

SPECIAL PROVISIONS – CONTRACT ITEMS SUPPLEMENTARY

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A2. PRECONSTRUCTION SURVEY

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

The Contractor will provide the City with a complete copy of the precondition survey including all CDs/DVDs and field reports together with any subsequent inspection report related to claims investigation forthwith.

The precondition survey must, upon the approval of the property owner and any tenants, include the taking of high resolution video or still photos of all properties inspected.

Upon written request of the property owner, the Contractor shall provide, at no additional costs, a copy of the Field Notes relating to their property only.

The Contractor shall submit to the City, for review and approval, a draft copy of the Notice to Residents for the precondition survey. Once approved by the City, the precondition survey Contractor shall submit on letterhead the final version of this notice. The City will arrange delivery of the initial letter as an attachment to the City's Notice of Construction. All additional notices for the precondition survey shall be delivered by the Contractor.

The complete precondition survey must include an entry for each property within the survey limits. An entry shall be:

- i. A completed inspection;
- ii. A letter or record of refusal by property owner and/or tenants who refuse a precondition inspection; or
- iii. A record of the precondition survey company's attempts to schedule an inspection if neither an inspection nor refusal are received.
 - As a minimum, the precondition survey company shall make three (3) attempts to inspect a property after the initial letter has been delivered by the City, specifically two (2) additional notices and a visit to the residence or business.
 - Each attempted contact shall be on a different day of the week and at a different time of day.
 - With the recorded attempts to schedule an inspection (dates and times), the precondition survey company must also include copies of the additional notices delivered to the properties.

The precondition survey shall be considered incomplete and payment for this item withheld until an entry for each property is included in the final survey package delivered to the City.

The limits of the properties to be included in the survey shall extend a minimum of 30 metres along each street beyond the limit of construction as noted on the contract drawings.

The precondition survey must be completed prior to the commencement of construction.

Basis for Payment

The lump sum price bid will be deemed to include any allowance to satisfy these provisions. Full payment will be made under this item in the first progress payment provided that a satisfactory survey is filed with the City.

A4. CONSTRUCTION LAYOUT

This line item shall include construction layout, as described herein.

a) Construction Layout

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document and OPSS.MUNI 100 GC 7.02, the following shall also apply:

The Contractor shall include in the lump sum cost for this item; the checking of all grades and alignment with the use of batter boards and boning rods or digital survey equipment to ensure proper adherence to design; re-staking of layout lost due to destruction or removals; any additional layout within the intent of the contract for minor revisions to the road, sidewalk, sewer design, etc.

An absolute minimum of 3 layout stakes shall be provided for any single line of layout. Maximum spacing of grade stakes shall be 15 metres for all layout and at all changes of grade and/or direction.

Layout for curb and gutter shall include offset stakes placed a maximum of 2 metres behind the proposed lip of gutter. Layout for curb shall also include the drop locations for all curb depressions, the bottom of slope shall be marked out, on site, prior to curb pour.

Catchbasin layout shall consist of 3 grade stakes installed in line with the inside back wall of the catchbasin (front face of curb) a center stake representing center of catchbasin and a 3 metre offset stake to the left and right of the center line stake.

Failure to comply with the above conditions will result in a reduction in payment to this item at the Contract administrator's sole discretion

Basis for Payment

As stipulated in the Niagara Peninsula Standard Contract Document.

A5. CLEARING AND GRUBBING

This line item shall include removal of existing trees, stumps, brush, shrubs & vegetation, as described herein.

a) Remove Existing Trees

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document and OPSS 201, the following shall also apply:

This item shall include the complete removal and disposal of all existing trees, as specified on the contract drawings, or as directed by the Contract Administrator. All trunks shall be removed to 300 mm below the finished boulevard grade or, in the case where existing tree roots may interfere with the installation of works in the contract, remove the entire root system and dispose offsite. The Contractor shall restore all disturbed areas at no additional cost to the contract.

Basis for Payment

Payment shall be as per the units indicated in the Schedule of Quantities and Unit Prices for each item noted.

b) Remove Existing Stumps

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document and OPSS 201, the following shall also apply:

This item shall include the complete removal and disposal of all existing tree stumps, as specified on the contract drawings, or as directed by the Contract Administrator. All stumps shall be removed to 300 mm below the finished boulevard grade or, in the case where existing tree roots may interfere with the installation of works in the contract, remove the entire root system and dispose offsite. The Contractor shall restore all disturbed areas at no additional cost to the contract.

Basis for Payment

Payment shall be as per the units indicated in the Schedule of Quantities and Unit Prices for each item noted.

c) Remove Existing Brush, Shrubs & Vegetation

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document and OPSS 201, the following shall also apply:

This item shall include the complete removal and disposal of all existing brush, shrubs and vegetation, as specified on the contract drawings, or as directed by the Contract Administrator. This item shall include the removal of the entire root system and offsite disposal. The Contractor shall restore all disturbed areas at no additional cost to the contract.

Basis for Payment

Payment shall be as per the units indicated in the Schedule of Quantities and Unit Prices for each item noted.

A8. CONSTRUCTION SIGNS, TRAFFIC CONTROL & TRAFFIC MANAGEMENT PLAN

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, GC7.06 and OPSS 706, the following shall also apply:

Interference with normal flow of traffic shall be kept to a minimum. The Contractor shall be prepared to supply and erect any barricades and signs which may be required for complete control of both pedestrians and vehicular traffic including competent flag persons in accordance with Ontario Manual of Uniform Traffic Control Devices. The Contractor shall further provide a Traffic Control and Management Plan in accordance with the most recent amendments to the Occupational Health and Safety Act. The Traffic Control and Management Plan shall include drawings, plans, sketches, etc., illustrating the layout of typical signage. The lump sum price shall be deemed to have included this provision.

The Contractor shall also be responsible for supplying their hired help with any necessary safety and/or protective equipment required to perform the work safely.

On **Jepson Street and McRae Street** a minimum of one lane of traffic shall be maintained at all times during construction. Two lanes of traffic shall be maintained at all other times. The Contractor's proposed sequencing and staging of works and operations is to make due allowance for this requirement. Work within intersections shall also be staged such that a minimum of one lane of traffic is maintained on the cross streets.

On **Third Avenue** the road may be fully closed to facilitate the construction of the improvements and movements of construction traffic. Through traffic shall be sufficiently detoured around the site, utilizing signed detour routes on adjacent and approved side streets. Appropriate signage on connecting side streets and approaches shall be provided (or existing modified), identifying the closure and detours.

Local traffic shall be maintained at all times on all streets. Access to commercial and private entrances shall be maintained at all times. Pedestrian traffic shall be managed at all times. Additional signage and flagging personnel shall be provided to maintain high volume traffic at entrances and side streets within the project limits and assist with the movements of construction equipment and materials.

The Contractor must submit potential road closure requests to the City, in writing, at least one (1) week prior to implementation, for review and approval. Allowances for such operations must be made in the Contractor's Traffic Control and Management Plan; all associated costs will be the Contractor's responsibility.

It is of critical importance that all planned construction activities be coordinated with the City's Operational, Traffic, Parking and Transit Departments. Notification on at least a weekly basis of planned works (schedule) will be required to ensure that the necessary detour signage, parking accommodations, bus routing and maintenance activities account for the active work zones within the project area. The Contractor must also work closely with the City's Construction Inspector and Contract Administrator to keep affected property owners informed of potential impacts to their businesses and residences and to minimize disruption to access and servicing of properties by planned construction activities.

Property Access

Pedestrian access to all businesses and residences is to be maintained at all times whenever possible. Access closures are to be scheduled at least two (2) business days in advance between the City, the Contractor and the Business owner and/or Residents, including the type and form of any temporary access provisions. Any disruption to pedestrian access is to be kept to a minimum duration.

Winter Maintenance

The contractor will be responsible for winter control maintenance in compliance with Provincial minimum maintenance standards for snow clearing, storage and removal, salting and sanding activities within construction work zones during the course of the contract, including maintaining sidewalks within the project area. All unit prices bid will be deemed to have included allowance for these provisions.

Communications

It will be the Contractor's responsibility to inform the various businesses and residences of, and/or the placement of no parking signs the day before, in order to reduce/eliminate any problems with parked vehicles that may interfere with their operations. Access to the abutting businesses and residences must be maintained at all times.

The Contractor shall advise the Police Department, Fire Department and Niagara Emergency Medical Service on a daily basis, with current status of the construction as it pertains to the passage of traffic within the contract limits.

The Contractor shall co-ordinate with Niagara Falls Transit to ensure minimum interruption to their bus schedules. Niagara Transit, school buses and garbage service vehicles will be given priority to maintain their schedule.

The Contractor shall also maintain/provide existing pedestrian access at all times to the businesses and residents during all phases of construction in an acceptable manner.

The traffic control signage requirements shall include the following:

Supply, locate, erect, operate, maintain, relocate as necessary and remove all necessary traffic signs, construction signs, including delineators, barricades and flashing lights, in accordance with the Ontario Traffic Manual (OTM) Book 7 and the latest edition of the "Traffic Control Manual for Roadway Work Operations - Field Edition".

The Contractor is responsible for the installation, daily maintenance and removal of all construction signage throughout the contract.

Regulatory signs and street name signs cannot be removed without approval from the City.

Any existing signs removed by the Contractor to accommodate construction shall be kept operational by placement on a temporary support.

All regulatory signs and street name signs will be replaced permanently by City forces.

Basis for Payment

In addition to the payment provisions noted in the Niagara Peninsula Standard Contract Document, the final ten percent (10%) of the lump sum price bid for this item will be held until project completion. The lump sum price bid shall be deemed to include full compensation for all the provisions noted herein.

B1. TEST PITS (PROVISIONAL ITEM)

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

Exploratory test holes shall be at locations and depths as directed by the Contract Administrator and must be witnessed by the Contract Administrator or assigned delegate.

Backfill shall be Granular 'A', compacted to 100% Standard Proctor Maximum Dry Density. Alternatively, clear stone may be used as backfill material where hydrovac excavation equipment is used. Disposal of the excavated material shall be in accordance with Special Provisions – Contract Items Supplementary, Item B2.

The purpose of these test holes shall be to verify existing utilities or underground infrastructure where a design change is required or as determined by the Contract Administrator.

Basis for Payment

Payment at the unit price bid for this item shall include all labour, materials, equipment and Granular 'A' backfill, necessary to complete the work.

This item is provisional. Prior written approval must be provided by the Contract Administrator. Compensation will not be considered if written approval is not sought in advance.

B2. EARTH EXCAVATION AND REMOVALS

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, OPSS.MUNI 206 and OPSS.MUNI 510, the following shall also apply:

Work under this item will also include the removal of asphalt, concrete, brick pavers and excavations of full road allowance widths as described herein.

The Contractor is responsible for sawcutting, excavating, separating and delivering any concrete or asphalt material to an approved recycling facility. Thickness of the concrete and asphalt will vary; however, no additional compensation will be made for the various depths. The removal of interlocking brick pavers shall also include removal of any concrete and/or granular base.

All asphalt and concrete must be sawcut. Sawcutting shall be to the limits shown on the construction drawings or as directed by the Contract Administrator.

