including forms, foundations, reinforcing steel, construction joints, and all mixing, conveying, spreading, compacting, finishing, curing and protection equipment.

15.0 CONVEYING

Concrete handling methods shall be in accordance with CSA Standard CAN/CSA-A23.1. Concrete shall be conveyed from the mixer to the point of deposit as rapidly as practicable, using means and equipment which will prevent segregation or loss of materials.

Equipment for conveying concrete such as buckets, cars and trucks, belt conveyors, and pumps shall be of such design, size and condition to ensure a continuous supply of concrete as practicable to the point of delivery, without segregation.

Conveying equipment, if supported by formwork, shall not impart harmful vibration to the freshly placed concrete nor cause misalignment of forms.

The conveying equipment shall be kept free from hardened concrete and foreign materials, and shall be cleaned at frequent intervals. Wash water shall not be permitted to enter the forms of fresh concrete.

16.0 DEPOSITING

Concrete deposition methods shall be in accordance with CSA Standard CAN/CSA-A23.1. Deposit concrete in the forms as close as practicable to its final position and in layers that are approximately horizontal. Concrete shall be confined in a suitable vertical drop pipe to within 1.50 metre or less of the concrete in place in order to prevent segregation by ricocheting off tie rods, spacers, reinforcement and forms and to protect these items from displacement. Concrete which has partially hardened shall not be subjected to injurious vibration or shock, except for controlled revibration where specified. The size of section to be placed in one continuous operation shall be as shown on the drawings or as directed by the Consultant.

Mixing and placing equipment shall be such that when concreting has once started, the depositing of concrete shall be carried on as a continuous operation until the placing of the panel or section is completed. Concreting shall be carried out at such a rate that the concrete is at all times sufficiently plastic to ensure proper bonding of successive layers. The maximum permissible time interval between placing successive layers of concrete shall be established by the Consultant.

17.0 BONDING TO EXISTING CONCRETE

When fresh concrete is to be bonded to hardened concrete, the surface of the set concrete shall be thoroughly cleaned of foreign matter and laitance and saturated with water for the period 24 hours immediately prior to concreting. Immediately before depositing fresh concrete on hardened concrete, all free water shall be removed from the surface. The first layer of concrete to be placed on the surface of set concrete shall be of the quality specified but shall contain an excess of mortar and shall be vibrated to achieve maximum bond.

18.0 COMPACTING

All methods of compacting shall be subject to the approval of the Consultant. As concrete is being placed it shall be compacted thoroughly and uniformly by means of tamping, hand tools, vibrators or finishing machines to secure a dense homogeneous structure.

For compacting the concrete, internal vibrators shall be used whenever practicable. Vibrators shall be approved by the Consultant and they shall be operated at a frequency of not less than 7 000 impulses per minute when fully immersed. Application of vibrators shall be made systematically and at such intervals that the zones of influence of the vibrator overlap.

The vibrator shall be applied, at any one point, only until the concrete is compacted and not for such a time that will cause segregation. Extreme care shall be taken to ensure that the vibrators do not disturb the reinforcing steel or its bond to the partially hardened concrete will be impaired. Vibrators shall not be used so close to the forms that they drive the coarse aggregate away from the face.

The vibrator shall be used only for consolidation purposes and shall not be used to move concrete more than a short distance.

19.0 FINISHING

Rough or board form surfaces shall be reasonably true to line and plane. Tie holes and defects shall be patched and fins exceeding 6 mm in height shall be rubbed down with wooden bows.

Plywood or metal formed surfaces shall be true to line and plane. Tie holes and defects shall be patched and all fins completely removed.

Related unformed surface shall be struck smooth after concrete is placed and shall be floated to a texture consistent with that of the formed surfaces.

The top or final surface of concrete slabs and other flat work shall be finished by screeding, floating and trowelling to a smooth, dense finish, free from defects and blemishes. All concrete surfaces exposed to view shall have sack rubbed finish.

20.0 CURING AND PROTECTION

Refer to CSA Standard CAN/CSA-A23.1 for complete curing and protection requirements. Key items are highlighted below. Freshly deposited concrete shall be protected from premature drying and excessively hot or cold temperatures, and shall be maintained with minimal moisture loss at a relatively constant temperature for the period of time necessary for the hydration of the cement and proper hardening of the concrete.

After the concrete has set sufficiently, the exposed surfaces shall be kept continuously moist for at least three consecutive days after placing, when normal Portland cement is used and for at least one day when high early strength Portland cement is used. During the curing period the temperature of the air in contact with the concrete shall be maintained at not less than 10EC.

Where the use of curing compound is authorized by the Consultant it shall meet the requirements of ASTM Standard C309, Liquid Membrane Forming Compounds for Curing Concrete.

Steel forms heated by the sun and all wood forms in contact with the concrete during the final curing period shall be kept wet. If forms are to be removed during the curing period, one of the above curing materials or methods shall be employed immediately. Such curing shall be continued for the remainder of the curing period.

(a) Cold Weather Protection

When the air temperature is at or below 4.5EC or when there is a possibility of it falling to that limit within 24 hours of placing, cold weather protection measures shall be used. When necessary, arrangement for heating, covering, insulating, or housing the concrete

work shall be made in advance of placement and shall be adequate to maintain the required temperature and moisture conditions without injury due to concentration of heat. Refer to CSA Standard CAN/CSA-A23.1 for additional information.

(b) Hot Weather Protection

When necessary, arrangements for installation of windbreaks, shading, fog spraying, sprinkling, poinding, or wet covering of a light color shall be made in advance of placement and such protective measures shall be taken as quickly as concrete hardening and finishing operations will allow.

(c) Protection from Mechanical Injury

During the curing period, the concrete shall be protected from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration. All finished concrete surfaces shall be protected from damage caused by construction equipment, materials, or methods and by rain or running water. Selfsupporting structures shall not be loaded in such a way as to overstress the concrete.

21.0 FORMS

Form design shall be established prior to the start of framing. The proposed method of construction shall be submitted to the Consultant for their review. Form design and its adequacy remains the responsibility of the Contractor. Refer to CSA Standards CSA-S269.1, Falsework for Concrete Purpose; CSA-S269.3, Concrete Formwork; and CSA-0151, Canadian Softwood Plywood, and CSA-0121, Douglas Fir Plywood.

Forms shall be built with sufficient strength and rigidity to carry the weight or fluid pressure of the concrete and of any equipment or runways which might be placed upon them.

Lumber used in forms shall be free from warp, and shall be sawn straight so that lines and shapes will be accurately maintained.

For exposed concrete surfaces, plywood or steel panel forms shall be used. Forms shall be free from defects that would be reproduced as concrete blemishes.

For concealed concrete surfaces, boards may be used where authorized by the Consultant, provided the edge contacts are made sufficiently tight to hold mortar.

For plywood or similar finished forms or for steel-panel forms, where stripped concrete is to be exposed, the panel assembly shall be established and makeup or patching strips between panels held to a minimum. The panel arrangement shall be wedged, and have means for bolting the edges to maintain accurate face alignment.

Internal form ties shall be of metal and of a type approved by the Consultant.

Forms shall be so constructed that the finished concrete will conform to the shape and dimensions specified.

Immediately before concrete is placed, all forms shall be carefully inspected to ensure that they are properly placed, sufficiently rigid and tight, thoroughly clean, properly surface treated, and free from snow, ice or other foreign materials.

Temporary ports or openings shall be provided at the bottom of all deep units, such as columns and walls, to facilitate cleaning and inspection. In restricted units they shall be located so that water can be used to wash out debris. They shall be closed with patches flush on the inside.

A non-staining mineral oil shall be used as a parting agent for forms, applied to the forms prior to placing of the reinforcing steel. The amount of oil used shall be kept to a minimum and any which contacts reinforcing shall be removed with solvents.

Untreated forms shall be kept wetted down to prevent shrinkage prior to the placing of the concrete and shall be surface wetted at the time of placing.

Prior to placing concrete, suitable means for checking the alignment and elevations of forms during placing shall be provided. These checks shall be made frequently during placement of the concrete. Checking and corrective wedging or shoring shall be carried out both horizontally and vertically as required, until all concrete is in place. Forms shall not be disturbed until the concrete has hardened adequately.

22.0 REINFORCING

Shop drawings, showing all dimensions necessary for fabrication and placing of the reinforcing steel and accessories shall be submitted for review by the Consultant prior to fabrication. Detailing of reinforcing steel shall be in strict accordance with the latest issue of ACI-315, "Manual of Standard Practice for Detailing Reinforced Concrete Structures". All bars shall be bent cold.

Reinforcement, at the time concrete is placed, shall be free from scale or other coatings that will destroy or reduce the bond.

Where there is a delay in depositing concrete, reinforcement shall be reinspected and cleaned when necessary.

Metal reinforcement shall be adequately placed and adequately secured in position by concrete or metal chairs or spacers.

Exposed reinforcing bars intended for bonding with future extensions shall be protected from corrosion by concrete or other adequate covering.

23.0 JOINTS AND EMBEDDED ITEMS

The locations and details of construction joints not indicated on the drawings shall be subject to the approval of the Consultant.

Construction joints shall be located and designed so as to least impair the strength and appearance of the structure.

Reinforcement shall continue in its normal position through the joint.

Shear keys shall be formed with bevelled strips.

Where construction joints are planned or permitted by the Consultant in watertight concrete construction, there shall be reinforcing steel on both sides of the wall or slab and shear keys provided.

A waterstop of a type, size, and material approved by the Consultant shall be carefully installed. Where waterstops cross or lap they shall be vulcanized to ensure that a continuous watertight diaphragm is formed.

Where a horizontal construction joint is permitted in a wall, the top of the first lift shall be carefully cleaned off and the procedure in Clause 17 - Bonding to Existing Concrete of this Section 8 - Concrete, shall be followed.

All sleeves, inserts, anchors, and embedded items required for adjoining work or for its support shall be placed prior to concreting.

Expansion joint material, waterstops, and embedded items shall be positioned accurately and supported against displacement. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.

24.0 MORTAR

All mortar shall be prepared from the specified materials in accordance with the following latest CSA Standard edition codes:

CAN/CSA-A5	-	"Portland Cement"
CAN/CSA-A8	-	"Masonry Cement"
CSA A82.43	-	"Hydrated lime for Masonry Purposes"
CSA A82.56	-	"Aggregates for Masonry Mortar"

It shall be thoroughly mixed dry in the proportions specified. The required amount of water as per CSA Standard CAN/CSA-A23.1 shall be added to produce a paste of satisfactory consistency. The mortar shall be freshly mixed by hand in boxes made for the purpose. No

mortar shall be used that has become stiff or that has stood more than 12 hours after mixing. Sand shall be measured by loose volume as shovelled into the measuring box.

The proportions by volume for different classes of work, unless otherwise specified, shall be as follows:

	Hydrated		
	Cement	Lime	Sand
Brick Masonry	1	1	6
Pointing or Grouting of Pipe Jointing	1	-	1
Parging	1	1	6

SPECIFICATION NO. 9 GRANULAR MATERIALS

1.0 DESCRIPTION

This specification covers the requirements for aggregates for use as granular subbase, base and surface course; shouldering; pipe bedding; and backfill to pipes, manholes and other structures.

2.0 MATERIALS

Aggregates for the above uses shall meet the requirements for MTO Form 1010 - "Material Specifications for Aggregates, Granular A, B, C, D and 16 mm crushed Types A and B".

2.1 MTO Form 1010 - Granular A

Granular A - MTO Form 1010, Section 1010.04 shall be modified to specify crushed gravel and thereby eliminate the use of crushed rock or crushed slag.

Crusher-Run Limestone - MTO Form 1010, Section 1010.04 shall be modified to specify crushed rock and thereby eliminate the use of crushed gravel and crushed slag.

2.2 Crusher-Run Limestone

51.0 mm and 19.0 mm crusher-run limestone shall conform within the following gradation envelope:

Sieve Series	51.0 mm	19.0 mm
	Canadian Standard Crusher Run Limestone % Passing	Crusher Run Limestone % Passing
51.00 mm	100%	-
38.00 mm	75 - 100	-
19.00 mm	45 - 75	100%
12.70 mm	-	70 - 90
4.75 mm	20 - 47	35 - 60
1.18 mm	11 - 32	15 - 37
0.30 mm	4 - 18	6 - 20
0.075 mm	2 - 8	3 - 10

51.0 mm and 19.0 mm clear stone shall conform within the following gradation envelope:

Canadian Standard Sieve Series	51.0 mm	19.0 mm
	Clear Limestone % Passing	Clear Limestone % Passing
64 mm	100%	-
51 mm	90 - 100	-
38 mm	35 - 70	-
25 mm	15 - 40	100%
22 mm	-	-
19 mm	0 - 10	85 - 100
16 mm	-	55 - 90
13 mm	-	30 - 70
10 mm	-	15 - 40
#4	-	0 - 10

3.0 MEASUREMENT AND PAYMENT

Unless otherwise specified, Granular Materials will be measured and paid for in accordance with the specification covering the application or as described in the Schedule of Contract Unit Prices.

SPECIFICATION NO. 10 TOPSOIL, SEEDING AND SODDING

1.0 DESCRIPTION

The work covered by this specification shall include the supply of all labour, materials, consumables, and equipment to apply topsoil, seed or sod areas as shown on the drawings and as specified herein.

1.1 Maintenance

Maintain seeded and sodded areas as required to establish vigorous growth. Reseed or resod, within the time periods contained in this specification, any eroded or deteriorated areas or where satisfactory growth has not been established.

2.0 MATERIALS

2.1 Topsoil

Obtain topsoil from existing stockpiles within the contract site or import, as required. Imported topsoil shall be fertile, friable, natural loam containing not less than 4% organic matter for clay loams and not less than 2% for sandy loams with an acidity value ranging from ph 6.0 to ph 7.5. Frozen or muddy topsoil will not be acceptable. Topsoil from stockpiles shall be tested for NPK and organic content. Amendments shall be made in accordance with directions by the testing agent or Consultant.

2.2 Seed

Seed shall meet the requirements of The Seeds Act for Canada No. 1. Unless otherwise specified, seed shall be mixed in the following proportions:

- 40% Bluegrass
- 25% Tall Fescue
- 20% Perennial Rye
- 15% Creeping Red Fescue

Seed supplied shall be of the best quality and of such brands as approved by the Consultant. They shall be furnished on the job in their original sealed packages bearing the brand and name of the producer, or distributor. Only seeds harvested the preceding season will be accepted.

2.3 Sod

Unless otherwise specified, sod shall be No. 1 Kentucky Bluegrass Fescue Sod grown and sold in accordance with the latest specifications of the Nursery Sod Growers Association of Ontario (NSGA). Sod shall be permeated with roots; be uniform in texture and free from weeds; be in a good healthy condition with no sign of decay; and contain sufficient moisture to maintain its vitality during transportation and placement. Each section shall be approximately 450 mm wide, 1.80 m long and at least 20 mm thick.

2.4 Mulch

Mulch shall be "Verdyol Mulch Standard Quality" or approved equal and conform to the manufacturers specification. Alternate mulching materials such as oat or wheat straw with asphalt emulsion must be approved by the Consultant.

2.5 Wooden Pegs

Wooden pegs for staking sod shall be approved hardwood pegs 25 mm x 25 mm square and at least 300 mm long.

2.6 Wire Mesh

Wire mesh, to be installed under sodded areas where specified, shall be #9 gauge galvanized wire-woven farm fencing or approved equal.

2.7 Fertilizer

Where required, fertilizer will be applied to topsoil as required subject to testing.

3.0 CONSTRUCTION

3.1 Site Preparation

Fine grade the sub-grade level to a uniform surface free from all debris. Scarify the sub-grade to a minimum depth of 75 mm to produce a loose textured surface free of weeds, stones, roots and branches. The finished sub-grade shall be approved by the Consultant prior to placing topsoil.

3.2 Topsoil Placing

Spread topsoil to the required minimum depth, but not less than 75 mm, over the prepared sub-grade, pulverize all clods or lumps and rake and roll to produce an even firm surface free from all stones, roots, branches, etc. larger than 50 mm in diameter immediately prior to placing seed or sod. Compact surface firm to footprints.

3.3 Seeding

Seed only those areas free from frost, snow or water and which can be mulched within the same day. Apply seed with a mechanical dry seeder (Method A) in areas having slopes in the 1-25% range or with a hydraulic seeder (Method B) on slopes exceeding 25% during the following time periods:

1. August 15 to September 15 (preferred)
2. Early spring up to May 30th.

Method A - mechanical dry seeder

Apply fertilizers, as specified, in accordance with the rates of application indicated followed by rolling immediately prior to seeding. Supply seed in two (2) intersecting directions by means of an approved mechanical dry seeder at a rate of 160 kg/hectare.

Method B - hydraulic seeder

Charge an approved hydraulic seeder with seed, water and fertilizer as specified and apply at rate recommended by supplier.

Other methods of applying seed may be permitted if approved by the Consultant.

3.4 Mulching

Immediately following seeding, apply mulch by means of an approved mulch blower or to the manufacturers specification at a rate of 1,700 kg/hectare to form a uniform mat.

3.5 Sodding

Apply fertilizers, as specified, in accordance with the rates of application indicated and work well into the topsoil within 48 hours before laying sod.

Lay sod as soon as possible after arrival on site but in any event within 48 hours. Place sod closely together without open joints or overlaps to blend uniformly with adjoining grassed areas, curbs, sidewalks, etc. Stagger joints in adjacent rows.

On slopes greater than 3:1, place sod perpendicular to the slope on wire mesh when specified and stake with wooden pegs at 0.6 m intervals providing a minimum of 1 stake per sod. Drive pegs flush with sod. Wire mesh will be provided beneath sod where intermittent water flows are expected.

Immediately after installation, water to saturate sod and underlying topsoil. When sod has sufficiently dried, roll to ensure a good bond between sod and topsoil and to remove minor depressions and irregularities.

Place sod prior to November 1 unless authorized by the Consultant.

4.0 MEASUREMENT

Unless otherwise specified, the measurement for topsoil, seeding and sodding are in the horizontal plane and are plan quantities. Field measurements will not be made unless drawings are revised.

Mulch, fertilizer, wire mesh and wooden pegs will not be measured, but will be included in the area measurements for sod and seeding.

5.0 ACCEPTANCE

On sites which will be mown in future, acceptance will be granted when:

- in seed area - a green sward has been established at least one time; or
- in sod areas - grass roots have knit to soil and grass has been mown at least one time;
and
- grass is green and exceeds no more than 60 mm in height

On naturalized sites, acceptance will be granted when:

- sod and seed areas are free of non-specified herbaceous plants and free of bare areas

6.0 PAYMENT

Payment will be in accordance with and at the rates shown in the Schedule of Contract Unit Prices and will include the provision and placement of topsoil, whether from on site sources or imported, seed or sod, mulch, wooden pegs, wire mesh and any other items necessary to complete the work. No additional payment will be allowed for watering, mowing, fertilizing, weeding, reseeding or resodding any other maintenance required to establish satisfactory growth.

Where restoration is designated, the seeding or sodding work will be included in the price provided within the Pricing Schedule for sewers, water mains, roads, structures etc. unless otherwise noted in the Schedule of Contract Unit Prices.

SPECIFICATION NO. 12

RIP-RAP

1.0 DESCRIPTION

This Specification covers the construction of a protective covering of approved rock with or without grout as specified, including excavating, trimming, compacting of subgrade, supplying and placing of specified materials and labour and equipment incidental to the construction.

2.0 MATERIALS

2.1 Rock

The quality and source of rock shall be approved by the Consultant. Rock subject to marked deterioration by water or weather will not be accepted.

Fractured rock will not be accepted.

The rock shall be free from earth and clay.

Rock shape shall be as near to cubical as possible, in particular thin slab shapes shall be avoided.

The gradation of the rip-rap rock is specified in the Project Specification.

2.2 Filter Material

The filter material shall be as described in the Project Specifications.

2.3 Grout

The grout shall be as described in the Project Specifications.

3.0 CONSTRUCTION

3.1 Rock

Place material in such a manner that the larger fragments occur at the bottom of the slopes, the rocks fit together tightly and chink the voids with spalls. The surface of the finished rip-rap shall have a uniform appearance conforming to the elevations and sections as detailed on the drawings.