Roadway excavation shall be inclusive of all required excavation on all roadways and include any additional quantities, as shown on the contract drawings. Plotted cross-sections, where not included within the Issued for Tender drawing set, shall be available upon request.

Basis for Payment

Payment at the unit price bid for this item shall include all labour, materials and equipment including sawcutting, and disposal of surplus or unsuitable excavated materials, necessary to complete the work as noted on the contract drawings or as directed by the Contract Administrator.

B3. GRANULAR MATERIAL

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, OPSS 314, 401 and 402, the following shall also apply:

All granular materials shall conform to the requirements of OPSS.MUNI 1010.

The unit price bid shall be complete compensation for the supply, hauling, placement, grading and compaction to the specified Standard Proctor Maximum Dry Density of Granular 'A'.

This item will be utilized for the Granular 'A' material for bedding, cover and backfill of all items for the water distribution system, sanitary sewer and storm sewer system when specified in the contract or indicated on the contract drawings. Only virgin Granular 'A' will be accepted for pipe bedding and cover.

This item will be utilized for the Granular 'A' under roads, driveways, and sidewalks and shall be placed at a depth specified in the contract or as indicated on the contract drawings. Only virgin Granular 'A' will be accepted for road base.

Granular 'A' must be installed on all road and sidewalk trenches to the existing grade to provide safe access.

The Contractor will be responsible for maintaining granular surfaces until the restoration work is carried out. The Contractor must include in this unit price bid all labour and equipment to remove the excess granular from the trenches prior to final restoration, and delivery of the granular to a location specified by the Contract Administrator. The Contractor is responsible to remove the granular in a manner that avoids contamination of the granular with asphalt, concrete or native material. Any contaminated material shall be removed at the Contractor's expense. Any cost for these requirements must be included in the unit price bid for the granular.

The unit price bid for this item shall include the fine grading and compaction of the sub-base immediately preceding the placement of granular road base material. No roadway granular is to be placed until the subgrade elevation has been checked by the City's Inspector.

Payment for all material quantities shall be determined by net weight as recorded by a Government certified weigh scale. The supplier will be responsible for providing suitable scales for all materials to be weighed. Weigh bills (tickets), shall be provided for each load of granular in accordance with SPGS G32.

Weigh tickets received after the monthly Progress Payment has been finalized, for deliveries made within that month's Progress Payment period **will NOT be accepted.**

The onus shall be on the Contractor to ensure that the City's Inspector is furnished with all weigh tickets on a daily basis, since these will form the method of measurement.

Basis for Payment

As stipulated in the Niagara Peninsula Standard Contract Document and priced as per the breakdown of items as indicated in the Schedule of Quantities and Unit Prices.

Recycled Material

Recycled concrete (RCM) and asphalt (RAP) will not be permitted on this project.

Under no circumstances will recycled material of any kind be permitted for use as pipe bedding, pipe cover or road base material.

B6. SUBDRAIN

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Documents and OPSS 405, the following shall also apply:

The unit price bid shall include coring into all structures as required for the connection of the subdrains, regardless of the concrete thickness. The unit price bid shall also include all labour, materials and/or equipment necessary to make the subdrain connection to the outlet structure.

It is the Contractor's responsibility to satisfy themselves as to the existing conditions and make allowance in their unit price bid, accordingly.

Basis for Payment

As stipulated in the Niagara Peninsula Standard Contract Document and priced as per the breakdown of items as indicated in the Schedule of Quantities and Unit Prices.

B8. CONCRETE CURB & GUTTER

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Documents and OPSS 353, the following shall also apply:

The Contractor shall take due precaution to protect green concrete from being damaged, marred or defaced, particularly at driveway entrances. In the event that the green concrete is marred or damaged in any way, the Contractor shall breakout and replace the damaged sections. Patching or grinding of damaged, marred or defaced concrete will not be accepted. The unit price bid shall be deemed to have made due allowance for this requirement.

A total tolerance (or elevation variance) of 3mm will be accepted as a reasonable variance from the specified curb and gutter elevations. If the total tolerance is exceeded, the Contractor shall, at their own expense, remove and replace the concrete curb and gutter to the satisfaction of the Contract Administrator, at no additional cost to the contract.

The exact location of dropped curbs as shown on the construction drawings will be deemed to be included in Item A4 Construction Layout. Adjustments in the field will be conducted by the Contract Administrator or the City's representative.

Additional 50mm curb key shall be constructed to accept concrete and asphalt surfaces where installation is adjacent to back of curb.

The unit price bid shall include abutting to existing curbs to match and terminations as per OPSD 608.010

A 2.0m length section of concrete curb and gutter shall be omitted at each single catchbasin.

The unit price bid shall also include all costs associated with cold weather work as noted in OPSS 351. There will be no additional compensation for the protection of concrete placed in cold weather.

The unit prices bid shall include any additional labour, equipment and materials required to produce custom formwork to form and pour curb repairs to match existing curb.

Basis for Payment

As stipulated in the Niagara Peninsula Standard Contract Document and priced as per the breakdown of items as indicated in the Schedule of Quantities and Unit Prices.

B9. CONCRETE SIDEWALKS

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document and OPSS 351, the following shall also apply:

The unit price bid shall include all necessary equipment, materials and labour to excavate to subgrade, form, finish and cure 32 MPa concrete sidewalks to the specified thickness, on a 125mm granular base.

The unit price bid shall also include all costs associated with cold weather work as noted in OPSS 351. There will be no additional compensation for the protection of concrete placed in cold weather.

A flat obstacle free surface is desired, therefore, do not apply a trowel finish at the joints or provide 'Dummy' joints.

Expansion joints shall be set in place prior to pouring and shall be full depth, spaced 30.0m c/c maximum. Contraction joints shall be spaced 2.5m c/c maximum and are to be saw cut to 1/4 thickness of the slab. The City will not accept any variance in the joint spacing beyond a 50mm tolerance from that specified. Panels with a greater variance will be removed and replaced at the Contractor's expense.

Private concrete sidewalks will be constructed to match the existing or minimum 125mm depth, whichever is greater, and paid for under this item.

The Contractor is to adjust the sidewalk crossfall where required to allow for positive drainage from the driveway and housewalks. Where the new sidewalk has caused ponding, the Contractor shall remove and replace the sidewalk at no additional cost to the contract. The Contractor shall include the supply and installation of a bond breaker (either plastic or tar paper) when a new sidewalk is installed adjacent to the concrete curb. An expansion joint at this location is not required.

The Contractor shall take due precaution to protect the finished surface of freshly laid concrete sidewalk from being damaged, marred or defaced. In the event that the freshly placed concrete is marred or damaged in any way, the Contractor shall break out and replace the damaged sections. Patching or grinding of damaged, marred or defaced concrete will not be accepted. The unit price bid shall be deemed to have allowed for this contingency.

The unit price bid shall include drop sidewalk ramps at driveways as per OPSD 310.050 and at crossings.

Excavation to accommodate a grade difference greater than 75mm between an existing sidewalk elevation and the replacement sidewalk shall be paid for separately under the appropriate item in the Schedule of Quantities and Unit Prices, specifically Item B2 Earth Excavation.

Granular 'A' for sidewalk base shall be paid for under the appropriate B3 item in the Schedule of Quantities and Unit Prices.

Tactile Warning Plates shall be paid for under the appropriate B34 item in the Schedule of Quantities and Unit Prices.

B11. ASPHALT MILLING

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Documents, the following shall also apply:

Asphalt millings shall be delivered to the Municipal Works Service Centre at 3200 Stanley Ave, as directed by the Contract Administrator at no additional cost to the contract. Deliveries to the Service Centre must be made between 8:00 am - 4:00 pm, Monday to Friday.

Asphalt millings that are not directed to be delivered to the City's Municipal Works Service Centre shall be disposed of at a licensed facility at no additional cost to the contract.

The unit price bid shall be deemed to have made due allowance for this requirement.

Basis for Payment

As stipulated in the Niagara Peninsula Standard Contract Document and priced as per the breakdown of items as indicated in the Schedule of Quantities and Unit Prices.

B12. SUPPLY AND APPLICATION OF TACK COAT

The provisions of OPSS 310 and 1103 and special provisions B12 shall apply except as amended or extended herein.

Tack coat shall be applied to all surfaces (vertical faces and horizontal plane) at the following application rates:

0.35 kg/ m² to all existing pavement surfaces and milled surfaces

Faces at which joints are made shall be painted/sprayed with a thin uniform and continuous coating to the satisfaction of the Contract Administrator.

Basis for Payment

As stipulated in the Niagara Peninsula Standard Contract Document and priced as per the breakdown of items as indicated in the Schedule of Quantities and Unit Prices.

Measurement for payment will be as per OPSS 310.09.01.02

B14. SUPPLY AND PLACE HOT MIX ASPHALT

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Documents and OPSS 310, the following shall also apply:

Clause 14.09 of the NPSCD for price adjustment provisions is not applicable under this contract.

All materials shall conform to the requirements of OPSS.MUNI 1003 and OPSS 1150.

At the limits of the proposed road works, the base asphalt thickness shall be increased to match the existing top course asphalt over distance of 2 metres. This provision shall be included in the unit price bid.

No extra payments will be made for any hand work involved in spreading or compacting the hot mix asphalt around radius, intersections, trench areas, areas between the existing asphalt and new gutters, curbs. Asphalt shall be machine laid, wherever possible.

The unit price bid for Item B14a) shall include any hand work required to form a temporary 2.0m long asphalt curb to match the concrete curb and gutter at catchbasin sections where the concrete curb and gutter is not installed.

The unit price bid for Item B14a) shall also include the placement of temporary ramping at all wheelchair depressions and other areas as instructed by the Contract Administrator.

Basis for Payment

As stipulated in the Niagara Peninsula Standard Contract Document and priced as per the breakdown of items as indicated in the Schedule of Quantities and Unit Prices.

B15. ASPHALT WALKWAYS & DRIVEWAYS

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, OPSS 311, OPSS 314, and Special Provisions – Contract Items Supplementary, Item B14, the following shall also apply:

Existing asphalt driveway depths are to be matched if thickness is greater than that specified in the Niagara Peninsula Standard Contract Document, which are deemed to be the minimum requirement.

The unit price bid for this item shall be complete compensation for the preparation and additional handwork that may be required to restore driveway aprons and driveways, as necessary, and as directed by the Contract Administrator.

The Contractor is to adjust the driveway gradient where required to allow for positive drainage from the driveway and housewalks. Where the restored driveway has created or caused ponding, the Contractor shall adjust and restore the driveway and gradient at no additional cost to the contract. Driveway gradient adjustments must not negatively impact vehicle access.

The Contractor must take all due precaution not to disturb any areas outside the limits required to complete the proposed works safely. Areas disturbed outside these limits will be repaired in accordance with the specifications outlined in this contract at the Contractor's own expense and solely at the discretion of the Contract Administrator.

Services

Where the installation of sanitary services, cleanouts or water services requires the excavation of existing asphalt driveway, the entire driveway bay shall be removed from

edge to edge and from the back of curb or sidewalk to a neat straight sawcut line behind the new installation. The sawcut line shall be made prior to all excavation or removals and shall be perpendicular to both edges of the driveway. The sawcut shall be made sufficiently behind the cleanout or curb stop to allow for the safe installation of the new service so as to provide a neat finished match line. Should this matchline become damaged, a new sawcut limit will be required and shall be completed at no additional cost to the contract (or Property Owner).

Curb boxes are to be set flush with the new driveway surface.

Cleanouts in asphalt shall be installed to the finished asphalt grade complete with a flat cleanout cap flush with the finished surface.

Basis for Payment

The unit price bid shall include all necessary labour, materials and equipment to complete the work in accordance with the specifications of this contract including, but not limited to, sawcutting, removals, disposals, surface preparation, backfilling, grading, compaction, bond breaker and tack coat.

In addition to the above, the unit price bid will cover any required restoration work between the contract limits (property line) and building face, where directed by the Contract Administrator.

Payment for the supply and installation of cleanout caps, supply and placement of Granular 'A' and supply and placement of Hot Mix Asphalt shall be paid for separately under the appropriate item in the Schedule of Quantities and Unit Prices.

B21. TOPSOIL AND SOD

In addition to the conditions stipulated in the Niagara Peninsula Contract Document, OPSS 802 and OPSS 803, the following shall also apply:

All areas to be sodded shall be graded to provide proper drainage. Any areas on private property shall also be included.

All unnecessary damage to front lawns, boulevards or grass areas caused by the Contractor's carelessness shall be reinstated at his/her own expense.

Topsoil

Topsoil shall be a PREMIUM BLEND, weed free, and naturally sterilized through composting.

The blend shall consist of:

- 50% Triple Mix (30% mixture of topsoil, sands, and shredded wood mulch/30% mixture of black organic compost and manure/30% mixture of peat loam); and

- 50% Premium Topsoil (50% mixture of topsoil, sands, and shredded wood mulch/ 25% mixture of black organic compost/ 25% mixture of composted cow manure).

In general, the resulting topsoil mix should meet the following parameters:

pH:	6.5 – 7.5
Potassium:	100 – 120 ppm
Phosphorous:	15 – 30 ppm
Magnesium:	100 – 120 ppm
Organic Matter:	≥ 3%

Unless otherwise specified, the minimum depth of applied Premium Blend Topsoil shall be 100 mm.

Basis for Payment

Measurement for payment shall be square metre of area topsoiled and sodded.

The unit price bid shall include all materials, equipment and labour necessary to complete the work and shall include grading and the supply and application of fertilizer and water necessary to ensure growth within the one year maintenance period.

B23. SUPPLY & APPLY CALCIUM CHLORIDE (PROVISIONAL ITEM)

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

Calcium chloride shall conform to the requirements of OPSS 506.

Calcium chloride shall be applied uniformly by means of a mechanical spreader when and as directed by the Contract Administrator.

Basis for Payment

Calcium chloride will be measured in tonnes. The unit price indicated in the Form of Tender shall be compensation in full for the supply and application of calcium chloride.

This item is provisional. Prior written approval must be provided by the Contract Administrator. Compensation will not be considered if written approval is not sought in advance.

B24. APPLICATION OF WATER FOR DUST CONTROL (PROVISIONAL ITEM)

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

Filling of water application vehicles from municipal hydrants will no longer be permitted. The City has installed a smart card water filling station, located across from the Service Centre located at 3200 Stanley Avenue.

The station is equipped with new technology allowing Contractors to pre-pay for water credit on a swipe card system that can be refilled once the card has been emptied. The cost of the swipe card is \$15.00 and may be purchased at the Service Centre. To set up a water filling account please contact Environmental Services at 905-356-7521, Extension 6322.

Water shall be applied by means of approved equipment capable of uniform and controlled distribution.

Basis for Payment

Water will be measured in cubic metres.

Payment at the unit price bid in the Schedule of Quantities and Unit Prices shall be deemed full compensation for all water, carrying, application and any other costs involved with this dust control operation.

This item is provisional. Prior written approval must be provided by the Contract Administrator. Compensation will not be provided if written approval is not sought in advance.

B34. TACTILE WARNING SURFACES

Tactile warning plates shall be supplied and installed within concrete sidewalks at all road crossings in accordance with NPSCD Standard Drawings 201.

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall also apply:

The unit price tendered is to provide replaceable Detectable Warning Plates and accessories as produced by a single manufacturer with a minimum of three (3) years' experience in the manufacturing of the Warning Plates. The Detectable Warning Plates are to be Neenah Foundry (or approved equal) as per OPSD 310.039 and OPSS 351 Concrete Sidewalks.

Shop drawings are required for products specified showing fabrication details, composite structural system, tile surface profile, fastener and anchor locations, plans of tile placement including joints, as well as outlining installation materials and procedure.

Layouts to be completed by manufacturer/manufacturer's representative, and approved by Contract Administrator before installation.

Warning Plates must be sized and ordered to suit project requirements. Manufacturer will supply layout and model numbers to suit radius conditions.

Installer's Qualifications: engage an experienced installer certified in writing by manufacturer as qualified for installation, who has successfully completed installation similar in material, design, and extent to that indicated for project.

It is the Contractor's responsibility to coordinate a field review of the pre-markings with the Contract Administrator.

Basis for Payment

The unit price tendered shall be full compensation for all necessary labour, materials and equipment to supply and install the tactile plates in accordance with the specifications.

B35. GARDEN RESTORATION

The unit price bid shall include all labour, materials and equipment to remove existing and supply and install new perennial flowers and plants that were disturbed during construction. The unit price bid shall also include the removal of debris, grading and placement of any required topsoil to match existing depths. This shall also include a 1-year maintenance period to ensure successful growth.

C1. SEWERS

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document and OPSS 410, the following shall apply:

Materials

Unless otherwise specified, sewer pipe may be PVC as follows:

- a. Polyvinyl chloride (P.V.C.) pipe - smooth wall (CSA B182.2) - 100mm - 600mm inclusive;

All PVC fabricated and moulded fittings shall be C.S.A. Certified.

Open Trench

It is strongly recommended that the Contractor use a trench box to install the watermain, sewer, catchbasin leads, sewer laterals, water services and any other pipes. The width of the trench box shall conform to OPSD 802.010 for Flexible Pipe. The height of the trench box shall be from 150mm below the bottom of the pipe to the level of the existing ground.

If the Contractor does not use a trench box as described above, then payment for the Granular >A= material will be based on theoretical dimensions as follows:

Width: Follow OPSD 802.010, OPSD 802.030 and OPSD 802.031 as applicable

Height: From 150mm below the pipe to the level of the existing ground surface.

Length: Equal to the pipe length

Therefore, to calculate Granular >A= weight (tonnes):

$$\text{Granular >A= (tonnes)} = 2.4 \times (\text{Width} \times \text{Height} \times \text{Length} - (\pi \times D^2 \times L) / 4)$$

where,

D = Pipe OD

L = Length of Pipe

$\pi = 3.1416$

When a trench box is used to support the wall of a trench its removal shall be as per clause 404.07.03 in OPSS 404.

During sewer installations, the Contractor shall be responsible to maintain the proper functioning of each sanitary, storm and water service lateral located in the field or shown on the construction drawings, at no additional cost to the contract. Should the Contractor choose to make temporary connections to ensure the same, these connections shall be removed in full and at no additional cost to the contract.

The Contractor is to note that full Granular 'A' will be used for backfill in shoulders, driveways, sidewalks and travelled roadways unless otherwise noted by the Contract Administrator. Native material may be used in all other areas with the written approval of the Contract Administrator. Where native material is used, the Contractor is to include in their price for all handling, hauling, stockpiling, placement and compaction.

Bedding and Cover

Bedding and cover shall always be Granular 'A' material; recycled materials will not be accepted for this purpose.

Leads/Laterals & Connections

Kor'n Seal adapters or an approved equivalent shall be used in all cases where PVC pipe is to be connected to a concrete structure (excluding catchbasins and ditch inlet catchbasins).

The price bid for PVC catchbasin leads shall include connections to the sewer main using approved saddles or manufactured tees for pipe size less than 600mm diameter, all bends, proper couplings at maintenance holes and catchbasins, manufactured plug or cap at property lines, and reconnecting existing rear yard catchbasin leads using appropriate reducers and couplings.

Where the new pipe installation crosses or is adjacent to an existing pipe or structure, the Contractor shall support the existing pipe or structures. In the event the existing pipe or

structure becomes disturbed, the Contractor shall replace or repair the same regardless of the material and at no additional cost to the contract.

Where the new pipe or lateral installation crosses a pipe which is abandoned, or is to be abandoned and requires removal, the abandoned pipe sections remaining shall be plugged and sealed on either side of the new pipe at no additional cost to the contract.

The unit price bid for this item shall include all sawcutting required.

Basis for Payment

The unit price bid under this item in the Schedule of Quantities and Unit Prices shall be full compensation for all labour, equipment and material to complete the work including disposal of surplus excavated material and removal and disposal of existing pipes and sewers.

The supply and placement of Granular 'A', sewer connections, and the removal and disposal of existing asphalt and concrete shall be paid for separately under the appropriate item in the Schedule of Quantities and Unit Prices.

C2. SEWER LATERALS

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall apply:

THE CONTRACTOR SHALL ALSO PAY SPECIAL ATTENTION TO AND MAKE ALL NECESSARY ALLOWANCES FOR THE FOLLOWING ITEMS:

- i. The Contractor is advised that many of the existing sewer laterals are directly adjacent to the existing water services. The Contractor shall make due allowance in the unit prices bid for the protection, maintenance, repair and supporting of such water services throughout the adjacent installation of the new sewer laterals.
- ii. The Contractor is advised that individual records of diameter, material types and number of sewer laterals is unavailable and thus the actual quantity of replacement materials cannot be determined at this time. As such, a quantity of couplings of varying diameters must be available on site and the Contractor shall make due allowance in the unit prices tendered to account for this requirement.
- iii. The Contractor is advised that not all laterals are shown on the contract drawings and those that are shown are approximate only. Furthermore, all laterals are not necessarily connected to a particular residence, used for sanitary sewer purposes and may either be used, unused or abandoned. The Contractor shall include in his/her unit price bid allowances for all necessary Subcontractor's, time, standby time, equipment, materials and labour to determine the exact location, purpose and usage of each and every connection, either known or otherwise, to the existing sewer. Where appropriate, CCTV camera inspections and dye testing may be used in verifying laterals and shall be paid for separately under the respective item within the Schedule of Quantities and Unit Prices. It is expected that a number of existing sewer laterals will be either abandoned or used for storm water connections.

- iv. It is expected that this determination will include, but shall not be limited to, careful examination of the trench, trench walls and sewer for possible connections, notifying and meeting with the City and each homeowner and/or resident to discuss connections, arrange for flushes of water and/or dye testing to confirm possible connections, usage of in line/remote service location devices and close co-ordination and co-operation with the City.
- v. No new connections will be made until the Contract Administrator has reviewed the proposed connection with the Contractor.
- vi. It is the intention of this contract to provide one (1) new sanitary sewer service connection to each serviced residence along a new sanitary sewer, within the limits of this contract. It is suspected that some residences may have more than one active service. Additional 'extra' connections shall not to be made until it is completely reviewed, inspected and approved by the Contract Administrator.
- vii. Laterals which have been proven to be abandoned or otherwise unused shall be plugged at the face of the excavation with a suitable watertight cap or concrete, as required. No additional payment for this requirement shall be made and the Contractor shall make due allowance in the unit prices tendered to account for this requirement.
- viii. Missed or overlooked lateral connections and any and all damage caused by these missed or overlooked connections shall remain the sole responsibility of the Contractor and no additional payments or claims pertaining to these items shall be considered for payment.
- ix. The Contractor shall notify all affected residents or businesses of any scheduled disruption of their sanitary service at least 24 hours in advance and shall endeavour to minimize their inconvenience to a maximum four (4) hours.