3.2 Grouting

When specified, fill the spaces between thoroughly wetted stones with mortar. All voids shall be filled and the outer faces of the stones left exposed.

Remove excess mortar from the exposed faces of the stones.

Cure and protect mortar grout as specified in Specification No. 8 - Concrete.

3.3 Filter Material

Place filter material in the manner outlined by the manufacturer or as specified in the Project Specification.

4.0 MEASUREMENT

Area measurements will be made in the plane of the surface rip-rapped and payment will be as specified within the Schedule of Contract Unit Prices. Field measurements will not be made unless drawings are revised.

5.0 PAYMENT

The price provided within the Pricing Schedule is payment in full for supplying labour, material and equipment to excavate the foundation, prepare the bedding, dispose of debris, and place rip-rap to the required dimensions indicated.

“Excavate the foundation” includes all excavation to the subgrade of the rip-rap unless otherwise specified.

When specified this price shall include grouting.

SPECIFICATION NO. 15

ENGINEERED FILL

1.0 DESCRIPTION

The work covered by this specification shall include the supply of all labour, material, consumables and equipment to do all the excavation, grading and filling with earth required for the execution of specified engineered fill requirements. This specification does not cover rock fills. "Rock Excavation" as defined in Specification No. 1, General Requirements, is not considered part of this specification and is covered in Specification No. 4, Excavation and Backfill.

2.0 CONSTRUCTION

2.1 Survey and As-built Requirements for Engineered Fill

The Contractor will retain an Ontario Land Surveyor (OLS) or Professional Engineer (P.Eng.) to supervise and where required herein certify all work associated with the survey and as-built requirements for Engineered Fill.

This article is to be read in conjunction with the Engineered Fill Certification requirements of the Company's geotechnical consultant included as an appendix to this document.

The Contractor will layout the limits of the fill envelope as shown on the drawings.

Following stripping, including any necessary subexcavation, the Contractor will take as-built elevations of the stripped ground within the limits of the engineered fill envelope. The ground elevations and the limits of the fill envelope will be certified and dated by the Contractor's OLS or P.Eng. and provided to the Consultant.

The Contractor will provide survey stakes and grade sheets to identify the specified height, by geodetic datum, of the engineered fill (at specified intervals if not all at one level) for each lot within the engineered fill envelope.

The Contractor will provide a copy of the grade sheets, prepared under the direction of the Contractor's OLS or P.Eng., to the Consultant's representative or designate.

Immediately following the completion of the engineered fill within an envelope the Contractor's OLS or P.Eng. will take elevations at the top of the fill line on a 10 metre grid across the envelope and again identify the limits of the fill envelope. The OLS or P.Eng. will reference all property lines, side and rear lot lines to the grid. These elevations and reference locations will be certified and dated by the Contractor's OLS or P.Eng.

A dated plot and digital disc of the top and bottom of the engineered fill and defined envelope, referenced to the property lines of each lot within the fill envelope will be submitted "certified" by the Contractor's OLS or P.Eng.

If required by the Consultant, the Contractor will calculate a volumetric quantity of engineered fill within the envelope, certified by the Contractor's OLS or P.Eng.

3.0 MEASUREMENT

Unless otherwise specified, no measurement of earthworks will be made.

4.0 PAYMENT

The price provided within the Pricing Schedule shall be compensation in full for all labour, material, consumables, and equipment to do all excavation, filling and compaction, control of surface and groundwater to complete the engineered fill requirements.

PROJECT SPECIFICATION NO. 1

GENERAL REQUIREMENTS

This specification is to be read in conjunction with the General Specification No. 1 - General Requirements.

Information provided in this specification supplements the General Specification and in the event of conflict between this specification and the general Specification, this specification shall govern.

4.0 DESCRIPTION

The 470 Tremblay site owned by Canada Lands Company CLC Limited is comprised of the proposed development of mixed-use, residential, park and stormwater management block components as well as the realignment of Tremblay Road.

The proposed work in Contract I includes mass earthworks operations to achieve the required balance line elevations and the installation of temporary erosion and sedimentation control measures. The proposed work in Contract II includes the installation of proposed underground services and their associated appurtenances, R.O.W. fine grading and construction of road structure to base asphalt. The Contractor shall accept the site as it is at the time of completing the Pricing Schedule for this RFP.

Notwithstanding the above, following completion of underground servicing and roads to base course asphalt, the Contractor must provide a topographical survey certified by Ontario Land Surveyor confirming the restored elevations as per SC 28. The Company reserves the right to credit from the payment to the Contractor for any incomplete restoration as substantial work. The deduction will equal the cost for the Company to complete the substantial restoration by another contractor.

The Contractor shall coordinate their work with any other contractors working on site at the time.

3.0 TRAFFIC

Access to the site will be from Existing Tremblay Road and St Laurent Boulevard only. Access points other than those noted on the engineering drawings are prohibited unless otherwise approved by the Consultant. Parking is not permitted on existing City roads (Existing Tremblay Road and St Laurent Boulevard) unless approved by the City.

Where construction occurs on Tremblay Road and St Laurent Boulevard, all lanes of traffic are to be maintained in each direction at all times. The Contractor is to submit a traffic control plan to the satisfaction of the City. The traffic control plan must be approved by the City a minimum of 10 days in advance of any disruption to traffic. The Contractor is responsible for obtaining road occupancy permits and road cut permits as required.

The Contractor is responsible for maintaining access to all dwelling units and businesses at all times. Driveway access is to be restored as quickly as possible.

The Contractor must perform operations, machine and equipment movements, deliveries and removals at times that will minimize disruption to traffic.

Refer also to Special Conditions Article SC6.

3.1 Traffic Control

The cost for all necessary permits, traffic signage, traffic control devices, temporary lane painting, delineators and flag persons shall be included in the prices provided within the Pricing Schedule. The Company will not entertain any claims for extras with regards to traffic control.

4.0 DISPOSAL SITES

The Contractor shall arrange for off-site disposal of any roots garbage, debris, excess excavated material, and/or unsuitable fill material. The cost of this disposal as well as the cost of loading and transporting of material to the disposal site shall be included in the provided within the Pricing Schedule prices.

6.0 CLASSIFICATION OF EXCAVATED MATERIALS

Unless otherwise noted the following will apply for the purpose of this contract:

Structural Fill shall be fill compacted using the necessary equipment and procedures to achieve a minimum of 95% and 100% Standard Proctor dry density for roads and building foundation respectively.

6.1 Rock Excavation

For the purpose of this Contract, neither weathered nor sound shale shall be classified as rock, but as earth. No extra payment for excavation in shale shall be considered.

6.4 Ontario Regulation 347, General Waste

Ontario Regulation 347, General Waste shall be applied to this Contract. Any excavated materials shall be tested and classified per this regulation and segregated into temporary stockpiles for inspection prior to disposal offsite. Only materials which meet the requirements for residential uses shall be reused on site.

10.0 LIMITS OF CONTRACT

On the Company's land, the Contractor shall limit their operations to within limits shown on the Engineering Drawings. The Contractor shall make their own arrangements for working on

adjacent private property if required except where directed to do such work by the Company or the Consultant.

11.0 EXISTING STRUCTURES AND UTILITIES

The available information pertaining to existing infrastructure in the project area is reflected on the engineering drawings. The Company and Consultant take no responsibility for the completeness, accuracy or validity of the information provided by the various utilities. The Contractor must satisfy themselves of the location of these existing services.

The Contractor must contact the various utilities, and obtain a field locate at least 5 days prior to the start of construction.

The Contractor should note that some utilities may require that excavations in the vicinity of their existing plant be hand dug when crossing their existing services. All costs for hand digging excavations shall be included in the contract unit prices. The Contractor should note that existing utilities may have to be relocated. The Contractor shall be responsible for coordination of utility relocation with any and all utility companies.

The Contractor is to ensure existing hydro, communications, cable T.V. and gas are supported in accordance with the requirements of the utility during the installation of any and all service connections, sewers and/or watermains.

Contract prices shall include locating, maintaining, supporting and repairing damaged utilities. Refer also to Special Conditions - Article SC3.

13.0 TEMPORARY RELOCATION OR SUPPORT

Temporary relocation or support of an existing buried or overhead utility shall be provided by the Contractor in accordance with the requirements of the City of Ottawa and the respective utilities. The means of support and protection shall be designed to be in conformance with the latest requirements of the Occupational Health and Safety Act of the Province. The Contractor will provide the utility, Company, and the Consultant a copy of the proposed means of support at least 5 working days prior to the start of work. It is the responsibility of the Contractor to contact the respective utilities to confirm their respective requirements based on the Contractor's proposed construction methodology and equipment. Support, backfill and restoration shall be in accordance with the requirements of the utility agency. Clearance from overhead lines is the responsibility of the Contractor. The Company shall not entertain any additional costs for any of the above.

14.0 EXISTING DRAINAGE

The contractor shall maintain adequate site drainage and siltation control for the duration of the Contract including construction and maintenance of swales, temporary ditches, berms, drainage structures and temporary culverts whether they are shown on the drawings or not.

The Company shall not entertain any additional costs related to the siltation of neighbouring natural features or properties.

All costs related to the requirements of this specification shall be included in the provided within the Pricing Schedule unit prices.

Refer to Special Conditions SC5.

23.0 OTHER CONTRACTORS

The Contractor shall make all necessary arrangements and coordination with other contractors and shall not claim extra payment due to the presence of such other contractors. At no time shall Contractors work in the same place and time.

24.0 MEETINGS

A representative of the Contractor (and any Subcontractors) shall attend the pre-construction meeting and periodic site meetings for the duration of the work.

PROJECT SPECIFICATION NO. 2

SITE PREPARATION

This specification is to be read in conjunction with General Specification No. 2 - Site Preparation.

Information presented in this specification supplements the General Specification and in the event of conflict between this specification and the General Specification, this specification shall govern.

4.0 DESCRIPTION

The Proponent must examine the site prior to submitting their Pricing Schedule. The Proponent must satisfy themselves of the existing site conditions and include in the Pricing Schedule prices requested any costs required to complete the works as specified in the contract drawings and specifications. The Contractor shall supply written confirmation that they have undertaken their own documentation of the quantities and satisfied themselves, prior to the submission of the Pricing Schedule. The contractor will accept the site "as is" at the time of the start of work. The submission of a Pricing Schedule shall constitute presumptive evidence that this requirement has been satisfied.

1.1,1.2 Clearing and Grubbing

The Contractor is advised to examine the site at the time of completing the Pricing Schedule. Any remaining clearing, grubbing, or stripping which the contractor determines is required to be completed shall be included in the Pricing Schedule.

1.3 Stripping

All topsoil stripping and earthworks are being carried out under this contract to prepare all roads, lots and blocks to pre-grade elevations. The Contractor will restore all disturbed area grading on lots and blocks to previous condition based on the balance lines specified in the Earthworks Contract, and provide a survey confirming the same.

In the event existing topsoil piles impede the operation of the Contractor in completing the requirements of this contract, he shall identify the area of concern in sufficient advance time, to allow the Company sufficient time to make arrangements to have the necessary portion of the pile relocated.

At no time shall topsoil be used for the purpose of backfilling or in areas which are unacceptable to the Company's Geotechnical Consultant. The definition of topsoil for the purpose of this contract will be equivalent to that of the Company's Geotechnical Consultant.

2.0 CONSTRUCTION

2.6 Existing Structures and Utilities

The Contractor is responsible for the field location and identification of existing utilities overhead and underground prior to the start of work. This includes arranging for non-mechanical type excavations, such as Hydrovac or hand digging to undertake the exposure of the existing utilities or structures within the roadway or boulevard and as required by utility companies.

Those existing services and utilities to be crossed by the Contractor to complete the works shall be supported in accordance with the requirements of the utility, City of Ottawa and the requirements of the Occupational Health and Safety Act.

2.7 Sediment Control Devices

Sedimentation control devices shall be supplied and installed as shown on the drawings. The Contractor shall clean and maintain the sedimentation control devices periodically to the satisfaction of the Consultant and City of Ottawa requirements.

3.0 MEASUREMENT

3.3 Topsoil Stripping

Stripped topsoil will be paid on a cubic metre basis. The volume will be determined by the Consultant based on surveys taken prior to stripping and after stripped and calculated using AutoCAD Civil 3D.

4.0 PAYMENT

There is no additional itemized payment for clearing and grubbing, restoration of area grading, surveys, or topsoil stripping. In the event the Contractor encounters additional topsoil the Company and the Consultant shall be notified in sufficient time to allow for its removal with no delay to the Contractor's schedule.

The requirements of this Specification will be included in the unit prices within the Pricing Schedule.

PROJECT SPECIFICATION NO. 3

GENERAL GRADING AND EARTHWORK

This specification is to be read in conjunction with General Specification No. 3 - General Grading and Earthwork.

Information presented in this specification supplements the General Specification and in the event of conflict between this specification and the General Specification, this specification shall govern.

1.0 DESCRIPTION

The Contractor will accept the site "as is" at the time of the start of work. Submission of the Pricing Schedule will constitute presumptive evidence that the Contractor has undertaken the necessary inspection of the site to satisfy themselves of the site conditions.

The Contractor is responsible to:

- Monitor the status of the sedimentation and erosion controls and maintain as necessary as required by the Consultant and City of Ottawa.
- Proofroll the subgrade of all fill areas prior to filling, and remove, replace or compact any soft or unsuitable areas identified by the geotechnical consultants.
- Provide positive drainage to existing outlets to avoid any ponding.

Provide and maintain positive drainage to approved outlets for all areas during and upon completion of this contract. The same specifications shall apply to completion of rough grading required under this contract. Following completion of underground servicing, the contractor must complete a topographical survey certified by an Ontario Land Surveyor confirming the restored elevations, as per SC 28. The Company reserves the right to credit from the payment to the Contractor for any incomplete restoration as substantial work. The deduction amount will equal the cost for the Company to complete the substantial restoration by another contractor.

2.0 CONSTRUCTION

2.4 Rough Grading

Rough grading shall be carried out to the subgrade elevation provided by the consultant.

Rough grading shall be in accordance with the requirement and procedures noted in the Geotechnical report.

2.2 Fine Grading

Fine grading shall be in accordance with the requirement and procedures noted in the Geotechnical report.

3.0,4.0 MEASUREMENT AND PAYMENT

The Contractor will provide the following surveys under the seal of a licensed Professional Engineer or Ontario Land Surveyor:

- Existing ground will be taken from the survey completed by the Company's O.L.S..
- Subsequent to the topsoil stripping and related operations, a survey of the stripped ground with spot elevations at 5m intervals internally and along boundary areas, indicating the pre-filling sub-grade for reference.
- Surveys of the final topsoil stockpiles (in the event topsoil is kept on site), top of engineered fill, prior to topsoil re-use and burial (top & bottom of trench) within the Company's lands. The survey of the lots will be provided as required by the Consultant and Geotechnical consultant in order to properly complete the determination of the extent and certification of engineered fill as described under this specification. A bulking factor of 0.80 will be used on any stockpile to determine the in-situ volume for payment.
- Subsequent to the completion of the cutting and filling of all roads, a survey of the centreline, both streetlines and easements.

All surveys will be completed and delivered in an Autodesk Civil 3D Version 2018 or newer format in addition to the hard copy under seal, with reference to at least two independent benchmarks, and tied to established boundary monumentation. The works associated with each survey will be deemed incomplete until the surveys are received by the Consultant and the Geotechnical Consultant in an acceptable form.

Substantial Completion will not be approved until the Consultant has received and is satisfied with all the surveys required under this specification.

The Company reserves the right to confirm using independent means the accuracy of the surveys provided by the Contractor. In the event the Contractor's surveys are found to be inaccurate, the costs of the Company's survey and any necessary subsequent surveys, will be deducted from the progress payments to the Contractor.

The Consultant will only review and certify to the Company survey information provided by the Contractor which the Contractor declares complete. One review will be the initial review and comments, and a second review subsequent to rectification of deficiencies if required. Costs of any additional reviews will be undertaken at the cost of the Contractor. These costs will be deducted from the payment by the Company to the Contractor.

The lump sum or unit prices provided within the Pricing Schedule shall apply in this Contract regardless of the final quantity of topsoil, or earth moved or work carried out to achieve the required grades specified in this contract and the approved drawings and in accordance with the requirements of SC7 - Work Schedule. The lump sum prices provided within the Pricing Schedule for the work done governed under this specification shall be full compensation for all labour, materials, permits, coordination, surveys and plant required to complete the work.

Quantities shall be calculated by the Consultant utilizing Autodesk Civil 3D. The quantities determined by the Consultant will be final.

All costs related to the on-site disposal and burial of boulders shall be included in the prices provided within the Pricing Schedule.

5.0 BENCHMARKS

Elevations are in metres and are derived from Geological Survey of Canada benchmarks. Elevations are geodetic and refer to the Canadian Geodetic Vertical Datum (1928), pre-1978 adjustment.

PROJECT SPECIFICATION NO. 4

EXCAVATION AND BACKFILL

This specification is to be read in conjunction with General Specification No. 4 - Excavation and Backfill.

Information presented in this specification supplements the General Specification and in the event of conflict between this specification and the General Specification, this specification shall govern. In the event of a conflict between this specification and the recommendations of the Geotechnical Study prepared by the Company's geotechnical consultant, the geotechnical recommendations shall govern.

3.0 TRENCH EXCAVATIONS

All trenching to be in accordance with the latest revisions of the Occupational Health and Safety Act and Regulations for construction projects.

3.1 Alignment and Depth

Backfill and compact with granular material in accordance with the requirements of the Company's Geotechnical Consultant reports and recommendations and City of Ottawa current standards.

When for any reason the trench is over-excavated, the Contractor shall, at their own cost, backfill to the correct grade in accordance to the requirements and procedure specified by the Geotechnical consultant.

3.2 Trench Width

1. Maximum and minimum trench widths shall be as details on the drawings for common trench sewers. For separate trench storm and sanitary sewers refer to O.P.S.D. 802.010 for PVC pipes and 802.030 Class B for concrete pipes.
2. The Company's Geotechnical Consultant will be present to monitor the trench slope stability during construction activity.
3. Vertical trench is to be used where required due to existing soil conditions.
4. Sheet piling or other approved vertical trenching techniques to be used as required for sewer construction.

5.0 DEWATERING

All dewatering costs to be included in the unit price for the individual infrastructure (sewers, manholes, watermains etc.) within the contract, including dewatering and sand or granular

seams that may be encountered. The Contractor is encouraged to review the available subsurface information related to existing ground conditions.

The Contractor should familiarize themselves with the geotechnical and hydrogeological reports included with this contract. The contractor shall pay particular attention to dewatering requirements. All costs for equipment, material and labour shall be included in the unit prices. There will be no separate payment for dewatering.

5.0 EXISTING PAVEMENTS

5.1 Size of Excavation

For this Contract, the method of trenching shall be chosen by the Contractor.

The Contractor shall be responsible for restoration of existing asphalt pavement, curbs, sidewalks and other surface features disturbed by their operations.

All joints with existing pavement in the municipal rights of way shall treated and restored in accordance with the municipality's requirements, to the same depths of asphalt, and granular base materials including all necessary compactive effort.

The Contractor shall include all costs related to restoration and joint treatment in their unit prices provided within the Pricing Schedule. The Company will not entertain any extras with respect to restoration of existing surface features.

5.2 Disposal

Any existing asphalt pavement, concrete etc. which has been removed by the Contractor to complete the works outlined in this specification shall be disposed of off-site by the Contractor, at no additional cost to the Company.

7.0 EXISTING UTILITIES AND STRUCTURES

The Contractor shall protect all existing and temporary utilities. It is the Contractor's responsibility to obtain all necessary permits and field locates prior to digging, all in conformance with the utility's or municipal authority requirements.

8.0 FROZEN GROUND MATERIAL

Frozen materials or earth will not be permitted for use as backfill. The determination of frozen materials will lie in the sole discretion of the Company's Geotechnical Consultant.

9.0 PIPE BEDDING

9.1 Materials

Refer to Company's Geotechnical Consultant reports. Also see item 3.1 above

9.2 Placing

Granular bedding materials should be placed as detailed on the contract drawings and should be compacted to 98% Standard Proctor Maximum Dry Density. Refer to Notes drawing NT1 for bedding requirement.

10.0 BACKFILLING

Backfilling shall be carried out in accordance with the Company's Geotechnical Report recommendations. The Contractor is encouraged to review the Geotechnical Reports.