Basis for Payment

As stipulated in the Niagara Peninsula Standard Contract Document.

The unit price bid for sewer lateral replacement or new sewer laterals from the sewer main to the existing lateral shall include all labour, materials and equipment necessary to complete the work.

The supply and placement of Granular 'A' shall be paid for separately under the appropriate item in the Schedule of Quantities and Unit Prices.

C5. FLUSH AND T.V. INSPECT (& TEST)

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall apply:

SEWERS Flushing (Cleaning) and TV Inspection

Upon completion, all new mainline sewers shall be cleaned and flushed using a high pressure, low volume hydraulic sewer flusher truck, after which the sewers shall be video inspected.

The Contractor will be fully responsible for the materials supplied and workmanship, including the submission of a written report and digital CCTV video following the completion of the inspection. The written report shall include a photograph at every service connection.

Two copies of each report and digital video shall be supplied to the Contract Administrator for review and shall remain the property of the City. Any and all defects discovered during this inspection shall be immediately repaired, flushed clean and re-inspected, to the satisfaction of the Contract Administrator.

LATERALS TV Inspection

All laterals shall be video inspected prior to the expiration of the one (1) year maintenance period, but not sooner than eight (8) months after construction completion. The Contractor shall notify the Contract Administrator in advance of the scheduled date in order to coordinate City inspection on-site.

The Contractor will be fully responsible for the materials supplied and workmanship, including the submission of a written report and digital CCTV video following the completion of the inspection.

Two copies of each report and digital video shall be supplied to the Contract Administrator for review and shall remain the property of the City. Allow a minimum of thirty (30) days for City review and approval.

Any and all defects discovered during this inspection shall be immediately repaired, flushed clean and re-inspected, to the satisfaction of the Contract Administrator. Maintenance hold back payments shall not be released until this requirement has been satisfied.

Mandrel Testing

Deflection testing is mandatory for all newly installed flexible sewer mainline and shall be performed by pulling a mandrel through each length of the pipe.

The mandrel shall have a diameter equal to 95% of the inside diameter of the pipe system being tested. Deflection tests shall first be performed not sooner than 30 days after completion of placement and densification of backfill. The pipe shall be cleaned and inspected for offsets and obstructions prior to testing.

The mandrel shall be:

- a. Certified by the Contract Administrator prior to use;
- b. A rigid, nonadjustable, odd number of legs (9 legs minimum), mandrel having an effective length not less than its nominal diameter; and

- c. Fabricated of steel, fitted with pulling rings at each end, stamped or engraved on some segment other than a runner indicating the pipe material specification, nominal size and be furnished in a suitable carrying case labelled with the same data as stamped or engraved on the mandrel.

The mandrel shall be pulled through the pipe by hand to ensure that maximum allowable deflections have not been exceeded. Use of an uncertified mandrel or a mandrel altered or modified after certification will invalidate the test.

If the mandrel fails to pass, the pipe will be deemed over-deflected. Over-deflected pipe shall be uncovered and, if not damaged, reinstalled. Damaged pipe shall not be reinstalled, but shall be removed from the work site. Any pipe subjected to any method or process other than removal, which attempts, even successfully, to reduce or cure over-deflection, shall be uncovered, removed from the work site and replaced with new pipe. The replaced pipe shall then be tested for deflection not sooner than 30 days after installation.

VERIFYING Lateral Connections

The Contractor is advised that not all laterals are shown on the contract drawings and those that are shown are approximate only. Furthermore, all laterals are not necessarily connected to a particular residence, used for sanitary sewer purposes and may either be used, unused or abandoned.

CCTV camera inspections and dye testing may be used to locate and/or verify use of existing laterals that cannot be located during the mainline sewer installations; and shall be paid for separately under the respective items within the Schedule of Quantities and Unit Prices.

CCTV Camera Inspections

The unit price bid to camera laterals from each house or building shall include all labour, material and equipment required to carry out the work at the direction of the Contract Administrator. No additional payment will be made for delay. The Contractor shall arrange to TV inspect the lateral from the building to the sewer mainline.

Dye Testing

The unit price bid to dye test each house or building shall include all labour, material and equipment required to carry out the work at the direction of the Contract Administrator. No additional payment will be made for delay. Different coloured dyes will be flushed into the sewer from toilets, sinks and/or laundry tubs in the house or building to determine if any existing lateral is live or abandoned.

C6. PRECAST CONCRETE MAINTENANCE HOLES, CATCHBASINS & DITCH INLETS

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall apply:

All structures shall be founded on a 300mm (min.) thick layer of compacted Granular 'A'. All Granular material shall be placed in maximum 300mm loose lifts and compacted to 100% of Standard Proctor Maximum Dry Density (SPMDD) at optimum moisture content.

Excavation, removal and disposal of surplus excavated materials shall be included in the unit price. The removal and disposal of any existing structure shall be paid under the appropriate item.

The Contractor shall make due allowance in the unit prices tendered for any bypass pumping, dewatering, sheathing, shoring and bracing to complete the work.

Kor'n Seal adapters or an approved equivalent shall be used in all cases where PVC pipe is to be connected to concrete structures (excluding catchbasin connections).

Structure rim elevation shall be set to blend with the surrounding base asphalt grade.

Under no circumstance shall HDPE adjustment units be used.

Maintenance Holes (MH)

Materials and installation shall be in accordance with OPSS 407 and any other specifications referenced therein and include benching, aluminium safety rungs, bulkheads, adjustment units and MH frame and covers.

All new MHs within the travelled portion of the roadway shall be fitted with a self-adjusting frame and covers from either East Jordan Iron Works (Product No. 00302201) or Bibby-Ste-Croix (Auto Stable C-50MONT.) Follow manufacturer's installation recommendations. MH top elevation shall be set to blend with the surrounding grades.

In addition to the maintenance hole manufacturer's rubber gaskets, each section of the manhole shall be sealed with an approved bituminous tape material, a minimum 1 mm thick and 150mm wide, wrapped around the outside of joint, 75 mm overlap on each side of the joint.

Drop Structure and benching

Maintenance Hole SANMH 9 shall be fitted with an external drop structure in accordance with OPSD 1003.010.

Shop Drawings of all structures, including benching details, shall be provided to the contract administrator for review/approval a minimum of one (1) week prior to fabrication.

Catchbasins (CB)

The frame and grating shall be in accordance with OPSD 400.020.

The CB shall provide for the placement of a minimum 100mm to a maximum 300mm of concrete adjustment units, per OPSD 704.010.

Inlet Control Devices (ICD)

Each catchbasin shall be fitted with a Framed Type 'A' Inlet Control Device, as supplied by IPEX, or an approved equivalent.

The ICD frame shall be affixed to the inside wall of the catchbasin, positioned directly over the catchbasin outlet pipe, including drilling and bolting to catchbasin wall with approved methods and hardware. The ICD shall be installed as per the manufacturers specifications.

Shop Drawings of all ICD's, shall be provided to the contract administrator for review/approval a minimum of one (1) week prior to fabrication.

Basis for Payment

The unit price bid for this item shall be complete compensation for all labour, equipment and material (including frame, covers and/or grates) to do the work as specified in OPSS 407.10.01.

The supply and placement of Granular 'A' shall be made separately under the appropriate item in the Schedule of Quantities and Unit Prices.

C7. CLEANOUTS

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall apply:

Cleanouts (Inspection Tees) shall be installed for all new and replaced existing sewer laterals at the property line.

The unit price bid shall include all necessary labour, materials and equipment to complete the work in accordance with the specifications of this contract.

Cleanout units shall consist of PVC Class DR28 pipe material and shall be delivered complete with all components such as cap, stem, tee, reducers, couplings, etc.

Cleanouts installed within asphalt or concrete areas shall have a Cast Iron Flat Cap complete with Gasketed Adaptor set flush to the surrounding hard surface elevation. In all other areas Standard PVC Caps may be used and shall be placed approximately 50 mm below the ground surface.

Only the appropriate manufactured couplings may be implemented in the transitions between varying lateral material types and diameters of the proposed, specified lateral and the private side lateral, in accordance with TABLE C1 – City Approved Lateral Connections.

The Contractor must submit a sample of the cleanout unit, cap and assembly to the City for approval one (1) week prior to construction.

Basis for Payment

The unit price bid shall cover the supply and installation of cleanout units at or near the property line and shall include the cost of all connections to the sanitary sewer laterals.

The supply and placement of Granular 'A' shall be made separately under the appropriate item in the Schedule of Quantities and Unit Prices.

Permanent restoration shall be made separately under the appropriate items in the Schedule of Quantities and Unit Prices.

C8. ROCK EXCAVATION FOR SEWERS

The provisions of OPSS 403 shall apply as amended or extended herein.

This item shall include bedrock excavation by controlled hoe ramming for sewer installations. Bedrock excavation by means of drilling and blasting will not be permitted. On-site crushing of rock will not be permitted.

This item shall only be applied to excavations where conditions prohibit the use of standard excavation equipment as defined below:

Broken Rock: Rock material that can be removed using standard excavation equipment equipped with rock teeth. In this specification, standard excavation equipment shall be Caterpillar 345CL Hydraulic Excavator or equal with 257 kW power and 1.9m³ bucket capacity.

Bedrock: Rock material that cannot be removed using excavation equipment equipped with rock teeth and requires breaking up using a Hoe Ram or other mechanical breaking equipment.

The unit price bid for bedrock removal shall include all labour, equipment and materials necessary to complete the work. The work shall consist of breaking of bedrock by mechanical means during the trenching operation and removal to an approved disposal site.

The Contractor is required to obtain written approval from the Contract Administrator that refusal to standard excavation has occurred.

All operations shall be conducted in such a manner as to prevent undue heaving of the roadway, or damage to existing utilities, infrastructure and/or property.

Basis for Payment

Payment of bedrock excavation in the open trench will be made by a field measurement in cubic meters (m³) calculated by average end areas. No payment will be made for over-break beyond specified limits.

C9. REMOVE & DISPOSE OF MAINTENANCE HOLES, CATCHBASINS

Granular 'A' backfill compacted to 100% Standard Proctor Maximum Dry Density shall be utilized to fill the resulting void, but SHALL NOT be included in the unit price bid; compensation for granular backfill shall be in accordance with the appropriate item in the Schedule of Quantities and Unit Prices.

The existing pipes shall be cut and plugged at all open ends including leads for catchbasins that are removed.

All existing frames and covers (grates) shall be salvaged and delivered to the City's Service Centre on Stanley Avenue. The unit prices bid shall be deemed to include this requirement.

The hours of operation at the Service Centre are 8:00 am to 4:00 pm Monday to Friday.

Basis for Payment

Payment for work under this item shall only apply where specifically noted on the Contract Drawings. The unit price bid shall be complete compensation for all labour, equipment and material necessary to do the work.

The supply and placement of Granular 'A' shall be made separately under the appropriate item in the Schedule of Quantities and Unit Prices.

Payment shall be made at 50% upon completion of the removal and disposal of the structure and 50% upon receipt of the salvaged frame and cover (or grate) to the City's Service Centre.

C10. SEWER AND/OR STRUCTURE CONNECTIONS

The provisions of OPSS 407, OPSS 410 and OPSS 412 apply as amended herein.

This item shall be used for connection of a new sewer to an existing structure or sewer and the reconnection of an existing sewer to a new structure.

Kor'n Seal adapters or an approved equivalent shall be used in all cases where PVC pipe is to be connected to concrete structures (excluding catchbasin connections). Approved adaptors shall be used for connection of new sewers to existing sewers. The unit bid price shall have made due allowance for these requirements.

Basis for Payment

The unit price bid this item shall be full compensation for all labour, material and equipment required to complete the connection including excavation, backfilling, structure coring and re-benching where required.

The supply and placement of Granular 'A' shall be made separately under the appropriate item in the Schedule of Quantities and Unit Prices.

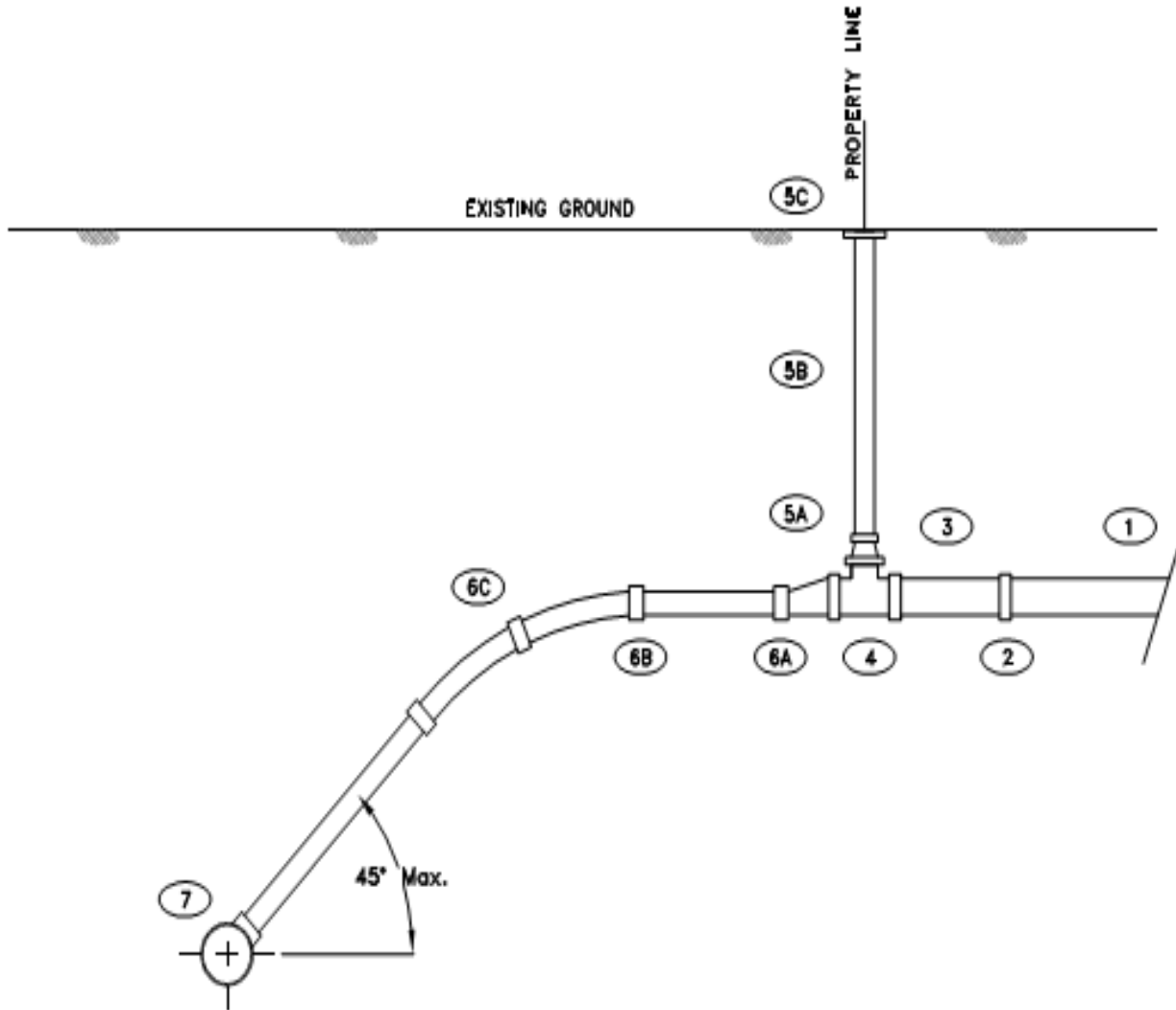


FIGURE C1 – City Approved Lateral Connections
(Read in conjunction with TABLE C1)

Insert Table C1 – Approved Sanitary Lateral Couplings

D1. WATERMAINS

In addition to the conditions stipulated in the Niagara Peninsula Standard Documents and OPSS 441, the following shall also apply:

General

Watermain and water services shall be installed to a minimum depth of 1.8m throughout.

All watermain installation shall be by open cut trench excavation method except when specified elsewhere in the contract documents and drawings.

Materials

All Waterworks materials must meet AWWA current quality criteria standards and American National Standard ANSI/NSF Standard 61.

All brass curb stops, corporation stops, service line valves, fittings and all other brass products used that come into contact with potable water must meet the requirements of ANSI/AWWA C800 Standard.

Watermain shall be DR18 PVC conforming to AWWA C900 or approved equivalent, unless otherwise specified.

Joints and fittings shall be compatible with pipe material and class and shall be in accordance with OPSS 441.

Mechanical Joint Fittings shall be ductile (cast) iron, or grey (cast) iron per AWWA C110/A21.10 with cement lining to AWWA C104/A21.4 and fastened with stainless steel nuts and bolts.

PVC Fabricated Fittings per AWWA C900 and CSA B137 Series-13.

All couplings and adaptors shall be bronze with one piece combination nut and tail, compression type stainless steel insert (heat flaring of tubing is not allowed) and conform to AWWA C800 and ANSI/NSF Standard 61.

Open Trench

It is strongly recommended that the Contractor use a trench box to install the watermain, sanitary sewer, storm sewer catchbasin leads, water services and any other pipes. The width of the trench box shall conform to OPSD 802.010 for Flexible Pipe. The height of the trench box shall be from 150mm below the bottom of the pipe to the level of the existing ground.

If the Contractor does not use a trench box as described above, then payment for Granular >A= material will be based on theoretical dimensions, as follows:

Width: Follow OPSD 802.010, OPSD 802.030 and OPSD 802.031 as applicable

Height: From 150mm below the pipe to the level of the existing ground surface.

Length: Equal to the pipe length

Therefore, to calculate Granular >A= weight (tonnes):

$$\text{Granular >A= (tonnes)} = 2.4 \times (\text{Width} \times \text{Height} \times \text{Length} - (\pi \times D^2 \times L) / 4)$$

where,

D = Pipe OD

L = Length of Pipe

$\pi = 3.1416$

When a trench box is used to support the wall of a trench its removal shall be as per clause 404.07.03 in OPSS 404.

Bedding and Cover

Bedding and cover shall always be Granular 'A' material; recycled materials will not be accepted for this purpose.

Backfill

The Contractor is to note that full Granular 'A' will be used for backfill in driveways, sidewalks and travelled roadways unless otherwise specified within the contract documents or as directed by the Contract Administrator.

Native material may be used in all other areas with written approval by the Contract Administrator. Where native material is used, the Contractor is to include in their price for all handling, hauling, stockpiling, placement and compaction.

General Construction

Care shall be taken during construction to minimize any contamination of the pipe from soil or water during installation; only clean pipe shall be installed. Contractors should be reminded of this prior to commencing construction.

If in the opinion of the Contract Administrator, trench water or an excessive amount of dirt or debris has entered the new pipe during construction, additional sampling may be requested in accordance with Section 5.1.2 of ANSI/AWWA C651, at the discretion of the Contract Administrator or designate.

Cathodic Protection

Cathodic protection must be provided at all metallic pipe, fittings, valves, water services and hydrants etc., installed underground in accordance with the NPSCD Contract Item D10.

All costs for cathodic protection shall be made separately under the appropriate item, specifically D10 in the Schedule of Quantities and Unit Prices.

Tracer Wire

Tracer wire will be required on all new non-metallic watermains and services installed as part of this contract. Tracer wire shall be supplied and installed in accordance with the NPSCD Contract Item D14. All costs for tracer wire shall be included in the watermain item, specifically D1 in the Schedule of Quantities and Unit Prices.

Conductivity Testing

The Contractor will be required to conduct all tracer wire conductivity testing to ensure that the tracer wire is installed correctly and intact. Testing shall be conducted by a *Certified* Damage Prevention Technician (DPT) using approved testing equipment and shall be supervised by the Contract Administrator or designate. All costs for conductivity tests shall be included in the watermain item. Fifteen percent (15%) of the full watermain payment (Item D1 on the Schedule of Quantities and Unit Prices) will be withheld until the Conductivity Testing has been completed and passed.

If the tracer wire is not electrically continuous from valve to valve, the Contractor shall at his/her own expense, replace or repair the wire as required.

Watermain Disinfection and Testing

Watermain Disinfection and Testing shall be at the lump sum price bid and in accordance with SPCS D13.

Existing Mains and Utilities

Known utilities shall be exposed in advance of construction in that location. A minimum of three (3) pipe lengths, and a maximum of five (5) lengths of open trench shall be maintained to allow for adjustment to grade to avoid utilities and sewer service laterals. No extra payment will be considered for removal and re-excavation to avoid obstructions.

Certified Water Operators (CWO)

All operation of the live water system shall be performed or supervised by a Certified Water Operator (holding a valid certificate) according to O. Reg. 128/04.

Operation of the water system includes disconnection of any service from a live water system, reconnecting of any service to a live water system and any works performed on a live water system (ex. maintenance, repairs, and/or connections).

Noncompliance of this requirement is a contravention of the Safe Drinking Water Act. Failure to comply with this Act will subject the Contractor to any penalties, fines or consequences as deemed applicable by the Ministry of the Environment and Climate Change.

The City will assign a Certified Water Operator to supervise all works required which are to be completed to the live water system. The City may require the assistance of the Contractor in operating the water system at no additional cost to the contract.

The Contractor is responsible for ensuring that the Contract Administrator is given 48 hours advanced notice, in writing, as to when the operation of the live system is scheduled to take place.

Water Service Interruptions

The existing watermain and water services must remain in operation until all water services have been connected to the new main(s), except during transfer periods.

The Contractor must advise the Contract Administrator of any proposed service interruption, in writing, a minimum of 48 hours in advance.