Prior to backfilling of any trench the Contractor shall confirm and provide written evidence that the necessary ties, and elevations have been obtained by the Contractor's surveyor.

Also see item 3.1 above.

11.0 PAYMENT

The Contract Price shall be compensation in full for all excavation in any material including dealing with frozen materials, sheeting and shoring and dewatering if necessary, and backfill and compaction as required and as directed by the Consultant.

The unit prices provided within the Pricing Schedule for manholes shall include the cost of granular backfill as specified.

The contract price shall include aerating and/or drying wet material as required and as directed prior to backfilling.

The lump sum and unit prices provided within the Pricing Schedule shall apply to the Contract regardless of the final quantity of the materials or earth moved or work carried out to achieve the required grades specified on the approved drawings and in accordance with this specification.

Upon completion of the backfilling of trenches, the contractor shall carry out the necessary rough grading to allow for the construction of the final surfaces as specified such as roads, lots, walkways or landscaped areas. The unit prices provided within the Pricing Schedule shall include all costs associated with this requirement. The Company will entertain no extras for this requirement.

The unit prices provided within the Pricing Schedule for the work under this specification shall include all necessary arrangements for offsite disposal, including all labour, equipment and materials required for the excavation, haulage and disposal fees.

Any disturb areas must be brought back to preconstruction grade unless otherwise directed by the Consultant.

11.3 Excess Excavation

There shall be no payment for the backfilling of any over-excavation in accordance with specifications of this contract by the Contractor.

Payment for the backfilling of any over-excavation as directed by the Consultant shall be made in accordance with the Schedule of Additional Unit Prices.

PROJECT SPECIFICATION NO. 5

WATER DISTRIBUTION SYSTEM

This specification is to be read in conjunction with General Specification No. 5 - Watermains and Appurtenances.

Information presented in this specification supplements the General Specification and in the event of conflict between this specification and the General Specifications, this specification shall govern.

2.0 MATERIALS

Watermains and appurtenances to be to City of Ottawa Specifications.

3.0 CONSTRUCTION

3.1 General

Watermains shall have 2.40 metre minimum cover at all locations along its length unless otherwise directed by the Engineer. Where the depth of the watermain or appurtenances does not meet the requirements of City of Ottawa, the main or appurtenance will be provided with sufficient insulation to compensate for the lack of cover per City of Ottawa Std. W25.2. All metallic components shall be protected from corrosion by cathodic protection per the latest OPSD or AWWA and City of Ottawa standards.

3.5 Connections to Existing Watermains

All connections to existing watermains must be coordinated by the Contractor with the City of Ottawa officials and the Consultant.

Watermain bedding shall be in accordance with City of Ottawa Standard W17.

3.7 Anchorage of Pipes, Fittings, and Hydrants

Thrust blocks are to be installed as per the City of Ottawa Standard W25.3 and W25.4. Watermains in fill areas are to be installed with restrained joints as per City of Ottawa W25.5 and W25.6.

3.9 Valve Boxes

The price for valve boxes located within boulevards shall include the setting and adjustment of the top to finished grade. The price for valve boxes within roads shall include setting and adjustment of the top to base course asphalt level. The price for valve boxes within roads shall also include adjustment of the top from base course asphalt level to top asphalt level.

3.10 Valve Chambers

Chamber drain may be connected to storm sewers only with agreement of Drinking Water Services provided that an approved backflow prevention device is included per Section 4.4.7.4 of Ottawa Design Guidelines – Water Distribution.

3.11 Hydrants

All hydrants shall be installed as per City of Ottawa Std. W19 and located as per City of Ottawa Std W18.

3.12 Service Connections

Type K soft copper as per City of Ottawa Std. W26 unless otherwise specified.

4.0 HYDROSTATIC TESTS AND FLUSHING

4.3 Allowable Leakage

Leakage tests shall be applied to the mains in suitable sections after the backfilling is completed. The ends of the mains shall be capped or valves closed and the main filled with water under a pressure of 1035 kPa after which all visible leaks shall be stopped. Leakage shall then be measured by a calibrated meter supplied by the Contractor with readings taken at fifteen minute intervals for a period of three hours. The average rate of leakage shall not exceed 115 L/day per 25 mm of diameter per km of pipe, and if the leakage exceeds this figure the Contractor shall locate and correct the leaks. Tests shall be repeated until the leakage is less than the specified amount. The pipe shall be left exposed where directed until the completion of the test, after which backfilling shall be completed. The cost of the labour and the materials required to locate and correct the leaks shall be borne by the Contractor. Leakage tests shall be borne by the Contractor. Leakage tests shall be carried out by the Contractor.

4.3.1. Swabbing

As a requirement to this Contract all watermains shall be swabbed immediately after the leakage test and prior to disinfection. In most cases watermains are usually swabbed using fire hydrants as points for entry and exit. Because of this, the main valve seat must be removed and a blind seat installed to prevent undermining the soil at the hydrant boot. The practice also prevents damage to the original hydrant seat as debris passes through the hydrant. All swabs must be inspected prior to insertion and immediately after they exit the main to ensure that they have remained intact and that pieces of the foam do not stay in the main. The swabs should also be numbered and carefully controlled by the Contractor and Consultant to ensure that all swabs that are introduced to the main are accounted for. Only new swabs will be permitted for use and in no case will used swabs be allowed.

All watermain pipes must be swabbed a minimum of one time plus a minimum of one swab shall be passed through each hydrant lead, stub or blow-off. Additional swabs shall be used as

directed by the Consultant if discharge water does not run clear within ten (10) seconds of the swab exiting the discharge point. Swabs shall be forced through the watermain using potable water so that they maintain a velocity of 0.5 to 1 metre per second. Any method of disposal of the discharged water must be approved by the Consultant. The Contractor shall take the necessary precautions to minimize soil erosion and to reinstate the area upon completion. All swabbing must be completed before any services are connected.

The swabs must be an open cell polyurethane foam, having a density of 1.5 pounds per cubic foot (19 grams per cubic metre), and are to be a minimum of 50 mm larger than the nominal pipe diameter with a length of at least one and a half times its diameter. Watermains 300 mm or smaller can be swabbed through hydrants on approval by the Consultant.

4.3.2 Disinfection

After swabbing, the watermains shall be chlorinated. The work of chlorination and sterilization will be performed by the Contractor for a period of 24 hours.

4.4 Flushing

Immediately after sterilizing, swabbing and hydrostatic and leakage tests are completed, the main shall be flushed again according to City of Ottawa Standards and left charged, so that the work of connecting the water services may proceed at once. Care should be exercised to ensure that the flushed wastewater shall be disposed of in such a manner to protect the environment as well as being approved by the Consultant.

5.3 Bacteriological Tests

The Contractor shall collect samples from the disinfected watermains for the performance of bacteriological tests. Should the tests prove unsatisfactory, the watermains in question shall be rechlorinated, flushed and tested until satisfactory results can be obtained. All costs for further disinfection shall be borne by the Contractor.

7.0 PAYMENT

7.1 Watermains

The Unit Price for watermain shall include all labour, materials and equipment required to construct watermains and appurtenances as per the drawings and specifications including all necessary excavation, bedding, backfill, insulation, compaction, restoration, plugs, restrained joints, thrust blocks, testing and other requirements of City of Ottawa, also corrosion prevention as described in General Notes – NT1.

The Unit Prices provided within the Pricing Schedule for works under this specification shall include disposal off-site of any surplus materials at completion of the work per SC1.

The Unit prices shall include all traffic controls and temporary detour provisions for those works in this specification, within existing road allowances or adjoining rights of way where other traffic may travel. This includes both pedestrian and vehicular traffic controls and provisions.

The Unit Price also includes extra depth watermain and crossings under existing utilities where indicated on drawings, and full compaction of backfill in trenches under pavements.

The Unit Prices provided within the Pricing Schedule shall include all necessary layout and preparation of As-Constructed red-line plans in accordance with the requirements of the Special Conditions, and City of Ottawa for the work under this specification.

PROJECT SPECIFICATION NO. 6

SEWERS AND APPURTENANCES

This specification is to be read in conjunction with General Specification No. 6 - Sewers and Appurtenances.

Information presented in this specification supplements the General Specification and in the event of conflict between this specification and the General Specifications, this specification shall govern.

2.0 MATERIALS

2.1 Sewer Pipe

- .1 Concrete pipe up to and including 900 mm dia. shall be supplied by a manufacturer which has obtained prequalification by the Joint OCPA/MEA/MECP Prequalification Committee.
- .2 All sewer joints to be fitted with rubber gaskets.
- .3 PVC sewer pipe shall be equal to CSA 182.2 or latest amendment Class DR-18, SDR-26, SDR-35 as specified on the drawings.

2.3 Manholes

- .1 Sanitary manhole frames and covers to be in accordance with City of Ottawa Std S24 and S25. All adjustment units, frame and grates are to be sealed as per the inflow and infiltration mitigation measures detail.
- .2 Storm manhole frames and covers to be in accordance with City of Ottawa Std S24.1 and S25.
- .3 Manholes to be in accordance with OPSD standards.

2.4 Catchbasins

- .1 Catchbasin and double catchbasins to be in accordance with City of Ottawa Std S1 and O.P.S.D. 705.020 respectively. Frames and grates per City of Ottawa Std. S19.1.
- .2 Curb inlet catchbasin to be in accordance with City of Ottawa Std S3. Frames and grates per City of Ottawa Std. S22 and S23.

2.5 Pipe Bedding

All bedding for sewers is to be installed as per the recommendations of the Geotechnical Consultant and the notes as shown on Drawing No NT1.

3.0 CONSTRUCTION

3.2 Pipe laying

Where a sewer crosses another sewer or watermain with less than 300 mm separation, the pipes shall be encased in 20 MPa concrete from the base of the lower to the springline of the higher. Concrete encasement is to be completed from pipe joint to pipe joint. Concrete encasement is to be included in the price provided within the Pricing Schedule for sewer construction.

Where trenchless methods are used, the Contractor shall submit the necessary shop drawings which include the hydrostatic joint rating being proposed.

3.6 Sewer Laterals

Sewer laterals are to be installed as per notes on Drawing NT1.