When shutting down watermains for any reasons, all affected properties are to be notified in writing, a minimum of 24 hours in advance of the water service interruption.

The Contract Administrator or designate shall prepare the notice and the Contractor will be responsible for door-to-door delivery to the affected customers. If there is no response at the door, the notice shall be left at the premises (mailbox).

The following City departments must also be notified when watermains, services or fire hydrants are shut down or used in any way:

- Environmental Services: 905-356-1355
- Niagara Falls Fire Department: 905-356-1324

THE CONTRACTOR SHALL ALSO PAY SPECIAL ATTENTION TO AND MAKE ALL NECESSARY ALLOWANCES FOR THE FOLLOWING ITEMS:

- i. The existing watermain and water services must remain in operation until all water services have been connected to the new main(s), except during transfer periods.

In many cases the existing watermain has exceeded its expected service life. The Contractor is advised to take all precautions and provide any support necessary to protect the existing main from damage.

The Contractor may consider installing the new watermain and abandoning the existing main prior to the sewer installations. Should the Contractor elect to proceed with sewer installations before the existing watermain replacement, the City will not entertain additional costs to repair the existing watermain as a result of failure directly associated with the sewer construction activities.

- ii. made separately under the appropriate item in the Schedule of Quantities and Unit Prices The Tenderer shall note that where it is necessary to install the new watermain deeper than the depth specified to avoid elevation conflict with certain

utilities, the unit price bid shall be deemed to include due allowance for this contingency. This may include deflecting a new main or service by up to 600mm.

- iii. The unit price bid shall also include the removal and disposal of all abandoned underground services/pipes (of any material and/or diameter) in conflict with the new alignment of the watermain. Any abandoned services shall be capped and sealed on both sides of the remaining sections.

Basis for Payment

Measurement for payment will be made horizontally over the centreline of the watermain as installed.

Payment will be made at the unit price bid in the Schedule of Quantities and Unit Prices and shall be full compensation for all work required including, tracer wire, and conductivity testing.

Fifteen percent (15%) of the final payment, at the unit price bid in the Schedule of Quantities and Unit Prices, shall be withheld until the conductivity test has been passed in accordance with this specification.

The unit price shall also include payment for supply and installation of pipe, reducers, bends, fittings, tracer wire, conductivity testing, restraints, thrust blocks and temporary and permanent support of all utilities encountered in the trench.

The supply and placement of Granular 'A' shall be paid separately under the appropriate item in the Schedule of Quantities and Unit Prices.

D2. VALVES

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document and OPSS 441, the following shall also apply:

Materials

All gate valves shall have stainless steel stem or cast bronze, resilient seat, interior epoxy coating and polyurethane outside coating. Gate valves shall be manufactured in accordance with AWWA Standard C509 with protective epoxy interior coating to AWWA C550.

Live Tapping

City forces will complete all live taps and invoice the Contractor \$100.00 for taps less than 100mm and \$400.00 for taps 100mm and greater. The Contractor is to make allowance for this provision in the unit price bid.

The unit price bid for tapping sleeve and valves shall include all labour, material and equipment for the complete installation.

Installation

Gate valves and valve boxes shall be installed level and plumb and supported by concrete blocking. The anchor block shall secure the valve or tee or cross and shall be sized as for bulkhead thrust blocks.

Backfilling shall be conducted so the valve box will not be knocked off plumb. Backfill material will be the same as that used for backfilling the watermain pipe in the immediate area.

The valves shall be subjected to pressure test of 1035kPa (150 psi), at the same time as the watermain is tested.

Prior to acceptance, the Contractor must demonstrate the operation of all valves to the Contract Administrator or designate.

Basis for Payment

The unit price tendered shall include all necessary labour, materials and equipment to complete the work in accordance with the specifications referenced within this contract.

The supply and placement of Granular 'A' shall be paid separately under the appropriate item in the Schedule of Quantities and Unit Prices.

All costs for cathodic protection shall be made separately under the appropriate item, specifically D10 in the Schedule of Quantities and Unit Prices.

D3. HYDRANT SETS

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document and OPSS 441, the following shall also apply:

Fire hydrants shall conform to AWWA C502 for dry barrel hydrants and be ANSI/NSF Standard 61 compliant. All Hydrants containing bronze or brass material must conform to AWWA C800. Protective epoxy interior and exterior coating must conform to AWWA C550.

Materials

Hydrants shall be Canada Valve Century, McAvity M-67 Brigadier or American AVK 2780.

All hydrants shall be three-way with STORTZ quick connect nozzles, specifically one 114mm (4-1/2") pumper nozzle and two 65mm (2-1/2") hose nozzles.

Hydrants shall be the City of Niagara Falls red in colour and shall be ordered with a minimum 1.5 m riser. Hydrants shall also be supplied with both stainless steel upper and lower stems with epoxy coating, pipe, thrust blocks, grip rings, extensions etc.. Hydrant valve and valve box to conform to SPCS D2.

THE CONTRACTOR SHALL ALSO PAY SPECIAL ATTENTION TO AND MAKE ALL NECESSARY ALLOWANCES FOR THE FOLLOWING ADDITIONAL REQUIREMENTS:

- i. Existing utilities (i.e. gas mains, etc.) must be exposed to ensure hydrant can be installed in designated location. The final location of all hydrants shall be determined in the field and must be approved by the Contract Administrator or designate.
- ii. All hydrant valves must be directly connected to a mainline anchor tee unless otherwise indicated on the contract drawings or directed by the Contract Administrator.
- iii. All hydrants shall be bagged when not in service and the Fire Department immediately notified at 905-356-1324. Covers only to be removed upon approval from Contract Administrator.
- iv. Hydrant leads shall be installed with minimum 1.8m cover. Where leads cross under ditches, other obstructions are encountered, or minimum cover would be otherwise reduced the Contract Administrator must be notified. Proposed resolutions shall require Contract Administrator's written approval.
- v. Hydrants on leads less than 1.5m long shall be restrained by the use of tie rods. The tie rods including nuts shall be coated with TC Mastic.
- vi. Hydrant extensions shall be provided in 150mm or 300 mm lengths to ensure flange is a maximum 100mm above finished grade. Where more than 300mm extension is required, adjustment may be directed with 45-degree bends.

The unit price bid is to include all hydrant extensions required to properly install the hydrant to proposed grade.
- vii. Cathodic protection: Zinc Anode DZP-1100-24 anodes to be used at each hydrant. Tie rods shall be made electrically continuous with other metallic components for cathodic protection.
- viii. Hydrants shall be tested with the watermain; the hydrant-isolating valve must be open. The isolating valves shall also be tested at 1035 kPa (150 psi) with the hydrants in the open position. Hydrants and valves shall be flushed and disinfected to the approval of the Contract Administrator.
- ix. Salvaged hydrants shall be delivered to the City's Service Centre at no additional cost to the contract. (Refer to SPCS D11)

Fire Flow Testing, Colour Coding & Numbering of Hydrants

All flow testing and colour coding shall be done in accordance with the Ontario Fire Code, Section 6.6.6.1.

Flow Testing Hydrants

All new or refurbished hydrants are to be fire flow tested by a qualified professional within one (1) week of the connection of the new/replaced watermain to the municipal water distribution system. The Contractor shall keep a written record of all testing procedures and results and this information will be immediately provided to the Contract Administrator for review and approval.

De-chlorination

An approved neutralizing chemical shall be applied to all chlorinated water used for disinfection, testing and flushing, before being discharged into the environment. Refer to Table C.1 - Appendix C of ANSI/AWWA C651 for the appropriate amount of chemicals required to neutralize chlorine.

A Certified Water Operator shall verify using an approved field test kit that the chlorine residual concentration of the water discharged to the environment shall not exceed 0.02mg/L.

Colour Coding Hydrants

Following the City’s review of the fire flow testing results, and upon approval by the Contract Administrator, the Contractor shall colour code the new hydrants with an oil base, gloss finish in accordance with the National Fire Protection Association (NFPA) 291, “Fire Flow Testing and Marking of Hydrants”, as summarized in the following table.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 291				
Class	Rated Capacity		Capacity Indicating Colour Scheme	Paint Colour Code Benjamin Moore (or Equivalent)
	GPM	(L/min)		
AA	≥ 1500	≥ 5680	Light Blue	2065-50
A	1000-1499	3785-5675	Green	2036-20
B	500-999	1900-3780	Orange	2015-20
C	< 500	< 1900	Red	2001-20

Hydrant Numbering

The Contractor shall be responsible for applying the hydrant identification numbers to all new hydrants at no additional cost to the contract. The Contract Administrator shall provide black, peel and stick numbers that shall be placed in the centre front of the hydrant barrel.

Basis of Payment

The unit price tendered shall include all necessary labour, materials and equipment to complete the work in accordance with the specifications of this contract including, cathodic protection, connection to the watermain, flow testing and painting and all necessary adjustments to ensure flange is a maximum 100mm above finished grade.

The supply and placement of Granular ‘A’ shall be paid separately under the appropriate item in the Schedule of Quantities and Unit Prices.

The supply of Type DZP-550-12 zinc anodes shall be made separately under the appropriate item, specifically D10 in the Schedule of Quantities and Unit Prices.

D4. WATER SERVICES

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document and OPSS 441, the following shall also apply:

This item shall be used for:

- a. Supply and installation of new water services associated with watermain replacement/installation;
- b. Replacement of any existing lead, iron, cast iron, and/or services less than 19mm diameter. The Contract Administrator should be notified immediately when lead services are encountered. The Contractor and the Contract Administrator shall then notify the homeowner of the type and condition of their existing water service; and
- c. Replacement of any existing water service(s) where they conflict with proposed works, from the new/existing watermain to property line or as required to be replaced due to its condition, as determined or directed by the Contract Administrator.

Materials

Services shall be 19mm (3/4") diameter, type 'K' soft copper tubing, to ASTM B88 Standards, unless otherwise noted on the contract drawings or directed by the Contract Administrator.

All water services shall have Type DZP-550-12 zinc anodes installed and attached to the curb stop with an electrical tail nut.

Installation

All water services shall be laid in one continuous length (i.e.: no joints) between the main stop and the curb stop.

Water services must have a minimum of 1.8m cover at property line and throughout the length between the watermain and curbstop. Any proposed variance to this depth must be submitted to and approved by the Contract Administrator, in writing. The Contractor shall make due allowance in his/her unit price bid for this requirement.

If necessary the Contractor shall cut back beyond the new curb stop to raise the new water service back up to match the existing on the private side using sufficient specified new copper tubing and proper pre-manufactured couplings and fittings to properly complete the connection. In such cases, exploratory excavation may be required to determine the elevation, size and material of the existing service. The unit prices bid for this item shall be deemed to have made due allowance for this requirement.

The maximum shutdown time for any valves which disrupt the water service to any home or business shall be four (4) hours after which time the Contractor shall make such temporary water service connections as are necessary to provide a water supply to those homes or businesses affected. These temporary water service connections shall be installed at no additional cost to the contract.

The Contractor shall supply all labour, equipment and materials necessary to replace the water services from the watermain to the property line (curb stop) and beyond where required to achieve appropriate cover and/or remove an existing curb stop and box.