3.7 Manholes

Concrete pipe to be supported from maintenance hole to the first pipe joint 1.0 m from outside wall with 20 MPa concrete to undisturbed ground. Maintenance holes shall be backfilled with Granular "B".

Minimum width of manhole benching is to be 230mm except beneath the access where it shall be at least 450mm.

All poured in place manholes are to be founded on compacted Granular 'A' or equivalent approved by the Geotechnical Consultant. A minimum thickness of 300 mm compacted to 100% Standard Proctor Maximum Dry Density (SPMDD) shall be provided unless otherwise noted by the Geotechnical Consultant.

Any soft subgrade sections are to be removed and replaced with 50 mm crusher run limestone or equivalent approved by the Geotechnical Consultant.

All adjustment units, frame and grates are to be sealed as per the inflow and infiltration measures detail.

3.8 Catchbasins and Catchbasin Leads

Subdrains shall be connected to all catchbasins.

4.0 TESTING

4.2 Procedure

1. The Contractor shall carry out T.V. camera inspections of all sewers up to and including 1500 mm diameter installed under this Contract. The camera can be either pulled or self propelled through the pipes, the equipment is to have features to enable closer

examination of faults and to view up lateral connections. The equipment is to provide "measured" location of the camera relative to manholes in order to locate faults, laterals, etc. Two copies are to be provided on CD and shall be submitted directly to the Consultant. Three T.V. camera inspections are required; one following base asphalt, second prior to the first occupancy, and a final prior to assumption. The two copies of each video recording shall be delivered by the Contractor to the Consultant along with a written report with photographs of problem areas.

2. The air-test, infiltration test and exfiltration test for the sanitary sewer system is to be completed at three times during the construction of the proposed works. First upon completion of the sanitary sewer system, second upon completion of base asphalt and finally prior to the first occupancy.
3. Prior to assumption the Contractor shall conduct smoke tests of all sanitary sewers to confirm that there are no cross connections. Supplemental dye testing shall also be conducted when directed by the Engineer as described in the City of Ottawa Standards.

4.3 Allowable Limits

The Contractor shall verify the allowable limits for all testing procedures according to the requirements of City of Ottawa.

5.0 MEASUREMENT

No measurement of sewers or maintenance holes for payment purposes will be undertaken in the field.

6.0 PAYMENT

The unit prices provided within the Pricing Schedule for the works under this specification include all necessary work to obtain and prepare the As-Constructed information required under the Special Conditions.

The Unit Prices provided within the Pricing Schedule for works under this specification shall include disposal off-site of any surplus materials at completion of the work per SC1.

The Unit Prices provided within the Pricing Schedule or works within existing road allowances under this specification shall include all necessary traffic controls and detours, both vehicular and pedestrian, in accordance with specifications of this Contract and City of Ottawa requirements; restoration of existing roads including backfill, granular base and subgrade base asphalt and top asphalt to match existing conditions; and restoration of existing boulevards, including backfill, topsoil, and sod.

The Contract Price shall include all costs associated with T.V. inspections. No additional amount shall be paid for this work. Any cost of repairing defective work and subsequent re-inspection shall be at the Contractor's sole expense.

The Contract Price for sewers shall include any temporary pumping required if no outfall is available due to scheduling the work program.

The prices provided within the Pricing Schedule in the pipe and manhole items for storm sewer shall include the cost of all required testing.

All costs associated with the testing of the sanitary sewer is to be included in the prices provided in the contract price.

All costs associated with the inflow and infiltration mitigation measures are to be included in the unit prices for the manholes and manholes adjustment as noted.

6.3 Maintenance Holes

The unit prices provided within the Pricing Schedule for maintenance holes shall include backfill approved by the Geotechnical consultant, the placement of 15 MPa concrete fill under the maintenance holes to undistributed ground in locations where the maintenance hole foundation has been excavated or otherwise substantially disturbed.

The unit prices provided within the Pricing Schedule for maintenance holes shall in all cases include drop connections and safety platforms as required on the drawings, whether or not such specials are highlighted in the Pricing Schedule.

6.4 Catchbasins

The price provided within the Pricing Schedule for single and double catchbasins shall also include the cost of supplying and installing the appropriate lead and any bedding material required in addition to that specified to make up the difference between undisturbed ground and the underside of the catchbasin.

6.9 Testing

The unit prices provided within the Pricing Schedule shall include all costs related to the tests as noted in Section 4.0 which may be requested by the Consultant. This includes the cost of television camera inspection of all sanitary sewers and the provision of the required video tapes and report to City of Ottawa.

7.0 SILTATION CONTROL DEVICES

The Contractor will be responsible for installing siltation control facilities (sediment ponds and hickenbottom drains with outlets or temporary catchbasin sedimentation control devices) at various points within the site. In some cases the Consultant may direct the reconstruction of the ponds or outlets and to connect the outlet pipes as directed with payment to be based on the additional unit prices provided in the Contract, and the review and approval by the Consultant.

PROJECT SPECIFICATION NO. 7

ROADS, CURBS AND SIDEWALKS

This specification is to be read in conjunction with General Specification No. 7 - Roads, Curbs and Sidewalks.

Information presented in this specification supplements the General Specification and in the event of conflict between this specification and the General Specifications, this specification shall govern.

3.0 CONSTRUCTION

Sub-drains to be laid continuously beneath all curbs in accordance with City of Ottawa Standard R1.

3.1 Road Base, Driveways, Parking Areas and Sub-Base

Subgrade

Any topsoil found within the roadway areas should be removed prior to commencement of sub-grade preparation. All sub-grades shall be proof-rolled with a representative of the Geotechnical consultant to identify and remove soft-spots. Contractor to notify the Consultant 48 hours prior to any proof rolls.

The sub-grade shall be compacted in accordance with the procedures as noted in the Geotechnical report.

33. SUB-BASE

The granular sub-base shall be installed in accordance with the requirement and procedures noted in the Geotechnical report.

3.2 Asphaltic Pavement

Where noted all existing pavement shall be saw cut as necessary to provide the required trench widths and joints to proposed asphalt. Joints will be provided as detailed on the applicable drawings.

The compaction and asphalt mix design shall be in accordance with the Geotechnical consultant report, OPSS and City of Ottawa Standards.

The contractor is to submit proposed asphalt mix design for review by the various authorities and Geotechnical consultant two weeks prior to the proposed start of paving. All mix designs must be provided to the Geotechnical Consultant for review and approval prior to construction.

3.2.1 Joints Between Existing and Proposed Asphalt

A 300 mm wide by 40 mm deep step joint is to be provided between existing and proposed pavement, and filled with a compacted layer of 40 mm HL3. All joints shall be routed and sealed with a hot rubber sealing compound as per OPSS 1212.

Prior to placing the tack coat and if directed by the Consultant, the base asphalt is to be flushed and swept including any minor hand cleaning all at no additional cost.

3.2.3 Joints Between Existing Base Asphalt and Proposed Asphalt

At an interface with existing asphalt roads with only base asphalt, the contractor shall provide a butt joint between the existing asphalt and proposed asphalt. The Contractor shall trim the existing asphalt to provide a straight edge for the butt joint and fill the joint with rubberized asphalt sealant as per OPSD 508.010.

3.2.4 Adjustments to Manholes, Valve Chambers and Catchbasins

The tops and frames of manholes and catchbasins shall be adjusted to the top of base asphalt using modoloc rings.

4.0 MEASUREMENT

All road quantities shall be measured on the Engineering Drawings in square metres at the specified thickness as indicated on the Engineering Drawings.

The measurement of base course asphalt shall not include the fillet laid over the top of the base curb which ultimately is trimmed off to permit top stage curb construction.

Adjustment of maintenance holes and catchbasins will be measured on a unit basis as described in Project Specification No. 6.

5.0 PAYMENT

5.1 Road Base, Sub-Base and Asphaltic Pavement

The Unit Prices provided within the Pricing Schedule for works under this specification shall also include disposal off-site of any surplus materials at completion of the work per SC1.

Payment for base asphalt and top asphalt shall be on a square metre basis of asphalt placed to the minimum specified compacted depth.

Unit prices for base asphalt shall include any immediate rectification of damaged areas or settlements and padding necessary for these settlements.

Unit prices for top asphalt shall include all machine or hand padding or scratchcoats required due to settlements of the base asphalt to provide the correct top asphalt crown. The unit price shall also include all necessary base asphalt repairs and patching required prior to top paving, including alligatored, broken or badly cracked asphalt, including the removal and disposal of broken asphalt offsite. The Contractor will not be responsible for damage by a third party. The Consultant shall determine if the repairs and/or patching is the result of a third party action.

Unit prices for asphalt shall be adjusted according to the rate of asphaltic cement used at the time of construction. The cost of asphaltic cement at the time of submission of the Pricing Schedule shall be specified by the contractor as a basis for adjusting the unit price for asphalt.

5,2, 5.3 Maintenance Hole Adjustments and Ramping

The unit price provided within the Pricing Schedule for the adjustment of manholes, chamber tops, access locations, and catchbasins shall include all the necessary materials, equipment and labour required to complete the works as specified.

5.4 Sidewalks

Payment for sidewalk shall be compensation in full for all labour, equipment and material required including excavation and fine grading, disposal of surplus material, supply of fill material and polyethylene film, expansion joints, edge scoring of both edges, regrading to boulevard level, application of curing compound, cold weather protection and cleaning and brushing of sidewalks and application of sealer.

DRAWINGS FOR CONTRACT I

The following Drawings are attached to this Schedule B-1 and form part of Contract I:

1. General Notes 19M-00609-NT1
2. General Plan 19M-00609-G1
3. Storm Drainage 19M-00609-G1A
4. Sanitary Drainage Plan 19M-00609-G1B
5. Grading Plan 19M-00609-GR1
6. Grading Plan 19M-00609-GR2
7. Grading Plan 19M-00609-GR3
8. Grading Plan 19M-00609-GR4
9. Street '2' 19M-00609-P1
10. Street '1' 19M-00609-P2
11. Street '2' 19M-00609-P3
12. Street '1' 19M-00609-P4
13. Street '1' 19M-00609-P5
14. Ex. Tremblay Road 19M-00609-P6
15. Ponding Area and ICD Plan 19M-00609-ICD1
16. Ponding Area and ICD Plan 19M-00609-ICD2
17. Ponding Area and ICD Plan 19M-00609-ICD3
18. Ponding Area and ICD Plan 19M-00609-ICD4
19. Erosion and Sediment Control Pre Earthworks 19M-00609-ESC1
20. Erosion and Sediment Control Pre Servicing 19M-00609-ESC2
21. Erosion and Sediment Control Post Servicing 19M-00609-ESC3
22. Erosion and Sediment Control Details 19M-00609-ESC4
23. Stormwater Management Pond 19M-00609-SWM1
24. Stormwater Management Pond Details 19M-00609-SWM2
25. Stormwater Management Pond Details 19M-00609-SWM3

- 26. Composite Utility Plans 19M-00609-UC1
- 27. Composite Utility Plans 19M-00609-UC2
- 28. Composite Utility Plans 19M-00609-UC3
- 29. Composite Utility Plans 19M-00609-UC4
- 30. Standard Road Cross Sections 19M-00609-D1
- 31. Details 19M-00609-D2
- 32. Details 19M-00609-D3
- 33. Details 19M-00609-D4
- 34. Details & Cross-sections 19M-00609-D5

SCHEDULE B-2**DRAWINGS FOR CONTRACT II**

The following Drawings are attached to this Schedule B-2 and form part of Contract II:

1. General Notes 19M-00609-NT1
2. General Plan 19M-00609-G1
3. Storm Drainage 19M-00609-G1A
4. Sanitary Drainage Plan 19M-00609-G1B
5. Grading Plan 19M-00609-GR1
6. Grading Plan 19M-00609-GR2
7. Grading Plan 19M-00609-GR3
8. Grading Plan 19M-00609-GR4
9. Street '2' 19M-00609-P1
10. Street '1' 19M-00609-P2
11. Street '2' 19M-00609-P3
12. Street '1' 19M-00609-P4
13. Street '1' 19M-00609-P5
14. Ex. Tremblay Road 19M-00609-P6
15. Ponding Area and ICD Plan 19M-00609-ICD1
16. Ponding Area and ICD Plan 19M-00609-ICD2
17. Ponding Area and ICD Plan 19M-00609-ICD3
18. Ponding Area and ICD Plan 19M-00609-ICD4
19. Erosion and Sediment Control Pre Earthworks 19M-00609-ESC1
20. Erosion and Sediment Control Pre Servicing 19M-00609-ESC2
21. Erosion and Sediment Control Post Servicing 19M-00609-ESC3
22. Erosion and Sediment Control Details 19M-00609-ESC4
23. Stormwater Management Pond 19M-00609-SWM1

24. Stormwater Management Pond Details 19M-00609-SWM2
25. Stormwater Management Pond Details 19M-00609-SWM3
26. Composite Utility Plans 19M-00609-UC1
27. Composite Utility Plans 19M-00609-UC2
28. Composite Utility Plans 19M-00609-UC3
29. Composite Utility Plans 19M-00609-UC4
30. Standard Road Cross Sections 19M-00609-D1
31. Details 19M-00609-D2
32. Details 19M-00609-D3
33. Details 19M-00609-D4
34. Details & Cross-sections 19M-00609-D5

SCHEDULE C

INSURANCE

1. General Liability

General liability insurance with limits of not less than \$10,000,000 per occurrence within any policy year with respect to completed operations, and with a deductible not exceeding \$5,000 (or as may otherwise be negotiated). The insurance coverage will not be less than the insurance provided by IBC Form 2100 (including an extension for a standard provincial and territorial form of non-owned automobile liability policy) and IBC Form 2320. To achieve the desired limit, umbrella or excess liability insurance may be used.

General liability insurance will be in the name of the Contractor and will include, or in the case of a single, blanket policy, be endorsed to name, the Company and the Consultant as insureds but only with respect to liability, other than legal liability, arising out of their sole negligence, arising out of the operations of the Contractor with regard to the Work.

General liability insurance will be provided from the Start Date and maintained until one year from the Substantial Performance Date. Liability coverage will be provided for completed operations hazards from the Substantial Performance Date on an ongoing basis for a period of 2 years following the Substantial Performance Date.

Sudden and accidental pollution insurance with limits of not less than \$5,000,000 inclusive per occurrence. Offsite clean-up expense coverage should be explicitly identified in the policy, including costs of waste transportation

Canada Lands Company CLC Limited, and its departments, divisions, agencies, offices, commissions, officers, employees and agents must be listed as *Additional Insureds* on the Commercial General Liability policy and Umbrella Liability policy.

2. Blanket Wrap-Up Liability

Blanket wrap-up liability insurance policy with the same specifications as the primary general liability coverage. This policy covers all new construction and large expansion and renovation projects for the interests of Canada Lands Company CLC Limited, and its contractors, subcontractors, engineers and other parties to the project.

3. Automobile Liability

Automobile liability insurance covering all licensed vehicles owned or leased by the Contractor with limits of not less than \$2,000,000 inclusive per occurrence for bodily injury, death, and damage to property.

Automobile liability insurance will be provided from the Start Date and maintained until expiry or termination of the Contract.

4. N/A

5. Equipment Insurance

"Broad form" contractors' equipment insurance coverage covering Work Equipment used by the Contractor for the performance of the Work will be in a form acceptable to the Company and will not allow subrogation claims by the insurer against the Company.

Such insurance will be maintained from the Start Date until one year from the Substantial Performance Date.

6. "Broad form" Property Insurance

"Broad form" property insurance in the joint names of the Contractor, the Company and the Consultant, and including as insureds all Subcontractors. Such insurance will have limits of not less than the sum of 1.1 times Contract Price and a deductible not exceeding \$5,000 (or as may otherwise be negotiated). The insurance coverage will not be less than the insurance provided by IBC Forms 4042 and 4047 (excluding flood and earthquake) or their equivalent replacement. Such insurance will also meet the requirements set out in paragraph 7 below.

The "Broad form" property insurance will be provided from the Start Date and maintained until the earliest of:

- (1) 10 calendar days after the Substantial Performance Date;
- (2) on the commencement of use or occupancy of any part or section of the Work unless such use or occupancy is for construction purposes, habitational, office, banking, convenience store under 465 square metres in area, or parking purposes, or for the installation, testing and commissioning of equipment forming part of the Work; or
- (3) when left unattended for more than 30 consecutive calendar days or when construction activity has ceased for more than 30 consecutive calendar days.

7. N/A

8. Additional Requirements for "Broad form" Property Insurance

The "Broad form" property policy will provide that, in the case of a loss or damage, payment will be made to the Company and the Contractor as their respective interests may appear. In the event of loss or damage:

- (1) The Contractor will act on behalf of the Company for the purpose of adjusting the amount of such loss or damage payment with the insurers. When the extent of the loss or damage is determined, the Contractor will proceed to restore the Work. Loss or damage will not affect the rights and obligations of either Party under the Contract.
- (2) The Contractor will be entitled to receive from the Company, in addition to the amount due under the Contract, amount which the Company's interest in restoration of the Work has been appraised, such amount to be paid as the restoration of the Work proceeds in accordance with the progress payment provisions. In addition the

Contractor will be entitled to receive from the payments made by the insurer the amount of the Contractor's interest in the restoration of the Work.

The Contractor shall ensure that each required insurance policy is endorsed to state that coverage shall not be cancelled or materially amended except after thirty (30) days' prior written notice by certified or registered mail, return receipt requested, has been given to the Company. The insurer must provide the Company with notification of any cancellation of any coverage and the Consultant must provide the Company with notification of any major change, modification or reduction in coverage.

The Contractor shall also ensure that all of its subcontractors maintain the same insurance as described above.

SCHEDULE D

SCHEDULE OF PRICES

SCHEDULE D-1

CONTRACT I - SCHEDULE OF PRICES

SCHEDULE D-2

CONTRACT II - SCHEDULE OF PRICES

SCHEDULE E

EFT TERMS AND CONDITIONS

SEE ATTACHED

ELECTRONIC FUNDS TRANSFER TERMS AND CONDITIONS

BETWEEN:

CANADA LANDS COMPANY CLC LIMITED (the "Company")

- and -

[Insert name of the Contractor] (the "Contractor")

IN CONSIDERATION of the amounts payable by the Company to the Contractor according to the **[Insert name of the Agreement]** Agreement signed between the Company and the Contractor on **[Insert date of the Agreement]**, the Parties have agreed to the following:

These Electronic Funds Transfer Terms and Conditions (the "EFT Agreement") shall become effective upon execution by the Contractor of the EFT Agreement and upon receipt by the Company of the completed Electronic Funds Transfer Authorization Form (the "EFT Form") and the Contractor's specimen voided cheque or a bank-stamped pre-authorized payment form.

Definitions – For the purposes of this Agreement,

- (i) "Processing Institution Account" means the Contractor's account at the financial institution;
- (ii) "Processing Institution" means the financial institution that holds the account to be credited/debited by means of electronic funds transfer;
- (iii) "Payables Payments" means amounts receivable by the Contractor (fees and reimbursement of expenses) according to the **[Insert name of the Agreement]** Agreement signed between the Company and the Contractor on **[Insert date of the Agreement]**.

Method of Payment – The Contractor acknowledges that the Company will process all Payables Payments by electronic funds transfer. The Contractor agrees that it will no longer be receiving a paper cheque or a paper explanation of the payment.

In the event that the Company is unable to release one or more payments by way of Electronic Funds Transfer, the Contractor agrees to either a) accept payment by cheque or some other mutually agreeable method of payment; or b) request the Company to extend the payment due date until such time as the Company can make payment by Electronic Funds Transfer.

The Company shall make payment to the Contractor using the banking information provided by the Contractor on the EFT Form. In the event that the information provided has changed, the Contractor shall be responsible to provide the Company with updated information. The Contractor undertakes to inform with sufficient prior written notice to the Company of any changes in the Processing Institution Account information provided in the EFT Form.

Authorization – The Contractor hereby authorizes the Company to deposit or draw on the Processing Institution Account, for the following purposes: a) deposit the Payables Payments according to the invoices submitted by the Contractor to the Company; b) debit the Contractor's Processing Institution Account if an erroneous remittance was made. The Processing Institution Account that the Company is authorized to deposit or draw upon has been specified by the Contractor on the EFT Form, and the Contractor's specimen void cheque or a bank-stamped pre-authorized payment form has been attached to the said EFT Form.