THE CONTRACTOR SHALL ALSO PAY SPECIAL ATTENTION TO AND MAKE ALL NECESSARY ALLOWANCES FOR THE FOLLOWING ITEMS:

- i. The Contractor is advised that individual records of diameter, material type and/or replacement history is not available for properties within the construction limits. As such, there may be a number of unidentified, capped/crimped or otherwise abandoned services along the length of the existing watermain that have not been shown on the contract drawings (or located in the field). The Contractor must take all due precautions not to break, pull or otherwise damage these services as they may be live. The Contractor shall make due allowance in the unit price bid to account for this requirement.
- ii. Water services shown on the contract drawings have been approximately shown. The actual alignment (vertical and horizontal) between the existing watermain and serviced house/building cannot be guaranteed. The Contractor must take all necessary precautions not to damage these live services. The Contractor shall make due allowance in the unit price bid to account for this requirement.
- iii. The Contractor shall locate and expose the existing watermain prior to making the connection to confirm the pipe material, elevation and accessibility for the connection, at no additional cost to the contract.

No work will be allowed to proceed until all materials required to make the connection and return the watermain to full service, are on site.
- iv. Exploratory excavations may be required to locate existing curb stops and to determine the material and size to be connected to on private property. Suitable adapters to reconnect to the existing service will be required and must be available on-site prior to starting the work. The Contractor shall make due allowance in the unit price bid to account for this requirement.
- v. The Contractor is advised that many of the existing water services are directly adjacent to existing sewer laterals. The Contractor shall make due allowance in the unit prices bid for the protection, maintenance, repair and supporting of such laterals throughout the installation of the new water service.
- vi. It is the intention of this contract to provide one (1) new water service to each property within the limits of this contract.

Some residences may have more than one active service. Additional 'extra' connections shall not to be made until it is completely reviewed, inspected and approved by the Contract Administrator.

Basis of Payment

The unit price bid shall represent the Contractor's complete costs to supply and install the water service in accordance with these specifications. All unit prices bid must allow for the

requirements stipulated above and all components of the work including excavation, removal and disposal of the existing service (including curb stop and box), backfilling and compaction in addition to supply and placement of all necessary materials, fittings and couplings.

Water services will be measured horizontally from the centre line of the watermain to the curb stop or the connection to the private service if greater than a metre beyond the curb stop, for payment. No allowance will be made for the goose-neck at the corporation stop or additional appurtenances or fittings necessary to carry out this work.

Separate items have been provided in the Schedule of Quantities and Unit Prices for main stops, curb stops and boxes.

D6. CURB STOPS

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Documents, the following shall apply:

Curb stops shall be in accordance with AWWA C800. Curb stops shall be brass ball valves with both inlet and outlet flared or compression to operate at 1035 KPa (150 psi). Curb stops are to be CSA Classified to NSF Standard 61.

All curb stops will use stainless steel stems to operate the valves.

Water services must have a minimum of 1.8m cover at property line and throughout the length between the watermain and curbstop. If necessary the Contractor shall cut back beyond the new curb stop to raise the new water service back up to match the existing elevation on the private side. Specified copper tubing and appropriate pre-manufactured couplings and fittings necessary to complete the connection, shall be used. In such cases, exploratory excavation may be required to determine the elevation, size and material of the existing service. The unit prices bid for this item shall be deemed to have made due allowance for this requirement.

The Contractor shall not leave existing curb stops on any new water service installations. It may be necessary to extend the new water service beyond the new curb stop and box at property line so as to remove and dispose of an existing curb stop and box on private property. There shall not be multiple curb stops left on any new water service installation.

Basis of Payment

As stipulated in the Niagara Peninsula Standard Contract Document.

The costs for the extended service and connection will be paid under the appropriate item in the Schedule of Quantities and Unit Prices, specifically Contract Item D4 - Water Services.

D7. CURB BOX

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall apply:

Curb boxes shall be cast iron, slide-type and adjustable to suit depth of service.

Service rods shall be stainless steel with a minimum 13mm diameter and include stainless steel cotter pin retainer clips.

The cap shall be a ribbed cover with bronze cap and 25mm I.P.S. tapping. The service box shall be installed and adjusted such that the telescopic portion of the box does not rest on the curb stop.

Basis for Payment

As stipulated in the Niagara Peninsula Standard Contract Document.

D9. INSULATION OF SERVICES/WATERMAIN

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, the following shall apply:

The unit price bid for this item shall include the insulation of the services/watermain where directed by the Contract Administrator or as shown on the contract drawings.

Where less than the minimum specified cover over services/watermain is to be provided or as otherwise directed by the Contract Administrator, the Contractor shall provide sufficient insulation to prevent freezing of such sections of services or watermain.

Unless otherwise specified, services with less than 1.4 m of cover at any location along the length shall be insulated. The width and thickness of insulation used shall be as specified in the following table.

* Depth of Cover (m)

Depth of Cover	Width of Insulation (m)	Thickness of Insulation (mm)
1.40	1.2	50
1.20	1.2	65
1.05	1.2	75
0.90	1.5	100

* Depth of Cover is the distance from the ground surface to the top of the service/watermain or the distance from a culvert, large storm sewer, unheated chamber, etc., to the closest point on the service/watermain.

The insulation material shall be styrofoam HI 40 as manufactured by the Dow Chemical Company or approved equal. The material shall be rigid type high density board with minimum compressive strength of 240 kPa as tested in accordance with ASTM D1621-64 or latest revision thereof, and manufactured by the extrusion of expanded polystyrene to produce a board with maximum water absorption of 0.7% by volume when tested in accordance with ASTM D2842. When installed underground, the insulation shall be protected on both faces by a layer of 6 mm plywood, unless installed against a formed surface.

The quantity of insulation to be paid for will be the number of square metres based on field measurements. Square meters shall be the total of both vertical and horizontal faces.

Basis for Payment

Payment shall be as per the units indicated in the Schedule of Quantities and Unit Prices for each item noted.

Payment shall be full compensation for all equipment, labour and materials required to do the work

This item is provisional. Prior written approval must be provided by the Contract Administrator. Compensation will not be considered if written approval is not sought in advance.

D10. CATHODIC PROTECTION OF WATERMAINS & APPURTENANCES

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document and OPSS.442, the following shall apply:

Cathodic protection is to be provided at fittings, valves, water services and hydrants.

1. Zinc Anode Specifications

(a) Zinc anode material shall be made from high grade electrolytic zinc 99.99% pure and conform in composition to ASTM B418-73 Type II. The zinc casting shall be supplied with a minimum 3.1 mm diameter core wire through its length.

(b) The zinc casting and its backfill shall be contained in a moisture absorbent container such as cardboard tube or jute bag, packed in appropriate, removable shipping bags. The backfill material shall have the following composition by nature: Gypsum 77% (± 2) Bentonite 15% (± 1) Sodium Sulphate 8% (± 1). The backfill material shall have an electrical resistivity between 40 and 200 ohm-cm when wet.

(c) The packaged zinc anode shall be supplied with 2.0 m of AWG #10/7 strand copper cable having white TWH insulation.

(d) Bituminous coating material Tapecoat MC Mastic or approved equal shall be used on all exposed bolts and anode connections.

2. Anode Installation

(a) The anode shall not be lowered into the trenches by its lead wire.

(b) The anodes shall be installed in accordance with the detailed drawings provided with this specification.

(c) The anode shall be placed a minimum distance of 0.5 m from the watermain, water service or other underground utility plant in a horizontal position at approximately the same elevation and parallel to the watermain, water service or hydrant branch.

(d) At least 300 mm of backfill shall be packed uniformly around the anode to eliminate voids of air pockets adjacent to the anode.

(e) The anode lead shall be wrapped around the watermain/fitting/valve/hydrant/water service and knotted prior to connection of anode.

(f) The anode shall be thermite welded to the watermain/fitting/valve/hydrant, using an Erico model CAHAA-1G welder and suitable cartridges (#CA 15 for ductile iron and #XF19 for cast iron) or approved equal. The thermite weld shall be tapped with a hammer to ensure that a strong connection has been accomplished and coated using approved brush applied bituminous coating material.

(g) The anode lead cable shall be connected to copper water services by doubling over the end of the lead cable and utilizing an approved brass or stainless steel band and clamp, properly coated with an approved brush applied bituminous coating material.

Basis for Payment

Payment shall be as per the units indicated in the Schedule of Quantities and Unit Prices for each item noted.

D11. ABANDON OLD WATERMAINS

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document and OPSS.MUNI 510, the following shall apply:

This item shall be used for:

- a. Existing watermain(s) that are decommissioned and left in place;
- b. Salvaging existing line valves and boxes; and
- c. Salvaging existing hydrant assemblies.

Watermain

As noted on the contract drawings or otherwise directed by the Contract Administrator, sections of the existing watermain throughout the project limits are to be plugged at both ends with watertight seal plugs and the pipe grouted with concrete, where:

Concrete for concrete seals shall be according to OPSS 1350 with minimum specified 28-Day compressive strength of 30 MPa.

Concrete for filling abandoned pipes shall be according to OPSS 1350 with minimum specified 28-Day compressive strength of 15 MPa.

Access points shall be provided to allow for confirmation that the pipe has been completely filled.

The unit price bid for this item shall be complete compensation for all labour, material and equipment necessary to complete all work for this item.

Line Valves & Boxes

Where existing watermain are removed, existing line valves, boxes and caps shall be salvaged and delivered to the City's Service Centre.

Where existing watermain(s) are abandoned, the existing line valve boxes and caps shall be salvaged and delivered to the City's Service Centre.

The unit price bid for this item shall be complete compensation for all labour, material and equipment necessary to complete the work for this item. Fifty percent (50%) payment shall be made upon removal of the item with the remainder to be paid upon delivery to the City's Service Centre. If in the Contract Administrator's opinion, the item has sustained unnecessary damage further to its removal and prior to delivery to the Service Centre, the final 50% payment may be withheld.

The Service Centre is open for scheduled deliveries between 8:00 am to 4:00 pm, Monday to Friday.

Fire Hydrants

All existing fire hydrants shall be removed including hydrant valves, valve boxes and caps are to be salvaged and delivered to the City's Service Centre.

The unit price bid for this item will include the cut, cap and block or plugging of the fire hydrant lead at the mainline tee.

The unit price bid for this item shall be complete compensation for all labour, material and equipment necessary to complete the work for this item. Fifty percent (50%) payment shall be made upon removal of the item with the remainder to be paid upon delivery to the City's Service Centre. If in the Contract Administrator's opinion, the item has sustained unnecessary damage further to its removal and prior to delivery to the Service Centre, the final 50% payment may be withheld.

The Service Centre is open for scheduled deliveries between 8:00 am to 4:00 pm, Monday to Friday.

D13. WATERMAIN DISINFECTION AND TESTING

The provisions of ANSI/AWWA C651, OPSS 441, MOECP Watermain Disinfection Procedure and the Niagara Peninsula Contract Document shall be followed except as amended or extended herein.

Disinfection and testing of all new main shall be accordance with the 'New Watermain Commissioning Process' flowchart and checklist included at the end of this section.

Testing and Sampling Plan

Prior to the pre-construction meeting the Contractor must submit to the Contract Administrator, a chlorine residual and bacteriological test sampling plan for approval as stipulated in the Niagara Peninsula Standard Contract Document.

As a minimum, the Testing and Sampling Plan must include:

- The location for source water connection.
- The location of sampling points.
- Lengths and volume of watermain to be tested.
- Chlorination product and dosage.
- The discharge location for flushing and de-chlorination.
- Identified method of de-chlorination (neutralizing agent and physical process).
- The final connection locations.
- Provisions for hydrostatic testing and disinfection of all water services (up to and including the curb stop).
- Provisions for temporary service whips (installed after the curb stops up to the existing grade) to allow for chlorination and flushing of all water services.

Any changes to the sampling plan requested by the Contractor must be made prior to commencement of construction and will be subject to Contract Administrator approval.

The Contractor is responsible for supplying, installing and removing all necessary valves, fittings and taps required for removing air and/or draining the watermain, introducing swabs, filling, pressure testing and chlorinating.

Municipal Water Distribution System

Failure to comply with the requirements under the Safe Drinking Water Act will subject the Contractor to any penalties, fines or consequences as deemed applicable by the Ministry of the Environment and Climate Change.

All operation of the live distribution system shall be performed or supervised by a City of Niagara Falls Certified Water Operator (CWO) (certified according to O. Reg. 128/04).

Operation of the live distribution system includes but is not limited to:

- Operation of water valves and hydrants;
- Disconnection of any service from a length of live watermain;
- Reconnection of any service to a length of live watermain; and
- Any works performed on a live distribution system (ex. maintenance repairs, and connections to the live system).

All new watermain shall remain physically separated from the active municipal water distribution system (except as described below). Final connections to the municipal distribution system will only be permitted once the Contractor receives written Authorization for Final Connection from the Contract Administrator.

All pressure testing, disinfection and de-chlorination shall be supervised by a City of Niagara Falls CWO.

Source Water

Water for disinfection and testing of new watermain may be supplied via a temporary connection to the municipal distribution system (fire hydrant), subject to City approval and in accordance with the following:

- ONLY City of Niagara Falls Certified Water Operators will make connections/disconnections to the municipal distribution system.
- As part of the temporary connection, the City CWO will provide and install a:
 - Water Meter to monitor and account for water used on the project;
 - Reduced Pressure Zone Assembly (RPZA); and
 - Secondary control valve (e.g. attached to hydrant port) to allow the Contractor access to water in the absence of a CWO.
- The rate of draw from existing watermains shall be limited so that the system pressure does not fall below 250 kPa (36 psi). Pressure gauges shall be supplied

and installed by the Contractor to confirm that adequate system pressures are maintained.

The Contractor will be responsible for the security and rental fee of the water meter and backflow assemblies provided by the City (on-site), for the duration of the project.

If additional water is required as a result of failure of the initial procedures to provide acceptable results, the additional cost will be charged to the Contractor at the prevailing bulk water charge rate.

New Watermain Commissioning Process

Swabbing

Prior to disinfection, all sections of the watermain shall be swabbed in accordance with the NPSCD Special Provision Contract Item D13.

Flushing and swabbing must be carried out under the supervision of the Contract Administrator or designate.

Hydrostatic (Pressure) Testing

Hydrostatic testing shall be completed under the supervision of the Contract Administrator or designate on all newly installed pressure pipe, joints, valves and all service lines (up to and including the curb stop) and only after all trenches have been completely backfilled and compacted in accordance with appropriate specifications.

Water shall be used for carrying out hydrostatic testing; alternative liquids or air testing will not be permitted. The temporary water supply connection must be disconnected (physically separated) from the new watermain during the hydrostatic test.

Only pressure gauges with a testing certificate valid within one (1) year of its use will be permitted. The test pressure shall be 1035kPa (150psi) for a two (2) hour test period.

The allowable leakage within the City of Niagara Falls shall be ZERO for all new watermain. Should the measured leakage exceed the allowable, all leaks shall be located and repaired, and the watermain retested until an acceptable result is achieved.

Measured Leakage = The amount of water (L) added to the test section to maintain the specified test pressure for the test duration.

Allowable Leakage = 0.0 L/m of pipe

Disinfection

After flushing is complete, chlorination may commence as per ANSI/AWWA C651 "Continuous Feed Method". Chemicals used for disinfection shall meet the requirements of ANSI/AWWA B300 or ANSI/AWWA B301. The placement of calcium hypochlorite granules in the watermain during construction will not be permitted.

Source water shall be added into the new watermain at a controlled rate and liquid chlorine added so that a minimum total chlorine level of 25mg/L is achieved throughout the new watermain. Sampling points identified in the testing and sampling plan shall be used to verify chlorine levels.

Overloading the test system with high levels of chlorine will not be permitted. Excessive chlorine loading negatively impacts test reliability and unnecessarily increases risks related to disposal, the environment and health and safety of workers. The City of Niagara Falls will not accept chlorine levels greater than 150mg/L.

Refer to Table B.1 - Appendix B of ANSI/AWWA C651 for the appropriate amount of chemicals required to achieve the desired level of chlorine. The watermain shall be left charged with chlorine for a minimum period of twenty-four (24) hours.

After the twenty-four (24) hour contact period, the chlorine level shall be measured throughout the watermain. The resulting chlorine level must be at least 60% of the initial concentration with less than a 50mg/L overall decrease. Should the chlorine level drop below 60% of the initial concentration or greater than 50mg/L, the main shall be flushed, re-chlorinated and retested under the direction of City staff.

A Certified Water Operator shall verify free chlorine levels using an approved chlorimeter; test strip readings will not be accepted.

De-chlorination

An approved neutralizing chemical shall be applied to all chlorinated water used for disinfection, testing and flushing, before being discharged into the environment. Refer to ANSI/AWWA C655 for the appropriate neutralizing chemicals.

A CWO shall verify using an approved chlorimeter that the chlorine residual concentration of the water discharged to the environment does not exceed 0.02mg/L.

Disinfection must be carried out under the supervision of a Certified Water Operator (CWO).

Recharge Watermain

After the disinfection procedure has been successfully completed, the watermain shall be flushed and recharged with source water so that the free chlorine residual throughout the new watermain is equivalent to that of the distribution system (i.e. between 0.2mg/L and 4.0mg/L). A CWO shall verify free chlorine levels using an approved chlorimeter.

Microbiological Testing

Once the free chlorine levels within the charged main are verified, the first set of microbiological samples shall be taken.

The number of samples required (a set) shall be as follows:

- One (1) sample for every 200m (655 ft) of new watermain;
- Plus one (1) sample from each end of the new watermain;
- Plus one (1) additional sample on each branch greater than 6m (20ft);
- Watermain less than 50m (164ft) long shall have a minimum of sample sites, one at each end of the main.

After remaining charged for a minimum period of sixteen (16) hours, a second set of microbiological samples shall be taken. The watermain shall not be flushed during the sampling period.

Acceptable sample results (for both sets) must be achieved before the watermain will be considered acceptable for final connection.

Test failures will be handled as follows:

- 1st Round** - if sample results fail = flush and resample
- 2nd Round** - if sample results fail = flush, re-chlorinate and resample
- 3rd Round** - if sample results fail = flush, swab, re-chlorinate and resample

Where:

“Round” means two (2) set of samples taken a minimum sixteen (16) hours apart.

A fail is represented by test results at concentrations greater than the maximum acceptable for the following parameters as noted.

Each sample shall be tested for the following parameters and maximum acceptable concentrations:

Total Coliform 0 Counts

E. Coli 0 Counts

Heterotrophic Plate Count (HPC) ≤10 Counts

Only a Certified Water Operator will take water samples. The microbiological testing shall be completed at the City approved testing laboratory. City staff will ensure the safe delivery of the water samples to the laboratory. All laboratory test results shall be reviewed and either approved or failed by the Contract Administrator or designate.

The New Watermain Commissioning Checklist will be filled in by the Contract Administrator or designate and must be completed for each test section.

Final watermain connections must be completed within seven (7) calendar days of receiving acceptable microbiological sample results.

The approved Testing and Sampling Plan and all checklists shall be maintained on-site and available for review.

Basis for Payment

Measurement for payment will be on a lump sum basis for all associated work under this item for the entire contract.

Payment shall be full compensation for all equipment labour and material necessary to provide the required sample locations including the installation and removal of any temporary valves, blow-offs and services.

D17. WATERMAIN CONNECTIONS

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Documents, OPSS 441 and SPCS Contract Item D1, the following shall apply:

The unit price bid shall include all labour, material and equipment to make the connection to the existing watermain. The unit price bid shall include all required fittings (bends, tees, sleeves, reducers) in accordance with OPSS 441, grey iron, ductile iron or PVC, thrust restraints and appurtenances to complete the connection. All pipe used under this item shall be paid for separately under the appropriate item.

All piping and fittings used shall be disinfected by swabbing or spraying. The connection must be isolated from the water distribution system and immediately upon completing the connection the watermain must be flushed to the nearest hydrant.

The Contractor is to note that three (3) DZP 1110-24 zinc anodes are required at all connections to existing cast iron and ductile iron watermains. The supply of Type DZP-550-12 zinc anodes shall be made separately under the appropriate item, specifically D10 in the Schedule of Quantities and Unit Prices.

D18. ROCK EXCAVATION FOR WATERMAIN AND SERVICES

The provisions of OPSS 403 shall apply as amended or extended herein.

This item shall include bedrock excavation by controlled hoe ramming for watermain and service installations. Bedrock excavation by means of drilling and blasting will not be permitted. On-site crushing of rock will not be permitted.

This item shall only be applied to excavations where conditions prohibit the use of standard excavation equipment as defined below:

Broken Rock: Rock material that can be removed using standard excavation equipment equipped with rock teeth. In this specification, standard excavation equipment shall be Caterpillar 345CL Hydraulic Excavator or equal with 257 kW power and 1.9m³ bucket capacity.

Bedrock: Rock material that cannot be removed using excavation equipment equipped with rock teeth and requires breaking up using a Hoe Ram or other mechanical breaking equipment.

The unit price bid for bedrock removal shall include all labour, equipment and materials necessary to complete the work. The work shall consist of breaking of bedrock by mechanical means during the trenching operation and removal to an approved disposal site.

The Contractor is required to obtain written approval from the Contract Administrator that refusal to standard excavation has occurred.

All operations shall be conducted in such a manner as to prevent undue heaving of the roadway, or damage to existing utilities, infrastructure and/or property.

Basis for Payment

Payment of bedrock excavation in the open trench will be made by a field measurement in cubic meters (m³) calculated by average end areas. No payment will be made for over-break beyond specified limits.

Insert Watermain Commissioning Flowchart

Insert Watermain Commissioning Checklist

P1. 19MM CLEAR STONE (PROVISIONAL ITEM)

All 19mm clear stone materials shall conform to the requirements of OPSS.MUNI 1010.

Basis for Payment

Payment at the unit price bid for this item shall include all labour, materials and equipment necessary to complete the work for supplying and placing the 19mm clear stone as shown on the contract drawings or as directed by the Contract Administrator.

Payment will be by the tonne, based on submitted weigh tickets for same.

This item is provisional. Prior written approval must be provided by the Contract Administrator. Compensation will not be considered if written approval is not sought in advance.