The Contractor declares and acknowledges to have contacted its Processing Institution to discuss the implementation of the Electronic Funds Transfer payment with the Company, and confirms that the Processing Institution will be able to accept the payments done through Electronic Funds Transfer on its behalf. The Contractor also declares and acknowledges to pay any and all service charges that its Processing Institution may levy for this service.

Continuing Authorization – This authorization is continuing and the Company may rely on this authorization for all financial transactions relating to the Payables Payments, until the Contractor notifies the Company of any changes in writing.

Revocation & Change – The Contractor may change or revoke the authorization given to process all Payables Payments via electronic funds transfer at any time upon providing ten (10) business days written notice to the Company, using the EFT Form. Revocation of the authorization does not terminate any contract for goods or services that exists between the Contractor and the Company. The authorization only applies to the method of payment and does not otherwise have any bearing on the contract for the goods or services exchanged.

Erroneous Remittance – In the event of an erroneous remittance, the Contractor acknowledges responsibility for ensuring sufficient funds are available in its Processing Institution Account for the Company to recover the amount. The Contractor agrees to notify the Company and return the funds in full within the 48 hours of receipt without dispute of any erroneous payment. After 48 hours, interest at the rate of ___ will apply if the amount is not returned in full. If the Contractor does not reimburse the funds, then in addition to any other remedies, the Company can offset those amounts against any other amounts owed to the Contractor. To ensure accounting integrity, the Contractor agrees to not use these funds to offset other liabilities owing to them.

Liability for uncompleted transfers – If an uncompleted transfer occurs because the Company used the Contractor's information provided on the EFT Form incorrectly, the Company remains responsible for making a correct payment as soon as reasonably possible after being notified of the uncompleted transfer.

If an uncompleted or erroneous transfer occurs because the Contractor's information provided on the EFT Form was incorrect and if the funds are no longer in the control of the Company, the Company is deemed to have made payment and the Contractor is responsible for recovery of any erroneously directed funds.

If an uncompleted or erroneous transfer occurs because the Contractor's information provided on the EFT Form was incorrect and if the funds are still in the control of the Company, the Company shall not make payment until the updated information is provided by the Contractor.

In no event shall the Company be liable for any special, incidental, exemplary, or consequential damages as a result of the delay, omission, or error in the transmission of an electronic payment, even if the Company has been advised of the possibility of such damages. In addition, neither party shall be liable for the act or omission of any financial institution or other party.

Prompt Payment – A payment shall be deemed to have been made in a timely manner as soon as the amount has been debited from the Company's bank account.

Notification – The Contractor hereby waives the right to receive pre-notification of the amount of each pre-authorized debit or deposit authorized by the EFT Form and agrees it does not require advance notice of the amount of the pre-authorized debits or deposits before they are processed.

The Contractor acknowledges that it has reviewed and hereby agrees to be bound by all the terms and conditions set out in this EFT Agreement.

IN WITNESS WHEREOF the parties to this EFT Agreement have executed this EFT Agreement as of the date first written above.

CANADA LANDS COMPANY CLC LIMITED

Per: _____
Name:
Title:

Per: _____
Name:
Title:

We have the authority to bind the Company.

[INSERT CONTRACTOR NAME]

Per: _____
Name:
Title:

Per: _____
Name:
Title:

I/We have the authority to bind the Corporation.

ELECTRONIC FUNDS TRANSFER AUTHORIZATION FORM
(The "EFT Form")

Privacy Notice – The EFT Form collects a minimum set of personal information regarding the Contractor. The personal information is used for enabling the Company for the Electronic Funds Transfer process. Furnishing the requested bank information is voluntary and the Contractor understands that the decision not to do so will require payment by another method. Information collected on this EFT Form will be kept in accordance with the requirements of the *Privacy Act* (Canada). All fields on the form are required to be completed before submitting it for processing. The voided cheque or the bank-stamped pre-authorized payment (PAP) form will be kept in the file to ensure the accuracy and integrity of the banking information provided on this EFT Form.

Request type: New Setup Change to existing Instructions Cancel existing Instructions

Effective date: _____ (dd/mm/yyyy)

Contractor Information

Full Name

Address

City/Town

Province

Country

GST/HST Number

Remittance E-mail*

Contact Name

Contact Phone Number

* The remittance e-mail is the e-mail to which the invoice number, invoice amount paid and the date of the payment will be sent to.

Banking Information

Institution Number

Account Number

Transit/Branch Number

Bank Name

Bank Address

Chequing Savings Business Personal

* Please attach one of the following:
 a) Voided cheque OR
 b) Bank-stamped pre-authorized payment (PAP) form

Acknowledgement and Consent

I(We) hereby authorize Canada Lands Company CLC Limited to direct payments electronically to the bank account specified here. I(We) have read and accepted the Electronic Funds Transfer Terms & Conditions provided by Canada Lands Company CLC Limited and I(we) represent that the information contained in this Electronic Funds Transfer Authorization Form is true, correct and complete.

I(We) understand and acknowledge that this authorization agreement is effective as of the effective date above and is to remain in full force and effect until Canada Lands Company CLC Limited has received notification of its termination. I(We) agree to submit an updated Electronic Funds Transfer Authorization Form to Canada Lands Company CLC Limited for the cancellation of this authorization or to make any changes to the information provided within this authorization.

[INSERT CONTRACTOR NAME]

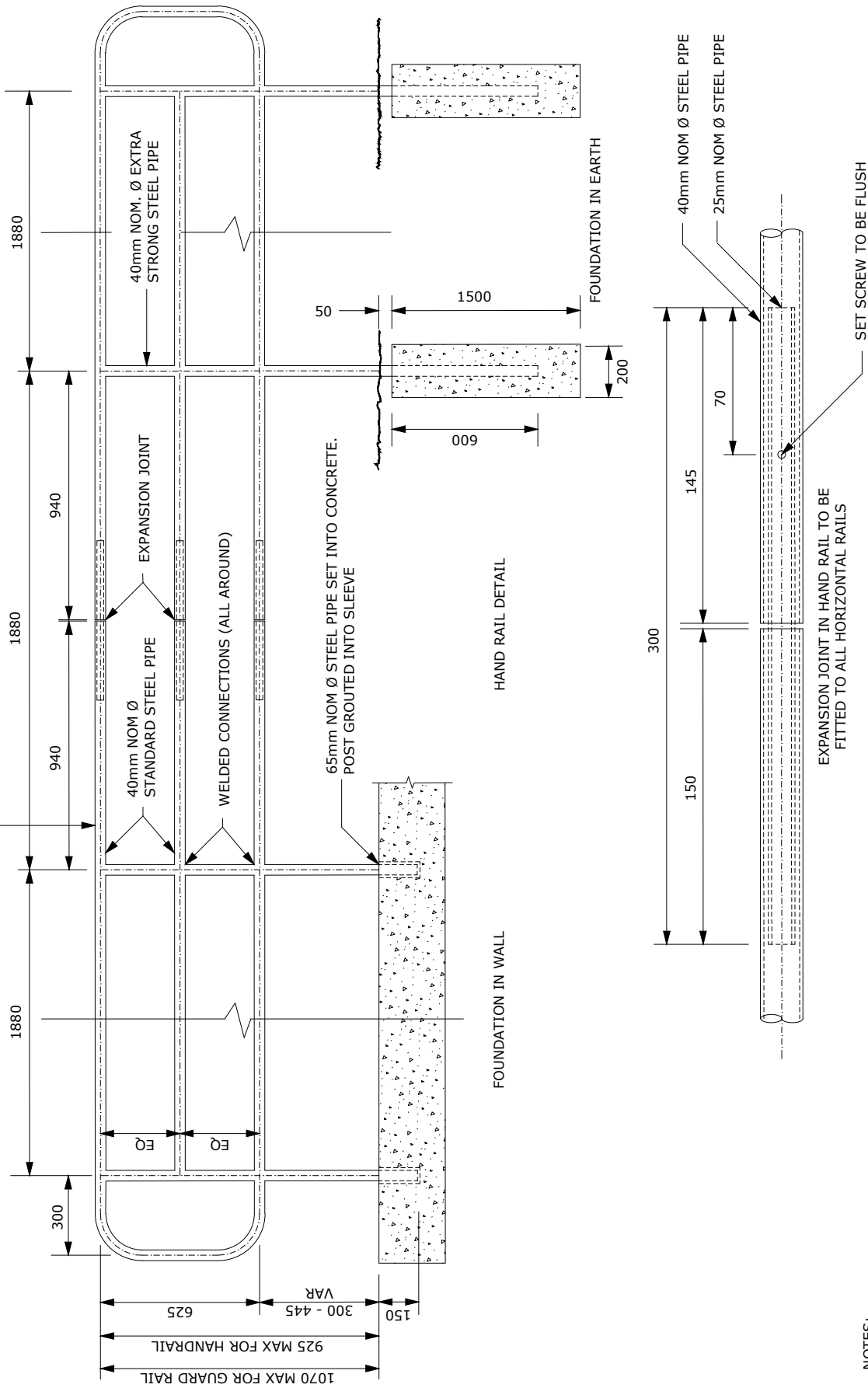
Per: _____
Name:
Title:

Per: _____
Name:
Title:

I/We have the authority to bind the Corporation.

Please send completed authorization form and signed EFT Agreement with the voided cheque or bank-stamped pre-authorized (PAP) form by email to **[INSERT EMAIL ADDRESS]**.

40mm O.D EXTRA STRONG STEEL PIPE. HOT
DIPPED GALVANIZED, FINISHED WITH A 2 COAT
PAINT SYSTEM (PRIMER AND PAINT) PAINTED
IN SHOP WITH FIELD TOUCH UPS



NOTES:

1. ALL MEASUREMENTS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED
2. GROUT TO BE NON-SHRINK AND NON FERROUS
3. ROUGH EDGES TO BE FILED OR GROUND PRIOR TO PAINTING
4. SLOPE OF RAIL VARIES WITH PATH SLOPE
5. POSTS TO BE PLUMB REGARDLESS OF SLOPE
6. GALVANIZE HAND RAILING IN ACCORDANCE WITH CAN/CSA G164M UNLESS OTHERWISE SPECIFIED



TITLE:

PIPE HAND RAILING

DATE: MAY 2001

REV: FEB 2017

DWG No: F1